13TH INTERNATIONAL SCIENCE-TO-BUSINESS MARKETING CONFERENCE

Cross Organizational Value Creation
Conference Proceedings of the 13th International Science-to-Business Marketing Conference on Cross Organizational Value Creation

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Foreword

With the increasing need of higher education institutions for external financing and the creation of large research funding schemes, such as Horizon2020, there is a high demand for research on cross-organizational cooperation. In light of this challenge, the 13th Science-to-Business Marketing Conference on Cross Organizational Value Creation, organised by the Science-to-Business Marketing Research Centre and Zurich University of Applied Sciences (ZHAW) has taken place. The conference brought together stakeholders in the fields of knowledge transfer, science-to-business marketing, design thinking, joint value creation and start-ups and spin-offs. The conference created opportunities for researchers and practitioners alike by supporting the sharing of experiences, thoughts and knowledge on the conference sub-themes.

The papers presented in this book are a reflection of this conference and provide readers with new insight in a wide variety of current research and practice. Also highlighting different perspectives, approaches and findings.

As the chairs of the Science-to-Business Marketing Research conference we would like to thank scientific and practitioners committee that supported the conference and made it a success:

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- Dr. Clive Winters

We would also like to thank all conference partners for supporting and promoting the conference and its topic: IM+io, Enterprise Europe Network, Swiss Institute of Service Science (SISS), EMPA, EUresearch and the Commission for Technology and Innovation (CTI).

Finally, we would like to thank all presenters for sharing their latest research, ideas, and practical experiences. Without their input and efforts this conference would not have been possible.

We hope for rewarding reading experiences and that future research arises from these proceedings. for developing new practices in promoting entrepreneurship and innovation in higher educational institutions and look forward to your participation in our future conferences.

Prof. Dr. habil Thomas Baaken
Science-to-Business Marketing Research Centre

Dr. Frank Hannich
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Design Thinking – Roadmap to Epiphany?

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Abstract

Design Thinking has become a strategic tool for innovation. Yet, often we hear complaints about how fuzzy the concept is. One reason for the confusion is that Design Thinking is more about posing the right questions than finding the right answers and that there is only little guidance for this kind of learning process. Since we have started collaboration with the Stanford Center for Design Research, our main focus has been on the cognitive aspects of the Design Thinking process. In our paper, we present an approach which highlights the aspects perception, communication, collaboration, reflective thinking and the collective construction of new knowledge. With a set of process models we give a framework to the team without being too restrictive. The main focus is on prompting cognitive and social processes, which otherwise might not occur. This enforces a fruitfully structured interaction with the stakeholders, consequently improving the joint knowledge acquisition and problem solving process.

We are practicing the Design Thinking approach in our problem based MScBA degree course, where we collaborate with business partners like Swisscom (How to implement services around watching TV?), Swiss Post (How to address and motivate customers for the new online service ‘Swiss Post Box’?), or Swiss Federal Railways (How to improve services at the ticket vending machine?). An evaluation based on bloom’s taxonomy shows that the course produces significantly higher results than the average of other MScBA courses. This result underscores not only the practical value of our action learning approach, but also the fact that we apparently have managed to structure and facilitate the learning process on different levels: individual construction of mental models; understanding needs and developing adequate solutions; critical reflection of results and methods.

Six years’ experience with more than 50 projects are proven evidence of the practical use of the process model. By focusing on the cognitive process, our approach helps to uncover white spots, to open up new perspectives, and to create new solutions in a pragmatic way. Learning is the main foundation for innovation. The ability to learn quicker than competitors is a crucial and provides a particularly long-lasting advantage.

Keywords

Innovation, Design Thinking, Constructivism, Collaboration, Collective Intelligence, Reflective Thinking, Knowledge Generation, Action Learning

1 Introduction

Commonly, the term ‘design’ is understood as the technical or artistic process of creating objects and products. However, in the context of developing innovative solutions, the meaning of the term has undergone some change. Today, when we use the term ‘design’, we are referring to a comprehensive process of creating objects, services or even experiences in a conscious, intentional and systematically planned manner. So in a figurative sense, the term ‘design thinking’ refers to inventive thinking.
For a long time, the design process was characterized by an engineering mindset: The assumption was always that one knew what the problem was and that the task was to find the right solution. However, often it turned out that solutions developed in this manner did not meet the needs of users. In recent years, what is understood as innovative has been progressively subject to change. Innovations are no longer being developed exclusively ‘inside-out’ from the point of view of a company or a service provider, but increasingly ‘outside-in’, from the point of view of the user or in general the stakeholders. This involves partnering with stakeholders to find solutions in a cyclical and iterative process, whereby needs are uncovered step by step, by generating ideas, developing concepts and coming up with preliminary solutions, which in turn are then measured based on the needs of the users. This process goes on until a solution has been found that is satisfactory to the potential users (cf. Fig. 1).

In this respect, Design Thinking is primarily understood as a learning process during which the goal is for designers and stakeholders to interact for the sake of generating new knowledge regarding possible solutions. But how do we manage this process? Is there a roadmap to epiphany? According to Mintzberg (2004) management is craft and is “as much about doing in order to think as thinking in order to do”. The learning process is not simply linear, but cyclical and iterative. A cyclical approach means that each phase goes through several learning cycles, at the end of which there is a concrete understanding of an issue or a validation of a hypothesis. We understand an iterative approach to mean allowing yourself to take a step back every now and then in order to incorporate insights into an earlier phase. What might be discovered at the time a hypothesis is developed and tested is that certain requirements may have not been sufficiently understood and so it may be necessary to redefine the point of view. In specific terms, ‘design thinking’ means applying a step-by-step learning process to find one's way toward the needs of stakeholders.
2 Challenges for managing the process

When trying to define a model for managing the Design Thinking process, we face the following challenges:

› How do we design a process model that is intended to clearly structure the perception and communication process with the different stakeholders, and yet which has enough flexibility to allow designers to individually tailor the solution process?

› How can we go about organizing the process in a way that on one hand we can incorporate as many needs and ideas as possible in a divergent process, and on the other hand we can keep re-directing the focus again and again, thus converging it towards our goal?

› How should we define a process that encourages the designers to repeatedly change the level of abstraction, so as on the one hand to stay close to the problem, and yet on the other to break away from the concrete object and to develop abstract models of an intended solution?

As shown in Figure 2 we have to manage the cognitive process on three different levels:

![Fig. 2: Thinking, doing, reflecting (inspired by Checkland)](image)

3 Thinking cycle

We understand thinking within the concept of constructivism (Watzlawick 1976, von Foerster 2010). Accordingly, reality is not objectively perceived, but moreover it is a construct that we lay out for ourselves based on our own mental models. Learning and collaboration means nothing more than the continuous adaptation and addition to our set of mental models (cf. Fig. 3).
Fig. 3: Learning = Constructing new mental models. Collaboration = Sharing and developing common mental models, ideally supported by mediating artefacts.

The collaborative development of shared mindsets and models is the basis for creative problem solving. As illustrated in Fig. 3, artefacts play a key role in making the thinking process tangible (for details cf. Ninck et al. 2014). Schrage (1995) assumes that it is mandatory in a collaborative context for symbols, pictures, models or concepts to be processed within a shared space: “The images, maps, and perceptions bouncing around in people’s brains must be given a form that other people’s images, maps, and perceptions can shape, alter, or otherwise add value to”.

4 Doing cycle

During the Design Thinking process we perform several doing cycles. This is indicated in Fig. 1 as a spiral and illustrated explicitly in Fig. 4. The process is performed with the output in mind. Before we start a new cycle we have to ask, which kind of artefact (model, scenario, drawing, prototype, etc.) we would like to present at the end of the cycle. The result represents the starting point for the next cycle. The development of artefacts in relatively short cycles is important for the ability to steer the process efficiently and effectively. With each cycle, the knowledge from the previous cycle is improved and fine-tuned.

The cyclic procedure helps us to ultimately resolve two of the main challenges stated above: On one hand, there is a divergent phase of understanding needs and developing ideas and a convergent phase of conceptualization and consolidation in every cycle. On the other hand, we face an on-going exchange between the concrete scope of the problem/solution and the abstract level of models/concepts. This process of changing views triggers so-called “perturbations”, that is, the deliberate disruptions in the cognitive process that lead to the change in mindsets and to a more creative perception and solution process.

In the Design Thinking process the feedback culture is central. At the beginning of each cycle, different viewpoints are explored together with the stakeholders. At the end of the
cycle, an artefact is generated which, during the next phase, can in turn be used as the basis for communication and feedback. At the end of each phase, the most crucial work steps and results are presented in a pitch to collect feedback and new ideas.

![Fig. 4 Doing cycle: Based on the results of the previous phase, each cycle will produce a specific artefact (compare the similarities with the thinking cycle in Fig. 3)](image)

5 Reflection cycle

Today's complex world is characterized by its transformation. As such, environment and requirements are constantly undergoing change. Problems at this level can no longer be solved merely with a set of fixed methods. In this case, what is needed is an on-going learning process applied to optimize the methodology. Design Thinking is more than simply ‘learning by doing’. In a world of complex challenges, taking action alone will not result in viable solution. What is needed is the step that involves reflection, so as to be able to discover specifically what has been learned in the problem solving process. Or, as John Dewey stated nearly a century ago: “We do not learn from experience … we learn from reflecting on experience”.

It is important to position oneself as often as possible, but at least once during each doing cycle, on the meta-level to take a critical look at one’s own doing from a bird's eye view. Inspired by Kolb’s learning cycle and according to the structure of the thinking and development cycle we propose to organize the four steps of the reflection cycle as follows:

Subject of experience: What is it I am observing?

General observations: How am I reflecting on new experiences in light of my insights from the past?
Lessons learned: How can I draw new insights from possible differences, and in what form can I generalize them for future purposes?

Consequences: In what way do I intend to apply the acquired knowledge in the future?

6 General process

For a long time, the problem solving process was characterized by the mindset, that one knew what the problem was and that the task was to find the right solution. However, often it turned out that solutions did not meet the needs of the users. In recent years we have been facing a paradigm change. Solutions are no longer being developed exclusively ‘inside-out’ from the point of view of a company or a service provider, but increasingly ‘outside-in’, from the point of view of the users or in general the stakeholders (Ulwick, 2005; Carlson/Wilmot, 2006).

Figure 5 gives an overview of the general process model (for details cf. Ninck 2014). It is more or less a modified merger between the Stanford d.school ‘Design Thinking Process’ and the ‘Double Diamond Process’ of the UK Design Council. The need for divergent and convergent thinking is illustrated with the diamonds. In addition, the double diamond divides the process into two main phases: A situation analysis (understanding, observing, focusing) and a solution design process (finding ideas, developing a prototype, testing). The question asked in the analysis is: WHAT is the problem and what are the relevant requirements? During the design process, on the other hand, the question is: HOW can we structure a solution that fits the problem? What is left out here are the two subsequent phases of production and distribution. These are rather technical activities, which, though important, typically do not cause many problems. By contrast, the two early phases are decisive for the success of a product, because here is where the course is set to assure acceptance by the users and stakeholders later on.

Fig. 2: General process with learning-doing-reflecting cycles and iterative loops
7 Application and validation

We practice the Design Thinking approach outlined above in our problem based MScBA degree program. When we set up a new course in ‘Business Analysis & Design’ six years ago, we took the chance to rethink some of the traditional education models and to implement new action learning methods. According to Marquardt (2004) action learning is: a problem (project, challenge, opportunity, issue, or task), an action learning team, a process of reflective cognition, an action taken on the problem, a commitment to learning, and an action learning coach.

We set up the action learning environment in cooperation with business partners. The partners describe their challenge on 1-2 pages. During the course of a semester, the students work on these challenges based on the outlined processes. Towards the end of the semester they come up with possible concepts. The challenges are mainly in the service field, and the bandwidth of companies and topics is very broad, such as:

TV Provider: How to provide services and experiences around TV watching?

Insurance Company: How to put into practice the slogan ‘Most personal insurance company in Switzerland’?

Cyclists Association: How to motivate customers to use the bike for shopping?

Bank: How to improve online payment services for senior people?

Railway Company: How to improve waiting time of commuters at railway stations and in trains?

Six years’ experience with more than 50 projects are proven evidence of the practical use of our approach. Among the business partners, both an evaluation of the performances as well as oral consultation have shown that the results do consistently indicate a high degree of quality and that they are relevant for practical purposes. Especially interesting are the results of a student evaluation, which focused on finding out the ability to achieve various levels of learning objectives (inspired by Bloom’s Taxonomy):

(1) Knowledge: ability to describe what one has learned
(2) Understanding: ability to explain what one has learned
(3) Application: ability to transfer what one has learned to a new situation
(4) Analysis: ability to analyse a complex situation and to present the findings systematically
(5) Synthesis: ability to condense different ideas into a concept
(6) Evaluation: ability to argue about the fit of a concept with regard to the requirements of a complex situation
(7) Reflection: ability to analyze the own actions and to draw conclusions that can be used to improve results in the future
The evaluation shows that the course in ‘Business Analysis & Design’ produces significantly higher results on levels 4-7 than the average of other MScBA courses. These results underscore not only the practical value of our design thinking and action learning approach but also the fact that we apparently have managed to structure and facilitate the learning process on different levels: individual construction of mental models; understanding needs and developing adequate solutions; critical reflection of methods and processes.

8 Conclusion

We understand Design Thinking primarily as a learning process. The goal for designers and stakeholders is to interact for the sake of generating new knowledge with the aim of creating innovative solutions. The learning process is not simply linear, but cyclic and iterative. A cyclic approach means that we go through several learning, doing and reflection cycles per phase, at the end of which there is a concrete understanding of an issue, which is narrowed down to its very essence. By an iterative approach we understand that sometimes it is reasonable to take a step back in order to incorporate new insights into an earlier phase. For example, we might discover at the time when we develop and test an initial prototype that certain requirements are not sufficiently understood and so it is necessary to redefine the specifications. In specific terms, Design Thinking means nothing more than applying a step-by-step learning process to find one's way toward the needs of stakeholders and toward solutions which adequately satisfy these needs.

The creation of new knowledge is the main foundation for innovation. The ability to learn quicker than the competitors is a crucial and a particularly long-lasting advantage. The challenge is to organize a creative learning environment which keeps the team on “the edge of chaos” (Brown & Eisenhardt, 1998). This means to lead the team on a path where maximum creativity exists and where learning occurs best, in a team or organization that ideally is responsive to the complexity of the environment, yet still structured sufficiently to succeed (Battram, 1999). Fulmer (2000) argues, that for a team to succeed, it needs to walk the fine line between stability and change. To stay at the edge of chaos, the team needs a few simple rules and a minimum set of norms or guidance, which are simple, but also adaptable (Olson & Eoyang, 2001). Our experience shows that the structured interplay between thinking, doing, and reflection can help to keep the team poised on the edge of chaos and to solve the somehow paradoxical demand to introduce disorder and to organize creative chaos.

There is no recipe for problem solving and no roadmap to epiphany. But our approach is more than a simple algorithm. In a world of increasing complexity, taking action alone will not result in a learning effect per se. What is imperative is to structure and facilitate the learning process on different levels: individual construction of mental models; understanding needs and developing adequate solutions; critical reflection of methods and processes. Reflective practice, where individuals are learning from their own professional experiences may be the most important source for change and innovation.
References


Design of the MSc degree in Colour Technology for the Automotive Sector

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Abstract

In the worldwide automotive sector, production of new cars involves at visual appearance level a continuous challenge to assure the visual harmony of car bodies, both colour and texture attributes, in particular in automotive coatings formulations based on special-effect pigments with attractive visual effects based on goniochromism (colour change due to variations in irradiation and viewing directions). It needs new knowledge and competences for controlling complex instrumentation and visual assessment of colour and texture differences, both for interior and exterior parts of a car. From the University of Alicante, for the academic year 2014-15, we are organizing the first MSc degree in Color Technology for the Automotive Sector, with a design of contents embracing colorimetry and visual appearance, instrumentation and color management software, fundamentals of coatings and plastics in the automotive sector, etc, mainly aimed to professionals, undergraduates and graduates in chemistry, physics, engineering, etc. The MSc syllabus, with 60 ECTS, is designed to be taught in two semesters. Firstly, from September to February, in virtual or semi-attendance mode and by Moodle platform, theoretical and practical learning activities, finally combined with an intensive period of mandatory laboratory practices and invited technical conferences before starting the internships from March 2015. And secondly, from March to June, at virtual level, only internships and the MSc Thesis. Therefore, the MSc Thesis would be the performance report during the internship in companies or research institutions. Some multinational companies, both as car makers and coatings and plastics providers, from European and non-European countries have already shown their support and interest in welcoming students for specific training, even some job offers when the first MSc edition finishes. We therefore hope that this new Master, unique in its design and organisation, and well tuned with some specific industry needs, and placing to the University of Alicante in the global vanguard of the training of new inter and multi-disciplinary professions in the XXI century, can suppose a great encouragement and outreach to improve the employability of professionals and high quality graduates and increase the scientific-technological advances and profits in many industrial sectors (automotive, cosmetics, plastics for electronic consumers, printing inks, etc).

Keywords
Color Technology, Automotive Coatings, Internships, Design Thinking, University-Business cooperation.

1 Introduction

The University in Spain, and at worldwide, is being transformed in a rush, and perhaps without realizing ourselves (Barber, Donnelly, Rizvi, 2013). In our country, but also in other EU countries, it is obvious how the economical crisis affects the budgetary and financial sustainability of our Universities (Sterling, Maxey, Luna, 2013). Therefore, any Spain and European University (Araque, 2009; Pérez, Serrano, 2012; Estermann,
Bennetot, 2011) should consider as soon as possible at strategic level which logistic, instrumental and human resources have and can quickly develop to undertake and diversify successfully capturing of new revenue from not public sources (Estermann, Bennetot, 2011; Hussey, Smith 2010; Attanasio, Capursi, 2011; Rondo-Brovetto, Saliterer, 2011).

In this sense, and relying on the three conceptual missions of the University, it always seems a good choice for each university to encourage, develop and consolidate their own postgraduate degrees, mainly for high professional specialization, promoting successfully the employability of our graduates anywhere of our planet. However, due to globalisation in recent decades, companies have evolved (Murmann, 2003; Davey, et al., 2011; UIIN, 2014), as well as industrialised and emerging countries, and everything quickly changes at an uncertain and high rate, but unstoppable, the European University should not continue from afar, but to analyse continuously from an institutional point of view of competitive intelligence.

The concept of work, in your attendance and virtual modes, or part or full time, etc, is also changing, and everything under the globalisation stream (Barber, Donnelly, Rizvi, 2013; Gratton, 2011; IPR-Bath 2013; Tomlinson, 2012). And in this sense, Universities should also be raised how to best ensure the employability of their graduates and postgraduates, both conventional and innovative profiles (OECD, 2011; Avis, 2010), but not only at regional or national level, but global (Barber, Donnelly, Rizvi, 2013; IPR-Bath 2013; Gratton 2011; Figuereido, et al, 2013; Montenegro, Pujol, 2013).

Following this argumentation, and without going into a pluralistic, constructive and synergistic discussion of common interests between supporters and critics of each of the three sub-missions of the University according to Ortega & Gasset (1930), or supporters of all of them, and some innovative ones not covered beyond the mid-twentieth century, this work focuses on a new design example and articulation, or implementation, of a new postgraduate course with high professional specialisation at worldwide, and that it would project, if was successful in its first class (to be shown in another work within a year, with their strengths and weaknesses, and improvement actions), the University of Alicante at the global vanguard of the training of new inter and multi-disciplinary professions in the XXI century.

2 Contextual origin of this Master

Colour technology focuses on the study of theories and techniques related to the design, manufacture and measurement of coloured materials (OpenCourseWare UA, 2009). A wide range of different industrial sectors are involved in colour technology (colorants, coatings, textiles, ceramics, plastics, printing, multimedia, etc.). Unfortunately, in many cases, colour experts within these sectors have not received any specific training in colour science. Therefore, their knowledge about colour, which is critical to develop their work, has been obtained through practical, possible self-taught, experience.
For this reason, companies involved in these productive sectors often invest considerable resources in specific colour training to improve their employees’ skills. In the same way, the limited number of graduates having previously done advanced colour training is highly sought after by many companies.

Over recent decades, colour measurement and colour quality control of gonio-apparent materials have become key areas for the automotive industry (BYK-Gardner 2014) and also for other sectors such as cosmetics, coatings, plastics, printing, textiles, architecture, etc. Therefore, it is necessary to count on in-depth knowledge of complex instrumentation techniques and visual evaluation procedures as regards differences in color and texture (sparkle and graininess); and even color formulation with solid and special effect pigments (OpenCourseWare UA, 2009; BYK-Gardner 2014; Pfaff 2008; Streitberger, Dössel, 2008; Poth, 2008; Klein 2010).

In response to this socio-economic demand, the Colour and Vision Group of the Department of Optics, Pharmacology and Anatomy at the University of Alicante, in collaboration with other Spanish institutions (University of Granada - UGR, Technical University of Catalonia - UPC, Technical University of Valencia – UPV, and High Council of Scientific Research - CSIC) and different companies (AUDI, SEAT, BASF Coatings, BYK-Gardner, Mercedes Benz, Volvo, Toyota Motor Europe, PPG, Merck, Valspar, Plastic Omnium, Nubiola Group, etc), is offering the Master’s Degree in Color Technology for the Automotive Sector (acronym: ColTAS) as a postgraduate course with 60 ECTS or credits (Figure 1).

![Logo of the MSc degree in Color Technology for the Automotive Sector.](image)
3 Mission, competences and objectives

The purpose of ColTAS Master is to provide comprehensive training in the multidisciplinary study of Colour Science and Technology from a global perspective. Students will learn the physicochemical and visual laws and solve real or simulated problems that often arise when using special effect pigments in different industrial sectors, particularly within the automotive sector (Figure 2).

![Stimulus](image1.png)

**Fig. 2: Light-matter-eye (brain) interaction at nano-micro (structural, left) and macroscopic (perceptual, right) level.**

This course includes an industry-based internship of up to 300 hours and provides a great opportunity to achieve basic and advanced colour control skills at an industrial level, particularly in the automotive sector.

For colour experts with, or not, a university degree, this new postgraduate course is a great chance to enhance training and professional qualifications. Meanwhile, recent graduates, even undergraduates as it will be shown below, who choose to undertake this specialist postgraduate course will find it easier to obtain highly specialized jobs, which are therefore more highly valued (and better paid).

From the skills demanded by the industry, a series of contents and learning objectives intended to meet the following competences has been planned as follows:

### 3.1 General Key Competences (GKC)

- **GKC1:** Acquire advanced knowledge and skills in the field of Colour Science & Technology;

- **GKC2:** Ability to critically trace and understand the last scientific-technological advances related to the special-effect pigments in some industrial sectors, particularly in the automotive sector;
GKC3: Ability to link knowledge and skills enabling to tackle problems from different views, enriching the solutions;

GKC4: Ability to carry out guided research or innovation works on the quality management of the visual harmony in cars at an advanced level;

GKC5: Develop originality and creativity when some specific colour technology problems applied in some industrial sectors (automotive, cosmetics, architectural coatings, design, et.) should be tackled.

3.2 Transversal Key Competences (TKC)

TKC1: Skills of writing and oral communication in English and Spanish. Capability of making and advocating reports and projects;

TKC2: Skills related to computer tools and ICTs, as well as database online access, scientific literature, patents and standards;

TKC3: Skills of adaptation, planning and organization in quality and effective making of autonomous works or inside interdisciplinary teams in front of new and / or real situations;

TKC4: Skills of leadership for taking sustainable, responsible, ethical, committed, consensual and efficient decisions.

3.3 Cognitive Key Objectives (TKC)

Therefore, the learning objectives would be structured as follows:

CKO1: Understand the physic-chemical causes of colour as a result of the light-matter-eye interaction;

CKO2: Control the mathematical foundations of the encoding and graphical and numerical depiction of colour and texture by the human visual system;

CKO3: Understand and know-how to measure the visual and optical properties, either normal or special (luminescent, goniochromatic, textured, functional, etc), of any material;

CKO4: Acquire a general view of the types of dyes and pigments (Klein 2010, Pfaff, 2008), either organic and inorganic, with normal or special / functional behavior, and their industrial applications (Figure 3);
Fig. 3. Scheme at nano-micro scale (left) of pigment particles with goniochromatic effect, and its perceptual and optical effect (right).

CKO5: Acquire a general view of the raw materials involved in coatings and plastics used in the automotive sector (Streitberger, Dössel, 2008; Poth, 2008), as well as their systems and application processes for special-effect pigments (Figure 4);

CKO6: Understand the perceptual foundations of lighting and colour in order to efficiently manage the quality control of the visual harmony in the automotive sector;

CKO7: Know and compare the current methods of coloration technologies, either conventional (textile, coatings, plastics, etc) and digital (displays, printing, etc), or any innovative other;

CKO8: Understand and adapt algorithms for effectively encoding and transforming of the visual and chromatic information among multimedia devices (capture, visualisation, etc) and its linking with the digital management of formulation and visual quality of gonio-apparent materials (Figure 5).
3.4 Procedural Key Objectives (PKO)

PKO1: Measure, calculate and graph the visual (colour and texture) appearance of materials, either opaque, goniochromatic, fluorescent, etc, associated with many industrial sectors;

PKO2: Calculate and graph the colour difference among objects (light sources, opaque or translucent or goniochromatic materials, etc), even images, and their industrial tolerances (i.e., $\Delta E_{Audi2000}$, based on the CIE-L*$a*b*$ colour space);

PKO3: Characterise any type of colorant (dye or pigment), either normal or special-effect, and material able to be colored to be used in any system of color formulation.

PKO4: Solve the colour recipe enabling, with the controlled mixing of some colorants, on a material or substrate, to match the reference colour of a previously characterised material (Klein 2010);
PKO5: Design and implement psychophysical experiments with real human observers using adequate lighting booths which efficiently manage the visual and instrumental correlation of gonio-apparent materials in many industrial applications;

PKO6: Integrate and weigh the texture and colour properties of gonio-apparent materials to control the visual harmony of interior and exterior parts of cars (Figure 5);

PKO7: Control some commercial reference softwares in the automotive sector for management of the texture and colour quality;

PKO8: Experiment with and apply quality control tests with the different systems and processes for special-effect pigments in coatings and plastics usually applied in the automotive sector.

4 Syllabus, teaching strategy and evaluation methods

This Master of 60 ECTS or credits (one academic year, from September to June) is managed by the Continuing Education Centre (CEC-UA), and organised by the Business School of the General Foundation of the University of Alicante and the Department of Optics, Pharmacology and Anatomy, belonging to the Faculty of Science of this University. The syllabus, taking into account the competences and learning objectives shown above, is composed by the following subjects distributed in two semesters (Table 1): first, up to February, for applied and theoretical training, and, second, for only the internships and MSc Thesis.

<table>
<thead>
<tr>
<th>DEGREE DISTRIBUTION</th>
<th>SEMESTER</th>
<th>SUBJECT</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>Expert in Colour Science</td>
<td>1</td>
<td>Basic Colorimetry</td>
<td>6</td>
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<tr>
<td></td>
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<td>Colour Perception</td>
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<td>Colour Physics and Chemistry</td>
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<td></td>
<td>1</td>
<td>Bibliographic Resources</td>
<td>2</td>
</tr>
<tr>
<td>Specialist in Colour Engineering for the Automotive Sector</td>
<td>1</td>
<td>Advanced Colorimetry</td>
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<td></td>
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<td>Visual Appearance</td>
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<td>Visual Harmony Management</td>
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<td>Coatings and Plastics</td>
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<td>Colour Reproduction</td>
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<td>Internships I</td>
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<td>MSc in</td>
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<td>Internships II</td>
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Colour Technology for the Automotive Sector 2 MSc Thesis 6

Table 1. Syllabus of the MSc degree in Colour Technology for the Automotive Sector, with options to cover some sub-degrees in different academic years for undergraduate students and professionals without University degree.

As shown in Table 1, for undergraduate students (with less than 18 ECTS for finishing her/his graduate) and professionals without University degree, the ColTAS Master enables to obtain two sub-degrees (Expert = 20 ECTS + Specialist = 30 ECTS) before obtaining the final MSc degree, even in different academic years, obtaining the corresponding qualifications signed by the University of Alicante President.

The teaching methodology will be the b-learning (blended learning) by the Moodle platform (http://si.ua.es/moodle), with individual and collective learning activities, with a weekly continuous and effective communication and tutoring between student and professor. However, taking into account the applied profile of this Master, when the first semester will be finishing, and before starting the internships, there will be an intensive period of mandatory laboratory practices and invited technical conferences (workshop).

Therefore, classroom attendance is not mandatory, except the mandatory attendance for laboratory sessions and workshop finishing the first semester. But the virtual learning activities will be diverse and demanding. These activities will be evaluated to guarantee the assimilation of general, transversal, cognitive and procedural skills. If students do not fulfill the established requirements, they will simply receive a certificate of attendance.

The Master’s thesis in June will involve drawing up, presenting and defending a report on the activities undertaken during the industrial internship (car manufacturers, coatings and plastic suppliers, etc., from March to June) or at a research institution. To do this, several companies of national and international prestige inside and outside of Spain will host ColTAS students for a period not exceeding 300 hours in the second semester (spring), and where the development activities can be conventional or RTD, always demanded and coordinated by the company and ColTAS guidance. Moreover, any professional could do the internship in her/his own company, provided that a formal agreement between the company and University of Alicante is previously signed. Exceptionally, some companies will offer freely some scholarships and grants for some ColTAS students. The ColTAS director will try to accommodate the preliminary interests and preferences of students and companies. The period for receiving without cost new company collaborations will be always open. The official ColTAS website is in http://www.enegocios.ua.es. Additionally, there always will be more information from the website of Colour & Vision Group: http://web.ua.es/en/gvc.

The ColTAS teaching staff includes professors and researchers belonged to the University of Alicante, but also from other Spanish Universities (UPC, UGR, and UPV) and
research centers (CSIC), and professionals currently associated with the automotive sector (AUDI, BASF Coatings, BYK-Gardner, Merck, AkzoNobel Coatings, etc).

5 Entry requirements, fees and registration

The CoITAS curriculum is mainly intended for graduates in chemistry, materials, chemistry, industrial engineering, physics, optics, imaging science, computer science, mathematics, or any discipline pertaining to the quantitative description of colored materials, with an intermediate knowledge in spoken and written English. But, obviously, it is possible to access to this Master as undergraduate student, or professional without University degree, provided that the „Expert“ + „Specialist“ combination is done, even though in different academic years. For any general information regarding registration, legalisation of documents, foreign students, scholarships, insurance and issuance of degree certificates it is convenient to contact with the Continuing Education Centre (CEC-UA: http://web.ua.es/en/continua/continuous.html).

The CoITAS registration fee is €4200 to be paid by installments (corporate registration available), taking into account a price of 70 €/ECTS. Anyone interested in registering should complete a pre-registration form before 30th June 2014 available in the official website. This form is also available from the course Secretary and must be handed in with a photocopy of the student’s National Identity card or passport, as well as any academic transcripts and degree certificate/s. During the first half of July 2014, the Head of Studies will publish the list of admissions, which will be formalised once payment of the course deposit fee (€420, equating to 10% of the total course fee) has been confirmed in the CE-UA’s Sabadell Bank account. This payment constitutes part of the first installment of the fee and will be deducted from the first installment in September.

Generally, those accepted onto the course will be required to pay course fees to the CEC-UA in three installments, the first one in September 2014 (50%), the second in November 2014 (25%) and the final installment in April 2015 (25%). However, despite having adjusted fees according to the great opportunity of employability and professional progression in an worldwide strategic industry sector for next decades, the advertising campaign, even using social networks as Linkedin, etc., has not got enough interest yet for potential students (chemistry, physics, engineering, etc.) to start the first edition in the academic year 2014-15. But, we hope to strengthen this initial weak point with the support of our University, Universia, etc.

6 Conclusions

The MSc degree in Colour Technology for the Automotive Sector (CoITAS) of the University of Alicante (Spain) is inter and multidisciplinary one-year course covering very innovative areas such as colour measurement & perception, visual appearance of texture and colour, colour quality management & formulation of special-effect pigments...
applied in the automotive sector, as well as in other industrial sectors as cosmetics, plastics, etc. The programmed objective is to train students in advanced methodologies and models in colour science and technology focused on gonio-apparent materials. With a perfect mix of relevant theoretical and practical knowledge, reinforced with internships in company, CoLTAS post-graduates will be in the position to join major companies in the automotive sector, both car makers and their coatings providers, or even in other industrial sectors (pigment producers, cosmetics, etc).

We therefore hope that this new Master, unique in its design and organization, and placing to the University of Alicante in the global vanguard of the training of new inter and multi-disciplinary professions in the XXI century, can suppose a great encouragement and outreach to improve to improve the employability of professionals and high quality graduates and increase the scientific-technological advances and profits in many industrial sectors sectors (automotive, cosmetics, plastics for electronic consumers, printing inks, etc).

7 Acknowledgements

This academic initiative was indirectly supported by the European Union and Spanish Ministry of Economy and Competitiveness under the grant DPI2011-30090-C02-02 with European Regional Development Funds (ERDF) support, and, the grant xD-Reflect (http://www.xdreflect.eu/) linked to the European Metrology Research Programme (EMRP), which is jointly funded by the EMRP participating countries within EURAMET and the European Union. We also would thank the confidence and support of our industrial partners, both car makers, coatings and plastic providers, pigment makers, and chemical additives and colour-measuring instruments.

References


University Industry Interaction
Best Practice Model for Partnership

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Abstract
Satakunta University of Applied Sciences (Satakunta UAS) has developed multiform interaction with the local industry for years. This interaction has evolved into partnerships with some of the firms. Typically these firms are significant operators in their field of industry. Partnerships are continuously developing processes, and the creation of trust is a crucial part of them. The trust between the university and firms grows with small and specific action steps. One well tried way in promoting the trust is to focus on the firm’s Research, Development and Innovation (RDI) actions. In these kinds of university-industry partnerships the research, development and innovation needs of the firms are constantly identified and, based on the identification, the most potential development tasks are defined and prioritized. This persistent work creates a solid base for a developing RDI co-operation. The partnership board is an essential operator in this identification process while students are the main operators in the implementation of the tasks.

In the paper the partnership based RDI process is modelled. The model is described and evaluated with case examples from the students’ point of view. The model is based on student projects, theses, work placements and technology evaluating processes performed by the students and guided by the expert lecturers but also on more demanding research projects conducted by the researchers. In the paper, e.g., the processes evaluating technologies are illustrated with case examples. When the evaluation process has been divided into smaller sections, every group of 2-4 students can be absorbed in evaluating one technology. In this way every technological possibility receives the attention it deserves and the results are practical and meaningful. This kind of evaluating process gives the firms wider and supplier independent information of the potential technologies for the improvement of the target. At the same time the students receive subjective experience of real-life RDI cases.

As the main outcome of this research a general best practice model of the partnership between a university and industry is created and evaluated.

Keywords
University, Industry, Interaction, Best Practice, Model, Cases

1 Introduction

This paper concentrates on partnerships between a university and industry in the creation of innovations in a regional context. Satakunta University of Applied Sciences (UAS) in Finland is used as a source for the case study to model the partnership interaction. The research aims at creating a best practice process model of partnership in a local context. The model should be pragmatic and have practical implications. There will be many potential benefits of using the model for both industry and higher education.

In order to develop and broaden the partnership actions the partnership process needs to be modelled. Then new operators can benefit from lessons learned from earlier actions.
and there is no need to reinvent the process and practices. The modelling is done for shareholders, partners and potential partners. It can be used to better understand and develop actions.

The structure of the paper is the following. First the background and theories are explained. Then the Satakunta UAS partnership process is modelled and the main actions of partnership model are presented with case examples. This is followed by the evaluation of the partnership model with best practice identification. The main results are summarized and discussed, and conclusions are given.

2 Background and theoretical framework

In the knowledge-driven economy there is a growing need for deeper and more productive interaction between higher education and industry. The full exploitation of knowledge requires strategies, incentives, appropriate processes and a strong interaction between the transferring processes and the main processes in the higher education. In a knowledge-based economy, knowledge is more likely to be created in application collaboration. In this kind of knowledge creation process, the knowledge creation, dissemination and utilization are carried out close to each other or even simultaneously. In addition, basic research and applied research can no longer be separated. Knowledge creation is discovered to be, in many cases, based on a long-term partnership where trust, commitment and mutual benefit can be achieved. (Laine 2010.)

Modelling of partnerships in this research focuses on processes which aim at the creation of innovations by creating new valuable combinations of internal and external knowledge. The research will use mixed methods by combining qualitative and supporting quantitative methods and process modelling. Innovation management research typically models the development paths of the idea, the people and organizations involved in the interactions and the transactions between the operators, the outcomes of the innovation process, and the context of innovation. Although innovation paths are individual, general elements suitable for most similar processes are presumably discovered (Tidd et al. 2005, Van de Ven et al. 2008).

In this paper a partnership is defined as long lasting collaboration between organizations in order to solve strategic challenges. A model is defined as a simple description of a system to describe how it works and to show its essential elements. Evaluation is judging the value or the condition of (someone or something) in a careful and thoughtful way (Merriam-Webster dictionary). A process is defined as a series of actions that are performed in order to achieve a particular result.

Best practice is a method or technique that has consistently shown results superior to those achieved by other means, and that is used as a benchmark. Best practice can evolve to become even better as improvements are discovered. Best practices are used to maintain quality as an alternative to standards and can be based on self-assessment or bench-
marking. Best practice can be used to develop and unify practices, learn from them and to share practices with others.

Innovation is the implementation of a new or significantly improved product (good or service), or a process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.

In Finland the main drivers of University Business Collaboration (UBC) are mutual trust, short geographical distance, prior relation to the business partner, mutual commitment and a common interest of the stakeholders. The main benefits of UBC identified by Finnish academics are: improved employability of future graduates, improved learning experience for students, improved reputation in the field of research, increased funding and the improved performance of a business. The main barriers to UBC in Finland have proven to be: differing time horizons between a university and a business, the limited absorption capacity of SMEs to engage work placements or projects, the businesses lacking the awareness of the university research activities/offers, the lack of financial resources of the business and the lack of university funding for UBC. The main benefits of UBC have been identified by the representatives of the Finnish HEI (Higher Education Institutions). According to them, UBC is seen vital in achieving the mission of the university, in improving the skills and graduate development. Furthermore, UBC has beneficial effects on the local industry, it increases local GDP and disposable income, and it creates local employment. Supporting mechanisms may be strategies, structures, approaches and activities. In Finland it is typical to have documented strategies with implementation plans. Collaboration is role-based and there are internal and external agencies focusing on it. Activities are, e.g. workshops for academics and students, networking, and promotional and project activities. (Davey et al. 2013.)

There are several reasons for developing interaction between higher education and industry. Practices change. It has been noted that collaboration matters. However, new ways to collaborate are searched. There is a need for more operative and goal focused collaboration between HEIs and industry. Earlier, industry was curious and wanted to see if collaboration had something for them. Nowadays there is no longer time for these kinds of open ended processes. Industry wants to define what they want as output and outcomes from the collaboration, and this definition steers collaboration. Our assumption is that HEIs should set their own goals as well and clarify them in the beginning of collaboration to avoid confusion and mistakes in collaboration.

2.1 Creating trust

Trust in relationships is a complex issue. It can be on a personal, team or organizational level. There are also dynamics between personal and organizational levels. Several researches have focused on trust, mainly on people’s conceptions of trust. Fewer researches have explored how trust is created in collaboration and what kinds of actions create trust. Partnerships between universities and firms are asymmetric from the knowledge point of view.
The creation of trust is necessary before the networked partners are willing to share knowledge openly and spontaneously. Trust is comprised of three dimensions: competence, goodwill, and identity. Competence is the most important element of trust (Blomqvist 2007, 178-190). Trust can be created by immediate problem-solving, frequent contact, honest communication and by developing wide relationships (Wilson and Wilson 1994). In dynamic situations entrepreneurs use fast personal trust based on fact analysis and intuition (Blomqvist, K. 2007, 178-190). Collaboration competence is seen as a core competence for innovation (Blomqvist and Levy 2006, Miles et al. 2005, 2006). In the future, the success of innovative SMEs is based on technology and trust (Miles and Snow 2005, Miles et al. 2005, Laine 2010).

Time, trust and territory are needed before the creation and transfer of knowledge can happen in innovation collaboration (Miles et al. 2000). Territory here refers to the personal areas of knowledge that are identified and accepted. Lewicki and Bunker (1996) separate trust into three levels: calculated trust, knowledge-based trust and identification-based trust. Transitions to a higher level of trust can happen in time. Predictability creates trust and predictability is created by sustained social relations. (Lewicki and Bunker 1996, Bews and Martins 2002.)

Calculus-based trust is based on a hope that positive actions will be rewarded and the fear that negative actions will be punished. Lewicki and Bunker (1996, p. 120) point out “…that at this stage, the deterrence elements will be a more dominant ‘motivator’ than the benefit-seeking elements”. Knowledge-based trust rests on predictability which is, in turn, based on knowledge gathered during regular interactions (Lewicki & Bunker, 1996). At this stage even negative outcomes can be tolerated. Identification-based trust is a form of trust dependent on a deep understanding of the needs of another and an “...identification with the other’s desires and intentions ... to the point that each can effectively act for the other” (Lewicki & Bunker, 1996, p. 122). Identification-based trust is a form of trust where one party will protect and promote the interests of another. At this level, trust is usually seen in more intense relationships. Contracts are typically minimal at this level. (Robbins, 2001).

3 Satakunta UAS partnership process

Satakunta University of Applied Sciences is a horizontal, internationally oriented university with 5650 students and 400 experts in 28 Finnish and 5 English programs. Offering both Bachelor and Master level education as youth education as well as further education for adults, SAMK has a wide contact surface for the employment sector both nationally and internationally. The faculties are: Welfare, Health, Service Business, Logistics and Maritime Technology, Energy and Construction, and Information Technology.

SAMK is the leading institution of higher education in the Satakunta region, operating on the west coast of Finland. SAMK is a limited liability company owned by the regional municipalities and local business institutions and organizations. Through the public non-
profit status and responsibility for regional development set by The Ministry of Education, SAMK is conducting public interest collaboration between higher education institutions, research and development (RD) centers and business sector.

Cluster development, networking and knowledge management activities have led to partnerships with the most active network contacts. The same model can be used with private and public organizations and clusters. Partnerships are future-oriented collaborations that use several elements of the interaction model to benefit both parties. (Laine 2007, 2008) The main features of the partnerships are the following: The partnership starts with a meeting with the senior management and strategy-level thinking of the goals. Both acute and future needs of partners are covered. The time frame for partnerships is several years. Partnerships are based on a contract with a list of contact people, milestones and responsibilities for actions. Theses and student projects are some of the tools that are used in knowledge creation. R&D&I project activation is also included. Third party funded projects are an option. Direct contract projects are a part of activities.

Satakunta UAS started partnerships with several types of organizations a few years ago. These organizations were large enterprises, SMEs and public organizations. In the beginning there were no clear goals for the partnerships, but there was the presumption that partnerships would create long lasting, deeper and more beneficial and flexible collaboration than ad hoc collaboration relationships. Another goal was to centre most of the connections on one contact person per partner to avoid ad hoc contacting. Ad hoc contacting tends to confuse partner organizations because the same type of contacts may come simultaneously from several people. This paper focuses on two partnerships, with Pori Energia (a local energy company) and Oras Oy (a local faucet and shower manufacturing company).

Collaboration in the partnership can have several forms, e.g. adaptive work placements, technology demonstrations, focused visits, Research and Development seminars, projects by students and personnel, theses and continuous personal development. All these can be used to fulfill the need of the partner. A partnership should be productive.

### 3.2 Partnership process model

Partnership establishing consists of five phases: identification of potential partners, partnership contract, partnership board, collaboration and evaluation. The partnership process model is presented in Figure 1.
3.2.1 Identification of potential partners

Partnership identification is a continuous process pursued by university employees interested in collaboration with partners. At the same time, the existing partners may spread good results of the partnership to their networks and a new firm may become interested in a partnership with the university. When a potential partner is identified or has volunteered, the preliminary or pre-contract partner work is initiated by the responsible university manager.

3.2.2 Partnership contract

The university has a formal template for the partnership contract. This template is used to create a contract that satisfies both parties. The contract defines the main objectives for the partnership and the essential actions to achieve them. Significant parts of the contract are the confidentiality agreement, ownership rights and rights to use the material produced in the partnership as well as the agreements of costs, the partnership board and the cancellation of the contract.
3.2.3 Partnership board
The partnership board has a very significant role in partnerships. The board is nominated in the partnership contract but it may be established at any phase of the partnership or the appointed persons may be changed when needed. The partnership board meets a couple of times per year and every time all the main actions and their status are evaluated. All the new subjects like new theses, new development projects and adaptive work placements are brought to the board meetings and the board decides which of them will be started. Also the results and possible challenges of the actions are discussed and considered from different viewpoints by the board.

3.2.4 Collaboration
The partnership board coordinates the collaboration as an entity. The collaboration consists of:

› Communication
› Interaction of personnel and students
› Work placements and theses
› Research, development and innovation projects

The board reviews new ideas, selects ideas for implementation, starts the planning of the actions, reviews the plans, evaluates actions and results. In addition, the board attends to the implementation challenges that could not be solved.

3.2.5 Communication
Communication between partners is perceived as one of the key actions in partnerships. Without proper and systematic communication the planned actions will not work as anticipated. Communication between partners and external networks is also important especially when results and achievements should be presented or when new collaborative projects are starting. Communication is set as one of the main subjects on partnership board meeting agenda. Consequently all communicative issues will be discussed and planned when needed.

3.2.6 Interaction of personnel and students
Supporting the training planning and the execution of the plans is included in the partnership. Good examples of partner interaction are different kinds of trainings that can be arranged so that the personnel from both the partner organization and Satakunta UAS participate together and the costs will be shared. Recruitment info and company excursions for students can be arranged so that the personnel of UAS and the students become familiar with the partner firm. Additional tested collaborative activities are, e.g. seminars and personnel work placements.
3.2.7 Work placement and thesis
From the university point of view the work placements and Theses are the two most important outcomes of the partnership. Different kinds of work placement methods and thesis subjects are constantly planned and discussed in the board meetings.

3.2.8 Research, Development and Innovation collaboration
Research, development and innovation (RDI) collaboration is one well tried way in creating trust but it also requires trust. Therefore, it should be started with small steps in the beginning of the partnership. When the first steps of creating trust are taken, the identification of RDI challenges may be started. The first identification is done by listing the acute development needs of the partner firm. The development needs are operationalized by transforming them into practical actions like measurements and searching of technology knowledge. Both the identified needs and practical actions are then prioritized according to the importance, urgency and available research knowledge and resources.

The prioritized list of development needs and actions is documented so that it can be used as a checklist during the process. Following this list the development actions are planned and described in more detail. Some development cases may be very quick in the right hands of accomplished personnel but some cases may need longer time periods and also knowledge from other sources. Planned RDI collaboration consists of different operative actions like theses, student projects and more demanding research projects conducted by university researchers and project engineers. Scheduling of all the actions is a part of the checklist writing.

Resources for the RDI actions are allocated case-specifically. The partnership contract does not allocate any resources for RDI collaboration but all the actions will be planned case by case with separate budgets and financing programme. When all the plans have been formulated the actions are carried out according to them. When new challenges are met the project personnel tries to solve them with the help of the firm’s personnel. Challenges exceeding the scope of action plans are discussed in the partnership board.

3.2.9 Evaluation
Regular review and the evaluation of actions take place usually twice a year. The evaluation is based on the objectives defined on the planning phase, on process resources and results. (Lähdeniemi et al. 2012, Malinen et al. 2009, Leino 2009).

3.3 Action steps for creating trust
In the partnerships between Satakunta UAS and local firms trust is created with small specific action steps
- Showing curiosity towards real world problems
- Constant identification of new problems
- Versatile evaluation and prioritizing of problems
Systematic verification of competences
Problem-solving based on knowledge and systematic approach
Collaborative learning

All these steps are seen in partnership meetings. Typically, all real world problem-solving requires diversified knowledge. Therefore, the partnership board should consist of people from several various fields of industry, education and research.

4 Case examples of partnership actions

In this chapter the modelled actions of the partnership based cooperation are described with several case examples. Adaptive work placements, projects for evaluating technology as well as more demanding research projects and thesis works have been chosen for examples presented here.

4.4 Adaptive work placement

Adaptive work placement is an operations model that has been developed to serve both the company and the university and its students. Adaptive work placement starts with student selection. The company observes students in their summer jobs and chooses yearly a couple of developable students to adaptive work placement. This gives these students opportunities to work in the same company in different positions throughout their studies. They see many different duties and have the chance to apply the theories learned in the university into practice, in their workplaces.

For the companies, adaptive work placement is a very effective way to get skilled employees who know the company procedures without hard orientation processes. It also gives the students a diverse possibility to identify their own interests. When a student has worked in the company for many periods of time per year over two to three years it is quite easy to find an interesting and meaningful topic for the thesis. This is a productive starting point for a thesis and usually leads to a quick graduation.

It is very important for both the company and the student to remember that although the students are chosen to adaptive work placements with a view to employment opportunity after graduation, it is not self-evident. The student must earn each subsequent work placement with hard work and by developing their know-how. After the graduation the student has a chance to become employed if there is a suitable open vacancy in the company.

4.5 Student projects for evaluating technologies

Good examples of cooperative RDI actions performed by the students are the projects for evaluating technologies. Both the students and the firms find these kinds of projects very productive. Two examples of such projects are described below.
4.5.1 Evaluating technologies for package quality purposes for Oras

This case example describes a project of technology evaluation made by engineering students for the partner company Oras Oy. Oras is planning on improving the packaging quality of their products. The main purpose was to construct an automatic system to verify the package validity. The preliminary study illustrated that there are many potential technologies that could be used. Based on these findings it was decided that a project to evaluate technologies was to be executed to support the decision making process.

This project was designed to be realized as five subprojects. Every subproject evaluated one technology and was assigned to one group of students. Each group performed their work as a part of either a course on machine vision or a course of a machine automation project. The evaluated technologies were:

- Radio Frequency Identification (RFID)
- Automated scale based identification
- Color packaging based machine vision identification
- Shaped packaging based machine vision identification
- Sample based machine vision identification

Each subproject group built a requisite setup for testing. They ran the tests with real packages with effected quality deviations. According to the tests the students programmed functioning software for the purposes and tested again the functionality of the systems. The evaluation tests were graphically documented and the usable and impossible technologies were listed for the use of the company’s decision making process.

4.5.2 Led street lighting project for Pori Energia

Pori Energia, another partner company of SAMK, is planning on changing street lighting technology used on the streets of Pori. LED street lighting is one possibility and that is why they asked SAMK students to execute a project of evaluating technology of LED street lighting. In this project the students tested LED street lighting in SAMK electrical engineering laboratory and in a real life environment in the district of Nyrkkilänpuisto. The aim of this research was to test the consumption of electrical energy with different kinds of light sources, to observe power quality and to measure the intensity of lighting with different sources.

The students also interviewed the residents of Nyrkkilänpuisto in order to collect their opinions on LED lighting in use. The results of this project of evaluating technology will be used in the decision making process in Pori Energia. This student project was also rewarded with a grant from Federation of Special Service and Clerical Employees, ERTO.

In addition to the obvious benefits for the company, this kind of projects for evaluating technologies give the students deeper know-how of certain technologies and a clearer understanding of projects and cooperation in projects. At the same time the students also
learn researcher-like manners in evaluating technology. When the students take the responsibility of the evaluation process they force themselves to investigate and find the right action steps and that way to identify the fruitful ways to seek for answers.

4.6 Research projects - students developing into research engineers in the university

Another method in university industry partnerships are the deeper research projects conducted by university researchers and research engineers. Usually these kinds of projects commence through the identifying and evaluation process of RDI actions in the company. The need of the research project rises from the company and its developing targets. University researchers and research engineers take the responsibility of the research actions but they also include a couple of engineering students to participate in the research. In this way these students become acquainted with the basic research steps and learn how to work with researchers.

4.6.1 Thermal Imaging Research in Optimizing Sand Core Production – Case Oras

Oras, a local, big faucet producer, needed help in improving their production and especially one of their sand core producing cells. The sand cores were not homogenous and a large number of cores were broken before they could be used in casting. SAMK researchers together with one automation engineering student started a thermal imaging research with an objective to find and solve the problem. Thermal imaging research of the process revealed clear faults in some of the heating elements. With three improving steps of the heating elements and thermal imaging after each step the heating elements were developed so that the thermal distribution was as homogenous as possible. The research was the key to successful improvements.

From the engineering student’s point of view this research project was a diverse learning experience. He underwent all the main phases of a research project, learned thermal imaging in practice and how to document research points and results. While the student had an important role in operative tasks of the project he also learned how to work in a university research project. This way he evolved into a skillful research engineer and was and still is employed by the university.

4.7 Theses

Students in adaptive work placements are encouraged to find their thesis topics by themselves while working in different positions in partner companies. This is noticed to be a very productive way in topic identifying. When students find their thesis topics by themselves they are very involved with the work from the beginning. They also finalize their theses with great results and on time.

The partner companies have also had many theses done by other students. In these cases the topics for the studies are brought to the partnership board meeting and from there to
expert lecturers who find suitable students to perform the studies. The expert lecturers have a great responsibility in finding skilled and motivated students for specific theses.

In partnerships with Pori Energia and Oras SAMK the students have finished in total over 50 theses in less than six years. The partnerships have helped SAMK and the companies to find more systematic and organized ways to commission theses. When the partners know each other and have mutual trust it is easier to bring subjects on the table. On the other hand the topics are easier to discover and the search for a thesis student is more straightforward.

5 Evaluation of the partnership model

In this chapter all phases of the partnership process are evaluated and best practices are identified. The main goal of a partnership is to create practical results.

Table 1. Evaluation and best practices of the partnership process.

<table>
<thead>
<tr>
<th>Partnership process phase</th>
<th>Evaluation of the phase</th>
<th>Best practices identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of partners</td>
<td>Active identification, different types of partners, contacts based on partners’ recommendations</td>
<td>Openness to all types of partners and partnerships</td>
</tr>
<tr>
<td>Partnership contract</td>
<td>Formal, simple general template, partner-based details, commitment of senior management</td>
<td>All key actors involved, shared understanding of importance and trust, contact person of the university selected</td>
</tr>
<tr>
<td>Partnership board</td>
<td>Role of the contact person is remarkable, all voices are heard, equal partners with equal authority, well documented meetings, all ideas, plans and actions covered</td>
<td>Covers everything but not in detail, future-oriented approach</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Several simultaneous actions and communication, role of a student is emphasized, only part of the partners want to include RDI collaboration</td>
<td>Type of collaboration based on needs, opportunities for students to participate in different types of tasks, step by step creation of trust based on collaboration, time scales and actions agreed, concrete results</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Continuous, informal, learning centered, UAS actively asking for feedback, made by the board, a lot of learning outcomes from university processes</td>
<td>Evaluation on agenda in all meetings, reporting results into the university metric systems for maximum benefits</td>
</tr>
</tbody>
</table>
Evaluation is actually conducted in board meetings, not as a separate action. This ensures constant feedback and the evaluation is done when actions are still in the fresh memory. The university contact person collects feedback from students and teachers and the contact person of the partner organization from his/her organization. The evaluation is based on

- The quality of planning
- The quality of actions
- The quality of process and resources
- Achievements reflected on goals, amount and quality
- The management of actions
- Communication and publications done based on partnership
- Interaction in partnership
- The scope of partnership

All above issues are covered in an unofficial manner during partnership meetings. The meetings are documented and the documents or parts of them are distributed to all people involved.

6 Main findings and discussion

The main result of this research is the partnership process model presented in Figure 1, the evaluation of its phases and the identification of best practices in all phases presented in Table 1.

The process is described as linear. When the board is nominated and parallel actions start, the actions may not look as simple as the description. The coordination of actions is a demanding task for the coordinator. The quality of partnership and its development seems to personified to the coordinator.

According to the research, all partnerships are different but similar process phases and elements can be found in each of them. The same phenomenon was observed also in innovation management research. Identifying the related and complementary knowledge areas of the partners is a very important step which leads to the next level of the partnership.

In this research, creating trust is considered as one important factor of successful partnership. This research shows that both knowledge-based trust and identification-based trust are usual in these kinds of partnerships between a university and industry. The research also indicates that the sooner the transition from knowledge-based trust to the identification-based trust happens the sooner the partnership gets on a more detailed level of collaboration. Identification-based trust makes it possible to deeply know the pro-
cesses and products as well as their problems for the partner. Consequently, the results of
the partnership may be remarkable.

One essential question for the future is how to develop the process so that the university
is actively setting goals already in the beginning of the process to ensure actions that
create the needed results for the university. This should lead to maximizing the wanted
results and metrics set for universities.

A sign that shows that the network is actually developing is that its members create new
practices together. In partnership this should happen in a similar way. In the researched
cases this seems to be true. Partnerships based on contracts that are organization-
specific seem to develop to their own directions. The development of a partnership is
personified to the partnership coordinator. Therefore, it is important to find more com-
mitted people from the university side to coordinate the partnerships. Otherwise it is not
possible to increase further the number of partnerships. Partnerships help developing the
competences needed in partner organizations. A coordinator of a researched partnership
said:

“Nowadays all my new competences are based on needs of partners.”

The role of students is emphasized. A lot of students have participated in different roles.
The same students can also have several different roles in the same partnership during
several years. The students give the university a lot of feedback that can be used to de-
velop processes. They seem to be very satisfied with the learning outcomes they have
attained in different projects. Also the adaptive work placement receives a lot of posi-
tive feedback. The students praise especially the wide range of different working expe-
riences.

Partner organizations are satisfied with the amount and type of actions, systematic prob-
lem solving approach, the research knowledge based on their own process data, and the
documentation of the results. As a partner organization representative stated in a board
meeting:

“It is easy to make decisions now because we have true knowledge based on
measuring data.”

The partnerships have helped the partners to solve several problems, create new prod-
ucts and services and to make investment decisions based on knowledge.

7 Conclusions and recommendations

In this research the partnership process between the university and industry was de-
scribed and evaluated. According to the findings, it is important for partnerships to un-
derstand the importance of trust and of creating trust, to make clear goals for the part-
nership, to agree on operational actions, to perceive time scales, and to create concrete
results with mutual benefits for university and industry. The role of students is empha-
sized in partnerships. Both the university personnel and the students and the personnel of the partner firm seem to learn a lot in the collaborative actions made in partnerships.

There are several benefits, e.g. new learning outcomes and the need-based competence development of personnel. However, partnerships require constant development of the process and the actions. A lot of feedback concerning university processes is available.

Partnerships create research-based knowledge to support innovation process in industry, foster new innovation creation and open eyes to see new opportunities for future collaboration. It is recommended that higher education sets its own goals from its own point of view and sets the goals already in the beginning of the process.

The research has implications both for theory and practice. The created models can be utilized in the management of partnerships and in the creation of innovations in collaboration between the higher education and industry. The modelling is a generalization since it is a simplified description of reality and the research tried to capture the most essential parts of the phenomenon. The research was found to have several practical implications. The results can be generalized to similar environments and organizations, yet should be used with care because the initial conditions also affect the results that can be achieved.

The study suggests future research items, such as how to build a network of partner organizations with even more innovation potential.

References


Business models for language courses for foreigners: a case on Brazilian universities

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Abstract
The rise of Brazilian economy and the major international events had a direct impact on the increasing of the search for student exchanges in Brazil, as well as the policies of university internationalization. To comply with international student’s needs, universities should provide mother tongue studies, mainly in countries like Brazil, where only Portuguese is spoken. We developed various business models to universities create programs for teaching language for foreigners by investigating the needs of foreign students in an immersion context. The research revealed that the market for teaching Portuguese to foreigners is a business on the rise and still little explored by Brazilian educational institutions. Training professionals prepared for teaching Portuguese for speakers of other languages still does not meet the needs of the sector, since language teaching should be integrated into the country's cultural contexts and requires specific techniques. There are significant differences in preferences for Spanish-speakers, who prefer courses oriented to the proficiency exams, in contrast to speakers of other languages, who are more interested in the application to everyday issues and situational contexts. The top three key factors for the creation of a course of Portuguese as a Foreign Language relate to attractiveness, pedagogy and extracurricular activities. The four business models created took into account the preferences and perceptions of students according to language learning, the intention of study hours and intended maximum payment for the hours mentioned. All models come with different scenarios and strategies to provide universities with tactics to meet the needs of the target audience, which generated business models based on different epicentres of innovations that meet the preferences and perceptions of students according to language learning, the intention of study hours and budget.

Keywords
Business models, language courses, education, mother tongue studies, Canvas

1 Introduction
The increasing relevance of Brazil in the global economy during the European and American crises has attracted students from around the world. The number of visas granted to study in Brazil in 2012 doubled in relation to 2005, according to the Brazilian Ministry of External Relations. Bearing this scenario in mind, the University of São Paulo launched the “International USP” program, which aims to strengthen its international presence, support, improve and/or expand internationalization initiatives, deploy and manage facilities at USP abroad and establish a new program of internationalization for years (UNIVERSDADE DE SÃO PAULO, 2013). The number of incoming schol-
ars from student mobility programs within the university has increased from 690 in 2009 to 1088 in 2012. By February 2013, 1427 foreign students were enrolled at the University of São Paulo.

The key-factors for a sustainable reception of international students are efficient human resources, adequate infrastructure and the offer of programs that teach Portuguese for foreigners (NOBREGA; CARDOSO, 2013). Such factors ensure the maintenance of high quality services and satisfaction. It also encourages foreigner students to participate in their social and student lives during their stay in the country.

The offering of programs that teach Portuguese for foreigners is affected by the absence of a Language Center in the campus of Ribeirão Preto in the University of São Paulo. Furthermore, it also implicates in difficulties in structuring consistent and effective programs grounded in intercultural approaches and techniques recommended by the literature. The Faculty of Economics, Business Administration and Accounting of Ribeirão Preto (FEA-RP) has had a significant growth regarding the number of international agreements signed with foreign universities from 2007 in 2012. Such growth resulted in the need to implement courses of Portuguese for foreigners. During 2012, the programs had a high dropout rate and low levels of satisfaction, according to the reports of the board of the International Relations Committee of FEARP/USP (CRInt). The courses did not follow appropriate methodologies and teaching staff lacked adequate training. The course was also criticized by its lack of division according to levels of proficiency and ease with the language. Such fact hindered the progression to more advanced levels and to more basic levels. Other faculties in the campus such as the Faculty of Odontology (FORP) also offered free courses of Portuguese for foreigners. Yet, they were mostly directed to hispanophones and were developed by volunteers that did not have the appropriate background.

This study aims to structure business models for courses of Portuguese for foreigners in campus of Ribeirão Preto, University of São Paulo. The specific objectives of this work are:

- Assessment of interests, motivations and behaviors of the target audience towards learning the language;
- Development of a value proposition for the identified target audience;
- Evaluation of channel structures, relationships, forms of revenue, key resources, key activities, partnerships and cost structure for the creation of the course;
- Validation of the value proposition elaborated.

First of all, there is a short literature review on business design and business models, focusing mainly the Canvas Business Model that was used to develop the work. Some ideas on Portuguese as a Foreign Language are also necessary so that there are enough fundamentals to advance in the proposed matter. The methodology states how the field research was guided, showing the mains structure of the focus group and the survey
conducted. At last the results are exposed and explained and conclusions are reached. Some recommendations for further research are also made.

2 Literature Review

2.1 Business models: Canvas

Business model is a term often used to describe the key elements of a business. The tool became popular among businesses and research on e-business (AMIT; ZOTT, 2001; TIMMERS, 1998). The definition was initially criticized by the literature, for not being enough clear, shallow and deficient in relation to the theoretical framework (Porter, 2001). Seddon et al (2004) argue that there is a huge divergence of concepts that define a business model, since many of them resemble concepts and models used in the strategy area. Lumpkin and Dess (2004) affirm that business models provide and ensure competitive advantage for the company that adopts it. According to the authors, the model reveals how the organization creates and generates value in competitive environments. Rappa (2004) explains that a business model is formed when need, reliability, usability, use, scalability and exclusivity factors meet. Osterwalder and Pigneur (2010) point out that the business model should be easy to understand. It should also provide a clear description of the business, with simple, relevant and understandable intuitive concepts. However, business models methodologies do not overly simplify business reality. The authors argue that a business model is a diagram for the strategies that will be implemented through organizational processes and systems structures. These precepts were the forerunners of the Business Model Canvas, which gained huge popularity among large and small corporations, due to their effectiveness and affordability.

The Canvas Business Model is based on nine blocks that depict the logic of how the company plans to generate revenue. The nine blocks cover the four areas of an organization: customers, offer, infrastructure and financial viability.

- **Customer Segments:** Define one or more segments that the organization wants to achieve;
- **Value Proposition:** Defines which products and services create value for the customer segment;
- **Channels:** Establish how the organization communicates and reaches its segment customers for delivering the value proposition;
- **Customer Relationship:** Determines which types of relationship the company has with its customer segments. The goals are getting new customers, retaining new customers or increasing sales volume;
- **Revenue streams:** State how the company captures money;
- **Key Resources:** Define what the most important assets are for making the business model work;
Key Activities: Define the most important actions to be done so that the business model works;

Key Partners: Determine suppliers and key partners that make the business happen;

Cost structure: Describes all costs required to operate the business model.

The five steps processes for building a business model, according to Osterwalter and Pigneur (2010) are: mobilize, understand, design, implement and manage. These steps rarely occur in a linear direction. This happens because building business models implicates in a series of tests, studies and reviews. The mobilization stage is defined as the meeting of all the elements for the design of the business model. This step consists on creating awareness of the need for a new business model, explaining the motivation behind the project and the establishments of a common language to describe, designing, analyzing and discussing the model to be created. The following step, comprehension, consists on the research of the necessary information by the design team. They must seek to understand the customers’ needs, the current technology available and the external environment. Such researches can be specialized interviews, study of potential clients and an effort to identify needs and problems to be solved. The design stage occurs once the collected information is converted into business prototypes that can be explored and tested. After testing the prototypes, the design team will also be able to choose the most suitable design. Finally, the implementation step consists on defining management structures that will be continuously monitored. Managers should also evaluate and adapt the designed business model according to their needs once they are implemented.

2.2. Business Design

Osterwalter and Pigneur (2010) define business design as a series of techniques and tools that support the projection of innovative business models. Brown (2008) states that the technique of design thinking is a discipline based on the sensitivity of the designer in order to create methods that meet people’s needs. Such methods can be achieved through alternative and viable technologies and a business strategy, which can convert into customer value and market opportunities. For implementing a business model, Osterwalter and Pigneur (2010) suggest six techniques for creating business design: customer insights (map of empathy), ideation, visual thinking, prototyping, storytelling and scenario building. Each technique is recommended to a specific stage of the implementation process:

- Mobilization: Storytelling;
- Understanding: Customer insights, visual thinking and scenarios;
- Design: Ideation, Visual thinking, prototyping and scenarios;
- Implementation: Visual thinking, storytelling,
- Management: Visual thinking, scenarios
The chosen techniques for building the business model were customer insight, ideation and prototyping. Storytelling has been dropped at the stage of mobilization, since the agencies involved in this research were already aware of the need to implement a new management model. This technique was not taken into consideration since the implementation phase is not one of the objectives of this work. The construction of scenarios, which is used to tangibilize a value proposition and offer a better understanding of clients’ perspectives, was also disregarded. We decided for a quantitative study with statistical treatment with the defined target audience at the prototyping process. The technique of visual thinking, composed for better visualization of building the business model consisted only in the use of post-its during brainstorming moments.

The Empathy Map, developed by the company XPLANE visual thinking provides the possibility of investigating the subjectivity of the consumers mind. The tool also allows a better understanding for what the customer is actually willing to pay. The design team involved in the process should discuss all segments of potential customers who may be affected by the business model. After choosing the three most promising and finally listing the segment with the greatest potential, the team must create a fictitious customer with characteristics such as name, demographics (income, marital status, among other characteristics deemed relevant). Secondly, the team must answer the following questions: “What does he see?”

Ideas for innovation in business models can originate from any one of the nine blocks Canvas style. Osterwalter and Pigneur (2010) cite four epicenters innovative business models: Oriented resources, supply-oriented, customer-oriented and financially oriented. Innovations oriented features have their origins in existing infrastructure and partnerships to expand the business model. Oriented models have to offer innovations in creating a new value proposition affecting other blocks Canvas. Innovations are targeted to customers based on customer needs, ease of access or increased convenience. Innovations driven by new revenue streams, pricing mechanisms and cost reduction are defined as financially oriented models. Finally, innovations can also be driven by multiple epicenters, which directly affect all blocks of the business model.

(1) Composition of the team. Key Question: The staff is diverse enough to generate new ideas in the business model? Members must have different profiles and backgrounds such as age, experience, time in business, the business unit in which they work, customer knowledge and professional experience.

(2) Immersion. Key question: what elements should be studied prior to generating ideas for the business model? Ideally, the team should go through a phase of immersion, which may consist of research, customer study, analysis of new technologies or evaluation of existing business models. The immersion can take several weeks or can be as short as the use of the tool map empathy.

(3) Expansion. Key question: What innovations can we imagine for each of the blocks of the business model? During this phase, the team expands the range of possible solutions in order to generate as many ideas as possible. Each of
the nine building blocks of the business model can serve as a starting point. The objective of this phase is the amount of ideas, not quality. The application of brainstorming rules keeps people focused on the generation of ideas.

(4) Selection Criteria. Key question: what are the most important criteria to prioritize the ideas listed for the business model? After expanding the range of possible solutions, the team should define the criteria to reduce the number of ideas to a manageable number. The criteria should be specific to the context of the business concerned, but may include topics such as the estimated time of implementation, revenue potential, the possible customer resistance and the impact on competitive advantage.

(5) Prototyping. Key question: how the model looks complete business for each of the ideas listed above? The technique of prototyping will be outlined in the next section for further elaboration.

The prototype assists decision making for the administrator to explore different directions where the business model can follow. Using the tool enables the assessment of what would happen if a new segment of customers were added, the consequences of removing an expensive resource or other changes in any of the nine blocks of the model. The use of prototypes infers the need to review questions of structure and logical relationship, which could not be discovered only by meeting or brainstorming techniques. The prototypes can be categorized in four different models:

- “Draft Napkin”: design and launch of an idea, The prototype should contain only the description of the idea, using key elements such as value proposition and key revenue streams;
- “Canvas prepared”: exploring what is needed for the idea to work. The prototype should contain the full Canvas model, the design of business logic, estimation of the potential market, understanding of the relationship between the blocks of the Canvas and verification of facts that validate the model;
- “Business Case”: make the Canvas in a detailed financial projections in order to estimate the potential profitability of the model, In addition to the points already mentioned above in the previous phase, the worksheet should consider the key business data, such as the calculation of revenue and expenditure, the estimated potential profitability and forecast this in different scenarios;
- “Field Test”: investigate consumer acceptance and feasibility of the model, The prototype should contain the case of well-grounded business, research and testing with potential customers of the channels, the value proposition, pricing and other factors on the market.
2.3 Portuguese as a Foreign Language

Almeida Filho (2008) classifies three major contexts of teaching and use of language: first language (L1), second language (L2) and foreign language (FL). The teaching of a first language extrapolates the literal sense of offering knowledge about a language. The teaching of a first language happens to those who already know the language, even before having classes or formal explanations about it. The focus of the education process should reside in building valuable experiences and reaffirming the student’s confidence, enabling thus deepening the understanding of the language.

Nobrega (2010) compares the similarities and disparities in teaching Portuguese as a first language and as a foreign language. The first difference consists on the environment in which the learning process occurs. Learning a first language is driven by the need and desire to communicate in a natural context. On the other hand, learning a foreign language, occurs in a formal moment, not tied to survival necessities. Nevertheless, such artificial context implies in the use of rules of the communicator’s mother tongue as a way to explain the learnt structures. The second disparity relies on the cultural repertoire. The first language speaker is aware of what is approved and what it rejected in his culture. Santos (2005) argues that foreign students experience a sense of strangeness and discomfort while learning a new language. That happens due to their different manner of perceiving and reading the world. The foreign language learner already has a formatted standard of comprehension and communication on how he relate with himself, others and the world.

Portuguese for foreigners teachers must be more focused on developing comprehensive and integrative attitudes (at least tolerant) than in teaching the other language itself. Almeida Filho (2008) recommends a few strategies for teaching Portuguese for foreigners at a professional level. Such factors include a specific professional training by reading and discussing specialized texts in specific courses and disciplines produced by universities, schools and institutions accredited to do so. The author also emphasizes the importance of personal preparation through professional attitudes and capacitiation for providing a high quality education. Such recommendations are also a strategy to overcome the lack of specific training courses for preparing more professionals in foreign language in Brazil. Nobrega (2010) recommends that educational administrators must invest the capacitiation of their teachers that are already active on the market as part of their professionalization.

The heterogeneity of students in classrooms requires appropriate pedagogical practices (NÓBREGA; CARDOSO, 2013). The leveling of classes should not be based only on the level of language proficiency. It should also consider cultural differences, needs and personal motivations. Santos (2004) discusses the need to develop intercultural competencies in foreign students, so they can enjoy the interaction with people from different countries.

Several linguistic researches reveal that hispanophones have different profiles and needs in relation to other learners of the Portuguese laguage (Almeida Filho, 2001; 2004;
The similarities between the two languages can result in frustrative learning processes by the student. Despite the initial rapid progress, students tend to “park right in the center of interlanguage feature, Portunhol” (Almeida Filho 2001, p.2). The impression of improvisation when using the language can result in negative and frustrating experiences, especially in oral communication. These errors are usually striking and predictable and are often not tolerated.

2.4 Proficiency Exams

The Celpe-Bras is the only test of proficiency in Portuguese foreign language recognized by the Brazilian government. It evaluates four proficiency levels: intermediate, upper intermediate, advanced and superior striker. The evaluation is based on the communicative approach (COURA-SOBRINHO, J. et al., 2006). Such approach prioritizes the development of strategic competencies instead of grammatical competencies. The main focus resides on the adequate use of the language in different occasions, instead of the language structures. There is no order of preference in use of the four language skills (speaking, writing, listening and reading). All of these skills must have been taught and developed in an integrated manner (LEFFA, 1988). However, the goals of student learning can lead to prioritizing any specific skill.

Its organizers define proficiency as “the proper use of language to perform actions in the world” (COURA-SOBRINHO, J. et al., 2006, p. 3). Grammar and vocabulary are assessed as part of the development of oral and written texts. However, they are not the main focus. This type of assessment allows evaluating how the participant behaves in contexts of real interaction. Thus, proficiency also includes the ability to understand cultural backgrounds and being sensitive enough to use the language in its different contexts and points of view. The test consists on moments of face to face interaction, in which one works the production and listening skills. Other activities may involve up to three skills, such as taking notes of a telephone call, involving listening, speaking and writing abilities.

3 Methods

The methodology for developing this research relies on the six stages of the business model implementation process proposed by Osterwalter and Pigneur (2010). The six steps, as already mentioned on topic 2.1, are mobilize, understand, design, implement and manage. The mobilization stage did not demand great efforts, since the project was well received by the International Relations Committee at FEA-RP and members of iTeam, the students association that offers support the faculty’s internationalization

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1 Students association created to enhance University of São Paulo’s internationalization process through support, information and integration for foreign and local students.
process. The design team was composed by the directors of iTeam, who were students of Economics and Business Administration at the University of São Paulo.

The understanding process consisted on a research about the international scenario of Portuguese for foreigners market and focus groups in order to create the empathy map. Such information was crucial for better accuracy of identifying the target audience needs. Two focus groups were conducted: one with students of hispanophonic speakers (four Ecuadorians, a Mexican, two Argentinian and two Spanish students) and another composed of other language speakers. In this case, due to sample restrictions, this second group ended up being composed francophonic speakers (seven French and two Belgian students). The focus group were 90 minutes long and followed the method suggested by Debus (1998) consisted by introduction, preparation, group debate, closure, questions and next steps.

The design step consisted on using brainstorming techniques (used in the art of ideation), prototyping, testing and selection (OSTERWALTER; Pigneur, 2010). The ideation process followed the principles of ideation technique, consisting of team composition, immersion, expansion, selection criteria and prototyping, as previously described. The team was composed of the directors of marketing and incoming areas and the president and vice-president of iTeam. The participants were introduced to the business model canvas, processeses of designing business models, information about the international market of educational exchanges, behaviors of foreign students, international panorama of Portuguese as a foreign language and the basic aspects of teaching Portuguese for foreigners. After the exhaustion of the brainstorming process, criteria for selection of the most viable ideas, guided implementation time and increase on the competitive advantage were raised.

Based on the information raised, we prepared the business case with cost sheets and revenues for each of the business models created. We considered only the cost of the hour of the teacher in this case, a more unsophisticated analysis, once the costs depend on the didactic course planning and teaching materials desired by the teacher, purposes that are beyond the scope of this study.

For the closure of the data analysis, a new focus group with the same population was performed to validate the developed and proposed clarification of doubts. Again, two focus groups were conducted using the same patterns of empathy map and methodology Debus (1998). The focus groups had a shorter duration of forty minutes.

4 Results

The results of the phocus groups are presented in a table, so that it is easier to view the differences got between the two groups, the hispanophonic and the speakers of other languages. In the phocus group, the participants were stimulated to create a character facing the same situation they face and then tell what this character 1) sees; 2) hears; 3) thinks and feels; 4) says and does; 5) feels as a pain; 6) feels as a gain.
### Empathy Map

<table>
<thead>
<tr>
<th>See</th>
<th>Hispanophonics</th>
<th>Other Language Speakers</th>
</tr>
</thead>
</table>
|     | • More critical point of view about violence, poverty and inequality  
     | • Brazilian fauna and flora  
     | • Brazilians are welcoming and kind to foreigners  
     | • Brazil is less conservative than their countries  
     | • Proximity with other hispanophonic students | • Different architecture, commerce, buildings, fashion and food.  
     | | • Brazilians are welcoming and kind to foreigners  
     | | • Difficulty with the language barriers and integration |
| Hear | Warnings about security  
     | Brazilians do not think they are foreigners due to their physical similarities  
     | Brazilians incentivize them to travel and explore the country  
     | Friends, roommates, buddies, iTeam and university as main source of information about the city  
     | Curiosity about why choosing Brazil | Constantly questioned about their countries stereotypes, Brazilian music and warnings about security  
     | | Brazilian daily expressions and incentives to make them speak Portuguese instead of French  
     | | Main subjects: travelling, parties, classes, countries, France and Brazilian music  
     | | Friends, roommates, buddies, iTeam and university as main source of information about the city |
| Think and feel? | Personal and professional development*  
     | Studying in a Brazilian university will enhance their Curriculums  
     | Learning to make decisions for their own lives and experience independence and developing new competencies  
     | Networking, making new friends  
     | Tourism, learning about Brazilian culture and learning Portuguese  
     | Afraid of being homesick, run out of money and not enjoying as much as they could | Travelling and enjoying the nice weather  
     | | Dating, making friends  
     | They are not interested in professional development during their stay in Brazil. Not clear professional ambitions.  
     | Not understanding the language generates insecurities, frustration and fears. (“Are people talking about me?”, “I don’t understand this class!”) |
| Say and do? | Learning how to cook  
     | Adjusting easily to the Brazilian way of living  
     | They are more extroverted and feel more free in Brazil  
     | Despite Portuguese classes, the language is still a barrier to understand jokes and daily expressions | They are more extroverted in Brazil and change their personalities to adapt themselves in the country  
     | | Despite Portuguese classes, the language is still a barrier to understand jokes and daily expressions  
     | | Homesick, insecurity in Street, worries about violence  
     | | Bargains and negotiates prizes  
     | | Tourism  
     | | Interacts easily with Brazilians because they do not look like typical Brazilians  
     | | Meets with people, dances, goes to the gym, goes to nightclubs, plays video-games and eats typical food |
| Pain | Frustation for not being corrected when speak wrong language (Portuñol barriers)  
     | Cultural differences and habits (“jeitinho brasileiro”, pontuality, etc) | Frustation for not understanding the language entirely and fear of speaking bad Portuguese  
<pre><code> | | Cultural differences and habits (“jeitinho brasileiro”, pontuality, etc) |
</code></pre>
<table>
<thead>
<tr>
<th>Challenge</th>
<th>Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sharing their rooms and houses with other students</td>
<td>• Homesick, French kitchen</td>
</tr>
<tr>
<td>• Not learning typical dances such as samba, forró, etc</td>
<td>• Being alone</td>
</tr>
<tr>
<td>• Homesick, French kitchen</td>
<td>• Dealing with local services</td>
</tr>
<tr>
<td>• Being alone</td>
<td></td>
</tr>
<tr>
<td>• Dealing with local services</td>
<td></td>
</tr>
<tr>
<td>• Development of new competencies and being a better human being</td>
<td>• Being approved in disciplines</td>
</tr>
<tr>
<td>• Fluency in the language</td>
<td>• Fluency in the language</td>
</tr>
<tr>
<td>• Making friends from all over the world and networking</td>
<td>• Making friends from all over the world and networking</td>
</tr>
<tr>
<td>• Professional internships</td>
<td>• Professional internships</td>
</tr>
<tr>
<td>• Tourism, learning about Brazilian culture and playing soccer</td>
<td>• Tourism, learning about Brazilian culture and playing soccer</td>
</tr>
<tr>
<td>• Prepare for a masters degree in Brazil</td>
<td></td>
</tr>
</tbody>
</table>

Based on the information collected, some business plans were created and tested. All these four models proved to achieve the students’ needs and interests and should be offered so that the course may be successful. It means institutions should offer different options to students for the learning to be attractive and effective.
### Compared Business Models

<table>
<thead>
<tr>
<th>Customer Segments</th>
<th>Cost Driven 1</th>
<th>Cost Driven 2</th>
<th>Partnership Driven</th>
<th>Value Proposition Driven</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Value Propositions</strong></td>
<td><strong>Concept</strong></td>
<td><strong>Concept</strong></td>
<td><strong>Concept</strong></td>
<td><strong>Concept</strong></td>
</tr>
</tbody>
</table>
|                   | • Well-experienced teachers in Portuguese as a second language area  
|                   |   • Applicable to professional and university activities  
|                   |   • Continuous interaction with the teacher  
|                   |   • Insert foreigners in national culture and local reality  
|                   | • Development of researches and trainings with local companies and associations  
| **Basic Portuguese** |   • 1 weekly class (1 hour and 40 minutes)  
|                   |   • 1 hour of group situational class  
|                   |   • Directed to daily needs  
|                   |   • Adequate didactic materials  
|                   |   • Division between hispanophones and speakers of other languages  
| **Portuguese for Proficiency Exam (Celpe-Bras)** |     • 2 weekly classes (1 hour and 40 minutes)  
|                   |     • Didactic material oriented to the exam  
|                   |               |               |                     |                         |
|                   | • International high school students  
|                   | • International students in higher education (undergraduate / post)  
|                   | • International short-term students (teachers or visiting researchers)  
|                   | • International students in professional internship  
|                   | • International students in volunteer work  

<table>
<thead>
<tr>
<th><strong>Concept</strong></th>
<th><strong>Concept</strong></th>
<th><strong>Concept</strong></th>
<th><strong>Concept</strong></th>
</tr>
</thead>
</table>
| • Well-experienced teachers in Portuguese as a second language area  
|   • Applicable to professional and university activities  
|   • Continuous interaction with the teacher  
|   • Insert foreigners in national culture and local reality  
| • Development of researches and trainings with local companies and associations  
| • Directed to daily needs  
| • Adequate didactic materials  
| • Division between hispanophones and speakers of other languages  
| • 2 weekly classes (1 hour and 40 minutes each)  
| • Didactic material oriented to the exam  
| • Course entirely focused on |

<table>
<thead>
<tr>
<th><strong>Basic Portuguese</strong></th>
<th><strong>Portuguese for Proficiency Exam (Celpe-Bras)</strong></th>
</tr>
</thead>
</table>
| 2 weekly classes (1 hour and 40 minutes)  
| Didactic material oriented to the exam  
| Course entirely focused on |

**Note:** The table above outlines the comparison of different business models focusing on their customer segments and value propositions.
<table>
<thead>
<tr>
<th>Channels</th>
<th>• Campuses units e-mail list</th>
<th>• Social Media (International Office, iTeam, viral);</th>
<th>• Foreigner’s reception day;</th>
<th>• Workshops with associations that work with high school exchanges</th>
<th>• International and volunteer internship organizations</th>
<th>• FEARP/USP website;</th>
<th>• Posters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Relationships</td>
<td>• Personal assistance</td>
<td>• Co-creation</td>
<td>• Community</td>
<td>• Follow-up</td>
<td>• Co-creation</td>
<td>• Community</td>
<td>• Personal assistance</td>
</tr>
<tr>
<td>Revenue Streams</td>
<td>• Fees</td>
<td>• Fees</td>
<td>• Fees</td>
<td>• Sponsorship</td>
<td>• Fees</td>
<td>• Sponsorship</td>
<td>• Fees</td>
</tr>
<tr>
<td>Key Resources</td>
<td>• Teacher</td>
<td>• Methodology and materials</td>
<td>• Infra-structure (rooms, projectors, etc)</td>
<td>• Development of materials for classes</td>
<td>• Relationship and follow-up of students</td>
<td>• Classes</td>
<td>• Development of materials for classes</td>
</tr>
<tr>
<td>Key Activities</td>
<td>• Development of materials for classes</td>
<td>• Relationship and follow-up of students</td>
<td>• Classes</td>
<td>• Development of materials for classes</td>
<td>• Relationship and follow-up of students</td>
<td>• Classes</td>
<td>• Development of materials for classes</td>
</tr>
<tr>
<td>Key Partners</td>
<td>Tracking the language Exchange program</td>
<td>Events (trips, confraternization events, etc)</td>
<td>with companies</td>
<td>Classes</td>
<td>Tracking the language Exchange program</td>
<td>Events (trips, confraternization events, etc)</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>• Campuses Commissions of International Relations (CRints) (undergraduate or higher)</td>
<td>• Campuses Commissions of International Relations (CRints) (undergraduate or higher)</td>
<td>• Rotary and LionsClub (high school)</td>
<td>• AIESEC (profesional and volunteer internships)</td>
<td>• Academic Center Flaviana Condeixa Favareto (CAFCF) (management with school of languages)</td>
<td>• Local students interested in being in contact with international students</td>
<td>• Companies interested in developing research and trainings with foreigners (export associations, companies in internationalization process, etc)</td>
<td>• Campuses Commissions of International Relations (CRints) (for undergraduates or higher)</td>
</tr>
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<td>• Rotary and LionsClub (high school)</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost Structure</th>
<th>• Hour/class</th>
<th>• Material (photocopies, printing, etc)</th>
<th>• Events</th>
<th>• Travel costs</th>
</tr>
</thead>
</table>
5 Conclusions and recommendations

The analysis of the panorama of student mobility market showed an optimistic and extremely convenient market scenario in Brazil for the development of the teaching of Portuguese as a foreign language. Despite the development and expansion of this area, courses in the country grow at a rate slower than necessary. This may result in unsustainable processes of internationalization and consequently in lack of credibility of international mobility programs of higher education in Brazil.

The specificities for teaching foreign language impose barriers and challenges that emphasize attention to recruit a professional for teaching. Lack of trained manpower for teaching Portuguese as a foreign language can result in the selection of professionals not yet prepared to perform the activity, especially in universities with no research in the field. The adoption of Celpe Bras as proficiency assessment tool implies a model even more specialized, due to the particularities over other language assessment tests. Indeed, teachers must have profiles and skills that exceed the abilities and pedagogical approaches mentioned in the theoretical framework, with a profile of extreme pro-activity, curiosity and quest for excellence in education, in order to overcome the barriers of lack knowledge and experience.

The evaluation of empathy maps and questionnaires revealed significant differences between the hispanophonic group and the speakers of other languages (represented by Francophones, due to the specificity of the sample), which exceed the linguistic and idiomatic sphere and show how cultural differences, economy and perception of Brazil directly influence the perception of the Brazilian-Portuguese language learning. Foreign students relate mainly to university students and are strongly influenced by members of the academic institution that welcomes them, like the professors and university bodies. Therefore, the university and agencies involved in the communication and preparation of the reception should be closely aligned to promote and encourage the participation in the Portuguese teaching programs. The need of learning the language of the country for survival, adaptation and growth during the exchange experience should be specially reinforced during the reception, the moment of integration and first impression of the university. Expressions that stimulate curiosity about the peculiarities of the Brazilian language can be used to spark greater interest in learning, as mentioned in the focus group of empathy for speakers of other languages map.

The major difference between the two groups lies in the audience interests and motivations for the choice of Brazil. Belgian and French students are extremely interested in tourism, Brazilian culture and knowledge of the country, and do not have a very clear vision of their professional and personal goals. On the contrary, Hispanic students perceive their chance to study in Brazil as a great opportunity for personal and professional growth and also as an excellent occasion to add experience to their career. This reinforces Brazilian leadership in Latin America as well as the leadership of the University of São Paulo in international rankings, in contrast to the European vision of peculiarity
about the country. Speakers of other languages have more difficulties in adjusting their daily lives and being independent due to language barriers, which shows on the most basic levels the need for more situational lessons, guided and oriented in daily survival activities in the country. Several times during the focus group discussion, the language was cited as a major problem of the adaptation of French and Belgian students in Ribeirão Preto. Both groups reported major concerns about safety on the streets, something that should be worked on in the early stages reception with students in order to prevent future problems with students and hinder the process of internationalization sustainable. The discussions about the differences between Brazil and their countries of origin had great commitment and interest of students, which reinforces once again the need of using intercultural approaches to teaching Portuguese as a foreign language.

The main reasons to choose Brazil are tourism, learning the language, knowledge of Brazilian culture and the image of the country. Among major complementary activities to be used for teaching Portuguese as a foreign language are, in order of preference, tourism, Brazilian culture, internships and fellowship with companies and in the end sports. The results obtained are against the market research of the Brazilian Ministry of Tourism. These themes should be incorporated into the Portuguese course, by uniting tourism factors and Brazilian culture. The Hispanic group proved even more interested in Brazilian culture than speakers of other languages. Significant differences in incentives for the coming of Hispanic foreign students by their governments or universities of origin were found. Topics related to the marketing of the university exchange programs, convenience of access to programs and incentives from Brazilian government had lower grades, which may suggest that the promotion of educational exchanges by USP and the Brazilian government are still insufficient and not consolidated. This analysis suggests the need of even greater investments in communication, promotion and expansion of university teaching programs internationally. The internationalization process is still new and so, requires more investments, more persuasive clarity and materials to encourage exchange carried out in the country. As the studies of Brazil (2010), among the key differentiators of choice in the exchange are the quality of education, the recognition of the degree, convenience of university admissions, communication and promotion of the destination and means of communication and information (Internet as the primary means of access to information).

The big difference between the two samples consisted of interest in achievement and proficiency examinations by the Hispanic group with top marks, as opposed to the other group. The authorized conclusion is that in addition to offering specific preparatory courses for Celpe-Bras, classes at the basic level for Spanish speakers should approach the exam during class, as the practice of exercises and simulations adapted to the level of reality and language they have. This group also found that the courses targeting proficiency examinations are an important differentiator for choosing the course.

Creating different value propositions, according to the intention of payment reveals the flexibility and adaptability that Portuguese courses for foreigners should adopt. In the case of cost reduction, classes may be combined with exchange practices with language
students (guided tours), situational lessons together, sponsorship and research with companies. In the case of an extended course without cost reduction, the course can have the layout of two classes per week. In all cases, we sought to create proposals that complement and add value to students. Certain proposed programs such as exchange language or conducting surveys can occur in any course. Adopting a fixed model is not necessary since extracurricular factors and interaction with companies have very high degree of reliability. In this case, we sought to stick to the number of study hours required per week.

The conclusions perceived here can be easily implemented in other higher education institutions with similar realities. For universities granted only with public budget, the program should be implemented along with associations, foundations or other entities in order to facilitate and expedite the implementation of the program. It is strongly recommended a specialized team responsible for managing the program to perform the activities of hiring teachers, monitoring, promoting and organizing the course.

As Brazil is a big extension of land where only one single language is spoken, the inhabitants don’t feel the need of speaking any other language. It means any foreigner who wants to live in Brazil, study or simply go on a tour around the country should learn at least the basic of the language to be able to subsist. Therefore, the scenario for courses of Portuguese for foreigners in Brazil is really optimistic once economics put the country as a target for several professionals and students.
Small Business Innovate in Beauty and Personal Care Sector in Brazil

Andréa Sekeff, Araken Lima, Patrícia Peralta

1Sebrae, Universidade Corporativa
2INPI, Academia de Propriedade Intelectual e Inovação
3INPI, Academia de Propriedade Intelectual e inovação

Abstract:
Despite the controversy surrounding the right to protection of intangible assets, Intellectual Property has established itself as a strategic institute of market action. Information technology and communication, which dominate as economic paradigm from the late twentieth century, intensified the importance of intangible assets for both large and for small businesses. The innovation in the small business environment happens with specific peculiarities. Small firms come into evidence, among other things, the generation of employment and income, the ability to respond quickly and dynamic in meeting the needs of the market. Brazil closed the year 2013 as the third best market in the world in beauty and personal care industry, overcoming Japan, second study by AT Kearney, who computed the large to small businesses. Despite being an industry dominated by large company - representing 73% of the sector's revenues in 2012, according to the Brazilian Association of Toiletries, Perfumes & Cosmetics Industry (ABIHPEC) - small businesses are highlighted when betting on innovative products or services to a specific audience.

Keywords
innovation, small business, knowledge, beauty and personal care.

1 Introduction
Small businesses have their own peculiarities in the context of innovation. The way it is the transmission of knowledge, of how innovation is presented and the main endogenous and exogenous aspects of the segment needs to be analyzed to understand the routines in these companies. The segment covers a broad spectrum of activities, encompassing the various sectors of the economy. This means that the micro and small enterprise (SME) offering sophisticated technology-based services to handmade products.

Despite this heterogeneity, small businesses emerge with common to virtually all sectors in which they operate features. The peculiarities of small businesses, such as predominance of tacit model of the encoded; responsiveness; lean structure; little bureaucracy; difficult access to credit; and low level of education of managers, lead to the understanding that even with the evolution of the creation of a favorable legal
environment performance, the sector still lacks the basic prerequisites that enable its evolution and growth.

As of 1970, there was a theoretical effort to understand the dynamics of micro and small business driven by "crisis of Fordist standard" and the rise of a market driven by companies that exploit information and communication technologies (ICTs). To understand the dynamics of small business, this work is divided into three parts, besides this introduction. At first, it will be contextualized, conceptually, innovation in the business environment and its relation to the transmission of knowledge and learning in the enterprise environment.

Then the scenario of small businesses is presented for understanding the field around them, how they fit into the economic dynamics, its major challenges, institutional constraints and public policies are some of the issues to be addressed. Attention will also be around indigenous issues, as these companies are organized, how they work, what is the job profile of their employees, gaps faced and how it fits innovation.

Finally, case studies of beauty and personal care industry, small business entrepreneurs who can keep up with new trends dictated by the big companies that dominate the industry are presented. The conclusion presents the challenges of the segment. The contribution of this paper is the ability to see the main advantages of the integration of innovation into the routine of small businesses, in addition to highlighting its peculiarities, weaknesses that hinder its growth and joint actions for generating a favorable environment for the practice of codified knowledge and adoption of strategic assets of Industrial Property.

2 Innovation in Business

Innovation is identified as a major factor of economic transformations since the British Industrial Revolution in the eighteenth century, through the advent of electricity in the late nineteenth century until today, when information technology become recognized as the main driver of development. Nowadays, the subject regains evidence mainly driven by the peculiarities of the Knowledge Era, when innovating, for most companies, is a matter of survival and market conquest.

The new ways in which innovation is presented in the business environment highlight the issue strategically. Innovation is recognized as a practice that does not come today. Literature comes to pointing it as a historical phenomenon, which manifests itself at different times, with specific impacts. In this context, innovation broadens its spectrum of activity and extends its reach beyond the research and development (R&D), generating integration between the various sectors of the company, whether through the area of product design, creating new processes or conception of routine practices of the company. (AROCENA; SUTZ, 2003).
Innovation has become essential to maintaining competitiveness tool, contributing to the passage of the economic cycles. Joseph Schumpeter, in his classic, "Capitalism, Socialism and Democracy" (1942), explains that when a new economic phase begins, the predecessors paradigms remain for a period until the transition does occur. The "creative destruction" of business cycles requires time for its maturation. These cycles are constructed and destroy not necessarily eliminating each other. There is a passage from one paradigm to another, with points of intersection that allows coexistence to a transformation.

Cycles gain a clear understanding from new trajectories can therefore begin with the Industrial Revolution, followed by the Age of Steam and Railways; Steel and Electricity; the Age of Oil, the Automobile and Mass Production (Fordism); and the current was, Information, Knowledge and Communication characterized by the culture of the digital world with the technology of computers, microprocessors, in short, by the information revolution. It is in this scenario that innovation works hard on the economy.

As described by Schumpeter, the "technological change is the engine of capitalist development, the firm being the locus of action of the innovative entrepreneur and innovation development." (LA ROVERE, 2006, p. 285). Thus, to survive, companies need to innovate. The importance of innovation in business - large or small - will depend on how much it is needed as part of its competence core (core competency). In many cases, the industry in which the company determines the value scale of innovation in business performance.

Economic cycles, in turn, are driven by technological paradigms that correspond to procedures and routines dominant. The dynamics of paradigms generates, in turn, the path dependency (path dependence) of companies in relation to technology. Freeman and Perez (1998) found that each cycle adjustments are needed technological paradigms that market dynamics can adapt to new demands and at the same time create and erupt with new concepts. Technological revolutions change the way the production process takes place in firms, corresponding to the diversification of setting innovation. This taxonomy is represented by incremental innovations, radical, changes in technology and techno-economic system. Each of which can be well understood.

Incremental innovations are characterized by changes, sometimes simple, but they result in increased productivity and profit. Radical require resources, mostly bulky in R&D, with recurring routine in large enterprises. Innovations in the technological system combine radical and incremental innovations and reach a broader market. "They are based on a combination of radical and incremental innovations, together with organizational and managerial innovations affecting more than one or a few firms." (FREEMAN; PEREZ, 1988, p 46).

Finally, the techno-economic changes involve the trajectories of engineering, including products and processes. The techno-economic stresses economic factors in the performance analysis of innovation and technological trajectory. This paradigm states that each phase only becomes standard with the close of each business cycle. The
intensity of how innovation is presented, too, will depend on how the company incorporates. In this context, small business found in the path of incremental innovation competitiveness.

For each of these taxonomies, the strategic business model may vary in innovation offensive, defensive, opportunistic and traditional. Fitting the firm establish the degree of investment in R&D, the same can still reconcile different business strategies and innovation intensity. The passage of the Fordist paradigm for technological revolution brought about by the speed of the flow of information required of companies more flexibility in routine decisions. The Knowledge Age, the market must offer products according to customers' wishes, which corresponds to a transformation in corporate restructuring to meet the demands.

If the Fordism - period commencing from the 70s, characterized by vertical integration of production and production of standardized goods - products were available as the production capacity of the firm, the Knowledge Age, the consumer is the one who determines the training that the firm should develop and offer.

The crisis of the Fordist model of production and the acceleration of globalization are factors identified in the literature as responsible for the recovery of small businesses in economic development. The need for the emergence of more flexible business unrelated to the vertical pattern of production, model represented an opportunity for the emergence of small business as an alternative in response to market demand. Understanding the transmission dynamics of learning and knowledge in small business will allow an understanding of its endogenous and exogenous characteristics.

3 The Scenario of Small Business

Based on the information and communication technology economy, the challenge of transforming information into knowledge involves both the environment of large and small firms. Large firms tend to compartmentalize knowledge, while small business focused knowledge on specific tasks and actions with a beginning, middle and end. Regardless of how these firms deal with this intangible asset, information only becomes knowledge when it is possible to contextualize it in the routine of business, through coded and able to be replicated systems.

On one hand, codified knowledge can be readily transmitted, on the other, tacit needs a social environment to be transferred. Nonaka and Konno (1998) explain that the encoded and tacit knowledge complement spiral-shaped, where it has been implied becomes encoded and provides feedback on new knowledge, phenomenon called as "BA". This knowledge will be responsible for the generation of innovation, especially in the context of small businesses that have few resources available for R&D.

The transmission of codified knowledge happens more often in the routines of large companies, through the rules, regulations, manuals, administrative, meetings, systematic
data. In small business, tacit knowledge prevails, because the appropriation of knowledge systems are deficient. The biggest concern is the entrepreneur with the rotation of their employees, because as there is no planning in the encoding of this knowledge, turnover may represent financial losses for the firm's sustainability (waste of time and human resources).

It is this learning that innovation is still down timidly in micro and small business environment. At the same time they are able to generate speed, let the process of transmission of knowledge without control. For these and other issues, small businesses learn from day to day with their own mistakes, with improvisation a major factor.

Small businesses, according to the Brazilian Institute of Geography and Statistics (IBGE), Brazil represent the more than six (06) million micro and small formal enterprises. The segment accounts for 25% of Gross Domestic Product (GDP) and generates fourteen (14) million jobs, approximately 60% of formal employment in the country. These numbers reinforce how micro and small businesses are key in promoting economic growth, job creation and income and, consequently, improving the living conditions of the population.

Small businesses are presented with a diverse setting in the market. Whether through local productive arrangement (APL) - cluster of firms seeking benefits collectively and share costs and expenses - startup (emerging digital business), disordered clusters or incubators style. Even with this diversity in organizational form in the economic scenario, the micro and small enterprise, understood as a segment, presents a similar feature in its configuration and endogenous and exogenous relationships (Schumpeter, 1961).

The survival of small businesses is associated with periods of economic balance of the country - Brazil is emerging as a major emerging economies of the world - and the growth of schooling of the small business owner. There is a review of current research survival of small businesses that combine the high rate of closure of small businesses with lower education of their managers1. Table of schooling of small business entrepreneurs went through major transformation in the last decade, causing a transition to entrepreneurship for survival based entrepreneurship knowledge.

This framework was directly reflected in the expansion of the survival of micro and small enterprises. In 2013, based on data from the Bureau of Internal Revenue is shown that the survival rate exceeds 70%, it means, seven in ten small businesses survive in Brazil. Of every hundred public firms, nearly 80 remain active in the first two years of life. Then appear trade (77.7%), civil construction (72.5%) and services (72.2%). Ten years ago, only 50 % of small businesses survive, i.e., each two businesses open, one survives. Of this group, the firms in the Southeast are those with the highest rate of survival. Rates are approaching those shown by countries like Italy, Spain and Canada.

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1 Study by the Brazilian Service of Support for Micro and Small Enterprises (SEBRAE) points out that most small business owners have no more than high school. (SEBRAE 2013).
Since the 1990s, government policies have intensified actions to insert the micro and small enterprises in the growth agenda of the country's economy. As highlighted by Lemos (2003), two factors have marked this initiative. The first occurred in 1972, when the Brazilian Center for Managerial Assistance to Small and Medium Enterprise (Cebrae still written with "c" then becomes the Brazilian Service of Support for Micro and Small Enterprises, Sebrae, was created in 1990). In practice, this is an organization working to promote the ambience of small business. The second factor concerns the impact of structuring a tax environment.

Since the creation in 1984 of the Statute of Micro (Law n º 7.256/1984) offered, in general, "favorable conditions for micro enterprises as ease in registration of new developments and tax and tax exemption." (ALMEIDA, 2012 p. 56). The Statute was the start of construction of an environment for creating a momentum aimed at MPE. He joined the Statute of Micro, on december 5, 1996, the creation of the Law of Micro and Small Enterprises, the integrated system of tax collection - Simples Nacional - including Corporate Income Tax (CIT), tax on Industrialized Products (IPI), Social Contribution on Net Profits (CSL), Social Integration Program (PIS/PASEP), Contribution to Social Security Financing (COFINS) and Instituto National Social Service (INSS).

In 2007, ten years later, the National Simple revoked entering its place Complementary Law (LC) n º 123/06, General Law of Micro and Small Enterprises, which provides in article twelve new configuration to the National Simple or "Super Simple" (entered into force on july 1, 2007), to unify the whole, eight federal, state and local taxes, including Value Added Tax on Goods and Services (ICMS) and Service Tax (ISS) to existing ones. Thus, the General Law established the bureaucracy in the form of compliance with tax obligations and increased participation of MSEs in Government procurement, and the creation of mechanisms to reduce informality, with the creation of the legal concept of Single Microempreendedor. The General Law of Micro and Small Enterprise became the main reference framework for definitions related to the development of this sector policies.

The creation of an enabling environment that allows the survival of small business is linked to the need of minimizing the barriers faced by this segment, which has peculiarities. One of the critical factors obstacle concerns the access to credit for small businesses. By their very nature, small businesses have a high degree of mobility in their operating structure. This flexibility is made possible mainly by lean feature that MPE is required to maintain, about eight employees on average (SEBRAE, 2013). A peculiarity reflecting in high flexibility of small business to adapt to market changes.

The environment of the micro and small business is constantly changing, leaving the role of innovation coupled with uncertainties in this scenario. Small businesses are recognized by decision-making in an agile manner, with few bureaucratic procedures, and therefore, small changes in processes can generate more efficiency and profit in these environments. Despite this fact, there are few that take an innovative approach in their management.
Compared with large enterprises, small business invest too little in R&D. Survey with 4,200 small businesses produced by Sebrae, shows that a new process or method is the primary way of innovation occur. And the micro and small businesses that invest in innovation recognize that this application was reflected in sales and business performance. In this survey, the purchase of machinery and equipment and the computerization of business processes management are prime examples of innovation cited by small entrepreneurs. The amount of resources spent by these firms in innovation actions did not exceed US$ 1,13 (thousand and thirteen dollars).

The environment of firms need to be aware and adapt to situations in the external environment. The ability of learning in small business happens in a peculiar way and as the industry, performance may suffer subtle differentiations. This sectoral analysis reflects the analysis of organization segment, with its specific problems and unique perspectives. The sectoral characteristics presented in the large enterprise environment are also reflected in the behavior of small business. "The existing debate in the literature stems from the fact that the innovative capacity of SMEs depends on several factors related to the organization of the sector and the innovation system where they are."(ROVERE, 2006, p. 146).

The industry of beauty and personal care gained momentum in Brazil from the growth recorded in recent years. Each month they are open about 7000 new salons across the country. Facing barriers recognized segment, entrepreneurs, this sector bear the constraints creatively. Incremental innovations in these projects contribute to the micro and small enterprises ensure sustainability and competitiveness in the big brands that dominate the sector.

From a survey conducted in the portal Sebrae News Agency - agency specializing in spreading news about the small enterprises - success stories, representative of the beauty and personal care industry segment will be presented. The study methodology was based on a survey of major cases reported by the agency in the last ten years, when it gave the growth of the Brazilian economy, bringing hundreds of workers to the labor market. Period in which spending on cosmetics, toiletries and beauty services increased by 124%, from R$ 26.5 billions in 2003 to R$ 59.3 billions in 2013.

4 Innovation in Small Business of Beauty and Personal Care

Brazil finished 2013 as the third best market in the world in beauty and personal care industry, according to a study from AT Kearney2, who computed from large to small businesses. Despite being an industry dominated by large firm - representing 73% of the sector's revenues in 2012, according to the Brazilian Association of Toiletries, Perfumes

2 Study by AT Kearney for the purpose of assessing the market of beauty and personal care.
Cosmetics Industry (ABIHPEC) - small businesses are highlighted when betting on innovative products or services to a specific audience.

The beauty sector expands in Brazil every year its market performance. According to a survey by Data Popular Institute\(^3\), brazilians spent US$ 26,8 billion with products, beauty and personal care services in 2013. During this same period, the industry was responsible for generating 5.6 million opportunities job. Sector revenues increased from US$ 2,2 billion in 1996 to US$ 17,2 billion in 2013. Of 2,426 firms operating in the sector, 2000 are small, opting National Simple. It is the second sector investment in innovation in Brazil, behind only, the pharmaceutical sector.

To reach this position, entrepreneurs of small businesses make use of innovation to ensure the competitiveness and sustainability of the enterprise on a market dominated by the big brands. The cases reported by Sebrae News Agency\(^4\) show that most small firms innovate in process. The entrepreneur Rogério Santos, for example, implemented differential time to gain market share. The opening hours of the RetroHair is 12 to 11 p.m.. About 60% of the movement happens between 7 and 11 p.m.. The firm has been operating for less than a year, but the movement guarantees a working capital needed to operate the business.

The deployment of incremental innovation led business expansion and the method has become an asset for expansion through a franchise network and partnerships with competitive brands in the beauty industry. The creation of a structure through organized clusters corresponded to one of the solutions also encountered by small businesses to compete in the market dominated by large companies. The largest beauty fair in the country, Beauty Fair, is an example where industry professionals organize to submit news, do business, exchange experience and follow the latest releases in the market.

The fair brings entrepreneurs of small businesses the opportunity to follow the market trends, which are usually dictated by the big brands. This is one of the alternatives found to update and prepare these small businesses to receive and implement the innovations offered by large firms. In this sector, the supply chain is characterized by trends set by major companies and disseminated by small businesses. To Acs (2005), small businesses act as agents of change. In its view, the firm's growth depends on innovation and human capital formation. Public policies then contribute to the creation of this favorable scenario.

Small businesses in the beauty and personal care industry work with about eight employees. In this context, guidelines and knowledge are passed on without coding. At the same time it generates agility, makes the transmission process of the open knowledge of control. For these and other issues, small businesses learn from day to day with their own mistakes and improvisation. This barrier is one of the main obstacles to

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\(^3\) Instituto de pesquisa de mercado.

\(^4\) Promotion agency specializing in small business.
the development of the segment in the industry. It is this learning that innovation is still
down timidly in micro and small business environment.

The entrepreneur Ricardo Ramos, lab owner Nanovetores, which created its own brand
and has been gaining ground in the beauty industry, shows how successful these SME
behave to establish this competitive market. The Nanovetores, for example, provides for
the cosmetics industry microscopic capsules of vitamin C and caffeine, substances that
increase the efficiency of products. Sustainable growth is a set of factors, where
innovation and the assets of Industrial Property (IP) support the strategy of the firm,
which already has nine (9) patents and trademark of the National Institute of Industrial
Property (INPI).

The main barriers for small businesses in the beauty and personal care to access the IP
industry are, in general, the lack of knowledge of how the protection system works;
filling requests comprises an item that prevents such entry; these entrepreneurs have no
clarity about the importance of Intellectual Property as a strategy to be adopted in the
management of the business; still consider the system very complex. Following the line
of understanding of Industrial Property as an important inducer of economic
development of a country, the Knowledge Age, the great challenge is to democratize the
use of the protection system, generally recognized as a structure with high costs and
restricted use. (COOKE; WILLS, 1999).

The success stories reported by Sebrae News Agency shows how these entrepreneurs
are managing to cope with these constraints. The entrepreneurial Fabiana Gondin
created a tool for classification of volume type, size and intensity of female hair growth,
which reduces up to 30 % spending on hair products. The method directly reflects the
profit of any beauty salon, which was achieved by Hairsize, Fabiana Gondin firm.
Registering the brand is priority businesswoman, but the method is already being
multiplied by salons around the country. Today, at least a hundred small beauty
businesses have already acquired the tool and apply the learning in management
routines. (BOSCHERINI; YOGUEL, 2000).

The Hairsize is a practical example of the transformation of tacit knowledge into
codified. The small business adopted the codification of knowledge, leading to similar
tributes to tangible assets information, practice approaching a commodity, turning the
process into a profitable business. Innovation has been transformed into this method and
transfer codified knowledge happens through a consultancy that is passed by the
entrepreneurial own.

The method allows the conscious consumption and reduces water waste and beauty
products. The knowledge arose in their routine work. From daily observations, Fabiana
found that there was no standardization when it came to hair coloring. The inspiration
came from the kitchen, heads that weigh and measure foods in a systematic manner to
ensure the quality standard. Besides working experience in the salon itself to reach the
ideal model, innovation has undergone more than eight years of testing in salons with
the help of professionals to then reach a satisfactory methodology.
Today, the replication of the methodology is part of the profits from Hairsize. The management of the hall brings sustainable awareness, and more efficiency in resource materials. The control of materials reflects the profits and then allows the Hairsize emerge as a successful business model. It is this form of knowledge not recognized within the formal system of protection of industrial property, but that the systematization methodology allowed replication and use as a competitive strategy.

Small businesses in the beauty and personal care industry implement incremental innovations, ally, gradually, Industrial Property and learn, day by day, using the same strategies of large enterprises. Even in a limited way, this learning ability has revealed Brazil as the second best and largest market of this sector in the world.

5 Main Results

Small businesses in the beauty and personal care industry with more than two years of operation, combined with innovation survive. Small changes in routine ensure more efficient management of these firms. It is the second most innovative sector in Brazil, after the pharmacist. Despite the low investment in research and development, entrepreneurs of micro and small businesses recognize that when they make use of innovation for more efficiency and financial profit. The main results collected from the survey are presented below.

Tacit knowledge prevails over encoded. Moreover, the structure of operation brings about eight employees with high turnover, making the detention of vulnerable knowledge. In these firms, the knowledge is concentrated on tasks. So that they can become competitive in this industry, small businesses stand out when they can identify a niche activity or offer differentiated products. Creativity brings the possibility of small businesses conquer specific clienteles. And innovation prevails in the business management process.

The incremental process innovation brings effective management solutions that reflect the firm's profit. Most of these entrepreneurs have a low level of educational attainment. This reality limits the knowledge and use of intellectual property protection system. Entrepreneurs consider this segment the IP system complex and difficult to access, with bureaucratic rules and high costs. On the other hand, when given guidance and consulting business - in the cases reported and registered by Sebrae - these companies fall protection of intangible assets as part of company management. Small businesses in the beauty industry are outside of the production chain, but show up competitive when combine the same rules of the major brands, demonstrating its ability to operate in the market, with bargaining power and performance in partnerships.

Brazil is the third largest market in the world in beauty and personal care industry and first in perfumes and deodorants, and small businesses are concentrated mainly in salons in direct sales and network expansion franchise. The growth of the sector in the country and the entry of new small businesses are directly associated with the expansion of the
middle class, when there was a migration of people from the lower classes to higher over the past ten years. Most of these enterprises have barriers in the category knowledge management, before that, those who manage to overcome these constraints are out in the market and are gaining in competitiveness. Marketing, finance, visual store and innovation are the most consultancies hired by small businesses. Empowering these entrepreneurs in managing their own business is the biggest challenge of institutions working to allied sector growth.

6 Conclusion

Innovation is still a challenge in routine small business because there are a number of barriers that prevent your practice. Moreover, the understanding of innovation as a broad process that has variously with a dynamic activities ranging from simple adjustments in business processes to investment in R&D, brought the discussion of this issue on the environment of SME. Situation favored also by the specific environment around this segment, comprising agile responses, reduced staff and flexibility in production arrangements.

The peculiarities of small businesses, such as predominance of tacit model of the encoded; responsiveness; lean structure; little bureaucracy; difficult access to credit; and low level of education, lead to the understanding that even with the evolution of the creation of a favorable legal environment performance, the sector still lacks basic prerequisites that enable its evolution and growth.

In this context, the figure of the entrepreneur small business has a role of great importance, because it is up to him also, among other challenges, get support from banks in providing credit in order to finance innovation. The investment is scarce, making it difficult and creates impediments. One solution proposed will planned induction of clusters. Where efforts can be summed since most of the problems faced by small businesses varies little, regardless of the form it presents itself.

Even if not ahead of investments in R&D, innovation generation, small businesses now show timid that you can incorporate their practical solutions in processes and routines that bring cost savings and greater efficiency. A simple example, but with small changes generate changes. The success stories highlighted by Sebrae News Agency are examples that deserve to be replicated. Small businesses in the beauty and personal care that make use of Industrial Property, incremental innovation and technology transfer to ensure competitiveness in the large firms that dominate the industry sector.
References


Supporting Networked Innovation Projects in Developing Market-oriented Solutions – the Case of an EU Collaborative Innovation Programme

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Abstract
Due to demographic change, public research funds have been directed to boost development of ambient assisted living solutions. This effort has been expected to create market for ICT-enhanced products and services, which could support older adults in to live independently for longer. However, the market for such products and services has developed rather slowly, and the uptake of the developed solutions has not always met the high expectations (Eberhardt, Fachinger, & Henke, 2010); hence it seems to be difficult to deliver on the promise that ICTs will help mitigate the economic and social impact of demographic ageing. In this paper, we present a framework for business support activities, which could help collaborative research and innovation projects in commercializing their ICT-based solution. The framework is based on an analysis of commercialization needs and requirements of European collaborative innovation projects funded by the AAL Joint Programme. The data set was collected during business development workshops with 50 different project consortia representing 117 individual partners notably including users, researchers, SMEs, 3rd sector organizations as well as industrial partners. The resulting framework covers (1) what can be done in ensuring projects are initiated in a way conducive to successful commercialization, (2) what can be done during execution of the project to support commercialization activities, and (3) how can project participants be supported after the financially supported collaboration phase.

Keywords
Networked innovation, market-orientation, ambient assisted living, EU research collaboration

1 Introduction
Horizon 2020, the European Union’s new Framework Programme for Research and Innovation, is focused on closer ties between the research community, industry, users and SMEs to boost economic growth in Europe. This focus on innovation closer to market constitutes a paradigm shift compared to previous EU framework programmes also reflected in the title of the programme. In this context, it is important to better understand the difficulties arising from the interaction of these diverse partners with different interests, cultures and know-how. Our study specifically focuses on such issues in the framework of a European R&D&I Programme that has already integrated the diverse stakeholder mentioned above (users, researchers, SMEs and industrial partners) since 2008. The Ambient Assisted Living Joint Programme (AAL JP) is an EU innovation
programme financially supporting the development of ICT-based solution addressing demographic ageing (AAL JP, 2014). The AAL JP projects are supported by private funds (from SMEs and industrial partners) as well as public funds from the EU and national sources. Therefore, the projects represent true public-private partnerships (PPPs). As an additional mandatory requirement, each project consortium also needs to include a user organization that can provide user feedback during the development of the solution. The AAL JP as an innovation programme defines the commercial goal for its projects very clearly: 2 to 3 years after the end of the funding period, the projects are expected to be in the phase of successful commercialization of their solution.

To support this ambitious goal, the AAL JP has assed and built a tailored, accelerator-type support framework for its projects on a European level. This paper describes this framework, which provides practical business development support for the networked, collaborative innovation projects supported by the AAL JP. The framework is based on needs-based analysis, which was performed to plan a full scale business support action (Isomursu et al. 2014). Our data set was collected during business development workshops with 50 different project consortia representing 117 individual partners notably including users, researchers, SMEs, 3rd sector organizations and industry. More specifically, the framework is based on an analysis of commercialization challenges and needs. This framework covers (1) what can be done in ensuring projects are initiated in a way conducive for successful commercialization, (2) what can be done during execution of the project for supporting commercialization activities, and (3) how project participants can be supported after the financially supported collaboration phase. This framework is currently being implemented in practice by the AAL JP.

We conclude with recommendations on how to utilize the strengths of multi-actor networked innovation projects with business development support activities. We hope that these can help individual organizations in planning and executing networked innovation activities, and give ideas for planning and organizing future and ongoing PPP innovation programmes.

2 Research method

2.1 Research design and setting

The study is based on a case study research design (Yin, 2009), and it involves extensive and interactive collaboration between the participants, so that they have an important role in shaping the themes that have emerged during the research process. Inductive reasoning has been used to build themes from data, and on the other hand research has also used deductive reasoning to check emerging themes against the data (Creswell, 2007). Hence, inductive-deductive reasoning has been used to work back and forth between the themes and the data until they establish a comprehensive set of themes. The research design embeds two units of analysis: individual projects operating within the R&D&I programme and the programme itself.
The research setting is the European innovation programme (AAL JP), which is financially and politically supported by 23 partner countries and the European Commission (based on Article 185 of the Treaty on the Functioning of the European Union TFEU). The programme supports the development of ICT-based solution addressing demographic ageing by providing funding to research projects. These research projects are formed by the international consortia including at least three Member states, one research body, one SME and one user organisations (European Commission 2014). Between 2008 and 2012 the programme funded 102 project consortia with 782 partners across Europe, and the projects participating in the case study were representing all phases of the project life-cycle (some projects were near the end of the funding period, while others had just started).

2.2 Data collection

Data collection was based on two primary data collection instruments: online surveys and facilitated workshops. In the first phase of data collection, a link to the online survey was sent together with the request to express interest in participating in the workshops. This survey was sent to all project partners funded by the AAL JP; mainly those who intended to participate in the forthcoming workshops also answered the survey. The survey focused on exploring previous experiences, knowledge of methods, and current activities related to business development.

Based on the answers, participants were selected to participate in the 5 transnational business development workshops organised in Paris, Stockholm, Budapest, Vienna, and Bilbao. The main selection criteria were (i) the participant’s desire to interact with others and (ii) the fit between their motivation to participate and the workshop objectives. Each of the selected participants received an additional online survey, which aimed at exploring the rationale of the company’s business model and design choices they had made regarding the developed solution. The survey also aimed at identifying the participants’ objectives, needs and challenges concerning commercializing of the developed solutions.

Each workshop included a dedicated section to work interactively in small groups (with 3-7 participants per group). Each group focused on the development of a business model of one pre-selected case. The facilitators of the workshops observed and took notes from the discussions during the group work. After the workshop, facilitators continued to provide business development support for the selected case companies. This continued interaction after the initial survey and the workshops was also utilized to collect more detailed information about the future needs that participants envisioned to confront during and after the project period.
Table 1. Data collection

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Type of data</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online survey</td>
<td>• Quantitative and qualitative data</td>
<td>• N=77</td>
</tr>
<tr>
<td>Online survey</td>
<td>• Qualitative data</td>
<td>• N=33</td>
</tr>
<tr>
<td>Facilitated workshop</td>
<td>• Written down observations from 5 business development workshop</td>
<td>• 20 small groups in total</td>
</tr>
<tr>
<td></td>
<td>• Canvas (post-it notes)</td>
<td>• Each small group worked about 2 hours</td>
</tr>
<tr>
<td>Emails, skype and/or face-to-face discussion</td>
<td>• Qualitative data from post-workshop interaction with selected participants</td>
<td>• 11 selected case companies</td>
</tr>
</tbody>
</table>

2.3 Analysis

We began analysis by writing a report of each of the workshops. These reports included also analyzing the answers of the online surveys related to the workshop. The analysis included basic statistical analyses of quantitative data, and collaborative qualitative content analysis of qualitative survey answers and workshop notes. These reports were commented by the other research group members and the expert review from the customer’s side.

In the next phase, individual reports were combined into the generalized findings. In this phase we started without theoretical preferences or a priori hypotheses, with an objective to identify patterns and construct propositions based on the data collected during the research process. Each of the involved researchers developed an understanding of critical issues and major challenges in the commercialization of project results. Based on the analysis and this understanding suggestions on how to improve market-orientation within the projects and the operations and management of the overall programme were developed.

These findings were validated by two rounds of expert review and presentation of the findings to public audience at the annual AAL Forum. First, external experts, who had not participated in the data collection but were experts on AAL solutions and markets, provided detailed written review about the findings. After their review additional discussions were organised between them and researchers to clarify unresolved issues. During a second validation round, the findings were validated by the experts involved in the management of the AAL JP. Finally, findings were presented to the AAL community at the AAL Forum 2012 in Einhoven. The presentation was followed by a panel discussion with AAL experts and the AAL community.
3 Framework for business support activities

A detailed discussion of the business support needs and requirements identified through our case study is available in Isomursu et al (2014). In this paper, we extend the analysis through presenting a framework of business support activities. The framework has the following two dimensions:

› **Timing.** Collaboration activities examined here are based on fixed-term project work, which has a specified schedule (typically 2 to 3 years). We propose that business support needs to be addressed not only during the research and innovation collaboration project, but also in activities preceding actual project work (such as selection of collaboration efforts to be supported with public funds), and activities to be done after the project (such as establishing contractual partnerships to continue collaboration).

› **Type of support mechanism.** The basic support mechanisms recognized in the context of a collaborative innovation programme are: (1) rules of the funding programme, (2) training and increasing awareness, and (3) networking and partnering.

3.1 Timing of business support

3.1.1 Before the start of the project

It was commonly noted that many decisions which are critical for success in accessing the market are already made before the collaboration project has even started.

**Rules of the funding programme**

The funding programme can define criteria to select projects that receive funding. This funding is often valuable to facilitate collaboration between partners who have shared interests and high level vision but unclear view on how the implementation of the service and the value co-creation between the partners of the service ecosystem. We identified critical issues regarding the selection criteria as follows:

- criteria to involve all relevant stakeholders
- defining flexible objectives and highly iterative R&D process to enable steering of the project’s goals when needed, and
- maturity of the concepts to be developed.

The AAL JP collaboration model, such as in most similar EU funding frameworks, is based on a fixed consortium. This means that it is rather difficult to add new partners once the project has been launched. On the other hand, one of the most important success criteria of AAL JP projects was stated to be the involvement of relevant stakeholders in the consortium. Because of these issues, it is critical that the rules and conditions set by the funding programme facilitate involvement of relevant stakeholders in the project consortium.
In order to reach valid conclusions about market potential of the solution, the collaboration project should be able to validate the value proposition in the value creation network. Since it is not often possible to validate these propositions before the project, during the execution many projects realize that initial hypothesis are not valid, and the development should be steered to the new direction. As a result, if these initial hypothesis defined in a project plan has to be followed too closely, the danger is that participating organisations lose motivation and focus merely on fulfilling the formal objectives of the project.

If the solution under development is technologically still very immature, the validation activities often concentrate on technical feasibility and stability, and the validation of the service value proposition and related value creation models are not performed. On the contrary, the funding criteria should ensure that the value of technological solutions is validated by other means before entering to long-term resource intensive product development phase. The results of non-technological validation can be then used to define what actually should be developed.

Training and increasing awareness

The majority of study participants (60%) stated that they were familiar or knew well business model analysis methods. However, further analysis of workshop data revealed that the practical business modelling and analysis work typically involved running everyday business activities, and not so much analysing new business opportunities and collaboration models. Increasing awareness of different types of value creation concepts during the phase when the collaboration partners are planning their project, could help select the right kind of partners for a project, as well as help identify alternative avenues for market entry with different partners.

Networking and partnering

An obvious challenge during collaboration preparation is that the right partners need to be found and involved. We claim that involving the right partners is a critical success factor for a collaborative innovation project. In addition to providing examples of successful value creation networks, networking support can be provided at networking events and through networking databases.

3.1.2 During the project

Providing commercialization support during the project can be effective when it smoothly supports and integrates with the actual work done in the project.

Rules of the funding programme

It was observed that during the course of the project as the knowledge about the solution domain increased, the need for involving additional stakeholders could arise. Therefore, flexibility in collaboration contracts and models would be needed to allow the project to add or change partners, if required.
Training and increasing awareness

Business development workshops, where the partners were brought together to discuss and develop business models and value creation concepts were found to be valuable tools for advancing market orientation. The projects struggled particularly with defining and validating viable business model and identifying proper market entry strategy in the immature AAL market. However, many of the projects had needs for more thorough support on business development, which couldn’t be provided within the implemented workshop concept.

Networking and partnering

As the funding rules may prevent addition of new partners, the projects can use other collaboration models to involve additional partners in validating the solutions or other business development activities. The collaboration programme could actively support projects in finding and establishing complementary collaboration relationships, for example, through encouraging collaboration between projects funded in the same programme, or with some other funding (e.g. national or EU framework projects).

3.1.3 After the project

As mentioned in the introduction, the AAL JP projects are expected to get their results to the market approximately 2-3 years after the end of the project. This means, it is expected that the partners will continue their efforts towards getting the solutions to the market even after the funding period has ended. Of course, as the collaboration consortium is no longer financially supported by public funds, this may take a more informal format.

Rules of the funding programme

The rules of the funding programme are unlikely to directly affect the collaboration after the project, but they certainly have indirect effects on how the project partners prepare themselves for activities performed after the completion of the funding period. We observed that project partners rarely made explicit plans on how to continue their collaboration: the end of the funding period was most of the time expected to be the end of the collaboration.

Training and increasing awareness

During our workshops, we observed that SME companies were the partners most willing to take the developed solutions to market. However, they often faced problems in financing the additional development work needed after the end of the funding period to get the solution to market. These companies thus need know-how and information about the funding opportunities and how to use those in solving this financing gap.

Networking and partnering
Over the course of its operation, the AAL JP has established a large network of end user organizations, business partners and academic institutions. This network of AAL experts can be a powerful resource for all actors, who aim to get their solutions to the European markets. Support activities for finding new customers or business allies could help those actors in market entry.

4 Conclusions and recommendations

The challenge of a collaborative innovation programme is that on the one hand this collaboration supported by public funding should be a high risk activity that cannot be justified from the perspective of existing business management without the public support. On the other hand, the innovation programme should support market-oriented activity that produces a high number of high quality solutions ready for market within 2-3 years after the end of the funding period.

As a result, there are only very few success stories, where business can be based on the initial vision of the project, and where the solution developed by the project consortium reaches the market within 2-3 years after the end of support through public funds. In many cases, the initial hypotheses are invalidated already during the project, but the project is continues nevertheless without redirection. In some other cases competitors move faster and implement a solution before the project is able to commercialize its own solution; the time needed from planning the project to the end of the project is usually already 3-4 years. In many cases the project concept might be viable, but it is never truly tested on the market, since none of the stakeholders have a personal motivation to take the risk and acquire financing for further development and commercialization of the solution.

In summary, our findings suggest that collaborations which are built around fixed partnerships, fixed project plans and long development time frames are very challenging in terms of attaining their commercial targets. Therefore, innovation programmes should be based – or more focused – on enabling co-operation of different types of complementary competencies that are highly motivated to work together. At the very least, innovation programmes should enable flexible steering of the project’s direction (if the consortia cannot be reshaped). By relaxing the focus on projects initial hypothesis, and using the project more as a framework for bringing competencies together to create and validate potential ICT-based service concepts, it might be possible to tackle both of the presented challenges of innovation programmes.

The findings of the study have already had an impact on the AAL Joint Programme. The AAL JP launched a scaled-up business support action in 2014, which offers several support services for the projects, which help companies to overcome their commercialization challenges. For example, the AAL JP is now providing individually tailored business development support as the main mechanism for providing help for individual projects and companies within the projects. This mechanism, which is based on face-to-
face interaction with projects, is expected to provide help to companies that struggle with business development and business modelling and help them steer their focus of the development in the right direction.

Another major challenge, accessing finance after the end of the period supported by public funds, is also tackled by this new support action we developed for the AAL JP. Companies that are evaluated to be potential candidates to receive private funding are provided tailored support and are connected with investors who specifically seek that type of investment opportunities (e.g. social investors). The AAL JP accelerator scheme also supports services tailored to projects applying for funding and for companies that seek potential deployers for their solutions. All these actions aim to increase market-orientation of the projects, and increase the effectiveness of public funding given to and invested by the innovation programme.

References


How to Change Payment Behaviour: A Mixed Methods Approach

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Abstract

Individuals do not always act as their attitudes suggest. This makes it difficult to predict behaviour and to identify starting points for behavioural change. Furthermore, especially in low involvement situations, people are reluctant to adopt changes and instead prefer to maintain the status quo.

The main focus of the research was to investigate how people change their method of payment method in low involvement payment settings and what measures might facilitate acceptance of new payment methods such as contactless payment (MasterCard PayPass, Visa payWave) among consumers. Based on extensive literature review, the main factors of behavioural change were identified and a framework for behavioural change developed. Building on this, a large-scale, multi-phase study had been conducted, combining different research methods to achieve the most valuable outcome for clients.

The study included three types of research methods, which were carried out sequentially:

First, a qualitative study (in-depth interviews) was carried out to gain insights into people's payment behaviour, especially to understand their underlying motives in choosing between different payment methods.

Second, building the core of the study, a field experiment had been conducted, for the purpose of testing different marketing measures (treatments) with regard to their effect on behavioural change and the use of new payment methods. The design included four treatment groups and one control group. The experiment ran for 14 weeks, covering more than 13'000 people.

Third, at the beginning and the end of the experiment, a gamified online survey was conducted to evaluate awareness, usage and attitudes regarding payment behaviour and new payment methods.

Key findings of the study indicated that treatments such as sales discounts, loyalty programs and promotions are likely to have a significantly positive effect on the usage of contactless credit cards and that the length of a treatment positively correlates with the probability of contactless credit card usage. In addition, prize competitions turned out to have a high impact on loyalty, but not on activating first usage.

Keywords

Payment behaviour, contactless payment, mixed methods, preferences, habitualisation, field experiment

1 Introduction

New payment methods such as contactless payment have been a highly discussed topic over the past few years. The term contactless payment refers to payments without the necessity to exchange cash or to read the magnetic strip at a terminal. Based on Near Field Communication (NFC) technology, transactional data on a card or other device are transferred via an integrated chip or antenna within a few seconds over short distances (own formulation according to work of Polasik et al., 2010; Adams et al., 2010). Compared to conventional means of payment like cash, it offers multiple advantages.
both on the macroeconomic as well as on the microeconomic level and comes along with benefits for consumers. Contactless payment reduces costs and transaction time and also helps consumers avoid the hygiene issues associated with handling cash. Despite these advantages, the number of contactless payment transactions has not risen in Switzerland as expected. This is due to, on the one hand, the complexity and high fragmentation of the payments market, which impedes the establishment of large-scale payment standards, and, on the other hand, the general scepticism of individuals towards adoption of new payment technologies.

2 Research Focus

The choice of a means of payment is primarily a rather habitualised decision, especially for smaller transaction amounts. Although contactless payment is associated with several advantages, people prefer to adhere to established payment methods and existing modes of behaviour seem difficult to break.

The use of non-cash payment methods has been the subject of numerous scientific studies over the last two decades. Most of the studies investigated the effect of single initiatives (e.g. loyalty programmes, Cabró-Valverde & Liñares-Zegarra, 2011; Ching & Hayashi, 2010) or factors (e.g. ease of use, Carow & Staten, 1999; Van Hove, 2009) on the use of card payment methods. However, so far, to best of our knowledge, no in-depth analysis regarding the usage of NFC-enabled credit cards (contactless credit cards) and the impact of suchlike on the behaviour of consumers has been published.

The main objective of this study is to identify relevant barriers in the use of new means of payment as well as to investigate the conditions under which individuals are willing to change their behaviour and adopt new technologies.

This paper is structured as follows:

First, based on literature review, the main dimensions for change were identified and a model for behavioural change developed. Second, building on this model, a mixed method approach, combining qualitative and quantitative research, has been applied to a field study in order to investigate starting points for behavioural change in the payment context to take place.

3 Conceptual Framework

From a theoretical point of view, behavioural change can be broken down into two main dimensions: value (preference-based utility) and habitualisation. Both dimensions have to be analysed in order to understand how behavioural change may take place.

Fig. 1 shows a basic framework for behavioural change with the dimensions value (utility) and habitualisation as main drivers.
Inseparably linked to human existence and the nature of human beings, individuals are constantly confronted with decision-making situations. Especially in market economies, freedom of choice has a high standing: Whether to take tea or coffee for breakfast, go to work by car or train, or which brand to choose from ten different detergent brands - we are all the time urged to make a decision, whether we want to or not. According to the Rational Decision Theory, individuals will act in ways that maximize their benefits or rewards in any given situation (cf. Altonji et al., 1992; Bettman et al., 1998; Blau, 1964; Coleman, 1998; Cox & Rank, 1992; George, 1998). Individuals rank different alternatives by attaching weights to the different options or their attributes and judge them based on the extent to which they are supposed to fulfil their needs (preference formation) (Bettman et al., 1998; Lancaster, 1966; Simonson & Tversky, 1992).

In economics, the objects of consumer choice and the foundations for preference formation are called consumption bundles. Under rational conditions, the consumer prefers the bundle and the bundle combination that maximizes his utility (economic concept of 'best things') (Tellis & Gaeth, 1997). If bundles are assumed to be equal in their utility aspect, the consumer is indifferent to the respective bundles, i.e. he shows no preference for a specific bundle. This situation is represented by the indifference curve. (Varian, 2005)
Fig. 2 illustrates two axes representing the simplest case of a consumption bundle of goods 1 ($x_1$) and 2 ($x_2$).

The green line is the indifference curve. It consists of all bundles of goods that leave the consumer indifferent to the given bundle. The curve is typically downward sloping (neg. slope) and the relationship non-linear: The more one owns of good 1, the more one is willing to abandon good 1 in exchange for good 2. Bundles above the indifference curve are preferred (preferred set, shaded area). (Varian, 2005)

Preferences are closely related to utility. From an economic perspective, utility is the ability of a commodity to satisfy needs or wants and seen as a way to describe and quantify preferences in terms of utility functions (Nieschlag et al., 2002; Varian, 2005).

An extension of the basic utility theory was proposed by Neumann and Morgenstern’s utility theorem (1944), which introduced the concept of expected utility. Expected utility accounts for uncertainty in the decision-making process and includes the probability of a certain event to occur (Clark, 2001).

The above theory of preference formation only holds under the assumption that individuals act rationally. However, many situations are marked by uncertainties; particularly in the course of technological innovations, situations come along with high risk levels, leading individuals to decide and behave irrationally.

While different scientists have dealt with the phenomenon of irrationality, the most attention has been paid to the research work of Kahneman & Tversky (1979). Their prospect theory explains the mechanism of decision-making under uncertainty and hence provides a model to understand irrational behaviour (Fig. 3).
The theory states that individuals make decisions based on the potential value of losses and gains rather than the final outcome and that decision-making is subject to cognitive biases. The value function is typically S-shaped, depicting that changes in value on lower levels are perceived more strongly than on higher levels. Therefore, individuals will act differently, depending on whether a given choice is framed as possible gain or loss. The term value refers to the psychological counterpart for the economic concept of utility. In contrast to utility, values are subjective, describing mental representations resulting from the process of estimating and judging alternative options (Giddings, 1891).

Normally with regard to gains, individuals tend to be risk-averse, preferring certain gains to uncertain ones. E.g. in a lottery, they generally prefer a certain gain of CHF 500 to a 50% chance of winning CHF 1’000. The opposite is true for losses: expected value held constant, the risky game is preferred to the certain loss. In other words: in the face of losses, individuals turn into gamblers. They are willing to accept a comparatively higher risk in order to avert a threatening loss; hence, they show a risk seeking preference (loss aversion).

At the same time, losses are weighted more heavily than gains. According to multiple studies, losing hurts twice as much as winning feels good (cf. Vohs & Luce, 2010).

Whether the outcome is perceived as a gain or a loss, normally depends on the reference or anchor point, which is relative. Under similar circumstances, it can vary from actor to actor, differ according to the situation or over time (cf. Huber et al., 1982; Levin & Gaeth, 1988).
Attitudes

Closely related to preferences and an important driver of behavioural change is the concept of attitude. Eagly & Chaiken (1996) define an attitude as a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour. In contrast to economic preferences, the application of the attitude concept is much broader. Whereas the former are about commodity bundles, the latter is a social psychology construct and includes anything people can like or dislike (Kahneman et al., 1999). In addition, attitudes tend to be more long-term in perspective than preferences (Foscht & Swoboda, 2011). Generally, attitudes are stable over time and difficult to change (Kotler et al., 2011, Kroeber-Riel & Weinberg, 2003).

Although in various studies a positive relationship between preferences and behaviour can be found, not every change in preference affects behaviour (Kotler et al., 2011). One factor that leads to this discrepancy is the status quo bias. This cognitive bias is referred to as one implication of loss aversion described above (Kahneman et al., 1991).

Status quo bias

The status quo bias causes a preference for the current state compared to any change. This means that people like everything to stay the way it is. An example for that phenomenon is that we are irrationally loyal to our current health insurance, although a switch could often be more advantageous and economical. This behaviour may be explained by the risk-averse nature of human beings (Kahneman et al., 1991).

Another factor that impedes behavioural change is involvement. The lower our involvement levels, the less we are willing to engage in extensive problem-solving and the more we wish to maintain the status quo (cf. Bakay & Schwaiger, 2006; Blichfeldt, 2007).

Involvement

The most important definition of involvement was given by Zaichkowsky (1985) and is applicable for various fields in business. According to this definition, involvement is defined as “a person's perceived relevance of the object based on his/her inherent needs, values, and interests”. Topics related to involvement are products, consumers, learning, media, advertisement, situations, structures and information processing (Day et al., 1995).

In 1965, the concept was used for the first time in relation to Krugman’s theory of consumer behaviour. It includes the inner commitment that a person shows towards issues and tasks. It further reflects the motivation to search for specific information regarding the issue, tasks or product and the willingness to process and store this information. Two forms of involvement are distinguished, which differ in their degree of activation / arousal: low and high involvement (Meffert et al., 2008).

High involvement decisions
A high involvement decision involves a detailed evaluation of product specifications such as price, quality etc. Multiple alternatives are considered and the individual actively searches for information. In addition, people are more likely to talk about the subject to other people and, if possible, test the product. Furthermore, in high involvement situations, people do not content themselves with only an acceptable solution; instead they head for the best possible alternative, even if this might result in additional search costs (Foscht & Swoboda, 2011). Examples of high involvement decisions are the purchase of a car or an insurance policy.

**Low involvement decisions**

In the context of a low involvement decision, information is not searched actively, but gathered accidentally, e.g. through advertisement and merchandising (Foscht & Swoboda, 2011). Very little or no comparison of the attributes of alternatives is done. With regard to products, brands are perceived as interchangeable, which manifests itself in no preference for a brand being formed (Zaichkowski, 1985). In the end, acceptable alternatives are sufficient for choice considerations (Foscht & Swoboda, 2011). Examples of low involvement decisions are the purchase of toothpaste or snack foods.

According to more recent studies, involvement can be divided into emotional and cognitive processes (Kroeber-Riel et al., 2009). These two types of involvement differ in terms of the motives that underlie self-participation (Park & Young, 1983). The motive underlying cognitive involvement is the collection of information. The focus lies on gathering, processing and storing information. On the contrary, with emotional involvement, the motives for participation are to be found in affective factors such as enthusiasm (Neumann, 2009). This implies that the consumer does not want to cognitively evaluate the product or outcome, but instead wants an emotional condition to be activated. The predominating type of involvement also depends on the stage in the buying process: cognitive involvement leads to strong information search before the purchase, emotional involvement leads to strong feelings after the purchase (Illmann & Mayer 2000).

Closely related to the concept of involvement is the degree of habitualisation in decision-making (Blichfeldt, 2007).

**Habitualisation**

About 60% of the decisions in a day are made habitually (Wood & Neal, 2009). Habitualisation may be defined as “the process by which actions that are frequently repeated with the same temporal relationships to one another are cast into a pattern” (Baumer & Tomlinson, 2006). During a habitual decision, a trigger in the environment directly activates a behaviour pattern without consulting current needs. An example is the sight of the coffee machine in the morning which automatically leads to the action of switching it on (without checking if there is a need for coffee). These habitual behaviour patterns simplify daily decisions, but can be problematic if they are so strong to impede behavioural change due to a change in circumstances. That would be the case when the buy-
ing power of an individual gets reduced due to economic or personal reasons, but he/she still buys a coffee to go at Starbucks each morning on his/her way to work (Wood & Neal, 2009).

Several characteristics have been uncovered in scientific studies regarding habitual behaviour patterns in buying situations. Habitual behaviour is used for low-risk and rapidly taken decisions and therefore related to the context of daily goods (Dieterich, 1986), i.e. goods related to low involvement (Kroeber-Riel et al., 2009).

**A proposed integrated framework**

For the purpose of illustrating the concept of behavioural change, the two main drivers of change, preference-based utility and habitualisation, have been integrated into a framework for behavioural change (Fig. 1). The vertical axis represents value, describing the perceived utility a customer gets from an object of consumer choice. The key figure to be considered is the net value, which is the difference between the value of the object in question less the value of the compared alternative(s). The dotted line in the middle represents the point of origin or reference point in which the consumer is indifferent regarding different alternatives. This means the higher the perceived utility, the more the object in question is preferred to the alternatives. The point of origin is individual and depends on the situation or point in time. The horizontal axis represents the level of involvement or rather the degree of habitualisation. The higher the involvement and the less habitual a situation, the more likely the consumer is going to change his/her behaviour, utility kept constant. The convex line is the change/no change line. Above the line, the consumer switches from a previous behaviour to a new one. With increasing habitualisation, breaking old habits becomes more difficult.

**Methods to initiate behavioural change**

Based on the model above, there are several starting points for initiating behavioural change. On the one hand, utility for the consumer might be increased by optimizing the product or service offering, and by better communicating any value added to the object of choice. In this context, it is of high relevance to ensure that consumers are aware of the product, as awareness is a main precondition for preference formation. Possible options for example include advertising campaigns or promotions at the point of sale (POS). On the other hand, efforts to increase involvement might be made, e.g. by offering discounts or via gamification approaches. Thus, the consumer is rewarded to change his/her behaviour.

Once a behavioural change has been provoked, the new behaviour needs to be reinforced and habitualised. This might be achieved for example by means of setting new triggers (Verplanken & Wood, 2006) and loyalty programmes (Sharp & Sharp, 1997) as well as ease of use (Yang & Peterson, 2004).
4 Methodology

Payments in daily life are highly habitualised (Soman, 2014). When it comes to payment transactions, people in general are not motivated to process information; instead they tend to choose their payment method automatically, without being cognitively involved. Even if the intention to try a different payment method is given, they hardly make use of it.

In this regard, we also need to distinguish between stated preferences and revealed preferences. In the case of stated preferences, individuals state that they would behave in a certain manner – it is another question if they actually do so or not. Stated preferences can be explored by direct methods asking consumers for their attitudes. Revealed preferences on the contrary reflect observed behaviour. They can be elicited by indirect methods involving actual choices made by consumers. (Adamowicz et al., 1993) Both methods have advantages and drawbacks. Direct methods are commonly criticized because of the hypothetical nature of the questions and the fact that actual behaviour is not observed (Cummings et al., 1986; Mitchell & Carson, 1989) Indirect methods avoid the criticism of being based on hypothetical behaviour, however, the hypotheses about the structure of preferences may be difficult to test (Adamowicz et al.1993).

Considering the circumstances above, the ZHAW Zurich University of Applied Sciences and MasterCard Switzerland initiated an extensive research project to evaluate people's payment behaviour, especially when it comes to new payment methods such as contactless payment, and to identify drivers for change.

For the purpose of the study, we decided on a mixed methodology research, which combined qualitative as well as quantitative research elements in a single study (Leech et al., 2008; Lobe & Vehovar, 2009; Tashakkori & Teddlie, 1998). The mixed approach was chosen due to the following reasons:

› It allowed for a multidimensional and more in-depth understanding of the research problem by combining different methods (Creswell & Plano Clark, 2007; Tashakkori & Teddlie, 2010).

› It had the potential to create synergies that went beyond the sum of the individual components by integrating and interlinking different methods to their mutual benefit (Hall & Howard, 2008; Tashakkori & Teddlie, 2010).

› It provided more robust research evidence based on the integration and synthesis of findings drawn from large-scale statistical analyses on the one hand and structural procedures on the other. (Tashakkori & Teddlie, 2010)

› It helped us tackle the stated vs. real preferences subject in a more comprehensive way than a single approach.

The study included three types of research methods, which were conducted sequentially by building one upon the other: in-depth psychological interviews (qualitative), a large-scale field experiment and two gamified online surveys – one each at the beginning and at the end of the experiment (quantitative).
Stage 1: In-depth interviews

Serving as a preparation and input basis for the subsequent field experiment, in-depth interviews among students and employees at two Swiss universities were conducted.

The objectives of the interviews were the following:

› To capture the status quo of payment behaviour (What means of payment do people use in which situations?)
› To record levels of awareness and up-to-date knowledge of products (How is the awareness of new means of payment?)
› To understand people’s underlying motives in choosing among different payment methods as well as to gain insights into preferences and attitudes (In what ways do attitudes towards the use of different means of payment differ? What are the underlying motives for usage or non-usage?)
› To identify success factors and barriers for behavioural change (What drives and what hinders the adoption of new payment methods?)

The sample contained 24 participants, who were selected according to pre-defined screening criteria. The interviews were conducted on the basis of a semi-structured interview guide.

Stage 2: Field experiment

Compared to other methods, experiments are considered as the most reliable way for testing cause and effect relationships (Aronson et al., 1990; Koschate-Fischer & Schandelmeier, 2014). By means of an experiment, it is possible to record dependency relationships which cannot otherwise be unearthed by pure observation. In an experiment, the investigator artificially intervenes in the environment by manipulating and varying it and thereafter measures the effects of the experimenter-induced conditions (Reiss & Sarris, 2012). In order to attain a higher degree of external validity (generalisation of results) compared to laboratory experiments, in the present case we decided on a field experiment (Koschate-Fischer & Schandelmeier, 2014; Reiss & Sarris, 2012).

The field experiment was run for 14 weeks with a sample size of over 13,000 people. Based on the preliminary findings from stage 1, different treatments had been designed in order to test their effect on behavioural change. The design included four treatment groups and one control group. In total, there were eleven treatments. These treatments either targeted an increase in involvement or level of activation, regarding the payment method decision, or they targeted a preference shift towards contactless payment. The treatments were applied before the payment process, during the payment phase at the POS or afterwards.

As a venue for the experiment, the cafeterias and canteens at different sites of the ZHAW Zurich University of Applied Sciences in Winterthur were chosen. All sites were equipped with contactless tills since February 2012. The micro payment system (campus card) of the university campus further provided an optimal basis for controlling
confounding variables (e.g. elimination of side effects resulting from different business strategies of retail chains such as merchant credit cards or closed loop payment methods).

Table 1 shows an overview of the different treatments applied within the study:
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<tr>
<th>Marketing communication</th>
<th>Incentives</th>
<th>Promotion</th>
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<tr>
<td><strong>Training</strong></td>
<td><strong>Advertising campaign</strong></td>
<td><strong>Providing incentives for contactless payment:</strong></td>
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| Description | Training sessions for cashiers of the cafeterias and canteens on the campus | Poster displays showing a contactless terminal on the campus | - loyalty programme  
- sweepstakes with an iPad as reward  
- discounts of 20%, 30% and 50%  
- instant reward (e.g. a croissant or a sweet) |
| Objective | Make cashiers familiar with the technology, the processes and the characteristics of contactless payment | Building awareness among consumers | Motivating consumers to pay contactless by rewarding them |
| Target | Preference shift | Involvement and preference shift | Activation |
| Phase | Before purchase | Before purchase | All phases |

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<th>POS attention shift</th>
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<td><strong>Contactless till</strong></td>
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<td>Description</td>
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*Table 1: Treatments*
**Stage 3: Gamified online surveys**

At the beginning and the end of the experiment phase, a gamified online survey was conducted. The aim of the survey was to validate the findings from stage 1 and 2 in the study as well as to measure the treatment effects by means of a before-after comparison. The two samples included members from different departments at the ZHAW (students and employees), where the treatments took place. In total, 687 persons participated in the initial survey and 850 in the second survey, ensuring the representativeness of results.

The questionnaire consisted of 78 items covering awareness, attitude and usage aspects.

### 5 Results

**In-depth interviews**

The data gained from the interviews were analysed by means of content analysis. For this purpose, the interview transcripts were screened and the statements categorised. Based on the content analysis, five key categories have emerged from the data: logos, awareness, security, readiness to use and loyalty programmes. These categories included important aspects and attitudes regarding payment behaviour and contactless payment. The key usage drivers identified for the use of contactless credit cards were speed, avoiding carrying cash and ease of payment. The key barriers that prevented consumers from using contactless cards were lack of access in the market, lack of security and fear of losing control on expenses. The results were incorporated in the design of the treatments of the field experiment, guaranteeing that treatments addressed the right issues.

**Field experiment**

All the payment transactions (over 360'000) were analysed with a statistical model (logit). The data showed clearly that treatments such as sales discounts, loyalty programmes, promotions and cues on merchandise (e.g. stickers on bottles) are likely to significantly increase the usage of contactless credit cards. Also, there was a significantly positive correlation between the length of a treatment and the probability of contactless credit card usage. Last but not least, sweepstakes were found to have the highest impact on loyalty, but not activating first usage.

**Gamified online surveys**

For quantitative data analysis, statistical evaluation techniques and hypothesis testing had been applied. It was found that, compared to the initial survey 12 months earlier, awareness of contactless payment has increased by 18% and attitudes towards it have improved. Participants evaluated contactless payment more positively in terms of security, trustworthiness, velocity and convenience than traditional means of payment.
Furthermore, based on the comparison between the surveys (stated preferences) and the evidence from the field experiment (real preferences), a gap between actual behaviour and intended behaviour could be revealed: participants in general had positive attitudes towards new payment methods as contactless payment, but actual behaviour is observed to follow status quo in the case without treatments (control group).

6 Conclusion

The use of non-cash payment methods has been the subject of numerous scientific studies over the last two decades. Most of the studies investigated the effect of single initiatives (e.g. loyalty programmes, Cabró-Valverde & Liñares-Zegarra, 2011; Ching & Hayashi, 2010) or factors (e.g. ease of use, Carow & Staten, 1999; Van Hove, 2009) on the use of card payment methods. However, so far, no in-depth analysis regarding the usage of NFC-enabled credit cards (contactless credit cards) and the impact of suchlike on the behaviour of consumers has been published.

As people in Switzerland see cash as a store of value that is visible and tangible, and cash as a widely accepted and extremely reliable payment method (Danthine, 2014), it is no surprise that Switzerland still counts for a high amount of cash transactions in the retail environment. Therefore, the investigation of the payment decision-making process is of particular interest, not only to industry leaders on a microeconomic level, but as well to economists on a macroeconomic level.

Based on extensive research, we have developed a behaviour change model that allows reflecting the main drivers for behaviour change in in a highly habitualised setting such as the payments area. The different sites of the ZHAW Zurich University of Applied Sciences represented an ideal environment that enabled us to validate our model and better understand what initiatives influence the payment method decision. In order to gain detailed insight, we had chosen a mixed method approach, combining qualitative and quantitative methods with an extensive field experiment as corner stone of our research.

First, our findings from qualitative research showed that interviewees had a rather modest amount of knowledge about contactless payments, favour the freedom to choose between different payment methods, and are likely to respond to loyalty programmes. Second, in our field experiment, we measured significant impact on payment decision from sales discounts, loyalty programmes, promotion activities, and cues on merchandise. Third, there is strong evidence that combining different treatments and particularly the length of the treatment setting are key to changing behaviour sustainably. Further, we observed that stated preferences differ greatly from real preferences in terms of a stated positive attitude towards the use of new payment methods versus actual behaviour.

We had the opportunity to discuss our results with various key stakeholders in the payment industry and to give input for initiatives that further validated our findings. Look-
ing ahead, we would like to encourage both, practitioners and scientists equally, to test their ideas and hypotheses with a mixed model approach in field settings. As new payment methods develop (e.g. mobile payment solutions, peer-to-peer payment applications, or closed loop systems) understanding the perceived value and the drivers for payment behaviour change will be a crucial factor in the future to successfully establish new business models.

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References


A public science product needs proper marketing: Polish experiences and challenges

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Abstract
In this paper, the reader will find an analysis of Polish experiences with science-to-business marketing. Four case-studies are presented. Admittedly, the experiences with science marketing addressed to the business sector in Poland are still very poor; the analyzed cases can be treated like good practices to be followed.

Keywords
science product, science marketing, science-to-business marketing

1 Introduction
Marketing of public science products has a key significance in the national economy in which – like in Poland – the vast majority of scientific production is being performed outside the business sector, i.e. at universities and other higher education institutions; in the Polish Academy of Sciences’ research institutes; and in other R&D institutions, mostly public.

The main aim of this paper is to analyze Polish experiences with marketing of science products created in the public R&D sector. Additionally, the paper’s aim is to attempt to formulate challenges faced by Polish R&D institutions in their marketing activities.

These two problems, i.e. the experiences and the challenges, are presented against the background of the specificity of the public science product marketing. The specificity of this kind of marketing is such that a public science product is a public good, which is made thanks to tax-payers’ money and so should be turned to good use.

The considerations in this paper refer mainly to scientific and technological solutions being created chiefly in engineering sciences. So, we are speaking about marketing pursued by the science sector and addressed to the business sector, i.e. science-to-business marketing that is a specific kind of institutional marketing.

This is an empirical paper based on the case-study method.
2 Structure of the full paper

Considerations related to science-to-business marketing can be found rather not in the marketing literature but in the literature on management of innovation, technology transfer and commercialization, for example in: Baaken (2009), Baaken and Plewa (2009), Butler and Gibson, eds (2001), Bok (2003), Etzkowitz (2002), Frischmann (2005), Isabelle (2007), Jolly (1997), Markman et al (2005), Shankar (2008).

The Polish literature on science marketing is very poor. Only few authors deal with marketing of research and innovation. Bialon in her articles writes about marketing support for management of research results (2011) and the principles of marketing of scientific research (2012). Jasinski in his papers has written on the promotion of scientific achievements as an element of public innovation policy (1998b) and science communication with society (2010) arguing that science in Poland needs good Public Relations (2003). Other authors in this field write about marketing of product innovation (Kruk, 2012), on innovation marketing as a whole (Pomykalski, 2001) claiming that this should be an internet, relationship and target marketing, and Trzmielak (2013) who writes about marketing for technology transfer and commercialization. Also, Bialon (2010) and Jasinski (1998a and 2012) investigate the relations between innovation and marketing. Earlier, as the first author in Poland, Jasinski (1992) presented a concept of the marketing of R&D and innovation.

In turn, the Polish authors who write about management of research and innovation projects like, e.g., Kisielnicki (2013), Krawiec (2000) and Tylzanowski (2014), do not mention marketing.

- A depressing picture emerges from the Polish literature. Bialon (2011), based on her empirical studies, notes that:
  - R&D organizations do not run marketing research,
  - they do not conduct research leading to a market segmentation,
  - therefore, they have a small knowledge about a demand for new technologies from the side of enterprises,
  - in most R&D institutions, there are no separate units/departments dealing with marketing research and activities,
  - so, the marketing activity is a lacking link in management of innovation processes.

Therefore, according to Bialon (2010), science marketing may lead to narrowing the gap between science and business in Poland; marketing activities run by research organizations have – even a bigger than firms’ marketing – role in coupling demands and supplies in the innovation market. Afterwards, she describes how a marketing-mix (5Ps) in R&D institution should look like.
As far as the market segmentation is concerned, such segmentation has been suggested by Jasinski (2010) who proposes to distinguish six potential target segments/markets for science marketing:

(1) politicians, both central and regional/local authorities,
(2) journalists, both from central and local media,
(3) businessmen, mainly industrialists,
(4) teachers and other workers in the education system,
(5) youth, both pupils and students,
(6) local communities.

3 Science-business/industry cooperation

Basic data on the science/R&D sector in Poland, which is in principle public, in 2012 are as follows (GUS, 2013a and 2013b):

› the number of higher-education institutions (HEIs): 210,
› the number of the Polish Academy of Sciences (PAS) research institutes: 70,
› the number of the other research organizations: 119,
› the share of researchers (FTE) employed in HEIs, PAS and the other institutes (totally) in the whole number of Polish researchers (FTE): 77.2%,
› BERD/GERD ratio: 32.2%.

At least one conclusion emerges from the above data: the vast majority of research performance/production is being performed outside the business sector.

The need for a proper science-to-business marketing in Poland results from the following weaknesses in the national system of innovation (NSI): 1

› weak scientific-technological cooperation between the science and the business sectors,
› little demand for new technologies from the side of enterprises,
› practically non-existent science sponsoring,
› too narrow range of commercialization of scientific and technological solutions emerging
› in the public sector,
› small scale of diffusion of new technologies in the national economy, and

1 More about the NSI in Poland in Jasinski (2006).
last but not least, poor marketing experience on the part of R&D institutions.

A low level (intensity) of science-business cooperation has been noted twice (Jasinski, 2006 and 2014). Also, other authors have confirmed this observation (Gwarda-Gruszczynska, 2013; Matusiak, 2010; Matusiak and Gulinski, eds, 2010; Trzmielak, 2013). An additional light has been thrown by the latest questionnaire research among enterprises in the Mazovia region of Poland. It turned out that (Systema, 2013):

- as much as 62% of the surveyed entrepreneurs negatively assess a possibility to establish collaboration with universities and other research organizations,
- only 13.2% can see such possibility,
- 57% of them just don’t know how such cooperation should look like.

There exist various reasons for such a poor state of science-business relations. Some of them are universal. The two worlds - science and industry - speak different languages and there is a difference in labour conditions, status and wage levels (Cogan, 2001). In turn, Parker (1999) pointed here natural obstacles, such as: (1) academic tradition and values (teaching, publications, long horizon of research, etc.), and (2) industrial priorities and culture (profit, risk taking, short horizon of activities, etc.).

However, there are typically Polish barriers for such collaboration as a heritage of the past. Here we mean:

- an organizational separation of science from industry (deliberately designed after the second world war),
- a low mutual trust between researchers and entrepreneurs (Bal-Wozniak, 2012; Czapinski, 2013), and
- the scientist’s ethos which didn’t allow him/her ‘to make his/her hands dirty’ with practical applications of their scientific achievements.

The both parties mutually blame each other and the both are right (Jasinski, 2014): research organizations claim that firms create too little demand for new scientific and technological solutions whereas enterprises claim that R&D institutions offer too low supply of such solutions. Thus, marketing may be helpful in ensuring an increase both in the demand and in the supply, and so can lead to quickly developing markets of innovations.
4 Polish experiences with science-to-business marketing

Poland has some positive experiences with science marketing or rather science promotion/communication with society (Jasinski, 2010). Here we mean actions being undertaken by various institutions and organizations, such as:

› Science Festivals (the oldest initiative),
› Science Centre ‘Copernicus’ in Warsaw (opened in 2010),
› The Scientific Journalists’ Association,
› Citizens of Science (the newest initiative).

However, their actions were and are addressed to society as a whole but not to the business sector.

Before passing further, two following assumptions have been adopted: (i) by science we here understand public science/R&D sector, and (ii) by business we mean both existing businesses/firms and new businesses in the course of establishing as well.

Now, let’s ask the question: Who (which institutions) should deal with science product marketing directed towards industry in Poland?

› firstly, scientific organizations, i.e., HEIs, the PAS institutes and other research institutions,
› secondly, so-called bridging institutions facilitating knowledge flows from science to business,
› thirdly, governmental or semi-governmental agencies responsible for distribution of public funds for research and innovation.

5 The Central Mining Institute

As mentioned, Polish research organizations suffer from poor marketing experiences. It doesn’t mean, of course, that we can’t meet exceptions. One of such examples, an institute of mining research, is analyzed below.

The Central Mining Institute (CMI) in Katowice, the Upper Silesia region, was established in 1945, just after the second world war. At present, this is the leading research institute in Poland. The Institute’s activity concentrates on the problems concerning work safety, modern mining technologies as well as environmental protection against the effects of industrial activities, in particular mining. This is a relatively big organization: 578 employees, mainly R&D workers, were employed in CMI at the end of 2013 (GIG, 2014).
The Institute sales offer contains own scientific achievements, being the result of research projects financed by public funds and the projects ordered by industry. Those are both new products and technical equipment as well as new manufacturing and exploitation technologies applied in coal mines and not only there. CMI offers technical services, too. An important part of its activities is protection and commercialization of intellectual property (IP) - data presented further on. In the field of relations with business clients, CMI cooperates rather with bigger firms, e.g., LABEDY Steelworks, MASK-POL Protection Equipment Company, and EKO-BRYKIET Briquette Production.

The Institute comprises a Marketing and Foreign Cooperation Unit where six people work, including a press spokesman. Every year, an Information and Promotion Plan is made based on an Information and Promotion Strategy which – in turn – is an element of the CMI’s Strategy. One of ten purposes of the present strategy is ‘promotion and dissemination of the Institute scientific and technological solutions’ (GIG, 2014), which seems quite obvious.

The Unit’s actions are divided into external and internal communication. As far as the former is concerned, being here our main interest, the promotional activities consist in (GIG, 2014): media relations, management of crisis situations, corporate identity, lobbying and business relations, advertising, sponsoring and other public-relations instruments. As far as internal communication is concerned, it is worth mentioning the CMI two strategic documents, i.e., Strategy of Social Responsibility, received in 2009, and Corporate Foresight, prepared in 2010. Both of them constitute a basis for external communication and, of course, for the Institute’s research programmes.

A composition of the main promotional tools being used by CMI is shown in the table (see further). The following conclusions result from it:

- the Institute uses ten basic promotional tools, apart from such traditional, routine information materials as: brochures, prospectuses, leaflets, bulletins and multimedia materials,
- most of them belong to public relations,
- they are addressed to three major groups of addressees: local communities or society as a whole, journalists and business entities,
- some of these activities are also conducted abroad, and
- a bigger diversity of promotional instruments is needed concerning various target groups. Here we mainly mean the business sector (small and medium-sized enterprises and big companies) which need a special attention.

In summarizing, we can conclude that: (i) CMI doesn’t limit itself to research and marketing in mining, (ii) the Institute is very active in marketing addressed to business, too, and (iii) a broad spectrum of communication tools are being used there.
The following data (for 2012) confirm that CMI is a successful case thanks to its proper strategy, including promotional activities (GIG, 2014):²

› 18 inventive submissions sent to the Polish Patent Office,
› 26 gained patents and protection rights for utility patterns,
› 25 active agreements concerning licensing, know-how and patent shared rights, and
› 6 active implementation agreements with manufacturing firms.

² Unfortunately, the Institute doesn’t reveal data referring to promotion costs and incomes from business clients.
<table>
<thead>
<tr>
<th>No.</th>
<th>Promotional tool</th>
<th>Type of tool</th>
<th>Main addressees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Promotional seminars for potential partners (once a month)</td>
<td>public relations</td>
<td>business</td>
</tr>
<tr>
<td>2</td>
<td>Open days being organized by various Institute’s research departments</td>
<td>public relations</td>
<td>local community</td>
</tr>
<tr>
<td>3</td>
<td>Electronic newsletter (on a regular basis)</td>
<td>public relations</td>
<td>society</td>
</tr>
<tr>
<td>4</td>
<td>Contests for journalists writing about CMI (four within last 15 years)</td>
<td>public relations</td>
<td>journalists</td>
</tr>
<tr>
<td>5</td>
<td>Press conferences (three to four per year)</td>
<td>public relations</td>
<td>journalists</td>
</tr>
<tr>
<td>6</td>
<td>Internet window ‘Press File’</td>
<td>public relations</td>
<td>journalists</td>
</tr>
<tr>
<td>7</td>
<td>Advertisements in a weekly ‘Trybuna Gornicza’ (regularly once a week)</td>
<td>advertising</td>
<td>readers, incl. entrepreneurs</td>
</tr>
<tr>
<td>8</td>
<td>Sponsored articles and interviews in business regional and central newspapers</td>
<td>sponsoring</td>
<td>business</td>
</tr>
<tr>
<td>9</td>
<td>Direct, personal contacts by the Institute workers with business clients</td>
<td>personal selling/promotion</td>
<td>business</td>
</tr>
<tr>
<td>10</td>
<td>Shows at fairs and exhibitions (two to three per year)</td>
<td>additional promotion, often called sales promotion</td>
<td>business</td>
</tr>
</tbody>
</table>

*Table. The CMI promotional tool-kit*

Source: Jasinski on the basis of GIG (2014)
In the science marketing system, there is a role to be played by bridging institutions, such as HEI liaison offices, technology transfer centres, science/technology parks, innovation and entrepreneurship centres, and so forth. In Poland, they are called Innovative Activity Support Institutions (IASIs). Some of them are parts of research organizations; some are independent – they are public or private as well, mostly non-governmental organizations (NGOs). A universal opinion prevails that the present number of such institutions in the country is sufficient. However, according to our research (Jasinski, 2006 and 2014), they don’t deal with the marketing of results of research projects conducted in R&D organizations. For instance, the University Technology Transfer Centre (UTTC) as a kind of liaison office established in 1998 ‘for a better use of The University of Warsaw potential in economy’ (The Senate’s Resolution, 1998), doesn’t run promotion of the University’s research results among the business sector.

Such state of affairs does not mean that, in the country, we do not have good examples/practices of the bridging institutions dealing with marketing or, at least, promotion of (public) science products in industry. One of them is BioTech-IP Technology Transfer Office.

6 BioTech-IP

BioTech-IP Technology Transfer Office was established in 2010 within the scientific consortium Biocentrum Ochota, made up by six research institutes of the Polish Academy of Sciences which are located on the Ochota Campus in Warsaw. Biocentrum Ochota has been founded to run large multidisciplinary research projects in biology, medicine and bio-engineering. BioTech-IP has created a Bio&Technology Innovations Platform.

Apart from promoting the intellectual and infrastructural potential of the Biocentrum Ochota institutes, the Office’s goals are (BioTech-IP, 2014):

1. to support scientists working in the Biocentrum in patenting and IP-rights management, applicable R&D projects and commercialization of developed technologies, and

2. to promote the intellectual and infrastructural potential of the Biocentrum Ochota consortium, services offered by the Biocentrum Ochota institutes and cooperation between researchers and enterprises acting in the field of Bio-Tech-Med.

BioTech-IP TTO activities are as follows:

› assessment of market potential of new technologies,

› clarification and protection of IP rights for new inventions,
financial support for PhD students carrying out research projects of a high commercial potential,

scholarships for scientists during their interchange and practical training in industry,

courses for researchers who plan to implement and commercialize their innovative technologies.

As seen, most of the TTO’s actions are directed towards researchers, including PhD students, who would like to become entrepreneurs. Aside from that, BioTech-IP undertakes some marketing activities addressed directly to the business sector:

(1) the Office organizes science-business brunches to gather researchers working in Biocentrum Ochota and experts from Bio-Tech-Med industry. Up to now, six brunches took place in which about 40 industrial representatives participated, and

(2) the Office has prepared and produced three information brochures, both in Polish and English, and over 100 copies of a prospectus containing six technological offers. As for now, all of the materials are being sent to concrete business entities and distributed among industry’s representatives during the brunches.

From the marketing point of view, we may treat the former as personal selling/promotion and the latter as public relations and direct mail.

Summarizing, BioTech-IP TTO operating on behalf of six research institutes, uses certain marketing tools addressed to business, however, this kind of actions seems to have a lower significance in the Office’s activities. Moreover, since they started to deal with such activity only recently, it is too early to evaluate results.

7 The National Centre for Research and Development

Among various government agencies, the key role in the dialogue between science and industry is played by The National Centre for Research and Development (NCRD) in Warsaw.

NCRD was established in 2007 to fulfill goals of the national science and technology policy. The Centre’s main task is management and execution of strategic research and development programmes which should lead directly to an increase in the economy’s innovativeness. Admittedly, NCRD was created with the main purpose to finance and co-finance research projects in applied sciences; it also deals with promotion of the science-business cooperation in a broad meaning, i.e., in a double sense:
(i) by co-financing joint projects conducted by research organizations together with commercial firms or by enterprises alone, and projects run by young entrepreneurs of academic background, and

(ii) by popularization of (a) results of programmes and projects (co)financed by the Centre and (b) beneficiaries of such programmes and projects, both research institutions and enterprises, and of their achievements mainly in commercialization.

NCRD uses a quite broad and varied set of promotional tools. Some of them are addressed to society as a whole. Here we mean such activities as (NCBiR, 2014): electronic newsletter being sent out every Friday to over 10,000 subscribers and a broad promotional campaign on radio and television, started in 2013, with cyclical broadcasts like: The Era of Inventions, Academic Entrepreneurship, Scientific Thursdays, etc.

Apart from that, the Centre applies various promotional instruments directed to business entities and research organizations at the same time, like:

› catalogue of the NCRD projects which is published once a year in Polish and English, and distributed during domestic and international fairs, exhibitions, congresses, conferences and symposiums,

› guides for beneficiaries, for example, Good practices in projects’ promotion – a guide for the beneficiaries in Operational Programme ‘Infrastructure and Environment’,

› Internet interactive multimedia platform presenting the most interesting projects co-financed by the European Union structural funds, and

› just started BRIdge Info – an information and advisory portal addressed to innovators who need more knowledge on commercialization.

It must be added that, in 2013, NCRD initiated BRIdgeVC – a new programme with the purpose to have more venture capital (VC) engaged in the innovation projects co-financed by the Centre. Thanks to an effective promotion of this programme, NCRD succeeded to attract some VC funds from the country and abroad.

As a result of the Centre’s activities, 2,755 agreements were signed in 2010-2013 within 84 programmes; among them 1,637 agreements (almost 60%) were concluded with firms who applied jointly with research organizations or individually (www.nauka.gov.pl).

To sum up, one can put forward the following conclusions:

› the National Research and Development Centre works partly as a government agency financing the research and innovation projects, and partly as a bridging institution,

› the Centre plays an important role as an animator of the innovation market and sometimes even as its participant, and
NCRD applies a quite broad spectrum of public-relations instruments. Nevertheless, the Centre should also use other promotional tools while approaching the business sector, for instance, organizing three-party meetings to couple research institutions with commercial enterprises.

8 The Foundation for Polish Science

A certain but not a big role in public science promotion is played by The Foundation for Polish Science (FPS).

FPS was appointed in 1991 as a semi-governmental institution. Now, this is a non-governmental and non-profit organization which pursues the mission of supporting science as such. The Foundation is the largest source of science funding in Poland outside the state budget. FPS fulfills its statutory purposes through (1) supporting distinguished scholars and research teams in all fields of inquiry, (2) modernizing research facilities and (3) assisting innovative ventures and commercialization of scientific achievements, especially inventions.

As far as the third purpose is concerned, FPS has run programmes mainly addressed to young, ambitious researchers-entrepreneurs. One of such initiatives was the ‘Innovator’ programme, the main aim of which was a complex, i.e., financial, training and advisory, support for persons or teams being authors of ideas having an implementation capacity and a commercial potential or/and being owners of patents or patent submissions.

The programme was carried out in three editions in 2006-2008. Each edition was divided into three stages:

* Stage 1 - a qualification/selection of innovative projects (new production technologies or services),
* Stage 2  - co-financing the best projects and business-plans, and an administrative assistance for establishment of own businesses, and
* Stage 3 – the laureates directed to financial institutions with the FPS assistance in negotiations with them. Its aim was to arrange a financial montage.

The Programme results were as follows (FNP, 2014):

- the number of participants: 46
- the number of laureates: 7,
- the number of established firms: 6.

Up to now, the biggest financial support from outside the Foundation was gained for two enterprises/initiatives: Apeiron Synthesis (from the EU structural funds) and Medi-
calgaryrthms (form Polish private investors). Both firms successfully operate in the medical market; the second one is entering the stock exchange now.

Nowadays, FPS is conducting two business-oriented programmes:

› ‘Ventures’ - offering financial support for innovative projects carried out by young researchers. There were as yet 11 contests, 90 laureates and 79 business partners identified, and

› ‘Impulse’ - contests for the best research project having a commercial potential, offered not only to young scientists. As for now, 21 applications have come through a formal assessment.

One of beneficiaries within the ‘Venturs’ programme is Grzegorz Gorczyca from Chemical Faculty in Gdansk University of Technology who has received a substantial financial support to his project on new polymeric materials for use in a medical treatment. FPS has helped him to align contacts with ten potential business partners. From among them, negotiations are being continued with 3M Poland Manufacturing in Wroclaw and GCZM Zarys in Zabrze.

As seen, The Foundation for Polish Science operates in this field as a bridging institution. FPS runs the programmes supporting a commercial use of ideas created by science-based entrepreneurs. The support tools being applied by the Foundation can be treated as sponsorship.3

9 Conclusion and challenges

A general conclusion emerges on the basis of the considerations in this paper: the experience gained by public organizations and institutions with science marketing addressed to the business sector in Poland is so poor that science-to-business marketing is still in its infancy. Admittedly, the four cases analyzed here seem to be good practices. However, it is research institutions which, first of all, should deal with such activity.

Against this background, the following challenges can be formulated towards scientific organizations and other public institutions responsible for science-to-business marketing:

(1) these organizations and institutions should derive with full hands from the experiences gained in this field by research organizations in highly developed countries (HDCs),

3 Kotler (1998) includes sponsorship into public relations.
(2) there is an urgent need for a broad exchange of good practices among scientific institutions in Poland,
(3) their marketing activities should take into account the specificity of the science product, and
(4) it should be a comprehensive marketing-mix containing not only product and not only promotion/communication described in this paper. There are also the other three Ps.

10 Acknowledgements

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Universities as Incubators of Creative Talents

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Abstract
Creative industries have rising significant role in the societies and the economies. That’s why the way how universities and the business sphere react to these changes has become very important. The T-model workers and the Weberian bureaucrats determined their own era. Nowadays do the creative talents make an era? Are they the great hope of the future? The creative talents need to feel culturally at home, creatively free and actively global persons.

The main questions of my paper/presentation are the following: Which kind of cooperation can be successful in arts, science and business sphere? And how can they develop joint innovations via this cooperation?

In my research I use three resources: (1) results of our VIADUCT1 research project; (2) Compendium2 profiles of 42 countries, (3) and case studies.

The objective of the VIADUCT is to build a bridge between the stakeholders in the field of art, science and business within the framework of a comprehensive basic research aiming at the analysis of creative industries, the relationship between our visual language and digital technologies as well as the role of contemporary material and design culture and that of the new media. It contains a representative survey on the Hungarian teenagers’ habits of using Facebook.

Cultural diversity is an essential value. The information and communication technologies are spreading. The creative industries are inspired by the cultural diversity and ICT and use their products.

In my paper I’m looking for focused and applicable methodes for the deeper understanding of the cooperation among artists, researchers and businessmen, and the role of these actors at organizations, i.e. clusters, incubators, start-ups, etc.

Keywords
creative industries, creative talents, incubation, innovation, new technologies / social media, universities

1 Introduction

How can universities become the incubators of creative talents? To find the answer to this hotly debated question one should understand the reasons behind the assumption that it is the task of universities to find creative talents, improve their skills and unfold their

1 „VIADUCT – The impact of our visual language, digital technologies and the new media on creative industries and society”, which is supported by European Social Fund.

2 The Compendium of Cultural Policies and Trends in Europe is a web-based permanently updated information and monitoring system on cultural policies, instruments, debates and trends, in Europe. The Compendium was initiated by the Council of Europe.
potential. It is also of crucial importance to determine whether creative industries have an increased role and share in the economy, the labour market and the everyday life of people. Is there an interface between universities and economic stakeholders in the course of fulfilling the above noble objectives? What factors enable higher education institutions to act as talent incubators for creative students? What impact do public policies have on these issues? From among the functions that support the improvement of creative talents, which ones should be vested in universities? Do universities need to undertake further tasks to widen their role as incubators?

According to the European Commission, higher education institutions have a threefold task being responsible for education, advanced research and pioneer innovation. Universities are the driving force behind a knowledge-based economy and society. Are the above three tasks sufficient to enable universities to become the engine of the knowledge-based economy and society in an environment where the demands of the network society and the consumers now turning into a user community are rapidly changing?

The present study is based on the findings of an EU project entitled “VIADUKT – The impact of our visual language, digital technologies and the new media on creative industries and society”. The researchers working on the project analysed the correlations between new media and community media, community art and architecture as well as the economic, social and philosophical implications of creative industries conducting studies in eight research groups that focused on design, animation, motion picture, photography, cityscape, taste, literary language and the social and economic impacts of creative industries.

Based on the findings of the VIADUKT research it has been concluded that the immense changes that have taken place in our modern age in the field of arts, science and technology barely reach the members of the wider society. The development and spread of mass communication devices, computers and the Internet since the mid-20th century have generated hitherto unknown changes raising novel questions in public thinking and social relations. Borders have disappeared, distances have decreased and cultural walls have come tumbling down. Creative industries have become a profitable venture fundamentally determining contemporary culture. Within this environment, the success of industrially developed societies depend on the potential joint cooperation of science, arts, technology and businesses.

In addition to the findings of the VIADUKT project, the present study also draws on the so-called COMPENDIUM country reports i.e. a compilation of studies on the cultural policies of 42 states. The COMPENDIUM (Compendium of Cultural Policies and

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4 A project funded by the European Union and implemented as a result of a tender under registry number TÁMOP-4.2.2.A-11/1/KONV-2012-0050. The support is allocated by the Science and Innovation sub-programme of the New Széchenyi Plan, October 2012-May 2014.
Trends in Europe) is a continually updated web-based information and monitoring system focusing on the cultural policies and trends of European nations under the auspices of the ERICarts (European Institute for Comparative Cultural Research) of the Council of Europe since 1998. Although the country reports primarily aim at analysing cultural policies and trends, they maintain a sharp focus on creative industries especially in their relation to art education.

2 The increasing importance of creative talent management

Creative industries have an increasingly important role in economic and social life. Numerous countries expect this particular branch of the industry to help foster economic and social development. Creative industries play a pioneer role in a knowledge-based economy and society and their role is becoming more and more appreciated in our global society. Creative industries are characterized by innovative actors who draw their inspiration from cultural – in many cases national – roots, who need the freedom of expression as well as a global stage and a networking society to boost efficiency. This work of high added value supports a host of other industries (e.g. tourism) creating a vibrant and innovative environment which, in turn, has a profound influence on people and their lives.

Creative industries are more than just pure culture and arts. Its complexity is reflected in its interdisciplinary nature with heterogeneous sectors operating under the same umbrella. Thus, they are not composed of a single industry but several different sectors resulting in a complex and diverse system. The term creative industries frequently includes the following fields: advertising, architecture, arts, antiquity market, craftsmanship, design, fashion, film and video, computer games, music, performing arts, publishing, software services, radio and television. The World Intellectual Property Organization (WIPO) defines creative industries as those where artistic and creative aspirations constitute an essential and inherent component of products and services (e.g. in craftsmanship, advertising, television and radio) and where creativity and craftsmanship play a significant role in the production process, i.e. in advertising, television and radio broadcasting (copyright industries).

Creative industries saw their great expansion when changes in technology had led to the prosperity of the new media and when cultural activities started to become increasingly commercialized. Creative industries see arts, media, design and digital content as trade activities.

Creative industries are based on innovation, information, knowledge and the communications sector, each increasingly determining our life. Creative industries are based on values, they originate from the cultural economy and their focal point is creativity and

the individual. The results of new ideas and activities are manifested through creativity. Creative talent is a value.

Creative industries are an interdisciplinary field with philosophy, arts, technical research, social sciences and economics all acquiring a specific task in them. This results in a dynamic, intellectual environment but at the same time it also leads to chaos with a plethora of interpretations.

3 Why do universities have the potential to become the incubators of creative talents?

Creative industries are receiving increasing attention in education for example at the following programmes: communication and media studies; business, economy and regional policy; creative arts (music, visual arts, performing arts); media products (film, television, digital products); design (fashion, architecture, interactive design, graphic design); information and communication technologies; law (property and intellectual rights); education (of the creative workforce).

Research is being conducted on the issue of the potential approach of education institutions to creativity and on the special type of labour required by creative industries. There have been several faculties and workshops established within higher education institutions including among others the Queensland University of Technology (QUT), Brisbane, Australia; the University of the Arts, London; the Queensland Academy for Creative Industries; the ARC Centre of Excellence for Creative Industries & Innovation, Australia, etc. China also boasts programmes on the creative industries at numerous universities and there is an increasing focus on the field of creative industries.

In a great deal of countries higher education excels in traditional sciences but the openness towards interdisciplinary sciences, social needs and the provision of social functions is still uncommon. That fact is underlined by a high number of examples reflecting the unwillingness of the academic world to gain practical experience and become active in trade. According to the Humboldtian ideal, academics are researchers and instructors at the same time but they do not have to go beyond these two traditional roles. However, a knowledge-based economy has different needs and as a result the above model is undergoing a slow but gradual change. Knowledge has a key role in production and economic growth. The role of universities have become more important in the spread of technologies and as facilitators of economic and social development. This, however, is not a brand new idea since as early as the beginning of the past century the Massachusetts Institute of Technology (MIT) started to function as an entrepreneurial university and others have followed suit.

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Higher education does not only have a key role due to its fundamental mission in education and science but also because as a centre of interaction between the entrepreneurial sector and science and industry it has the opportunity to establish connections between countries and institutes which also contributed to the fact that through international relations HEIs have become the valuable members of clusters.

Clusters of creative industries were born as a result of the collaboration between the cultural and media industry and they started to spread in the 21st century. Their growing popularity came as a result of an annual event organized between 2002 and 2008 in the United Kingdom, the Creative Clusters forum which soon became a platform for networking experts. The economic actors in the field of creative industries are primarily freelancers, micro, small and medium-sized businesses. The industry is also characterized by a highly qualified workforce and project-based activities with a lot of self-employed persons (writers, authors, musicians, artists, filmmakers, etc.), i.e. creative persons with the potential to be organized into networks.

As a result of the structural changes brought about by the 21st century and under the circumstances offered by the information and knowledge-based economy and society, clusters represent an operating structure that is able to provide even small businesses the necessary strength and presence, access to sources and research findings as well as connections to other actors. The term cluster refers to groups of companies where the group members – in spite of competing with each other and remaining competitors in the future as well – enter into alliances to gain benefits that are not accessible to those outside the cluster. Their further common characteristic is that their interests are directed towards the same economic region. In addition to business companies, cluster membership also includes the academic sphere, financiers and the media.

The academic world usually fulfils a supportive function within clusters through its in-depth knowledge, analytical potential and its separate and special communications skills, i.e. their role is to enhance cooperation, reliance on social capital, innovative activities and to stimulate networking. Furthermore, it also has a monitoring function continually supervising cluster strategy, efficiency and activities.

The establishment of industrial parks was followed by the spread of knowledge parks modelled on U.S. practice. The first knowledge park was founded in 1951 in California (The Stanford Research Park) and by the end of the 1990s there were as many as 1,000 knowledge parks across the world. The majority of knowledge parks were established with state or other support based on university campuses creating a venue where universities and companies were able to work close to each other. Innovation clusters, in turn, were established on the same premises in most cases since it is in the nature of clusters to boost the competitiveness of industries on the basis of network cooperation and to enhance innovation through disseminating knowledge and resources. Productivity is a key factor in creative industries not only due to its influence on efficiency, markets and income but also due to its close clausal relationship with innovation and its great dynamism (new products, services, new markets and shops).
Creative industries have arisen from the knowledge-based economy but at the same time they also coordinate it through using and adapting knowledge. Today, the meaning of knowledge increasingly includes innovation as discovery, a new paradigm and a new point of view. The spread of information leads to a favourable environment where these creative processes are generated and launched. In the academic world the publication of “new knowledge” has been a proven practice, a way of disseminating knowledge. Today, “new knowledge” does not only emerge in laboratories or within the private academic world but also at the interface of different fields, in new situations and then spread through community networks. Creative industries play a central role in driving this type of innovation.

4 Most important measures, best practices

Art and cultural policies generally support creativity. The State Cultural Policy Guidelines 2006-2015 approved by Latvia outlines three dimensions of cultural education: 1) training specialists and representatives of creative professions who are creative, mobile, professional and competitive cultural actors; 2) the development of a competent audience of culture; 3) the training of creative, proactive people with social responsibility, talent and ambition to become competitive and productive persons. Russia also has a diverse governmental programme within the framework of the Concept of Arts Education in the Russian Federation 2001 and the Development of Arts Education in the Russian Federation in 2008-2015 while in the Czech Republic the so-called Open Cultural Think-tank serves creativity. In Russia, Denmark and France art higher education do not belong to the ministry of education but it operates under the ministry of culture.

A growing number of countries are paying increasing attention to art education implementing differentiated development in a wide range of areas. At the same time, the number of students participating in art education is also increasing, e.g. in Croatia, Finland, Malta and Spain. In Finland the number of students graduating in culture and media studies programmes (from polytechnic schools) rose from 420 to 1,850 between 1999 and 2006. On Malta, 277 students graduated in 2006 compared to 355 in 2010. There was a significant increase in Spain as well with 6.3% of the students in higher education (103K persons) pursuing their studies at art programmes in academic year 2010/2011. As a result of a similar growth, 2,000 students study arts at university level from 738 teachers in Croatia.

The scope of postgraduate programmes is also being widened with the introduction of new courses such as cultural management, intercultural communication, intervention art, pictorial sciences, archiving, design, cultural event management and museum and exhibition management. Universities are launching new programmes to train the necessary workforce required by the cultural industry. There is an increasing demand for cultural management and cultural marketing programmes while governments also foster the further training of those actively involved in artistic activities (Germany, Austria, Estonia,
Hungary, Spain and Serbia). These countries perceive the cultural field as a productive, effective and marketable area.

Since the mid ‘90s there has been a continuous growth in the programmes and education content related to multimedia, design and audio-visual topics. In 1994 the first college for design and multimedia (Austrian Fachhochschulen) was founded in Austria. In Estonia there are two private higher education institutions offering design programmes. In Ireland the National College of Art and Design as well as a network of art colleges in major centres of population provide for training in visual arts and design. In Latvia, the city of Liepaja hosts a Design College and the content of the educational material related to creative industries, including that of design, has been revised. In Lithuania there is a Design Innovation Centre financed by the European Union while on Malta an Art and Design Institute operates within the Malta College of Arts, Science and Technology. In the area of art education the Portuguese government focuses on fashion and design. In Sweden almost each education institution has a design and media programme. In Slovenia fashion and design programmes are launched at the natural science and technical faculties. The field of design is also treated as an important component of the educational system in Macedonia, Germany, Russia, Hungary, Romania and Spain.

In the Czech Republic the teaching of new technologies already starts at the secondary school level, while in higher education a prominent institution, the Studio of Graphic Design and New Media at the Academy of Applied Arts, Architecture and Design opened in 2005 offering regular seminars and workshops for students including the Interactive Installations and 3D event since 2010. In Denmark, the use of new technologies is an evident expectation everywhere, while on Malta it has become part and parcel of theoretical and practical courses at the motion picture, 3D design and graphic design programmes. Moldova has also called for a reform of higher education including the need to insert the possibilities offered by new technologies, the Internet and the new media into the educational materials and training programmes in addition to contemporary arts. In Hungary, education institutions, both state-funded and private, pay sharp attention to the use and teaching of new technologies, including 3D technologies as well. In Ukraine, during 2010-2012 exhibitions and master classes were organized by the NGO “Alternative Visual Studies” / MediaArt Lab department with the support of European partners and cultural organizations (Ars Electronica, EMAF, FACT and others). An innovative educational project for children and teenagers, the Spark!lab at Mystetskyy Arsemal was organized to introduce innovative ideas and technologies. At the same time, in Ukraine there are no sustainable educational or vocational programmes for developing the creative relationship between culture and technology. There are no special faculties or departments of media art either.

Although art education has a deeply rooted and long tradition everywhere, the spread of private universities only started in the 2000s. Private universities have been established in Albania, they have been present in Austria since 2004, while in Macedonia they were founded in 2007-2008. In Russia, the number of private institutions is also on the increase in the field of art education. In Estonia, they have appeared in the audio-visual and
design areas. In France, private schools run courses in graphic arts, interior design, cinema and broadcasting, press, video games and multimedia in addition to training the technical professionals for performing arts. In Hungary, a private university has been established with programmes in visual communication, media arts, media design, cameraman, photography and applied arts. Private institutions offering courses related to the creative industries have also been established in Latvia, Poland, Armenia and Serbia as well.

The analysis of art higher education based on the review of the 42 country reports has verified that there is an increased attention to new courses and programmes supporting the creative industries which may be a factor in the growing number of private higher education institutions in this special field. The issue of creative industries also appears at the public policy level and in educational strategies in several countries (Latvia, Russia, the Czech Republic, etc.). This visible prosperity is in close relationship with the developments in technology and the opportunities they offer. Technical developments are opening new vistas for the economy, the opportunities for profitable investments appear in new fields. New services, new ways of application and contents have emerged which, in turn, have a profound impact on society increasing cultural diversity due to today’s global culture.

5 The central role of new technologies and social networks

Today, we are living in a world of special global information networks. New information and communications technologies, interactive web interfaces (Web2.0) and applications are constantly emerging and spreading inducing widespread effects.

What are the implications of the above process for the younger generation, future university students, the creative workers of the future and the creative talents of the present? In what ways are they involved in the globalized world of networks, how do they use new technologies and what kind of devices do they have access to? Numerous studies have underlined the assertion that the use of the social media by young people (aged 15-29) is considerably different from that of the older generation.

The above statement has also been verified by a survey conducted within the framework of the VIADUKT project in the autumn of 2013 on the use of media and mobile telephones by Hungarian secondary school students (aged 15-18).

The survey found that the youngest people are the most active in the social media with 97% of them having at least one profile on Facebook. 77% of the surveyed population

7 The survey was commissioned by the BKF University of Applied Sciences, Budapest (Schleicher, Nóra – Rétfalvi, Györgyi – Gayer Zoltán) and was conducted by the Forsense Market Research and Strategic Consultant Institute on a sample of 600 secondary school students. For more details see http://forsense.hu/tarsadalom/facebook-hasznalat-a-magyar-közepiskolasok-koreben. Sampling and the collection of information using a CAPI questionnaire with interview questions prepared by BKF was performed by the Forsense Institute. The research was implemented within the framework of the BKF VIADUKT research programme under registry number TÁMOP-4.2.2.A-11/1/KONV-2012-0050 supported by the Structural Funds of the European Union. In the course of the research a focus group study was performed in the summer of 2013 to discover the user habits, relationship and attitude of young people relating to social and new media.
are registered on YouTube, 69% use Skype followed by Viber (51%), Google (42%) and Instagram (25%). They generally show a high presence in the social media but the rate of Facebook users is especially prominent. The second biggest group is composed of students with a YouTube registration. Since watching videos does not require registration, registered users consequently include more active users who wish to share videos or edit lists.

Facebook is generally accessed via phones with the aim of chatting, i.e. for real time communication with friends and acquaintances. Thus, the most attractive feature of Facebook is that it works as a communication channel.

![Figure 1: The most frequent ways of chatting/exchanging quick messages among secondary school students with a smart phone](image)

The importance of chatting is underlined by the fact that 8% of users have one chat window open on a single occasion while more than half of the respondents keep 2-3 chat windows open. Facebook is considered to be the single most important chat page. Smart phones not only provide an opportunity to perform the above activities but at the same time they also dramatically change our habits related to the use of these types of devices.

It is widely believed that our civilization is becoming more digitalized as a result of rapid and constant developments in technology. The man of the year in 2006 according to *The Time magazine* was “YOU”, i.e. millions of anonymous people editing such user-generated websites as YouTube, Wikipedia, MySpace, Facebook or the Linux operation system, etc. In other words, users also create content and the boundary between the manufacturers, experts and consumers seem to become increasingly blurred. The way content is generated has undergone immense changes that effect similarly immense changes on scientists and their status. They cannot act as neutral observers any longer, since experts either belong to the university staff (professionals) or they may come from basically anywhere (amateurs).
The above research on Facebook in a certain sense also outlines potential future trends based on the habits of those soon entering the adult age.8

Information technologies have become parts of the communication channels and they continue spreading. In this environment creative expression has become a crucial value. The circumstances of competition have also changed as a result of the emergence of the cultural and creative industry sector with the national stage being replaced by the international scene. New markets, novel products have appeared, property rights have changed and new professions have developed, e.g. web designer, online journalist, online curator, etc. The development of digital technologies, the mass use of information and communications means have a deep impact on cultural life, on the consumption of cultural goods and on participation. Primarily, visual and performing artists tend to use these new technologies to an increasing extent.

Digitalization, the spread of new technologies and creative industries also influence cultural participation. The consumption of cultural products mainly depends on social, demographic and geographic factors, it has a close connection with urbanization, the level of schooling, profession and the quality of life. One of the most visible changes include the dramatic increase relating to the time people spend watching television as a result of the multiplication of television channels. This phenomenon goes hand in hand with the decline of visits paid to the theatre, museums and other state-funded classical cultural institutions. On the other hand the number of visitors to concerts (including festivals as well) has risen in a lot of countries. Theatre plays, dance performances, classical concerts, fine art and contemporary art exhibitions, museums and historical memorial sites are popular mostly among the most highly qualified people. Cultural entertainment in the home has also become more common in the past decade as a result of the spread of communications devices and services.

The involvement of the society in creative and cultural activities have a positive influence on both the community and the individual, and the cultural improvement of the latter has become a top priority. Culture contributes to the intellectual, emotional and moral improvement of each citizen.

6 Summary – How can universities become the incubators of creative talents?

In the course of the twenty-month-long VIADUKT research our research groups were looking for correlations between the spread of creative industries, the operation of network societies and the changes in higher education and its role in talent management. The research revealed the basis of these phenomena and found good practices among the countries investigated. Further research is needed to comprehend the consequences of

8 Due to the space limitations of the present study, further details cannot be expounded here.
specific methods and solutions and their potential results with the aim of answering a host of new questions formulated during the study. How are art programmes transformed, renewed and to what extent are these changes related to the spread of creative industries? Why is the number of courses connected to the creative industries increasing especially at (private) higher education institutions? What predictions can be made based on the analysis of the present trends? What kind of potential scripts for organizational development are offered by the information and best practices collected and reviewed by the research? The responses to these questions shall be discovered by new research with the objective of providing useful information, proposals and choices for governments, leaders in higher education, cluster members and students planning their future career.

Existing research findings have led to the conclusion that not only the number of – primarily art – programmes and students related to the creative industries has increased but also their function and place within the university structure have changed. The most novel solutions, activities and initiatives are present at those institutions where creative industry-related programmes are consciously designed with a view to their potential connections with each other and where cooperation with other courses – mainly economics, commerce and marketing, IT and technical programmes – are encouraged.

A further subject of future studies may be the investigation of the solutions for organizational changes and functions applied by the so-called entrepreneurial or practical universities that have taken a step beyond the traditional threefold task of education-research-innovation. These universities pay great attention to company relations and the benefits arising from the above mentioned three functions and make use of the opportunities offered by their cluster membership and their role as an incubator or organization supporting start-up businesses. The best practices in this field include cooperation with the world of companies within the framework of which students may take part in internships (even at programmes where work placement is not mandatory), competitions, studies and work activities. These are, in turn, completed with a project-based instruction which is a common practice at art courses but which still requires great effort at humanities or economic programmes. In addition to the above activities, a university organizational unit operating as an incubator or mentor of start-up businesses has to perform tasks that are not traditional university activities. They typically include legal assistance (intellectual property, patents, copyright, changes in legal provisions, etc.), financial and banking counselling, tendering and project management skills, knowledge and assistance, insurance, marketing, crowdfunding, career counselling, sharing best practices, facilitating international relations, providing for incubator venues, preparation for competitions, offering programmes and meeting points, etc. These activities are not only provided in the form of available services but also included in the educational material.

Universities are supposed to be able to successfully perform the above listed activities with a view to the development of creative industries and the productivity of creative talents. Nevertheless, further research and surveys are needed to investigate not only these functions but their effects as well. Is it a university organization that is best suited to perform these tasks? Or should we outsource them (to agencies, associations, counsel-
ling services) to achieve greater success? What indices should be used to measure productivity? What kind of public policies enhance and hinder the above activities? How can the different worlds of academics, economy and public administration find their common interests? What strategies have been developed and how have they been implemented? What lessons can be learned from all that?

The prosperity of the creative industries confirm the notion that arts and the media bear a significant economic value in the new digitalized economy. This value is unfolded through creativity and embodied in new products and services. The appearance of digital cultural contents and services have introduced a new era which influence education and the way audiences are targeted and gained. The advent of digitalization is also important for the creative industries since it creates the social basis for the products of creative industries and strengthen the cultural and economic effects of creative ideas.

Digital technologies also enhance the dissemination of information, the cohesion within communities, the establishment of an increasing number of networks, the spread of educational services in addition to facilitating the consumption of culture as a result of its easy reach of the audience. States have recognized the new dimensions that have been opened up by cultural heritage and creativity, they are aware of the important role of clusters in strengthening innovation and boosting competitiveness. Cultural heritage constitutes a central and integral component of national identities (although in education arts are primarily about the improvement of skills instead of transmitting cultural heritage) and the products of the creative industries that stem from this heritage can be easily distributed in a globalized world using digital tools and new technologies. Information and communications technologies function as bridges between the cultural and other sectors also reaching the community.

On the other hand, bridges are not only indispensable between the worlds of science and business but also within the organizations themselves that offer the opportunity for new encounters and connections (career centres, offices for tenders, training centres, offices for exhibition/event management, talent management workshops, laboratories, etc.). Universities have to meet not only the demands of business ventures and labour market expectations but also those of the society, they have to live up to the rapidly changing habits and mentalities in addition to the requirements of the state administration with the aim of serving the common good.

The management of higher education institutions is also changing which is marked by new organizational units and positions responsible for development and innovation (vice-rector for innovation, vice-rector for strategy development, etc.). Due to the specific features of the creative industries, universities shall reinvent and widen their traditional teaching role and invest a great deal of effort in delivering the appropriate circumstances under which they may become the incubators where creative talents – building on their inherent characteristics – may unfold their full potential. They shall teach, do research and initiate developments and at the same time create opportunities for the upcoming generations. It is the responsibility of universities to bear the slightly modified
version of the old proverb in mind: not everybody may become a brilliant and creative talent, but brilliant creative talents may come from anywhere. It is our task to recognize them, improve their skills and offer the opportunity to unfold their brilliant creative talents.

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China and Europe - Regional Differences in the Value Chain of Small Medium Enterprises

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Abstract
Based on a survey, economic factors, and empirical knowledge, a study was undertaken to answer the following questions:

(1) Is there a difference between the Value Chains of Chinese and European SME (especially medium-sized companies)?

(2) If so, what are the implications of the different business models with regard to costs, innovation, customer response time, and service capability?

Research Method:
Using a structured questionnaire, a survey was conducted which consisted of face-to-face interviews with business owners, 10 in China (in English) and 10 in the three German-speaking countries of Europe (Switzerland, Germany, and Austria). The final outcome is an analysis of their answers, the results of a literature review, and an evaluation of economic key factors (including industry clusters, the size of the domestic market, labour cost, and the general costs of doing business).

Findings:
The medium-sized companies in the two regions have distinctly different business models.

The value chains of Chinese companies are much deeper (i.e. longer, since there are more steps in the production of their goods) than those of their European counterparts (which concentrate more on buying semi-finished products and the final assembly).

The depth of the value chain transforms the nature of a company’s competitive advantage. Research has shown that this greatly influences a company’s ability to be flexible with regard to:

› Innovation
› Reaction time to modify products
› Closeness to customer needs
› Customer service level

At the same time, basic economic circumstances affect the way business is conducted in these two areas and further increase the differences. Factors include:

› The development of industry clusters
› The general cost of doing business
› The size of the home market
Quality standards
The general flexibility of the companies themselves.

Conclusion
The depth/length of the value chain of medium-sized companies has a strong influence on how companies react to market and customer needs. The more steps of the value chain are under the direct control of a company, the better it can react to market changes and customer needs.

Outlook
Based on this conclusion, companies especially in the West have to find ways to respond to customer needs that are changing more and more quickly.

The findings also have strong implications for the CRM of SME: How can they develop and implement practical measures in order to improve and maintain customer relationships?

Keywords
Small Medium Companies (SME), depth of value chain, comparing Chinese and European SME, labor costs and general costs of doing business, competitive advantages, innovation, CRM Potential.

1 Introduction - Companies and their Value Chain
These are the instructions for the full paper submission. The full paper should be written in British English using this template in preparation for publishing. You are kindly asked to use the predefined headings (Heading 1, 2, 3, 4, 5) and the current format (line spacing and columns). The length of full paper should be around 7-15 pages.

The value chain is an important business concept strongly advocated by Michael Porter in 1985. The main focus lies in the incorporation of the main steps of doing business (generally they include R&D, sourcing/inbound logistics, production/operations, distribution/outbound logistics, marketing/sales and after sales services) into a company related system. Based on this concept, companies can have a substantially deep value chain, encompassing basically all activities from sourcing to POS activities or a not-so-deep value chain (incorporating only a few selected steps) which means that some steps are outsourced or bought from the open market. Consequently, the value chain is also called the “value system” of a company, where a business is segmented into strategically relevant activities and under direct control.

Large multinational enterprises (MNE) often do not have a deep value chains and thus depend for their production on connected suppliers and partners on a global scale. However, among the midsize companies, there is a broader mix in depth of their value chains.

1 M. Porter and V. Millar, “How Information” page 151.
2 E.g. some car manufactures control only around 20% of their value system.
This article focuses on products producing SME and raises the question, whether there are determining regional influences between midsize companies in China and Europe or the Western businesses in general. The interviews of SME in China and Europe (from now on Chinese and European SME) show that regional factors influence strongly the depth of the value-added activities of midsize companies.

2 Research questions and hypothesis

Building on the understanding of the importance of the value chain for SME, we conducted an empirical study to address the following questions:

› Do small and midsize companies in China and Europe have a different depths of their value chains?
› Are regional economic circumstances different and thus influence the value chains of SME?

Based on the literary research and personal experience while doing business in China, we hypothesized that the differences in the length of the value chain should be reflected mainly in the general market conditions. Accordingly, we set forth and tested the following research questions:

RQ1. Is there a significant difference between SME in China and Europe and in the way they do businesses – length of the value chain?
RQ2. Do specific external factors generally determine the depth of the value chain of SME?

The survey was conducted by SME in various industries. However all researches focused on companies that produce goods, while none in the service industry. The service sector was deliberately excluded.

Research method and data collection

We conducted interviews in China and in the German speaking region Europe by total twenty companies, equally divided. The questionnaire was written in English and in Chinese containing 16 main questions, often expanded with sub questions. The business owners or heads of the companies had to answer open questions as well as multiple

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3 For the business environment as related to the here discussed topic (excluding the service industry), similar conditions do exist within the industrialized West.

4 For this preliminary research ten companies in China and ten companies in Europe have been interviewed with a standardized questionnaire. They build a) the basis for this report and are also instrumental for the larger survey which will be conducted in the near future.

5 Service companies generally serve their customers local (except internet services) and require mostly “local” value chains.
choice questions. This mix helped to cover the main area and to foster distinctive answer to specific questions.

3 Research Results

In this section, we first present the descriptive information of the responding firms. The research showed that a clear difference exists, between SME from China and Europe. Chinese companies have distinctive longer value chains than their Western counterparts. Chinese companies produce as much as possible by themselves, whereas their European counterparts have reduced value chains.

All companies were asked to describe their individual steps of their value chains and mark them on a prepared graph with the main steps of innovation/design, raw material and sourcing, technique (production/assembly), sales and after sales services. The difference was remarkable. While all the Chinese companies marked basically all steps from the design (9 mentioning), sourcing (10 mentioning), technique (production, 10 mentioning), sales (10 mentioning) to the after sales service (9 mentioning), European companies marked design (8 mentioning), sourcing (5 mentioning) technique (production, 3 mentioning) and sales (10 mentioning) and after sales services (7 mentioning). Asked, whether they consider the own value chain rather deep or not so deep, significantly all companies from China market the answer “rather deep.” On the other side, 80% of interviewees from European companies marked “not so deep.” Furthermore, the comments to the follow-up question provide additional insights into the difference. Chinese companies consider the following issues decisive for their deep value chain; eight companies the sales price of their products (Europe 5, mentioning), nine the after sales service (Europe, 3 mentioning), seven the control over the quality of their products (Europe, 4 mentioning) and six the ability to innovate (Europe, 4 mentioning).

The question about which part of the value chain is most capital intensive, 90% of the Chinese companies answered that it is the raw material, whereas 70% of the European companies answered with the “general cost of doing business.” The question which part of the value chain bears the largest cost factor, 90% of all Chinese companies answered with “material”, where for 80% of the European companies it is the cost of skilled laborers. For 80% of the Chinese companies, the latest technology is decisive for their production, whereas 70% of the European companies place the need to have the latest technology into the hands of their sourcing partners which supply them with components. Furthermore, the question about which part of the value chain depends most on the skilled laborers, 90% of the Chinese companies answered with “production,” whereas for 60% of the European companies answered with “sourcing” – where to buy the right components.

Asked directly, what they consider the most influential factors for the depth of their value chain, all Chinese companies answered with “labor cost” whereas only 20% of
the European companies agreed to this. Also all of the Chinese companies stated that it is cheaper to do things by themselves, a fact to which only 20% of the European companies agree.

Independent from the length of the value chain, 80% of the Chinese respondents considered manual labor to be the decisive factor for securing a high quality level (Europe 4 mentioning). Additional answers are integrated directly into the following conclusion.

Focusing now more on external factors and how they influence the depth of the value chain of Chinese and European SME, the difference between East and West becomes evident. Chinese companies, mainly due to the availability of comparatively cheap laborers, the still low technological products they produce, the closeness to source (work inside industry clusters) and the cost of running a company, favor to perform most steps of the own value chain under one roof. The average monthly wage of a laborer in China lies between 3’000 and 3’500.-- RMB (~270 to 430.-- €)6 whereas in Europe, roughly the same amount is paid in Euro. This difference is the strongest factor which leads to a deeper value chain.

Analog to the above fact, for the Chinese companies the cost of material is the highest capital intensive segment of their value chain (80%), followed by the machinery (20%). Wages are for all firms the lowest capital intensive financial burden to run their business. For European companies, wages are on the top of the list (60%) followed by the needed technical equipment (40%).

Regarding securing the quality throughout the whole value chain, the difference between all asked companies is not significant. However, as the follow-up questions indicate, the Chinese companies consider that their products do not have the same high quality standard as their Western counterparts have. They also consider their Chinese home market big to find enough buyers, despite slightly lower quality standards. When asked, whether they believe that their depth of the value chain will change in the near future, all Chinese companies consider their way of business to remain the same. Furthermore, all Chinese companies consider the market to grow and future orders to be bigger. This reflects their understanding that their home market is still growing.

Considering the results of the research which point clearly to two different depth of value chain SME in China and in Europe, it is evident, that regional determinants influence the depth of a value chain of the interviewed midsize companies more than anything else.

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Further, combining the research answers with economic data, the own knowledge of both markets and literature research, it helps to round up the results of our research and to draw conclusions.

Several key factors have a strong influence on the depth of a value chain. They determine strongly the value chain, which a company has to control directly in order to be successful. This is especially true for SME. The issues which determine the Chinese business structure lie in eight distinctive differences. In comparison, these differences reflect, why European SME have a shorter value chain in order to be successful in their market. The key differences or the specifics of the Chinese environment for SME are:

**Low labor cost and abundance of workers**

Labor costs vary dramatically from regions to regions. Developing countries such as China, Indonesia, Vietnam and Malaysia have much cheaper labor forces than developed countries. Areas and regions with enough people who are willing to work for relatively low wages foster companies to have deep value chains.

**Availability of land and land cost**

The availability of land and the density of industrialization relate directly to the cost to do business. Europe has saturated industrial land density, whilst China moves from the dense coastal areas to the more open mainland. The availability of land and cheaper places to produce in China allows local companies to extend their production, whereas the high cost in the Western world, induces shorter value chains.

**Level of products and services**

In China, most SME are in the low-technology industries, producing goods like small equipment, textiles and toys. They generally lack new product developments and are mostly trend followers. In contrast, enterprises in the West produce mainly in the high-tech industries which requires swiftly reacting to changing markets with updated or products. Consequently, companies who produce lower value-added products tend to extend their value chain, whereas companies which produce higher valued goods are more prone to buy parts from specialists.

**Industrial clusters**

Companies who produce in large industrial clusters have clear substantial advantages. They find, what they need to produce and thus can manage to source in close proximity.
from several competing suppliers. Industrial clusters are increasingly permeated with entrepreneurs, research organizations and technological institutes. Thus SME have direct access to the newest developments and innovations. Doing business in China’s large clusters allows quick access to know how and material resources.

Size of the home market

Having a large market to serve also influences the depth of a company’s value chain. Chinese companies, being domiciled in a vast growing market are prone to have a large production – economies of scale. Such an environment where even smaller towns have more than a million inhabitants, allows SME to have large production.

Quality and service standard

The high quality standard in the West of products and services requires high standards along the whole production process and elaborate quality assurance systems. In China, the fast growing, but still fragmented market, still overlooks too often the low quality of products and services.

Availability of capital to run a business

Looking first at the situation in China, smaller enterprises have great difficulties to receive loans and working capital. Besides specific remarks during the interviews, the existence of “shadow banks” and their large amount of lent money, speak dramatically for this situation.

General cost of doing business

Many of the above mentioned points contribute to the lower cost level of running a business in China and the potential to create competitive advantages. Furthermore, lower social and other financial obligations and administrative duties towards the government; keep the general costs of running a business down in China. In the West, the high taxes and general expenses drive the cost of running a business up.

The existence of all these factors influences strongly how SME do business and the preferred depth of their value chains. For Chinese companies, having a deep value chain is important to keep the small profits each value-added step generates, within the own company. They are generally also flexible producer for their customers and to the changing market needs.


11 China’s three, globally speaking, very large production areas of the Pearl River Delta, the Yellow River Delta and the Yangtze River Delta Basin incorporate many industrial clusters. Other large clusters do exist along the highly developed eastern area of China where SME can satisfy their needs along their value chain.


13 M. Porter and V. Millar: “How Information” pages 149, 153 and 157. This is even true for the apparel industry, where it is assumed that it moves the fastest to low wage countries. B. Jin: “Apparel Industry” page 231.
Having a deep value chain helps the Chinese companies also to adapt quickly to changes in their market. The control over the final product is also a decisive factor to be closer by the customers and to have a good customer service. Chinese SME know their products well and spare parts are available within the own company. Consequently, this is a good base for satisfying customer relations.

However, the difference for European companies lie also directly in the sphere of the eight above mentioned factors. European companies are mainly positioned in higher value added sectors and depend heavily on innovation. These SME need highly skilled laborers rather than cheap workers. Furthermore, they are domiciled in areas, where the costs of labor and the production space in general are high and sourcing is not right around the corner in global industry clusters. Consequently, their value chain is being shortened, whenever it is possible. This reduction strongly reduces the fixed cost and the required investments – the longer the value chain is, the higher the related investments are. A short value chain has also adverse implication for the power to innovate and to service the customers well, since segments of the solution are in the hands of business partners or suppliers.

4 Conclusion and recommendations

The research in the two different geographical regions shows two different Business Models:

› Chinese companies have, mainly based on their business environment, a larger value chain – producing almost everything by them!
› European companies have, mainly based on their restricted market situation, a short value chain – outsourcing especially the production part!

The two distinct business models are successful and equally well adapted to their specific production conditions and their sales areas.

Determining factors which dictate the depth of the SME value chain SME are:

› cost of labor
› business environment
› closeness of sourcing (raw materials)

15 L. Yueh, China’s Growt, p. 183. The strong rise of patents is a clear indicator.
 › ability to provide good after sales services
 › as well as
 › ability to innovate
 › control of the final product – quality.

External factors determine the depth of a companies' value chain in China and consequently also those of their European SME. Combining the research answers with economic data, the own knowledge of both markets and literature research, it helps to round up the results of our research and to draw the second conclusion! Comparing the situation of the Chinese SME with those in the Western world, the following graphic provides an overview and acts as a summary. The initial points of comparison are the condition in China to which the situation of the European SME is added.

These following eight factors determine the longer value chain of Chinese SME (table with viewpoint China) are:

<table>
<thead>
<tr>
<th>Factors influencing the depth of the value-chain of a SME</th>
<th>Conditions in China</th>
<th>Conditions in the West</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor cost / abundant workers</td>
<td>low cost with abundant workers</td>
<td>not so favorable</td>
</tr>
<tr>
<td>Availability of land and land cost</td>
<td>favorable</td>
<td>not so favorable</td>
</tr>
<tr>
<td>Level of products and services</td>
<td>rather low</td>
<td>quite high</td>
</tr>
<tr>
<td>Industrial clusters</td>
<td>yes, very big centers</td>
<td>not so abundant</td>
</tr>
<tr>
<td>Home market</td>
<td>very big</td>
<td>in comparison small</td>
</tr>
<tr>
<td>Quality and service standards</td>
<td>not yet world standard</td>
<td>high world standard</td>
</tr>
<tr>
<td>Availability of capital</td>
<td>hard to obtain</td>
<td>structured available</td>
</tr>
<tr>
<td>Cost of running a business</td>
<td>low</td>
<td>comparing high</td>
</tr>
</tbody>
</table>

*Table 1. Comparing SME-business conditions between China and the West.*

Concluding from additional comments and of the researcher, know-how of the local situations and about doing business, it can be added:

Companies with a deep value chain a) enhance a business ability and b) are closer to the market needs (CRM) to be more innovative (less dependency).

Our research showed two significant different business models with regard to the value chains between companies in Europe and in China. Looking into the future, the SME in Europe face the danger of not being able to react fast enough to the developing market. Their dependency on subcontractors and suppliers makes quick reaction more difficult.
This might indicate for them to carefully “narrow” their production range and to “own” more steps of the value chain. The issues which Chinese SME might encounter in the near future are the quick development of their own industry makes it harder for them to upgrade all stages of their value. The dilemma for both, the Chinese and the European SME is that the quick pace of innovation depends on the control of the whole value chain!

Further research

Based on the preliminary findings, a broader survey will be conducted in the near future, where specific industries are in the focus. The above mentioned facts based on the survey and the theoretical background is not expected to be questioned, but rather deepened. The production and market condition between China and Europe are distinct and will remain so in the near feature. It is to be hoped that other researchers will be attracted to this topic and cooperate in the new project.

The new focus should be on a) specific industries and (b on themes like “binging back production” or “turn around manufacturing!” Clear results will a) give a solid base for SME to stay competitive and b) gives answers an issue which is solely on the level of political slogans.

References


2010, p. 63-77.


Knowledge and Technology Transfer as an Enabling Element of 100% Renewable Energy Regions

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Abstract
Developing transition strategies for energy systems based on the use of renewable energy (REN) is currently an important issue in many regions all over the world. Up to now, mostly case studies deal with ‘(100%) renewable energy regions’. These studies focus on Scandinavia, Austria, Germany, Switzerland and the Netherlands. Given the relevance of the topic, our paper aims at identifying and concretising drivers of renewable energy regions. We hereby combine theories derived from policy studies and innovation economics dealing with the transition of the energy sector. A municipality online survey, conducted in 2011 in all German states, provides the main empirical basis of our paper. The results show that the examined transition process is driven by a combination of economic and environmental strategies. The existence of a transition strategy, municipal participation in REN projects and inter-municipal cooperation turn out to be the main drivers regarding the implementation of a central transfer institution coordinating the transition process towards a (100%) renewable energy region. These findings enable us to derive the following policy and managerial recommendations: First, policy making should rely on established public partnerships, as for example inter-municipal science and technology parks or competence centres for increased inter-organisational knowledge and technology transfer (KTT). Second, new private players in emerging local and regional renewable energy markets need to be integrated more and better in the existing public transfer networks as this is currently the case. Furthermore, different policy transition strategies have implications for managerial decision making at firms and universities bear potential for further KTT activities fostering regional development and hence particularly the transition towards renewable energy regions.

Keywords
Knowledge and technology transfer, renewable energy, inter-municipal cooperation, public-public partnerships, public-private partnership, regional development

1 Introduction
Considering the core challenges with regard to energy policy strategies, the development of adequate transition strategies for energy systems based on the use of renewable energy has become an important issue for many municipalities and regions all over the world. Up to now, mostly case studies examine this subject. Recent case study literature deals with it from a geographical point of view, primarily focusing on Scandinavia, Germany, the Netherlands, Austria and Switzerland (Reiche, 2005; Späth and Rohracher, 2010; Gerstlberger et al., 2011). The drivers of the global movement towards an increasing use of renewable energy on a regional level are manifold: Engage-
ment against climate change and environmental pollution, rising energy prices and achieving a high level of energy independency as well as regional and business development and new jobs are mentioned as drivers in strategy papers of renewable energy regions and municipalities (e.g. Rösler et al., 2013).

Scientific reflection and evaluation of the currently ongoing transition of regional and municipal energy sectors towards renewable energy systems has just been emerging and intensifying in the last few years (Smith, 2007; Berkhout et al., 2009; Cooke, 2009; Foxon and Munch, 2009; Andersen, 2009; Späth and Rohracher, 2010). Hence limited knowledge exists so far about preconditions, drivers, success factors and barriers or rather challenges of transition paths from conventional regional energy sectors to systems which are based to a large extent or even completely on renewable energy. Given the high environmental and economic relevance of this issue, the aim of our paper is to contribute to filling the research gap regarding drivers of renewable energy regions. More precisely, our paper contributes to theory development and practical discourses by providing new findings from a large-scale survey among German municipalities. The sample of this study allows us to deal with research questions which have merely been discussed conceptually or based on case study results so far.

The remainder of the paper is organised as follows: Section 2 is dedicated to the research question, the theoretical background and the literature review of our study. Section 3 describes the research design and procedure. Section 4 presents and discusses the findings of the survey for the background of regional transition and innovation system approaches. The paper concludes with section 5, which points to limitations of our study, possible directions for further research and some preliminary policy recommendations.

2 Research question, theoretical background and literature review

The paper aims at contributing to identify the most important drivers of renewable energy regions and municipalities. Our main research question reflects this aim:

Which ‘value creation and knowledge and technology transfer practices’ drive the transition of mainly conventional regional energy sectors towards systems which are primarily or even completely based on the use of renewable energy?

The term ‘value creation and knowledge and technology transfer practices’ refers to different types of institutionalised or informal resource- and knowledge-related regional and municipal cooperation, such as public private partnership (PPP), public public partnership (e.g. energy or utility joint ventures between different municipalities), implementation of intermediaries (‘knowledge brokers’), university spin-offs or public subsidies for knowledge sharing. Particular emphasis is given on the knowledge and technol-
ogy transfer (KTT) activities from universities into business and society practice (Bok, 2003; Reddy, 2011; Kliewe et al., 2013).

From a theoretical perspective, the interactions of these different practices as well as the actors and institutions behind them are studied recently mainly in ‘Innovation System’ (regional, local, sectoral) and ‘Triple Helix’ approaches (Etzkowitz and Leydesdorff, 1998; Cooke, 2001; Etzkowitz, 2008).

The modern understanding of innovation system approaches stems from the late 1980s (Freeman, 1987; Lundvall, 1988). We are hereby following Lundvall (1992: 12) regarding different definitions of innovation systems, from which

"the narrow definition would include organizations and institutions involved in searching and exploring—such as R&D departments, technological institutes and universities. The broad definition [...] includes all parts and aspects of the economic structure and the institutional set-up affecting learning as well as searching and exploring—the production system, the marketing system and the system of finance present themselves as subsystems in which learning takes place".

Starting from this rather broad theoretical innovation system framework, our study focuses on the triple helix of the three key actors which are usually involved in renewable energy regions: (i) companies, (ii) universities and (iii) municipalities/regions (‘local states’) (Etzkowitz and Leydesdorff, 1998, Reiche, 2005; Etzkowitz, 2008; Späth and Rohracher, 2010).

For a better understanding and operationalisation of our research question, it is furthermore necessary to rely on definitions of the relevant core terms. Transition of an energy system summarises the fundamental and long-term restructuring of the technological, legal, economic and political conditions of energy production, transport and consumption in a defined geographical area. A transition in this sense cannot be revised by short term political decisions (Berkhout et al., 2004; Cooke, 2009). Renewable energy in this context refers primarily to hydro, wind, bio and solar energy. Additional renewable energy sources—such as for example wave energy or geothermy—were of minor relevance in our study.

As geographical transition areas or units of analysis for our survey we chose the units defined and referred to as administrative regions and municipalities in the context of the German political system. Our paper focuses both on regions and municipalities, as both administrative units often cooperate very closely in developing renewable energy regions. In the German political system, the term ‘region’ is not as clearly defined as ‘state’ (‘Bundesland’) or ‘municipality’. Both counties (‘Landkreise’) and other types of regional administrative bodies (e.g. ‘Regierungsbezirke’, ‘Regierungspräsidien’; [regional administrative districts]) are referred to as administrative or political regions (Hesse and Ellwein, 2012). ‘Landkreise’ and other regional administrative units in Germany can make use of a broad range of tools and subsidies to support the use of
renewable energy. This is often done in form of a combined approach, supported by local and regional political institutions (Rössler et al., 2013).

In our paper (and hence as well as our empirical survey), a region comprises at least one county. As already mentioned, municipalities are clearly defined in the German political system. This term refers to all local authorities with own territories and local self-governing bodies (e.g. a city council). German municipalities are divided into administratively and politically independent ‘major cities’ with at least 100,000 inhabitants, and smaller municipalities (cities or other types of local authorities) belonging to a certain county.

Finally, terms like ‘only’, ‘mainly’ and especially ‘100% based on renewable energy’ are often used in the literature and in political transition strategies rather qualitatively than quantitatively (Mathiesen et al., 2011). Significantly more importance than to the exact degree of actual or planned use of renewable energy is attached to the political will to replace conventional energy sources by renewable energy sources, following a long-term ‘renewable energy plan’ or ‘concept’ (e.g. Reiche, 2005; Rössler et al., 2013).

With respect to empirical case study findings, some of the recent single or multi-case studies on renewable energy and sustainability transition regions focus on innovation system and/or triple helix considerations (Smith, 2007; Tukker et al., 2008; Smith et al., 2010; Gerstlberger et al. 2011; Mathiesen et al., 2011).

Long-term visions about alternative technological and economic development paths are a common starting point for regional transition processes towards renewable energy regions. Single projects and initiatives of different actor groups (companies, non-governmental organisations, public authorities, universities and research institutes) refer to these visions and place themselves around regional visions and intermediate public public and/or public private transfer institutions (e.g. Späth and Rohracher, 2010). The investigated regional visions differ in detail, depending on geographic, cultural, economic and political conditions. Despite these differences, visions of renewable energy regions show a common framework:

› Legitimation due to the decision of political bodies (e.g. city or regional councils),
› PPP and public public partnership (e.g. energy agencies),
› Intense KTT activities between all actors involved,
› A decentralised, combined exploitation of different renewable energy sources is favoured against focusing on only one energy source,
› Active participation of citizens, associations, universities and companies in concrete renewable energy projects (e.g. privately owned wind-farms).

Research gaps of prior studies discussing such visions for renewable energy regions (Späth and Rohracher, 2010 and Gerstlberger et al., 2011 provide a basic overview) concern (i) potential long-term effects of the former public organisation of the energy
sector, (ii) the relevance of different types of visions and (iii) challenges in the interaction between long-term visions and goals on the one hand and daily routines of the involved public and private actors on the other hand.

In the context of our research, sub-systems of regional innovation systems in the energy sector are the producers of renewable energy and energy technologies as well as different groups of actors dealing with education and training, research and development (R&D), knowledge and technology transfer, financing, consulting, maintenance and other services. According to the findings of the reviewed case studies, renewable energy regions are linked in different ways to global, national and other regional innovation systems.

First, advanced regions mainly export renewable energy, renewable energy technology and related knowledge to consumers as well as to users in their own or foreign countries. Second, less advanced regions rely more on imports of renewable energy, renewable energy technology and related knowledge from other regional, national and global innovation systems (Reiche, 2005; Gerstlberger et al., 2011).

Despite existing technological knowledge and practical experiences with the use of renewable energy, a specific institution had been chosen or newly implemented to coordinate and support the transition process in most of the cases. Most of these institutions are based on PPP or inter-municipal (public-public) cooperation. Typical examples for these institutions are regional energy agencies, specific organisations for ‘regional management’ and regional energy networks (e.g. Späth and Rohracher, 2010).

Discussing critically this institutional approach, Smith (2007) entitled his case-study paper on this topic “Emerging in between: The multi-level governance of renewable energy in the English regions”. With ‘in between’, Smith describes the development of new local and regional networks and institutions in England during the last years. These new local and regional actors increasingly share the responsibility for renewable energy projects with already established national and also relatively new European institutions. This changing multi-level governance structure in the energy sector implies that municipalities and regions have to cooperate with national and European institutions to successfully initiate and perform renewable energy projects (Smith, 2007).

With respect to Germany, the situation of ‘co-responsibility’ in the energy sector may be slightly different due to a relatively strong legal and political position of the municipalities (Hesse and Ellwein, 2012). In most other European countries, the current situation seems to be similar to the status quo of England, when it comes to governance of renewable energy programmes and projects (e.g. Rösler et al., 2013). The recent emergence of multi-level governance structures in the European energy sector has affected the cooperation between companies and local, regional, national, and supranational public institutions in different ways. While on the one hand new opportunities for inter-firm and -municipal cooperation as well as for PPP have unfolded, traditional innovation cooperation patterns have been affected negatively on the other hand. However, cases dealing with similar transformations from other EU countries, as for example UK or
Germany, show that the still ongoing liberalisation and privatisation of the national and European energy markets affects renewable energy regions (e.g. Wüstenhagen and Bilharz, 2006; Smith, 2007; Smith et al., 2010) in an ambivalent way.

On the credit side, European regions and municipalities gained more autonomy to formulate and realise their own energy strategies and projects and access to new types of national and European subsidies (e.g. the ‘100% Renewable Energy Regions’ of the German Ministry for Environment project competition or the ‘Intelligent Energy Europe’ programme; Mathiesen et al., 2011; Rösler et al., 2013). On the debit side, particularly for many regions without large cities and utility companies, they face increased competition between regional and municipal utility companies regarding energy price and shares of regional energy markets. In Germany, municipal and regional utility companies had a quasi-monopoly for energy supply in their territory before the stepwise recent liberalisation of the national energy market. Inter-regional and -municipal competition of utility companies was only possible as an exception, e.g. for large company customers (Wüstenhagen and Bilharz, 2006).

3 Design and procedure of the research

We followed a mixed method approach, namely a sequential exploratory strategy (Creswell, 2009) which we applied in order to better explore the phenomenon in question. For this purpose, we started with a qualitative phase and afterwards collected quantitative data (Creswell, 2009) and first present the core findings of qualitative interviews. Two rounds of (i) explorative and qualitative face-to-face interviews regarding the above mentioned research gaps and (ii) thorough pretesting with altogether 29 experts from municipalities, ministries, universities and research institutes and companies in April 2011 helped to justify, shorten and improve our draft questionnaire.

Selected findings of own explorative qualitative interviews

Our own explorative qualitative findings are basically in line with the summarised case study results from the literature review in section 2.

First, the need of a more effective KTT between science and business actors was highlighted in the explorative qualitative interviews. The founder and CEO of a smaller private development/engineering firm (fuel cells, electro mobility) with offices in several German federals states expressed this need quite drastically:

“Currently, there is no university in Schleswig-Holstein which’ technology transfer really works. Fraunhofer works, but is quite expensive due to the considerable overhead cost. Other research institutes are rather dedicated to basic research.”

Second, the requirement of implementing a central transfer institution for strategic (concept development) as well as operative coordination and knowledge sharing purposes was also confirmed in our own qualitative interviews. For example, one top manage-
ment member of a public university in the Northern German Flensburg region formulated his recommendation to regional and municipality policy makers like this:

“Common centers of knowledge for sustainable energy in the border region, that is the region of Southern Denmark and Schleswig Holstein with its EU contacts none of the least, give the required resources for completing projects, and for investigating new technologies within sustainable energy. A center of knowledge is contributing to the planning and establishment of new facilities.”

Based on the illustrated changing institutional and economic framework, we developed the methodology for the quantitative phase of our empirical research. Our large-scale municipality online survey was conducted between June and November 2011 in all sixteen German states (‘Bundesländer’). 482 usable questionnaires give us an acceptable return rate of approximately 10%. The questionnaire covered (i) municipalities’ activities in the whole field of renewable energy and future plans, (ii) strategic goals, (iii) public subsidies, (iv) potentials for future activities and location factors, (v) supporting and hindering technical, socio-economic and political factors for actual and future activities, (vi) actors involved and their relevance and (vii) networking, cooperation and knowledge and technology transfer.

All applied scales and the majority of other questions had been derived from the literature and partly modified slightly for the purpose of the following research.

The personalised mayors’ e-mail addresses for the online survey were extracted from commercial and public municipality databases (e.g. Deutscher Städtetag, 2010). Only very small municipalities with less than 2,500 inhabitants were not considered for this paper.

All contacted mayors received a personalised cover letter by e-mail for accessing the online survey. Two reminders were sent out. As an incentive to participate in the survey, we promised all participants a short summary of the main findings.

4 Findings and discussion

Based on the findings of our literature review and of the explorative qualitative interviews, which were conducted in the first empirical phase, we formulated the following sub-questions regarding our main research question (see section 2):

› Which **strategic (economic as well as environmental) goals** drive the **implementation of a central transfer institution** for regional renewable energy transition? (**dependent variable**)
› Which types of **actors and cooperation** drive this implementation?
› Which **project-related factors** drive this implementation in the renewable energy sector?
While the first sub-question refers to strategic, conceptual foundation of a central regional transfer institution for renewable energy transition (e.g. a regional energy agency or competence centres as a hub for coordinating energy issues), the second and the third sub-questions focus on the operative organisation in terms of actors, cooperation and projects involved.

**Descriptive statistics**

The descriptive summary of our variables (*Tables 1 and 2*) shows a remarkable gap. While the majority of the respondents agrees on a high importance of strategic goals such as CO$^2$-reduction, protection of existing and creation of new jobs, public competence development and acceptance regarding renewable energy projects, and attraction of new investors, merely a minority has started to institutionalise the strategy process required for this purpose yet: 26.7% of the cities whose representatives answered our questionnaire have formulated a transition strategy so far. Furthermore, only 40.0% of the municipalities in our sample have established a central transfer institution for coordinating the transition process towards a (100%) renewable energy region yet *(dependent variable)*.

A closer look at the description of our additional independent variables reveals that this gap is primarily a ‘transfer and strategy gap’ and not a ‘potential or resource gap’ (*Table 2*).

**Table 1**

Dependent variable

<table>
<thead>
<tr>
<th>Implementation of a central transfer institution (Yes/No)</th>
<th>Yes</th>
<th>No</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40.0%</td>
<td>60%</td>
<td>467</td>
</tr>
</tbody>
</table>

**Table 2**

Independent variables

<table>
<thead>
<tr>
<th>Strategic goals</th>
<th>Variable</th>
<th>Important</th>
<th>Not important</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>CO$^2$-reduction</td>
<td>64.2%</td>
<td>35.8%</td>
<td>469</td>
</tr>
<tr>
<td>(ii)</td>
<td>Existing jobs</td>
<td>64.6%</td>
<td>35.4%</td>
<td>466</td>
</tr>
<tr>
<td>(iii)</td>
<td>New jobs</td>
<td>70.2%</td>
<td>29.8%</td>
<td>469</td>
</tr>
<tr>
<td>(iv)</td>
<td>Competence</td>
<td>76.5%</td>
<td>23.5%</td>
<td>467</td>
</tr>
<tr>
<td>(v)</td>
<td>Acceptance</td>
<td>70.4%</td>
<td>29.6%</td>
<td>467</td>
</tr>
</tbody>
</table>
In the clear majority of 85.1% of the municipalities in our sample, (renewable) energy firms are located. In addition, almost all of the investigated cities seem to have access to a university in their region – although only 46.8% have a university directly available within their borders. Furthermore, the clear majority of our respondents is open for PPP as well as for public public partnership in relation to supporting renewable energy projects and institutions. On the project level, the conditions for the transition process towards (100%) renewable energy regions already seem to be quite well developed as well. 81.4% of our respondents report on existing renewable energy projects in their municipalities and 45.3% answer that their cities are currently directly involved in such
projects. A relatively low level of supporting private R&D activities in the field of renewable energy (39.6%) and difficult governmental regulation in this area (53.5%) constitute potential barriers for renewable energy regions.

Finally, the description of our control variables (Table 2) shows that the majority of cities in our sample is small to medium-sized (< 20,000 inhabitants), directly related to a county (‘dependent’), and located in Western Germany. One the one hand, this result basically reflects the general situation of German municipalities. On the other hand, it points to a strong need for regional cooperation and knowledge transfer due to limited resources and competencies of most cities.

As a next step of our data analysis, we conducted a logistic regression to investigate the indicated interactions more in depth.

**Logistic regression**

The findings of the performed logistic regression model (Table 3) provide us with a clearer picture of the drivers towards the transition process towards (100%) renewable energy regions.

Public public partnership in the sense of institutionalised cooperation between two or more municipalities and/or universities (inter-municipal cooperation) in one region (comprising one county or more) and protection of existing jobs are among the most important drivers in our model (both significant on the 1%-level). This is insofar interesting as rather economic than environmental strategic goals and rather public public cooperation than PPP seem to promote the shaping of renewable energy regions.

While these findings are – at least partly – surprising, compared to the results of our literature review, our additional findings are very much in line with existing theoretical literature and case study results: The existence of a transition strategy, municipal participation in renewable energy projects (both highly significant) and the conditions of relevant governmental approval processes (significant on the 5%-level) are further expectable drivers for the creation of renewable energy regions.

Regarding our controls, only the type of municipality (‘dependent’ or ‘independent’) is close to significance (only on the 10%-level), without reaching it.

**Table 3**

Results of the logistic regression

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Included in Analysis</td>
<td>387</td>
<td>80.3</td>
</tr>
<tr>
<td>Missing Cases</td>
<td>95</td>
<td>19.7</td>
</tr>
<tr>
<td>Total</td>
<td>482</td>
<td>100.0</td>
</tr>
<tr>
<td>Unselected Cases</td>
<td>0</td>
<td>.0</td>
</tr>
</tbody>
</table>
a. If weight is in effect, see classification table for the total number of cases.

Variables in the Equation

<table>
<thead>
<tr>
<th>Step</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Constant</td>
<td>-0.393</td>
<td>0.104</td>
<td>14.350</td>
<td>1</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Model Summary

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>443.064a</td>
<td>0.184</td>
<td>0.249</td>
</tr>
</tbody>
</table>

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

<table>
<thead>
<tr>
<th>Step</th>
<th>Chi-square</th>
<th>Df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11.370</td>
<td>8</td>
<td>0.182</td>
</tr>
</tbody>
</table>

Classification Table

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Central transfer institution</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>188</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>76</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Overall Percentage</td>
<td>69.3</td>
</tr>
</tbody>
</table>

a. The cut value is .500

Variables in the Equation

<table>
<thead>
<tr>
<th>Step 1a</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company-internal R&amp;D</td>
<td>-0.325</td>
<td>0.301</td>
<td>1.165</td>
<td>1</td>
<td>0.281</td>
<td>0.723</td>
</tr>
<tr>
<td>Existence of universities etc.</td>
<td>-0.134</td>
<td>0.285</td>
<td>0.220</td>
<td>1</td>
<td>0.639</td>
<td>0.875</td>
</tr>
<tr>
<td>Previous project experiences</td>
<td>0.036</td>
<td>0.277</td>
<td>0.017</td>
<td>1</td>
<td>0.896</td>
<td>1.037</td>
</tr>
<tr>
<td>Increase in competence in the municipal administration</td>
<td>0.486</td>
<td>0.342</td>
<td>2.025</td>
<td>1</td>
<td>0.155</td>
<td>1.626</td>
</tr>
<tr>
<td>Inter-municipal cooperation</td>
<td>0.810</td>
<td>0.321</td>
<td>6.347</td>
<td>1</td>
<td>0.012</td>
<td>2.248</td>
</tr>
<tr>
<td>PPP potential</td>
<td>-0.459</td>
<td>0.302</td>
<td>2.308</td>
<td>1</td>
<td>0.129</td>
<td>0.632</td>
</tr>
<tr>
<td>Creation of new jobs</td>
<td>0.267</td>
<td>0.350</td>
<td>0.580</td>
<td>1</td>
<td>0.446</td>
<td>1.305</td>
</tr>
</tbody>
</table>

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Referring to our theoretical framework, it is quite surprising that the private business component – compared to the state and university components of the triple helix concept – is not stressed more by the respondents.

A possible explication for this rather surprising finding from a triple helix or science-to-business perspective could be the historical path-dependency of the German and European energy sector. It was not until recently that European as well as national liberalisation and deregulation enabled the emergence of ‘energy markets’ in the EU. Before, energy production and distribution in the EU member states was managed either by public enterprises with a local monopoly (especially “Stadtwerke” (municipal energy suppliers) in German municipalities and regions) or by an oligopoly of large private and public energy companies on the national level (E.ON, RWE, EnBW and Vattenfall Europe for the different German regions). These traditional energy actors performed in the past not only energy production, but also a large share of the relevant R&D activities inhouse and/or in cooperation with universities and research institutes (e.g. Fraunhofer Society).

Although the newly created German energy market led to the market entry of new private actors, as for example private producers of wind, bio and solar energy technology (e.g. Siemens Windpower, SMA Solar Technology AG, SolarWorld AG, VERBIO AG

| Incentives for potential investors | -.009 | .321 | .001 | 1 | .979 | .992 |
| Protection of jobs | .747 | .300 | 6.218 | 1 | .013 | 2.111 |
| Relevance CO² reduction | .091 | .283 | .104 | 1 | .747 | 1.095 |
| Current municipal REN projects | -.254 | .335 | .576 | 1 | .448 | .776 |
| Municipal participation in REN projects | .859 | .248 | 11.965 | 1 | .001 | 2.362 |
| Existence of a transition strategy | 1.386 | .271 | 26.113 | 1 | .000 | 3.997 |
| Municipality size | -.516 | .396 | 1.697 | 1 | .193 | .597 |
| Municipality type | .782 | .489 | 2.550 | 1 | .110 | 2.185 |
| Conditions of approval processes | .198 | .086 | 5.280 | 1 | .022 | 1.218 |
| Federal state | -.200 | .302 | .438 | 1 | .508 | .819 |
| Constant | -2.740 | .639 | 18.394 | 1 | .000 | .065 |

*Variable(s) entered on step 1: Company-internal R&D activities, Existence of relevant universities and research institutes in the region, Previous project experiences, Increase in competence in the municipal administration, Inter-municipal cooperation potential, PPP potential, Creation of new jobs, Protection of jobs, Relevance of CO² reduction, Current municipal REN projects, Municipal participation in REN projects, Existence of a transition strategy, Municipality size, Municipality type, Conditions of approval processes, Federal state.*
etc.), the position of these new players is still relatively weak in terms of local and regional PPP and institutionalised science-to-business transfer (e.g. Rösler et al., 2013). Apart from this, the high relevance of ‘protection of existing jobs’ in our model points in this direction, as such new private players are more related to ‘creation of new jobs’.

Our second finding regarding the dominance of economical compared to environmental goals is both less surprising and more in line with existing literature (e.g. Deutscher Städtetag, 2010; Gerstlberger et al., 2011): Given the currently difficult financial situation of many municipalities in Europe and also Germany, it is plausible that they prioritise economic against environmental goals in their renewable energy policies. This does not necessarily contradict our descriptive finding that 64.2% of the respondents assess CO₂-reduction as ‘important’ policy goal. However, in situations of conflicts of goals regarding the shaping of ‘central transfer institutions’, economic considerations may be weighted higher than environmental concerns. This potential conflict of goals needs to be considered and reflected on when formulating our recommendations for policy makers and managers in the renewable energy sector in the following section of the paper.

5 Conclusions and recommendations

Considering the rather vague scientific contributions with regard to renewable energy, this paper aimed to provide new findings and theory elements for this issue and for further research and practice implications. Based the research gaps identified by our literature review, we conducted a mixed method-based research featuring a larger study among German municipalities. This study aimed at identifying value creation and knowledge and technology transfer practices which serve as relevant drivers of the transition of of mainly conventional regional energy sectors towards systems which are primarily or even completely based on the use of renewable energy.

We can derive both policy and managerial recommendations from the findings of our quantitative and qualitative empirical analysis. For policy makers, advice regarding the formulation of transition strategies towards (100%) renewable energy regions can be provided. Policy making with the aim of improving knowledge and technology transfer in regional and municipal renewable energy sectors should on the one hand rely on established public public partnerships, as for example inter-municipal science and technology parks or competence centres (see also Rösler et al., 2013 for additional survey findings in German municipalities). On the other hand, the new private players in emerging local and regional renewable energy markets need to be integrated more and better in the existing public public transfer networks as this seems to be realised currently due to the findings of our regression model. In this context we would particularly like to point to the KTT potentials of regional universities of applied sciences (‘Fachhochschulen’) and public utilities in the energy sector (‘Stadtwerke’), providing further potential for fostering the transition towards REN systems. Both types of regional organisations often already have established intense contacts with small and medium-sized enterprises (SMEs) which should be further supported by policy makers.
For instance, specific policy tools for this support are (i) financial support of ‘contact platforms’ and ‘match-making events’, (ii) ‘mobility grants’ for internships of students in practical transfer projects, and (iii) ‘regional potential and foresight studies’.

Furthermore, different transition strategies for policy makers have implications for managerial decision making at firms and universities. Universities need to develop and implement specific KTT strategies for their renewable energy sector as a whole and its most important subsectors (e.g. wind energy in Northern Germany, solar energy in Southern Germany etc.). Local and regional SMEs in the renewable energy sector should consider more systematically collaborative activities with municipalities and universities such as e.g. (i) internships of students or PhD students for market, feasibility and foresight analyses, (ii) public-private research and development (R&D), demonstration and test projects, and (iii) joint on and/or off the job training programmes (for example in areas such as maintenance, quality management or marketing and sales).

Finally, the most important limitations of our study and related suggestions for future research in the context of KTT in regional and local renewable energy sectors are summarised here briefly. First, our empirical study is clearly limited regarding time, space and target population. We conducted a number of explorative qualitative interviews in advance, followed by a large-scale cross-sectional municipality survey in Germany. Based on both our own and complementary findings (e.g. Rösler et al., 2013), multi-country and/or multi-region qualitative further cross-sectional or even panel studies could be developed and performed. This would, however, require another type of funding than in our case. While our data collection was – partly – supported by a EU Interreg project, the suggested type of future research would probably require funding from a basic or applied multilateral European research project (e.g. funded by a framework program such as ‘Horizon 2020’ or ‘Intelligent Energy Europe’). Based on our research and survey experiences, we highly recommend integrating universities, universities of applied sciences, institutes such as from the Fraunhofer society, and public utilities, municipalities and SMEs from different European countries in this type of research. Given the high relevance of inter-municipal cooperation as a driver for the implementation of central transfer institutions regarding regional REN progress, inter-organisational KTT from science into business practice clearly has to be considered as one core element in regional development, particularly as a promising enabler with regard to the transition towards 100% renewable energy regions.

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IPT’S Quick & Dirty Economic Valuation Method: An Empirical Test on Three Cases

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¹ Institute for Technological Research, Planning and Business Coordination, São Paulo, Brazil
² Institute for Technological Research, Planning and Business Coordination, São Paulo, Brazil

Abstract
The assessment of economic potential of technological innovation projects and its valuation is key aspects in negotiations between universities, research institutes, and companies. Among the reasons for this, it can be quoted portfolio prioritization, which involves several different economic, social and environmental impacts aspects and industrial productivity. The standard of economic potential is an important reference in the project selection process. For technology transfer, the valuation of technologies consists in a relevant task to support Intellectual Property (IP) negotiations. However, in dynamic environments, negotiations for the commercial exploitation and payment of IP resulting from research projects require quick answers due to several aspects like tight deadlines to sign contracts. Moreover, technology valuation is one of the most complex activities related to the technology transfer. Due to these challenges faced by Instituto de Pesquisas Tecnológicas do Estado de São Paulo - IPT (Institute For Technological Research) in its participation in Brazilian Association of Industrial Innovation (EMBRAPII, acronym in Brazilian Portuguese), we developed an expedite technology valuation method, based on concepts of discounted cash flow (DCF) associated with Gompertz Curve adaptations as a way to support universities and research institutes in negotiations with enterprises. This method has been regularly applied on negotiations between IPT and companies. In this paper, we will present cases of metallurgical companies. The results obtained confirm the validity of the method in supporting the definition of the payable amounts for commercial exploitation of technologies, enabling the application of this method as an alternative to some methods found in the literature and eventually employed by universities and research institutes in Brazil. For future research, authors recommend comparative studies between Gompertz Curve and other methods, such as the Pearl Curve, using the same variables of our method.

Keywords
1 Introduction

The Institute for Technological Research of the State of São Paulo - IPT is one of Brazil’s largest research institutes, with state-of-the-art laboratories and a highly qualified team of researchers and technicians working basically in four major areas: Innovation, R&D, technological services and metrological support, and Information and education in technology. It was founded in 1899 as engineering school laboratory. IPT is a public research institute linked to the State of São Paulo, Brazil. According to 2013 figures, the Institute had this organizational profile:

- Number of laboratories: 37
- Employees: 908
- Budget: R$ 140 million (€ 45 million)

Since 2012, IPT has been part of the Brazilian Association of Industrial Innovation – EMBRAPPII, founded by the Brazilian Government. EMBRAPPII promotes the interaction between Research Organizations with Brazilian companies to develop technological innovation. Besides innovation, the Brazilian Government expects to increase the number of Industrial Property (IP) agreements and patents. During the IP negotiations, it is quite important to get some idea of the technology’s economic potential as well as the period of the negotiations, always defined in the short term.

Under this context, the Department of Business Support of Planning and Business Coordination of IPT developed a Quick & Dirty method to estimate the value of Technological Projects to support decision makers in the IP agreements between companies and IPT. Since December 2012, the method has been applied in the negotiations of commercial exploitation of technologies resulting from EMBRAPPII projects.

The main goal of this paper is to demonstrate the application of the IPT’s Quick & Dirty Method and illustrate it with the metallurgical companies’ cases. The results obtained confirm the validity of the method in supporting the definition of the payable amounts for commercial exploitation of technologies, enabling the application of this method as an alternative to the methods found in the literature and eventually employed by universities and research institutes in Brazil.

The paper structure defined for this objective starts with this introduction. In sequence, we present some considerations of theoretical concepts. Next, we describe the method, present the main results and finally finish with the conclusion.

2 Theoretical background

The term “valuation" refers to the task of obtaining the monetary value of an asset, object or organization (Boer, 1999). The valuation methods can be summarized into three different approaches: cost, market and income (Parr and Smith, 1994; Park and Park, 2004). Each approach carries specific methods, each with their advantages and limita-
tions. For example, methods based on the cost tend to ignore the future value of a technology, but, instead, require fewer assumptions for its application (Santos and Santiago, 2008). However, since technology value is based on historical values, it cannot be taken with its real potential value (Boer, 1999). On the other hand, the Theory of Real Options - method based on income - has several benefits, such as managerial flexibility and technological uncertainty. However, it is a complex method application, requiring several assumptions use (Black and Scholes, 1973; Trigeorgis, 1995; Copeland and Antikarov, 2001; Erbas and Memis, 2012). In section 3, the basic IPT’s method proposed to this article will be presented in more detail.

3 Method

The IPT’s method is defined in four steps. It’s based on concepts of Discounted Cash Flow (DCF) associated with variations of Gompertz Curve (Gompertz, 1825) as a way to support IPT in IP agreements with companies. Gompertz Curve was created by Benjamin Gompertz in the 19th century for human mortality rate influenced by age-dependent component. It is a mathematical model related to time series (logistic curve with S-Curve behaviour). Under these features it’s possible to develop different uses for the original model (Gompertz) such as designing scenarios for the value of technology. Basically, the Gompertz technique works with three variables: B Factor, K Factor and Limit Value. B Factor has influence in the beginning of the curve. Changes on B Factor, we can extend the period of time to market, for example (Figure 1). K Factor, otherwise, has influence in the slope of the curve until the limit, when the technology presents high demand or slow insertion. Changes on the K Factor can adjust the curve for these conditions (Figure 2). Limit value is the goal to be reached, as, for example, 15% of market share or 24% of company’s revenue. In the figures below, 100% means reach this goal.

The formula is:

\[ P_t = L \cdot e^{(e^{-kt})-b} \]

Where:

p = participation

t = time (year)

k = K factor

b = B factor
For our purpose, this technique helps us make scenarios with several possibilities, as expansion, maturity and decline of technology in the market and forecasting growth period. In general, we work with three probability scenarios: pessimistic, expected and optimistic. Through occurrence probabilities, we have the Expected Value (EV) of technology. The IPT’s Quick and Dirty method can be applied in a short period of time, since we have reliable input informations. The reference method assumes that technical success and successful market share of the project will be well succeeded.
Basically the method is defined in four steps as shown in Figure 3.

Estimates or data of the net revenue of the company are the starting point. The next step is the most important and complex phase of the method. We need a lot of discussion with technical experts in order to abstract properly what specific company activities could suffer the impact of new technology implementation.

The next phase of the method is appraisals of the participation of this technology in the net sales of the company along the time curve (technology adoption). From these curves, we get a financial cash flow of the technology benefits. According to the industrial segment, the technology may have different life cycles as well as any product in the market. So, the broad understanding of the innovation dynamics, such as S-Curve analyses and technology cycles are fundamental to analyse possible routes of technology evolution.

Finally, we calculate the Present Value of technology benefit. From the IPT’s point of view, the Net Present Value (NPV) of each project considers the economic and financial amounts invested by IPT in the projects. Basically, this resources are those related to the payment of workforce, indirect costs, overhead and researcher prizes (1/3 royalties or success fee resulted from negotiations). The hurdle rate used by IPT is 9.5% per year. In this condition, the minimum NPV needs to be greater than IPT expenses for each project. Thus, the values for the Royalty Rate or Success Fee (fixed value) have been calculated on the basis of participation considered "fair value" by the Institution - in most cases, in agreement with the partner firm – in general never being less that minimum NPV calculated, unless other strategy benefits are taken into account.

It’s important to emphasize the results of Quick & Dirty method application in the negotiation process strategy. In general, IPT’s researchers meet members of the partner com-
pany to present: calculation procedure, assumptions and variables used for the valuation plus market analysis. Several meetings between IPT and firms happen to refine data and valuation results. This is the main step for the negotiation success. It aims to achieve two specific objectives:

1. Decrease the gap of information (market, financial, business, etc.) between IPT and the partner company
2. Transparency in relation to the negotiation assumptions and information data used in the valuation method.

4 Results

As a result of IPT’s Quick & Dirty application, until May 2014 eighteen proposals have been analyzed. From those, twelve have become contracts and eleven technologies were valued with our method support. The type of contracts was: royalties and success fee. For this paper, we are presenting three specific cases of metallurgical companies in face of the importance of this economic segment in the Brazilian economy. Furthermore, the expressive values obtained in the final agreements to demonstrate the process and a result of IPT’s Quick & Dirty method application.

For confidential reasons, the company's name and the technology description have been omitted. Table 1 presents the result of the final agreement of these three contracts.

<table>
<thead>
<tr>
<th>Company</th>
<th>Technology</th>
<th>IPT’s Break Even Point</th>
<th>Final Agreement</th>
<th>IPT’s Internal Rate of Return (IRR)</th>
<th>Contract type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company A</td>
<td>Rolling mill rolls</td>
<td>€ 240.000</td>
<td>€ 350.000</td>
<td>10,5%</td>
<td>Success fee</td>
</tr>
<tr>
<td>Company B</td>
<td>Piston rings</td>
<td>€ 80.000</td>
<td>€ 1.750.000</td>
<td>16,4%</td>
<td>Royalties (1%)</td>
</tr>
<tr>
<td>Company C</td>
<td>Steel slag</td>
<td>€ 1.250.000</td>
<td>€ 2.750.000</td>
<td>7,4%</td>
<td>Royalties (4%)</td>
</tr>
</tbody>
</table>

Table 1: EMBRAPPII Projects - Final Agreement of Metallurgical Industry Projects
Source: IPT research database (2014)

In general, not only for the cases above, we can detach these main issues for the IPT’s Quick & Dirty Method application:

› The optimistic, pessimistic, and expected scenarios analysis has contributed to improve the expected future revenues value from the commercial exploitation of the technology resulting from the project.

› To consider the expenditures done by IPT in research have enabled the calculation of the IPT minimum value to be accepted in the negotiation process.
The royalty fee (when applicable) has been considered in terms of a range of values, starting from the minimum amount mentioned in the previous item to the average practiced by the market, based on the book “Royalty rates for licensing intellectual property” (Parr, 2007).

The IPT’s Quick & Dirty Method has enabled the reduction dependence on royalty rates shown in the literature. This fact has contributed to the value calculation more appropriate to Brazilian reality, as opposed to averages shown, for example, by Parr (2007), cited as outdated and incompatible with the Brazilian management innovation in some studies (Guimarães, 2013).

The project IRR adjustment to the hurdle rate (9.5% based on prime rate of the Brazilian economy in October 2013) enabled that two of these three metallurgical technologies had valued higher than those expected by the institution, even the technology that got lower value (IRR= 7.4%) than hurdle rate was selected due to others strategies.

Besides the aspects shown in the items above, the method has made agile negotiations of royalties / fees to be paid by successful commercial exploitation of technologies developed by IPT. Before the development of the Quick & Dirty method, the assessment process took from four to six months to complete. Currently, the valuation is usually completed in a week, allowing quick negotiations with satisfactory results, as shown in Table 01.

In addition, as result of the negotiation process strategy mentioned in the item 3 (Method), it was possible to get support from most companies to the valuation process of IPT. Furthermore, companies agree with the researcher prizes and reinvestment in research politics came from the remuneration of the commercial success of the technology.

Although the method has become fundamental in the technological negotiation supporting within the EMBRAPPI projects, it is necessary to evaluate more precisely the method variables, in order to determine the most sensitive aspects and thus allow accurate information survey, in face of the elasticity of: discount rate, period to a maximum contribution of technology in sales, decrease rate, K factor and B factor, as shown by Azevedo and Guimarães (2013).

5 Conclusions

The objective of this paper was to present concepts, development and application of the IPT’s Quick & Dirty Method. The results obtained confirm the validity of the method to supporting decisions makers in the definition of the amounts payable for commercial exploitation of technologies, enabling the application of this method as an alternative to the methods found in the literature and eventually employed by universities and research institutes in Brazil.
The method limitations are mainly in the variable "share of technology in the company's revenues," due to two main aspects: (1) difficulty to define accurately the input value of the variable; (2) for new technologies to the company's portfolio, this estimation becomes impracticable due to the lack of historical data on the performance of technology and by limitation of the revenue information to be incorporated into the current company revenues. For future research, authors recommend comparative studies between Gompertz Curve models and others, like Pearl Curve, using the same variables of our method to attending the end results have been met with IPT's Quick & Dirty Method. Moreover, the method is flexible enough to accept adjustments in their variables. Therefore, it is suggested that adaptations of input variables is proposed as alternatives to the method presented in this paper.

References


Company Identification, Emotional Attachment and Investor Behavior

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² MS (Scholar), Superior University Lahore, Pakistan.

Abstract
You are kindly asked to start with an abstract of 250 to 500 words. Please state the problem(s) / knowledge gap(s) you address, your paper’s goals, your methods / approach, as well as your main findings.

Purpose: Marketing literature provides empirical evidence on the relationship between company identification, emotional attachment, and corporate image on consumer behavior. Taking lead from this theory current research examines how company identification, emotional attachment and corporate image influence investor behavior. Research provides connection between consumer behavior and investor behavior i.e. investor being buyer of corporate shares act like consumer. This study proposes a theoretical model that integrates, company identification, emotional attachment, corporate image and investor behavioral outcomes.

Research Design: Self-administered structured survey will be conducted with a sample of 500 individual equity investors as respondents as Lahore Stock Exchange, Pakistan. The reliability and correlation analysis will also be performed through SPSS. The study will use confirmatory factor analysis (CFA) for testing validity and structural equation model (SEM) technique to test hypotheses through AMOS software.

Findings: The findings of this study will be useful for corporations to attract and retain investors. This research will also provide directions for future researchers in this area.

Originality/Value: This study extends the concept of company identification, emotional attachment, and corporate image to investor’s context. It suggests that marketing strategies focusing on increasing company identification, emotional attachment and corporate image can yield not only better customer outcomes but also favorable investor behavior.

Keywords
Company identification, emotional attachment, corporate image, investor behavior.

1 Introduction
Corporate marketing strategy has attracted the attention of researchers in the recent years. Increasingly, corporations are designing marketing strategies not only to attract the prospective customers, but also to magnetize other stakeholders including investors, employees, suppliers, society and other business partners. Corporate marketing strategies now-a-days communicate some shares assumptions to multiple stakeholders in order to increase corporate image, corporate identifications, emotional attachments, brand equity, corporate social responsibility and so on (Brown et al., 2006; Balmmer, 2009 and Aspara
& Tikkanen, 2010). A notable amount of studies verify the significance of corporate identity or image to contour favorable investor behavior. For instance, Aspara (2009); Aspara and Tikkenan (2010); Balmer and Grey (2003); Balmer et al. (2009); Dowling (2004); Hatch and Schultz (2003) hold that corporate identity influence investors’ decision making behavior.

The link between corporate identification and investor behavior is well established in the literature as Aspara and Tikkenan (2008) and Aspara and Tikkenan (2010) have empirically tested the linkage between corporate identity and investor behavior. Taking lead from these studies, the current study proposes a theoretical model that integrates emotional attachment and corporate image along-with corporate identification to examine the investor behavioral loyalty intentions. The interdisciplinary nature of marketing actions can be applied to customers, employees, investors and other corporate stakeholder. For instance, Helm (2007) examined the influence of corporate reputation on loyalty, whereas corporate reputation is generally more associated with consumer behavior. The objectives of this study are manifold; it establishes the linkage between corporate identification, emotional attachment, corporate image and investor behavioral loyalty. These concepts are mostly used in the context of consumer behavior; however, the current study investigates the influence of these marketing related constructs on investor behavior. For this purpose, a unique theoretical model is proposed to be empirically tested in this study. To the best of our knowledge emotional attachment is not used to examine the investor behavioral loyalty, which is the contribution of this study to the body of knowledge.

2 Theoretical Discussion and Development of Hypotheses

2.1 Corporate Marketing and Investor Behavior

The interdisciplinary research in various disciplines is increasing day by day. Researchers are exploring the multi-dimensional effects of various theories in the perspectives of different subjects in order to gain yield maximum benefits from these theories. Some classic examples includes use of marketing theories to explain investor behavior for instance, Aspara and Tikkenan (2008) examined the influence of company-related attitudes on investors’ stock buying behavior. Likewise, application of behavioral finance models to examine customer behavior for instance, Thaler (2008) investigated the use of mental accounting by consumers to choose products. Marketing literature provides ample evidence that elucidates the implications and applications of marketing theories on consumer behavior. the recent stream of research is using marketing theories to explain the investor behavior. For instance, corporate reputation is a marketing construct that is used extensively to investigate the consumer behavior. But this construct is now used to analyze the investor behavior. The fact remains that corporate communications are not only noticed by existing and prospective customers, but also by employees, investors and other corporate stakeholders. For instance, Fomburn (1996) holds that reputation provides the benefit of the doubt to be corporate in ambiguous situations and companies with
good reputation gain attraction of investors. Srivastave et al. (1997) proposed that corporations must maintain their market value in order to compensate the shareholders who trust corporation's reputation. Pollock and Rindova (2003) viewed that positive corporate rating by a third party like rating agencies and the media asserts positive influence on investor's behavior, especially in initial public offerings (IPOs) by corporations. Little and Little (2000); Eberl and Schwaiger (2005) provided that corporate reputation can be used to attract potential investors and can help in obtaining cheaper capital for doing business. It influences the decision making behavior of individual and institutional investors (Fieseler et al., 2007). Ali (2011) recorded the positive influence of corporate reputation with various stakeholders. Fehle et al. (2004) investigated the role of advertising on investment decision making and found significant buying activity of stock among the small equity investors of corporations, which are more visible to the media, indicating that tend to be attracted more by firm’s increased publicity.

2.2 Corporate Identification, Emotional Attachment and Investor Behavior

Although plenty of marketing related theories have been used to explain the investor behavior, for instance corporate reputation (Helm, 2007), firm visibility in the media (Annette, van den Bosch, and Menno, and Wim, 2005), many marketing theories are not yet considered to examine the investor behavior. There is sparse research to integrate the association between corporate identification, emotional attachment with investor behavioral decision making in the marketing and the behavioral finance literature. Marketing literature provides ample evidence on the relationship between corporate identification, emotional attachment and consumer behavior. For instance, Thomson, Deborah, and Park (2005) examine the association between consumer emotional attachment and their buying behavior. Karaosmanog, Bas and Zhang (2010) proposed multidisciplinary approach to examine influence of corporate identity and corporate image on various stakeholders. Karaosmanog et al., (2010) tested the model of corporate identification, emotional attachment and corporate image in the context of consumer. Taking the lead from Karaosmanog et al., (2010), this study suggests the application of corporate identification, and emotional attachment on investor behavior. The study proposes the association between emotional attachment, corporate image and investor behavior.

2.3 Hypotheses Statements

H1: Corporate image is positively influenced by company identification.

H2: Higher the company identification higher will be the investor’s emotional attachment.

H3: Emotional attachment has positive relationship with corporate image.

H4: Corporate image has positive relationship with investors’ behavioral loyalty.

H5: Investors’ behavioral loyalty is positively influenced by company identification.

H6: Investors’ behavioral loyalty is positively influenced by emotional attachment.
2.4 Theoretical Model

The conceptual model proposed in this study is presented in Figure I. The model integrates company identification, emotional attachment, corporate image and investor behavioral loyalty. Previous studies including Aspara (2009); Aspara and Tikkenan (2010) have examined the influence of company identification on investor behavior, however, the use of emotional attachment and corporate image in an integrated model with company identification on investor behavior is quite novel, which the main contribution of this study.

![Figure I: Theoretical Model](image)

3 Research Methodology

3.1 Sample and Data Collection

A sample of 500 respondents was selected from Lahore Stock Exchange, Pakistan. Self administered structured questionnaire is used for data collection from individual equity investors. A total of 381 questionnaires are found complete in every respect with response rate of 76% which is quite acceptable in such type of research. The respondents include 91.3% male investors and 9.7% female investors, which depicts low participation by female investors in stock markets of Pakistan. Sample composition in Table I shows 29.7% respondents below 30 years of age, 42.2% between 31 to 45 years, 20.7% between 46 to 59 years of age and only 7.4% above 60 years, most of investors in Pakistani stock exchanges are between 31 to 45 year age. Majority of respondents are married 65.7% whereas 31.6% are having single marital status. The sample composition in education presents 58.6% respondents are undergraduate and 32.9% are having master education, whereas 8.5% were having above than master or other professional qualifications. There are 37.1% respondent investors with less than 5 years of trading experience at the stock exchange, 27% between 5-10 years, 24.9% between 11 to 15 and 13.6% having more than 15 years of trading experience, thus, majority of investors are having less than 5 years investment experience in the stock exchange among selected respondents. The
figures of investors’ income level shows that 57.4% investors have less than USD 500 as monthly income, 21.8% between 600 and 600 to 1000 USD, 11.4% having 1000 to 1500, 5.5% with 1600 to 2000 USD and 3.9% respondent investors having more than 2000 US dollar as monthly income, which shows that majority of investors are having less than 500 USD monthly income

3.2 Procedure

The collected through structured questionnaires is entered into SPSS sheet for further analysis. The statistical analysis techniques used in this research includes; reliability analysis through Cronbach Alpha using SPSS software, and validity analysis using Confirmatory Factor Analysis (CFA) using AMOS. The correlation analysis technique is used to examine the relationship among all variables, and regression analysis are performed through Structural Equation Model (SEM) to test hypotheses proposed in this study.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>347</td>
<td>91.3</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>34</td>
<td>09.7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>381</td>
<td>100</td>
</tr>
<tr>
<td>Age</td>
<td>30 and Less</td>
<td>113</td>
<td>29.7</td>
</tr>
<tr>
<td></td>
<td>31-45</td>
<td>162</td>
<td>42.2</td>
</tr>
<tr>
<td></td>
<td>46-59</td>
<td>78</td>
<td>20.7</td>
</tr>
<tr>
<td></td>
<td>60 and above</td>
<td>28</td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>381</td>
<td>100</td>
</tr>
<tr>
<td>Marital Status</td>
<td>Single</td>
<td>120</td>
<td>31.6</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>250</td>
<td>65.7</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>11</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>381</td>
<td>100</td>
</tr>
<tr>
<td>Education</td>
<td>Undergraduate</td>
<td>223</td>
<td>58.6</td>
</tr>
<tr>
<td></td>
<td>Master</td>
<td>125</td>
<td>32.9</td>
</tr>
<tr>
<td></td>
<td>Above/other</td>
<td>32</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>381</td>
<td>100</td>
</tr>
<tr>
<td>Investment Experience</td>
<td>Less than 5 years</td>
<td>141</td>
<td>37.1</td>
</tr>
<tr>
<td></td>
<td>6-10 years</td>
<td>103</td>
<td>27.0</td>
</tr>
<tr>
<td></td>
<td>11-15 years</td>
<td>95</td>
<td>24.9</td>
</tr>
<tr>
<td></td>
<td>More than 16 years</td>
<td>52</td>
<td>13.6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>381</td>
<td>100</td>
</tr>
</tbody>
</table>
Table I: Sample Composition

<table>
<thead>
<tr>
<th>Income / per month</th>
<th>Less than USD 500</th>
<th>600 – 1000</th>
<th>1100 – 1500</th>
<th>1600 - 2,000</th>
<th>More than 2000</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Dollar</td>
<td>218</td>
<td>83</td>
<td>45</td>
<td>21</td>
<td>14</td>
<td>381</td>
</tr>
<tr>
<td></td>
<td>57.4</td>
<td>21.8</td>
<td>11.4</td>
<td>5.5</td>
<td>3.9</td>
<td>100</td>
</tr>
</tbody>
</table>

3.3 Measures

The study comprises various variables including company identification, emotional attachment, corporate image and investor behavioral loyalty. Company identification is measured on scale adopted from Mael and Ashfort (1992); the scale is used by Karaosmanoglu et al., (2011) in the context of consumer, but it is used in this study to measure investor company identification. The scale consists of 6 items measured on 5 point Likert scale where 1 for strongly disagree and 5 for strongly agree. Sample items include; if someone criticizes this company, I feel personally insulted and I care about what others think about this company, these items shows the strength of individual’s identification with company. Emotional attachment scale is adopted from Karaosmanoglu et al., (2011), the scale has 3 items measured on 5 point Likert scale. The corporate image scale is adopted from Karaosmanoglu, (2007); Karaosmanoglu et al., (2011); and Williams and Moffit, (1997), it also consists on 3 items. The scale to measure investor behavioral loyalty is taken form Helm (2007), the scale consists 8 items having two dimensions investor affective loyalty and investor behavioral loyalty.

4 Results and Discussion

4.1 Reliability and Validity Analysis

The reliability analysis is computed using Cronbach alpha to check if data is reliable for analysis purposes. The study uses reliability parameter as proposed by Nunallay and Bernstein (1978) that suggest that Cronbach alpha value should be equal or greater than 0.5 to meet the standard criteria. The Cronbach alpha value for all variables including corporation identification, emotional attachment, corporate image and investor behavioral loyalty scored satisfactory values as depicted in Table II, the data is thus, reliable and appropriate for use in statistical analysis. The validity of the instrument is computed through Confirmatory Factor Analysis (CFA) presented in Table II. The standard criteria for measuring the validity require the factor loading value should be (≥ 0.40); the items scoring below this threshold should be deleted in order to have good model fit indices. All the variables used in this study scored factor loading higher than 0.40, which shows good validity results for all items and variables used in this research.

The SEM model obtained good model fitness with CMIN (Chi-Square) = 1431.342, Degree of Freedom (DF) = 371, probability level (p-value) = 0.000, CMIN/DF 3.858. Various statisticians, for instance Wheaton et al. (1977) and Marsh and Hocevar (1985) ar-
guessed value of CMIN/DF as standard measure for model fitness should be less than 5 and between 5 and 2 for good model fitness. The model fitness of SEM is also within 5 to 2; hence this study also achieved good model fitness. Gerbing and Anderson (1992); and Hair et al. (2003) also used another measure for model fitness and proposed that the model fitness ratios including GFI, CFI and NFI should be closer to 0.90 and the value of RMSEA should be less than one. The model fitness ratios are also satisfactory according to these criteria’s as well as therefore, data can be used for further analysis.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Factor Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company Identification (0.84)</strong></td>
<td></td>
</tr>
<tr>
<td>If someone criticizes this company, I feel personally insulted.</td>
<td>0.73</td>
</tr>
<tr>
<td>I care about what others think about this company.</td>
<td>0.81</td>
</tr>
<tr>
<td>When I talk about this company, I say “we” instead “they”.</td>
<td>0.85</td>
</tr>
<tr>
<td>The success of this company is my success.</td>
<td>0.69</td>
</tr>
<tr>
<td>If someone appreciates this company, I feel proud.</td>
<td>0.75</td>
</tr>
<tr>
<td>If there is a bad news about this company in the media, I feel embarrassed</td>
<td>0.82</td>
</tr>
<tr>
<td><strong>Emotional Attachment (0.79)</strong></td>
<td></td>
</tr>
<tr>
<td>I feel good about company X.</td>
<td>0.78</td>
</tr>
<tr>
<td>I respect company X.</td>
<td>0.64</td>
</tr>
<tr>
<td>I trust company X.</td>
<td>0.77</td>
</tr>
<tr>
<td><strong>Corporate Image (0.82)</strong></td>
<td></td>
</tr>
<tr>
<td>Your general impression about company X.</td>
<td>0.75</td>
</tr>
<tr>
<td>Other people’s impression about company X.</td>
<td>0.85</td>
</tr>
<tr>
<td>Your impression about company X, compared with other companies in the same sector.</td>
<td>0.86</td>
</tr>
<tr>
<td><strong>Investor Behavioral Loyalty (0.85)</strong></td>
<td></td>
</tr>
<tr>
<td>Are you going to purchase more shares of company x within the next three years?</td>
<td>0.75</td>
</tr>
<tr>
<td>Are you going to hold your shares on a long term basis?</td>
<td>0.68</td>
</tr>
<tr>
<td>Would you refer company X’s shares to others?</td>
<td>0.70</td>
</tr>
<tr>
<td>Are you going to sell your X-shares within the next 12 months?</td>
<td>0.83</td>
</tr>
<tr>
<td>To what extent do you feel bonded to company X?</td>
<td>0.85</td>
</tr>
<tr>
<td>To what extent would you regret if company X and its products were no longer available?</td>
<td>0.75</td>
</tr>
<tr>
<td>As a shareholder, to what extent do you identify with company X?</td>
<td>0.86</td>
</tr>
<tr>
<td>To what extent are you interested in the welfare of company X?</td>
<td>0.84</td>
</tr>
</tbody>
</table>

Note: GFI = 0.96; AGFI = 1.15; CFI = 0.95; NFI = 0.88; NNFI = 0.87; RMSEA = 0.04; RMR = 0.091.

**Table I: Reliability and Validity Analysis**

### 4.2 Correlation Analysis

Correlation analysis measures the relationship between all variables; it also examines the multi co-linearity. This research has computed Pearson’s linear correlation to analyze the strength of relationship among variables. The results of correlation analysis presented in Table III exhibit positive relationship between company identity, emotional attachment, corporate image and investor behavioral loyalty. The mean and standard deviation values
also show satisfactory results as per standard criteria. Table III below shows values for relationship and the significance level for each variable used in this study.

<table>
<thead>
<tr>
<th></th>
<th>Company Identification</th>
<th>Emotional Attachment</th>
<th>Corporate Image</th>
<th>Investor Behavioral Loyalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Identification</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Attachment</td>
<td>0.84*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporate Image</td>
<td>0.74**</td>
<td>0.88*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investor Behavioral Loyalty</td>
<td>0.79*</td>
<td>0.97**</td>
<td>0.91*</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>4.11</td>
<td>3.45</td>
<td>3.28</td>
<td>3.47</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.84</td>
<td>0.75</td>
<td>0.97</td>
<td>0.88</td>
</tr>
</tbody>
</table>

* Correlation is significant at 0.01 levels (2-tailed).
** Correlation significant at 0.05 levels (2-tailed).

**Table III: Correlation Matrix**

4.3 Hypotheses Testing

The Table IV provides the results of structural model for this study with different hypotheses paths and their decision. The standard criterion for acceptance of hypothesis is that that the P value should is less than 0.05 to score the significant relationship between the variables. The first hypothesis presents the relationship between company identification and corporate image. The P value for this relationship is (0.013), which is well below 0.05, we therefore, accept our H1. It depicts that higher level of company identification among individual equity investor results in better corporate image for investor. H2 is related to company identification and emotional attachment, the P value is (0.002) resulting acceptance of our proposition. The next hypothesis is related to linkage between emotional attachment and company image, the results presented in Table IV provide P value (0.000) which is highest level of significance. It means that the emotional attachment of investors' with corporation affects their investment behavior in a highly significant manner. The final hypothesis establish the association between company identification with investors' behavioral loyalty, the P value is (0.021) which is also positively significant. The model fit indices for structural equation model (SEM) are normal as meets standard acceptance criteria as mentioned by Gerbing and Anderson (1992); and Hair et al. (2003). The findings of this study are consistent with the result of similar previous studies as mentioned in our literature review. The results of equation model are also presented in Figure II
<table>
<thead>
<tr>
<th>Paths</th>
<th>Hyp.</th>
<th>Estimate</th>
<th>S. E</th>
<th>P</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Identification ------&gt; Corporate Image</td>
<td>H1</td>
<td>.160</td>
<td>.071</td>
<td>.013</td>
<td>Supported</td>
</tr>
<tr>
<td>Company Identification ------&gt; Emotional attachment</td>
<td>H2</td>
<td>.447</td>
<td>.010</td>
<td>.002</td>
<td>Supported</td>
</tr>
<tr>
<td>Emotional attachment ------&gt; Corporate Image</td>
<td>H3</td>
<td>.825</td>
<td>.016</td>
<td>.022</td>
<td>Supported</td>
</tr>
<tr>
<td>Emotional attachment ------&gt; Investor Behavior</td>
<td>H4</td>
<td>.191</td>
<td>.152</td>
<td>.000</td>
<td>Supported</td>
</tr>
<tr>
<td>Corporate Image ------&gt; Investor Behavior</td>
<td>H5</td>
<td>.269</td>
<td>.019</td>
<td>.001</td>
<td>Supported</td>
</tr>
<tr>
<td>Company Identification ------&gt; Investor Behavior</td>
<td>H6</td>
<td>.074</td>
<td>.051</td>
<td>.021</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Note: GFI = 0.88; AGFI = 0.95; CFI = 0.93; NFI = 0.83; NNFI = 0.98; RMSEA = 0.03; RMR = 0.085.

Table IV: Regression Results

Figure II: Structural Equation Model Results

5 Conclusion

The study examines the influence of company identification, emotional attachment, and corporate image on investor behavioral loyalty. The study noted positive and significant influence of company identity on investors’ emotional loyalty, corporate image and investor behavioral loyalty. Emotional attachment is significantly and positively associated with corporate image and investor behavior. Finally, corporate image also influence positively on investor behavior in significant manner. The results of this study depict that like consumer behavior the behavior of individual equity investor is also influenced by com-
pany identification, emotional attachment and corporate image. The findings of this study have implications for corporate managers and other decision makers. The study proposes that corporations should use their marketing strategies to shape favorable behavior of investors along with customers. The marketing campaigns of corporations are observed by various stakeholders; therefore it influences their organizational behavior in respective ways. We propose that, corporations should consider the interest of different stakeholders in designing their marketing campaigns.

References


The Role of Partnership in Science to Business Marketing

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² University of Szeged, Knowledge Management Research Center, Szeged, Hungary

Abstract
Nowadays knowledge based economy, knowledge creation and the number of innovations are dynamically growing; however, the commercialization and utilization of produced intellectual properties are taking place in increasingly saturated and refined markets. This technology transfer situation is particularly challenging for basic research and early phase development stakeholders, such as universities. One of the recently invented theoretical approach towards technology transfer commercialization is science-to-business (S2B) marketing. S2B marketing is the entirety of marketing devices related to knowledge creation and innovation activity taking place in research institutions, especially in universities.

We developed a unique theoretical marketing-mix model for contextualizing the general marketing approaches of S2B marketing. We have applied McCarthy’s well known 4P marketing-mix model on the one hand, and extended it with two additional factors on the other, thus we have developed a 6P marketing-mix model. The two additional factors are Potential and Partnership. In this paper we detail and examine the elements of the 6P model, especially the later factor: the partnership, which is meant to be activities whose aim is to create accordance between external and internal stakeholders.

For the validation of the 6P model we completed a pilot study, in which we asked the university and business stakeholders involved in Hungarian technology transfer about the specificities of the process. The sample can be considered representative for the Hungarian university technology transfer. In the course of compiling the questionnaire, we operacionalized the elements of our theoretical 6P model, and then validated it with the results obtained. The results supported the correctness of the 6P model. Although the model needs further development in terms of the factor of potential, however our main focus about the partnership factor proved to be correct. Regarding partnership, it was revealed that the academic relationship system of universities is very extensive, but they can be barely considered as business stakeholders yet. In the area of partnerships we mainly find the lack of professionalism and real marketing approach.

Keywords
Innovation management, Science-to-business marketing, Technology transfer, Partnership

1 Introduction

One of the keystones of today’s knowledge based economy is ongoing knowledge creation and innovation (Buzás 2005a), which covers a very wide spectrum ranging from multinational company units specialized in applied research to university institutions completing basic research. Thanks to technological advancement, we can identify a process in the field of intellectual properties similar to the one occurring in developed market economies in the second part of the last century, when the main challenge of marketing was no longer manufacturing a product but selling the manufactured product. According to the results of the annual surveys of the Association of University Technology Managers (AUTM), in 1995 the revenue from licensing university patents were equal to 1.7% of the total research cost, while
the same ratio was 2.9% in 2004, which is a growth, but the revenue is still a fraction of the expenditure, which supports our above assumption (Swamidass–Vulasa 2009). The market utilization of innovation results created in universities means a serious challenge for universities (Plewa et al 2013), since commercialization requires professional market research and creating marketing policies corresponding to demands (OECD 2004; Sandberg, 2008), which are traditionally not included in the scope of university tasks. As a response to this challenge, technology transfer offices and agencies have been established in universities in the past years and decades (Bennetzen–Moller 2013). By today, not intra-organizational knowledge but the organization joining the knowledge network has become the essential condition of successful innovation activity. As a result, the emphasis has also been replaced from traditional contracted cooperations to relationship based cooperations in the technology transfer process (Buzás 2005b).

In our study, in the light of the above situation, we examine today’s marketing possibilities and challenges that are related to the commercialization of intellectual properties created in universities. According to our basic hypothesis, the technology transfer activity of universities requires a special marketing approach – different from business-to-business model –, since the university as knowledge creator has specificities that cannot be captured with sufficient precision through the marketing models applied to business stakeholders (Bennetzen–Moller 2013). As the theoretical framework of our research we have chosen science-to-business (S2B) marketing. We previously (Prónay – Buzás 2013) set up a theoretical framework within S2B marketing, which starts out from McCarthy’s (1960) traditional 4P toolbox, defines its 4 elements in terms of the specificities of university technology transfer, and completed with additional two tools, partnership and potential, it creates a 6P marketing mix corresponding to the specificities of S2B marketing. In our study we compile the model on a theoretical basis, and then validate it with a pilot study, concentrated around the special approaches towards partnership on the field of S2B marketing.

2 Theoretical background

For our model we took McCarthy’s (1960) widely known (Kotler–Keller 2009) marketing-mix model as the basis, which concentrates marketing toolbox into four factors. The model we created covers specifically the marketing toolbox related to university technology transfer, which formally includes McCarthy’s 4 factors, but in terms of content they are specified to S2B marketing in each case, furthermore, we defined two additional factors, which are determining with regard to the efficiency of S2B marketing, thus we obtained a model with 6 factors in total, which we named “6P model”, in accordance with the nomenclature of marketing.

It is important to emphasise that the with the 6P model we do not aim to overwrite or extend McCarthy’s model, which we claim to be applicable well in several fields, but it slightly matches with the specificities of S2B marketing, thus with this more special model we aim to set up a new model, which is more suitable to capture this field. Establishing such a model is not unusual in marketing literature, whose most well-known example is Booms-Bittner’s
(1981) 7P model specified to the area of services. Our model is a theoretical construction, which we test empirically with a pilot study. The model consists of six separate factors, which can slightly overlap but they are intended to form separate units.

A detailed theoretical description of the 6P model and its factors can be found in Prónay and Buzás (2013) previous study. Here we only give a short overview about the 6P model in each case focusing on what S2B marketing specificities a certain factor has:

› **Product:** This factor focuses on conscious portfolio management. In this activity, challenge is represented by the registration and evaluation of existing intellectual properties on the one hand, and the difficulty of portfolio cleaning on the other (Buzás 2005a).

› **Price:** This factor focuses on applying those market-based pricing strategies and price policies that reduces the risk of losing higher future incomes resulting from a too early or two cheap sale. The price formation of S2B marketing is done by individual pricing. This means a possibility of higher pricing due to the uniqueness on the one hand, and a limit on the other, because it is hard to find a starting point to determine the price (Reeves 2006).

› **Place:** As technology transfer often involves the transfer of tacit knowledge rather than codified knowledge, personal participation in the process has crucial importance, consequently interpersonal relationships are also significant besides institutional relationships (GrØnholdt et al. 2000; Gertner et al 2011; Walter et al 2011; Plewa 2013. Commercialization generally takes place through a short channel and the product itself is very complex, therefore its overall understanding often requires deeper scientific knowledge (Veres–Buzás 2006).

› **Promotion:** The objective of S2B marketing communication is not only providing information about the intellectual product and arousing the interest of potential customers, but also promoting the institution itself through professional market-orientated image building (Park et al. 2006). S2B marketing specifically depends on regional image, i.e. besides the characteristics of the intellectual product, it is also important where it comes from (Porter, 1998; Jaffe–Nebenzahl 2001).

› **Potential:** The commercialization of intellectual properties often (for universities in almost every case) takes place before the level of the concrete, marketable product (Jensen and Thursby’s 2001), i.e. in this sense we can barely talk about a “product”, it is much rather a kind of promise or potential (Borg 2001). The evaluation of S2B potential means activities that are grounded on market based utility approach, and form the portfolio through evaluating intellectual properties with a long-term approach and according to defined protocols, under strict confidentiality. It is worth noting, that open innovation models (Chesbrough 2003; Huizingh, 2011), place potential management in a considerably different context.

› **Partnership:** S2B marketing is characterized by that two different spheres meet, the academic and the business, which are different in many respects, e.g. market orientation; research motivation; use of profit, public contribution. The
cooperations related to the transfer of early phase technologies require an even greater effort from companies compared to the usual technology transfer processes, since these technologies are generally quite far from market utilization (Bercovitz–Feldmann, 2006). In order to create proper synergy between the participants, special attention has to be paid to the cooperations between them, i.e. partnership. In S2B marketing, partnership refers to the activities whose aim is to create accordance between external and internal stakeholders. Internal partnership focuses on creating an atmosphere of partnership within the organization. It includes the cooperation of researchers and S2B marketing managers, and related to this the provision of two-way (industry – researcher; researcher – industry) flow of information (Bercovitz - Feldmann 2006). The main point of S2B external partnership is that the university should present itself as a competent partner for the industrial actors (Litan et al. 2007), forming partnerships that focus not merely on implementation but joint development, as in the latter case usually a much higher marketing potential can be achieved compared to the simple selling of early phase research or completing industrial commissions.

3 Empirical study

Our research objective was generally to explore the ongoing specificities of university technology transfer, and specifically to test and operationalize our 6P model developed based on the above theoretical bases. Our present research was merely a pilot study, in which we studied the above questions on a narrower population.

3.1 Methodology

We chose the stakeholders involved in the Hungarian university technology transfer as the population of our research. Hungary, as most Central and Eastern European countries, is lagging behind Western countries in terms of technology transfer; however, for its state of economic development, the country has research universities in high positions in the field of science, which provide proper basis for the examination of the topic. Nevertheless, it has to be noted that as it is a pilot study, this research has a limited suitability to draw widely generalized conclusions.

We chose the quantitative survey technique as the research method, in which we forwarded an online questionnaire to every member of the population. It was possible because the population did not have too high quantity in total, and it was concentrated well, since it included 39 persons working in technology transfer offices (TTO) in 6 research universities of the country. For a broader research spectrum we sent the questionnaire to 10 companies that have a close cooperation with research universities, thus our results are not restricted only to the viewpoint of the academic sphere, but it also reflects the opinion of those active in the business sector. In the questionnaire we mostly applied a 4-point Likert scale, which surveyed the attitudes, opinions and activities related to technology transfer. We chose the 4-point scale because due
to the low number of sample we would have obtained very low cell element numbers in the case of a broader scale, and we wanted to avoid mean value distortion characterizing odd scales.

4 Main findings

We can divide our research results into two groups. First we present the results regarding the operacionalization of our 6P model, and then we describe the specificities of the Hungarian university technology transfer based on the distribution of answers given to the questionnaire.

In the survey conducted in the spring of 2014, from the above mentioned 48 persons 23 in all completed the questionnaire; among them 16 work in a university TTO, while 7 people work related to business technology transfer. They have worked on average for 4.2 years in the field of technology transfer, but there were examples of 15 or 21 years as well. The results can be considered as representative regarding national TTOs, since this population is relatively homogeneous on the one hand, and nearly 50% of the population was involved in the sample on the other.

One of the objectives of our research was to validate the 6P model, i.e. to decide whether we actually operacionalized the model properly. For this we completed a reliability test, in which we categorized the answers for the questions of the questionnaire according to the factors of the 6P, and we calculated Cronbach Alpha value by group. We carried out the test in several steps, continuously excluding the questions (4 such questions in total) that worsened the matching of the model. In what follows, we summarize the results of the Cronbach Alpha analysis used for the validation of the 6P model in Table 1. It is important to underline that we asked about the variables included in the table with several questions, and we completed the Cronbach Alpha analysis by question and not by variable, we grouped the questions into variables in Table 1 only in the interest of clarity.

<table>
<thead>
<tr>
<th>Cronbach Alpha</th>
<th>Factor</th>
<th>Tested variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.688</td>
<td>Product</td>
<td>The knowledge of TTO about inventions, services, instruments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Researchers’ inclination to report and the quality of reports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seizing inventions at the level of department</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The efforts of TTO to explore inventions and summing up the knowledge in departments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Invention assessment protocol applied by TTO</td>
</tr>
<tr>
<td>0.631</td>
<td>Price</td>
<td>Relation of the price of university inventions and market price</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Difficulty in the price determination of university inventions</td>
</tr>
<tr>
<td>0.822</td>
<td>Place</td>
<td>The role of personal selling in the commercialization of inventions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The role of online contact in the commercialization of inventions</td>
</tr>
<tr>
<td>0.673</td>
<td>Promotion</td>
<td>The image of the university with a business eye</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Professionalism of the online and offline appearance of the university</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Availability and transparency of university portfolio</td>
</tr>
<tr>
<td>0.545</td>
<td>Potential</td>
<td>The extent of business potential in the elements of the portfolio</td>
</tr>
</tbody>
</table>
The results indicate that with the exception of the factor of Potential we obtained a particularly high Cronbach Alpha value for the other factors, thus we properly operationalized 5 factors of the model, and the Potential factor’s value is nearly acceptable (however the questions and variables applied on this factor has to be refined in the future).

After acknowledging that the 6P model can be considered sufficiently reliable, we review the answers given to each set of questions in detail. In the following analysis we do not incorporate the answers that were given to the 4 questions we excluded in the above validation of the 6P model.

The first part of the questionnaire was about patenting and the related attitude. All respondents agreed that the majority of patents do not recoup the costs, i.e. it is not effective to have the objective of short-term profit in mind. It is also supported by the result that 43% disagreed with the assumption that the patent that lacks interest for 2-3 years has to be abolished. Besides a long-term approach, there was an agreement about that business aspects have to dominate in addition to scientific aspects in the process of patenting: with the exception of 1 person, everyone thought that only the inventions with real business potential needs to be patented, and 78% thought that the university should rather have fewer but promising patents.

In the following block, we explored the opinions regarding the activities of university TTOs. The respondents were quite divided in terms of the question regarding the knowledge of TTOs about university portfolios. According to 54%, the TTO has relatively complete knowledge about university inventions, but less about utilizable services (25%) and instruments (30%), although the vast majority agreed that the TTO devotes great energy to register technologies and actively seeks researchers in order to get familiar with their inventions. An interesting skepticism was observed concerning the invention reports of researchers. Not a single respondent agreed completely with the statement that “Researchers report their new invention to the TTO”, and one-third claimed that this statement is generally not true, and there are many inventions that are known only at the department level. In addition, they claimed that the researchers’ reports are often incoherent. According to the majority (78%) the TTO evaluates the reported inventions based on a defined protocol and regularly revises the patent portfolio.

The result of the above product policy situation is that according to the respondents the university invention portfolio is less transparent with an industrial eye, and although several universities have a knowledge map, only 13% said that it can be used particularly well.

The volume of the commercialization of the intellectual products of universities is not particularly high, 83% of the respondents said that their institution sells 5 or less invention per year, and the vast majority thought that these sales happen at a lower price compared to the
market price. It has to be added that over half of them claimed that it is very difficult to
determine the price of university inventions. As for the method of commercialization, two
thirds of the respondents agreed with the statement that it can take place only through personal
selling, they did not consider online contact as a particularly efficient form. Accordingly, TTO
staffs participate in international technology transfer workshops on a relatively high number of
occasions (5 times on annual average).

Due to what has been detailed in the literature section, universities also have to step out of a
merely academic image and increasingly appear as entrepreneur universities, i.e. professional
business actors in the market. According to the respondents, this process is in an initial phase
in national universities, not a single respondent thought that the university they know would
have a business image. However, half of the respondents admitted that the R&D image is
strong, although from an academic rather than a business aspect. It is important to emphasize
that respondents did not consider it as an acceptable situation, 78% would call for significant
changes in this area, and not one respondent thought that the university should not operate on a
business basis.

The above discrepancy also occurred in the examinations on university partnership. Three
respondents from four (one of them completely) agreed that the university is not a professional
partner from a business aspect. Only half of the respondents think that university publications
and websites are professional with a business eye. Interestingly, they do not think that the
university is completely non-market (only 13% had this opinion), they much rather think the
problem is that although it is an important partner (according to 40%), it is complicated and
overly bureaucratic (according to 84%).

The dominance of academic character also occurred in the partnerships of the university. In
terms of external partnership, compared to the relations with other national and foreign
universities, the relationship with the business sector is much looser. According to over the
half of the respondents, the relationship is intensive with national large enterprises and national
SMEs, while only every third respondent reported on frequent cooperations with multinational
companies. It is interesting that almost no one marked the category of “close partnership” for
business relationships, which indicates that the cooperations are mostly formal. It is even more
interesting that the same phenomenon also occurred in the internal dimension, in terms of the
collaboration with researchers: only every fourth respondent thought that they have a partner
relation with university researchers, the majority merely claimed the relationship to be
intensive.

In the light of the above results we think that the variables and factors theoretically defined in
the 6P marketing model indeed relevantly influence the process of technology transfer and
therefore they are important determinants of the theory of Science to Business Marketing.

5 Conclusions

In our study we intended to highlight on the peculiarities of Science to Business marketing by
operationalizing and testing a theoretical model that based on the traditional 4P marketing-mix
model. One of our main goal was to operationalize the partnership as a main driving factor of
S2B marketing. According to the results we have succeeded in this effort and we came up with appropriate values that can describe the partnership in university-industry interactions.

Defining S2B marketing as a separate marketing field is necessary because of the specificities of intellectual properties. In contrast to traditional products, the innovation results commercialized in the S2B marketing process mainly cannot be considered as a product in themselves, only as a kind of promise, possibility, potential. Considerable risk is attached to their commercialization from both the seller’s and the buyer’s side, since the market utility deriving from their further development is difficult to estimate and can be utilized on the basis of a longer time period. In the course of the primary research, the respondents highlighted the importance of business aspects for patentability, which, however, has to manifest itself not in short-term profit gaining, but in long-term thinking. This all confirm that there is a place for the factor of potential in the filed of S2B, instead of the traditional marketing approach.

These products are also special because their “manufacturers” (universities) often only slightly know their own product; moreover, they often have no knowledge of what innovation processes hide in the subunits at the institutional level. On the other hand, the problem with the innovation results which once were put into portfolio is often that keeping them in portfolio is unnecessary and expensive. The findings of the research confirmed that in terms of product policy the TTO does not have an easy task in the exploration of inventions, thus although it makes efforts in the area of active portfolio management, it still seems to be proved – which is a quite rare situation in the business market – that the university does not know its own marketable products either, therefore it can present them towards the industry in a more complicated way. It justifies more conscious and more comprehensive marketing activities in terms of product policy. From the aspect of price policy, university TTOs also face serious challenges, and generally they can sell their intellectual products cheaper than the market price, which in itself indicates that they do not utilize price strategic opportunities well – it is true even if price determination is very difficult in this market. The commercialization of intellectual products can happen only with considerable financial and human resource input in the respondents’ opinion, because online contact do not substitute personal meetings and participating in international workshops.

The entrepreneur university is not only a theoretical construction, the experts working in the field of technology transfer unanimously find it important to strengthen the business character in universities, in terms of which there is still much catching-up to do. Although the R&D significance of universities is recognized in business circles, they consider them less professional actors due to their inflexibility, administrative difficulties and partly to the mixed quality of their online and offline publications. The “academic ivory tower” phenomenon is also projected to partnerships to some extent, neither the internal nor the external cooperations are characterized by close partner relations, much rather by a formal cooperation.

S2B marketing directly concerns a quite wide scope of stakeholders, who generally have different knowledge and different motivations, therefore managing partnership is of high importance in this field. The researchers know the product itself the most, but they frequently consider the publication of the results more important instead of the commercialization of the
product. On the contrary, both the buyers and the sellers interested in commercialization can often get only limited information about the technological details of the intellectual product.

Based on the findings of the primary research, we found that the factors and their specificities summarized in the 6P model indeed characterize the field of technology transfer, although the measuring instrument has to be refined in terms of the operationalization for the factors of potential, but it proved to be valid in case of our main focus: at the partnership factor. We hope that the connections and ideas outlined in our study prove to be useful for innovation professionals and inspire to further S2B marketing examinations.

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Creation of Cross-Organizational Values in The Education Project EM A2 Sigma

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Abstract
The aim of this presentation is to provide a case study of the European Commission educational project Erasmus Mundus Action 2 SIGMA for the Western Balkans. In particular, it will be analysed how the project creates cross-organizational values: in terms of its efficient inter-cultural interaction and successful implementation of business values.

Following the aims of the programme Erasmus Mundus Action 2, project SIGMA promotes European higher education, while enhancing career prospects of its participants, supporting inter-cultural understanding, and contributing to a sustainable development of the Western Balkan higher education. To achieve this, partnership SIGMA offers scholarships for studies, research or training, and, at the same time, performs additional activities that help to develop critical skills necessary for successful functioning on the labour market. The presentation will provide many examples of good practices that result in creating a synergy within SIGMA virtual team, as well as among the worlds of education, research and business.

Questionnaires conducted among the scholarship holders prove that international experience is considered as the most important outcome of academic mobility. Structured interviews with the alumni indicate that participation in the project really improves chances for employment. The research also shows that in comparison with other similar initiatives, project SIGMA seems to be particularly focused on cooperation with businesses and on building cross-organizational values.

Inclusion of this presentation into the programme of the Science-to-Business Marketing Conference will further prove that the worlds of education, research and business can be interconnected and that educational projects can substantially contribute to this kind of cooperation at the grass-root level.

We can conclude that such projects as Erasmus Mundus Action 2 SIGMA provide foundation for innovative approach to education and further, contribute to social capital building and sustainable development of the regions involved.

Keywords
Academic mobility; cross-organizational values; Education, Audiovisual and Culture Executive Agency; Erasmus Mundus Action 2; educational project; skill learning

1 Introduction
According to Manuel Castells (1998), the contemporary society is a society of networks that create virtual cultures. The same can be true for many organizations that operate as
multicultural virtual teams. A good example can be the European Commission educational projects within the programme Erasmus Mundus Action 2. The purpose of this paper is to present a case study of the project Erasmus Mundus Action 2 SIGMA for the Western Balkans. In particular, it will be analysed how the partnership creates cross-organizational values: in terms of its efficient inter-cultural interaction and successful implementation of business values.

2 What is Erasmus Mundus Action 2?

The aims of the European Commission programme Erasmus Mundus 2009-2013 include: the enhancement of quality in European higher education; promotion of the European Union as a centre of excellence in learning around the world; promotion of intercultural understanding through cooperation with Third Countries as well as for the development of Third Countries in the field of higher education. As the Education, Audiovisual and Culture Executive Agency (EACEA) indicates, partnerships that are established in the framework of the programme Erasmus Mundus are the basis for enhancing academic cooperation and exchanges of students and academics, while contributing to the socio-economic development of non-EU countries targeted by EU external cooperation policy. So called Erasmus Mundus Action 2 provides support for the establishment of cooperation partnerships between European higher education institutions and Third Country ones and offers scholarships for Third Country and European individuals at different levels: students, researchers, academic staff and professionals. The duration of the mobility period can range from 1 month to 36 months. The life cycle of each project is 4 years. Programme Guide includes the following specific objectives:

(1) To contribute to the mutual enrichment of societies by developing the qualifications of men and women so that they possess appropriate skills, particularly as regards the labour market, and are open-minded and internationally experienced;

(2) To promote mobility both for students, researchers, academics and administrative staff from Third Countries, especially from vulnerable groups, selected on the basis of academic excellence, to obtain qualifications and experience in the European Union;

(3) To contribute towards the development of human resources and the international co-operation capacity of higher education institutions in Third Countries through increased mobility streams between the EU and Third Countries in accordance with the principles of equal opportunities and non-discrimination.

Every year the European Commission, represented by the Education, Audiovisual and Culture Executive Agency, accepts over 40 Erasmus Mundus Action 2 projects for different regions outside the European Union (so called lots). It is required that they are operated by partnerships that include a minimum of 5 higher education institutions from
at least 3 European Union countries and a number of higher education institutions from
the targeted non European regions. The maximum number of partners in each partner-
ship is 20.

3 How does the project Erasmus Mundus Action 2 SIGMA promote critical skills learning and employability?

Erasmus Mundus Action 2 SIGMA is an educational project accepted by the Education,
Audiovisual and Culture Executive within the above programme. It offers over 260
scholarships for students, researchers and staff from the Western Balkans (WB) and
from the EU to visit partner universities. According to the guidelines, approximately
80% of all the scholarships have been reserved for the Western Balkans. The partner-
ship contains 10 universities from 6 Western Balkan countries (Albania, Bosnia and
Herzegovina, FYR of Macedonia, Kosovo*, Montenegro and Serbia) and 9 higher edu-
cation institutions from 8 EU countries (Austria, Germany, France, Italy, Poland, Swe-
den, the Netherlands, UK). There are world-class universities, like Lund University or
Freie University Berlin, and provincial ones. All the partners are accredited higher edu-
cation institutions in their countries with good reputation for academic quality. The
University of Warsaw is playing the role of the coordinating institution. On a daily ba-
sis, the partnership is functioning as a virtual team. The coordinating team in Warsaw is
staying in regular contact with all the project stakeholders: partner universities in the
Western Balkans and in the EU, scholarship holders, funding organization, experts, as-

dociate partners, and other important actors, such as embassies, student organizations,
alumni, other Erasmus Mundus partnerships, local authorities, EU delegations in a given
region, NGO’s, employers and businesses.

Project SIGMA is setting realistic goals that are of great value for all the partner institu-
tions, for higher education in the Western Balkans, and for the whole region. The pro-
posal has been constructed on the basis of reports regarding the needs and development
strategies of the Western Balkans, needs identified by the partner institutions and their
development strategies, lessons learned from similar projects, experts’ opinions, and the
EACEA regulations. As the UNDP reports state, education is one of the factors of the
economic and social growth. Also, Strategy for Europe 2020 puts stress on a great role
of education and universities in fighting the economic crisis. Skill learning in an interna-
tional environment is a vehicle towards successful functioning on the labour market in
the contemporary knowledge-based society, while mobile, open-minded workforce with
international experience has the capacity to respond to the opportunities and challenges
that emerge in their home countries. OECD Skills Strategy, Lisbon Strategy, WB coun-
try-specific reports, Thessaloniki Agenda for the WB of 2003, as well as Tempus Study
on the higher education systems in the WB of 2012 and Erasmus Mundus A2 - Strand 1
objectives, all include skill learning as one of the necessities of the current regional and
global economy. The new European Commission Programme Erasmus+ aims to boost skills and employability and to modernize Education, Training and Youth work. It will support transnational partnerships among Education, Training, and Youth institutions and organizations in order to foster cooperation and bridge the worlds of education and work. These needs have been incorporated in EM A2 SIGMA objectives, which is reflected in the project title: “Critical Skills Learning for Innovation, Sustainable Growth, Mobility and Employability in the Multicultural Environment of the Western Balkans”. The specific aims of the project have been formulated as follows:

(1) Development of critical skills necessary for functioning in the knowledge-based society and increasing chances for employment, for example: intercultural skills, linguistic skills, entrepreneurial skills, managing one’s career, managing organizational processes, applying for grants, conflict resolution, teamwork, and others; bridging the gap between education and work; mutual enrichment and cross-fertilization.

(2) Mobility of students, young researchers, academic and administrative staff; enabling excellent candidates from the WB to obtain qualifications in the EU, and EU candidates to gain experience in the WB. Innovative education will be promoted. Equal opportunities will be given to excellent candidates from vulnerable groups, anti brain-drain measures will be taken.

(3) Quality measures. Like Six Sigma method in business, project SIGMA is going to implement quality planning, assurance and control measures and transfer of expertise within the partnership, thus promoting the EU as the centre of excellence in learning. Bologna process and ECTS documents will be applied. Smooth transfer of grades, credits, programmes, diplomas, skills and qualifications between the EU and WB higher education institutions will contribute towards a greater compatibility between the WB and EU higher education systems and will help to increase the quality of education in the WB.

(4) Transfer of know-how; building academic, managerial and administrative capacity in the WB partner institutions. Well-trained academic and administrative staff and alumni of the project will contribute towards further human development and capacity building in their home institutions; transparent procedures will be developed.

(5) Ensuring long-term structured cooperation among the EU and WB higher education institutions, with emphasis on sustainability and future joint initiatives, such as sustaining the network, joint projects, research and innovative programmes, curricula development, publications, workshops, conferences. Lessons learned and good practices will be gathered throughout the life-cycle of the project, cooperation with other initiatives in the region and local authorities will ensure a multiplier effect of tangible results.

(6) Development of greater cross-cultural understanding, peaceful cooperation, inclusion of all groups, supporting talents, and the development of skills for
employment; awareness of cultural and linguistic diversity; in a wider perspective, contribution towards the improvement of the higher education system in the WB, sustainable development of the region, peace and stability, fighting extremism, decreasing the feeling of isolation from the EU, enhancing the European knowledge-based economy and greater social cohesion; promoting equality of all groups and non-discrimination of any kind.

As we can see, through student, researchers, academic and administrative staff exchange and other project activities, partnership SIGMA provides opportunities for tightening and developing structured and sustainable institutional cooperation between the Western Balkans and the EU. Like in Six Sigma approach, expertise is being transferred within the partnership, the partners are sharing innovation, good practice, and are learning from each other. The project facilitates stronger development of the institutional cooperation, transfer of know-how to the Third Countries, teaching, learning, and management capacity building. It stimulates the development of new innovative curricula and improvement of the existing ones, launch of joint programmes, initiation of joint research and projects, publications, centres for excellence, and other initiatives, such as workshops and seminars. By exposing the scholarship holders and administrators to the international environment, their professional, intercultural, adaptation, language, and other skills can be developed.

EM A2 SIGMA is particularly concentrated on providing the scholarship holders and other actors involved the opportunity to develop critical skills that help to successfully function in the contemporary world of knowledge and information. This aim is being achieved by:

1. Participation of business schools and other departments that provide programmes focused on skill learning.

2. Workshops for students and researchers at the early stage of their careers in order to develop their skills for employability.

3. Professional development training for administrators and academic staff engaged in the project administration. In this way, Lifelong Learning is promoted.

4. Use of webinars and e-learning methods for the above purposes, in order to reach a wider audience.

5. Involvement of all the partners from all the participating institutions in the organization of the professional development training.

6. Cooperation with career centres, student organizations, alumni, external experts, professional coaches, employers and local businesses.

7. Transfer of expertise within the consortium - to use Six Sigma term, involvement of the “black belts”.

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Project SIGMA is operating both on the micro and macro level: from the individuals through the departmental to the central university level, and, possibly, even further: from the university level to the higher education policy making institutions, local authorities in the region and employers. It provides foundation for innovative approach to education and further, contribute to social capital building and sustainable development of the countries involved.

4 How does Erasmus Mundus A2 SIGMA create cross-organizational values, in terms of its efficient intercultural interaction and successful implementation of business values?

As it has been demonstrated, Erasmus Mundus A2 SIGMA involves many different actors located in different geographical areas in order to be able to achieve its immediate and long-term goals. The diagram below presents the structure of the partnership:

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**Figure 1: EM A2 SIGMA Structure**

Thanks to this complex network of organizations involved, the partnership successfully manages to link the worlds of education, science and work, while operating at the grass-root level. At its basics, EM A2 SIGMA implements academic and scientific activities
in the countries involved. However, the partners also regularly cooperate with employers, career centres, coaches, external experts and professional organizations, such as Project Management Institute. For example, the latter provided experts to conduct workshops and online webinars dedicated to all the SIGMA scholarship holders, administrators, and other stakeholders. It is planned to launch an internal internship programme for SIGMA scholarship holders. The aim of all these activities is to equip the scholarship holders with critical skills that will help them to better function in the intercultural society of knowledge and will improve their chances for success on the labour market. We can argue, that on the way, the project helps to develop attitudes and values. At the same time, it promotes brain gain.

As the authors of the British Council report “Culture at Work” assert, the employers are under strong pressure to find employees who are not only technically proficient, but also culturally astute to thrive in a global work environment (British Council, 2012). In this context, it is very important that SIGMA partners and scholarship holders are functioning in an international, multicultural environment. The participating universities have different academic and work cultures, different organizational structures, regulations, values and approaches. As the partners are working in one team, towards the same goal, it is necessary to find common standards and to follow the same rules. They have to be agreed upon with all the partner institutions and also, they need to be in line with the European Commission regulations, in order to be able to successfully implement the project. To achieve this, EM A2 SIGMA has worked out such documents as: timetable and milestones, work break structure, communication plan, work and responsibilities chart, quality plan. As far as the academic part is concerned, the partnership has to take care that the credits, scores, skills and qualifications gained abroad have been transferred and recognized. As mentioned before, the partnership is actively cooperating with other actors, such as other Erasmus Mundus partnerships, experts, career centres, employers, local authorities and businesses. All this enables to create cross-organizational values within the partnership, and, at the same time, achieve the best possible results of the project.

As Douglas T. Kenrick at al. (2002) observe, teams that are ethnically diversified can produce more solutions and ideas, especially if the problems that they are working on are somehow connected with this diversity. Erasmus Mundus projects can provide a good example in his context. Experiments conducted by Warren Watson, Kamlesh Kumar and Larry Michaelsen in 1993 suggest that after initial problems, culturally diversified teams can achieve the same or even higher efficiency than ethnically homogenous teams (Kenrick at al., 2002). Gelfand et al. (2007) quote Shapiro et al. (2002), who argue that the characteristics of transnational teams reduce the sense of team identity, which can lead to effort-withholding behaviours. Being aware of this problem, Scholtes et al. (2003) stress that the leader of a virtual team needs to have excellent communication skills and should be charismatic enough to build team spirit despite distances. Such a manager has to be able to communicate messages very clearly through a number of different channels, should be resourceful, effective, and very well organized. Great cul-
ture awareness and sensitivity is a must. Phillips and Schweisfurth (2008) state that a team leader should be interculturally highly skilled and have a comparative perspective. As Grefen et al. suggest, the manager of a virtual enterprise should be extending workflow support in such a way that different organizations can be linked and that integrated cross-organizational processes can be managed. In the case of Erasmus Mundus Action 2, team work enables intercultural dialogue and allows to look at problems from different perspectives. The solutions should be workable in different academic and work cultures. These aspects help to create cross-organizational values within the consortium.

5 Results of research, questionnaires and structured interviews with the scholarship holders.

The research conducted among Erasmus Mundus A2 SIGMA scholarship holders was focused on the efficiency of the project, and in particular, on its skill learning component. This was based on the conceptualization of the 21st century skills in different frameworks (Voogt, Roblin, 2010), around the 3 basic groups of skills: learning and innovation skills; information, media and technology skills; life and career skills.

87,25% of the respondents stated that participation in Erasmus Mundus A2 SIGMA had helped them to improve language skills. 74,51% indicated communication skills, while 66,67 %: intercultural sensitivity, open mindness and tolerance, flexibility and adaptability. 64,71% observed that they had become more independent. The next most frequently selected skills were: creativity and innovation, general navigation and travel skills, organizational skills, initiative and self-direction, problem solving. Fewer scholarship holders mentioned such skills as: global awareness, patience and perseverance, leadership skills, productivity and accountability, social and civic competences, assertiveness, crisis management. 16,67% marked ICT skills and 12,75 – sense of entrepreneurship. Please see the diagram below:
Figure 2: Results of a survey conducted among EM A2 SIGMA scholarship holders regarding the acquisition of specific skills

76.92% of the respondents predict that the skill-learning component of Erasmus Mundus A2 SIGMA will be beneficial for the scholarship holders, while 88.24% state that the skills acquired will improve or have already improved their career opportunities.
Text analysis also proved that skill learning was the most frequently mentioned outcome of the academic mobility experience. Structured interviews further confirmed that the scholarship holders had adapted in the new environment and that they had learned a very important lesson of life, including: independence, self-confidence, self-reliance, learning to learn, self-definition. They all seem to have a strong sense of purpose and underlined that participation in an international mobility programme had helped them to achieve it. For example, they seem to be more aware of the opportunities that they can seize and are more capable of looking for such opportunities. In their own view, they
became more tolerant and open to talk about topics that would be considered taboos in their home countries. Interviews with Erasmus Mundus Action 2 alumni from the Western Balkans and from Asia demonstrated that after the mobility period, the grantees’ academic or professional career was developing very successfully and that very often their jobs required international experience. Many of the interviewees were mentioning that while abroad they were observing good practices and attitudes that were not present in their own countries.

6 Conclusions

Erasmus Mundus A2 SIGMA offers not only academic experience, but also a possibility to acquire critical skills that enable better career opportunities. Functioning in an international virtual team enables to develop these useful skills in the case of the scholarship holders, as well as in the case of the administrators, academic staff, and other stakeholders. According to the British Council report, in the view of the employers, the most highly valued skill is the respect for others, followed by working effectively in diverse teams. These skills are ranked even above the qualifications related to a given job (British Council, 2012).

All the actors involved in the works of Erasmus Mundus A2 SIGMA have the opportunity to exchange knowledge, experiences, values and points of views. As a consequence, cross-organizational values are created: both in the sense of intercultural dialogue and organizational values. Gelfand et al. observe that much of the research in cross-cultural organizational behaviour is focused on intercultural comparisons, whereas more attention should be paid to what we could refer to as the “cross-cultural interface” and how cultural differences actually affect intercultural encounters. We can argue that Erasmus Mundus A2 SIGMA creates such a space and is effectively creating cross-cultural organizational behaviours.

* This designation is without prejudice to positions on status and is in line with UNSCR 1244 and the ICJ opinion on the Kosovo Declaration of Independence

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Tempus
Thessaloniki Declaration
Managing Relationships in Interdisciplinary Research Projects – The HoQ Experience

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Abstract
In recent years, interdisciplinary research projects grew in importance. The reasons are twofold: On the one hand research areas become more and more specialised. On the other hand, “out-of-the-box-research” seems especially successful for innovations. Further, research projects are increasingly associated with the need to re-integrate the traditional approaches. One of the most complex challenges of such projects that re-integrate the different areas of science is the development and management of relationships between interdisciplinary partners. This implies the need of bringing together the diverse ways of thinking and the “languages” which are spoken in the corresponding disciplines. In the present paper, we will outline the adaptation of a method to meet the mentioned challenge: the House of Quality (HoQ). First, a short description of this approach in the original innovation management context is given. Afterwards, we will demonstrate the adaptation for an interdisciplinary research project using a current project which was initiated by the authors in 2013 and is running until 2015. At the beginning of this project in 2013, the HoQ approach was used in a conceptual way, assigned with a small empirical study (expert interviews). We will show and discuss the results of this application. The paper ends with a general discussion on the opportunities and limitations of the presented adaptation. One important implication is that the usefulness of the approach for interdisciplinary research projects, noticing that proceeding instead of the “analytic result” is most important.

Keywords

1 Introduction: Managing Relationships in Interdisciplinary Research Projects

Interdisciplinarity has a long tradition in research and still is a very relevant topic (e.g. Jacobs/Frickel, 2009: 44; Huutoniemi et al., 2010: 79). The reasons are twofold: On the one hand, research areas become more and more specialised. On the other hand, applied
and interdisciplinary, so-called “out-of-the-box-research” seems especially successful for innovations. Further, research projects are increasingly associated with the need to re-integrate the traditional approaches (e.g. Hacklin/Wallin, 2013), for example the HoQ. One of the most complex challenges of such projects that re-integrate the different areas of science is the development and management of relationships between interdisciplinary partners. This implies the need of bringing together the diverse ways of thinking and the “languages” which are spoken in the corresponding disciplines (see e.g. Bracken/Oughton, 2006). At the same time, realised communication between disciplines can be seen as an indicator for lived interdisciplinarity (see similarly e.g. Jacobs/Frickel, 2009: 48).

Increasingly, interdisciplinary projects are seen as a management challenge (see e.g. König et al., 2013). Thus, management tools can be used for solving appearing existing problems in this area. This corresponds with the generally observed relevance of management methods in science and the handling of research processes (see e.g. Malik, 2013): In the past, some scientists associated “management” with normative, business oriented strategies and capitalistic practices. Currently, more and more scientists recognise that instead, “management” can be seen as (non-normative) tools which can be successfully used for business as well as for science (see similarly Malik, 2013).

In this paper, we will present the adaptation of such a management method, which was originally developed in innovation and quality management to meet the mentioned challenge of interdisciplinary research projects: the House of Quality (HoQ) (see e.g. Akao, 1990; Chan, 2002). First, a short description of this approach from the original innovation management context is given. Afterwards, we will demonstrate the adaptation for an interdisciplinary research project using a current project which was initiated by the authors in 2013 and is running until 2015. At the beginning of this project, the HoQ approach was used in a conceptual way, assigned with a small empirical study (expert interviews). We will show and discuss the results of this approach.

The paper ends with a general discussion on the opportunities and limitations of the presented adaptation. One highly relevant implication is that the usefulness of the approach for interdisciplinary research projects, noticing that the proceeding instead of the “analytic result” is its most important result.

2 Theoretical Background: The House of Quality

For some time, innovation research investigated how customers’ requirements and their language could be translated into the technical language and vice versa. One of the most established approaches in this field of research is the “quality function deployment” (QFD) and especially the HoQ. The QFD concept traces back to Akao (1990; 1992), who developed it at the end of the 1960s in Japan. Furthermore, Akao applied it at Mitsubishi shipbuilding at the beginning of the 1970s (King, 1987: 227pp.). During the following years the concept attracted widespread interest in different fields of application as well as
in scientific literature (for an overview see e.g. Chan, 2002: 463pp.). Additionally, it is especially recommended for high-tech sectors due to the growing complexity of technology and the resulting gap between user language and technical language (e.g. Moriarty/Kosnik, 1989: 13; Mohr/Sengupta/Slater, 2010: 201).

The HoQ links needs of (potential) users of a new technological benefit with the technical specifications using a matrix structure. For this purpose, relevant attributes from each perspective are put in the rows (users’ view) respectively in the columns (technical view). Consolidation is done using correlations of the two perspectives: A matrix develops that provides the connection between each row and all columns and thus presents a “translation” of the customers’ view (row) into the language of the engineers (columns) (see e.g. Schmidt, 1996: 301; Bergquist/Abeysekera, 1996: 269; Gerards et al., 2011: 3). It is exactly this discussion about the correlations which leads to a better understanding of the particular counterpart; the resulting matrix itself is of negligible interest. One example for a description is shown in figure 1 (see similarly e.g. Bruhn, 2008: 291; Fleiss/Madu, 2006, 21; Johnson/Chvala, 1997, 79).

Figure 1: „Classical“ House of Quality (Source: Bruhn 2003: 39)
The QFD was originally designed for application in R&D departments. Recently, approaches which are based on the basic principle of HoQ are increasingly discussed more complex and related directly to consumers. For example, Gerards et al. (2011) demonstrate that an QFD based approach can provide assistance for consumers when they purchase complex high-tech-products such as digital cameras: a “translation” of technical features into potential applications (respectively the resulting value) takes place. With this, the consumer herself aligns her preferences (as well in the sense of mass customization) with his selection or a compilation of products without the necessity that she fully understands the language of engineering. The way such a “program of translation” could work is shown in figure 2. The study which is shown hereafter is also based on this idea.

Figure 2: “Translation” of the languages of the user and the technical part using the example of a digital camera (Source: Gerards et al., 2011: 6; see also Gerards, 2010: 62)

3 Study: The House of Quality Experience for an Interdisciplinary Project

3.1 Project idea

Biodegradable, resorbable polymers are frequently used in daily medical practice, for example surgical stitches or wound dressings. The most important benefit is that the medical product based on degradable polymers dissolves over time. The main drawback
in usage of resorbable polymers in this context is the release of degradation products (for example acids) that activates the immune reaction, which may cause serious complications.

The project is based on the idea to avoid such complications by developing a polymer additive that exhibits buffering action to neutralise acids and keep pH-value at physiological level. One sub-issue is to establish and optimise the process of the integration of the additive into polymer fibres and later in the medical product. Another aspect is the developing and adapting a mathematical model to gain understanding of the degradation and buffering processes. The project members work on the research question using the candidate application of a stent. Stents are implantable cylinders used to open and stabilise blood vessels in case of constriction or occlusion of the vessel. Furthermore, a basis for a process chain producing textile based medical application will be developed within the project. This application will include a fibre that degrades without reducing the pH-value.

The following fields of research are involved in the project: chemistry, physics, medicine, engineering and textile applications, marketing and innovation management. On the one hand the interdisciplinarity is required to achieve the project's goals, on the other hand it challenges the members due to the different foci and diverse discipline-specific terminology they use.

For the identification of a common basis and synergies between the project partners a HoQ is applied. The aspects evaluated within this framework include the members’ perspectives and requirements. For the application of the HoQ the project partners are separated into users (medicine) and development respectively technical perspective (chemistry, physics, engineering and textile applications). Expert interviews for both perspectives are based on a partially standardised questionnaire. It includes questions regarding desirable and necessary attributes for the resulting medical product (users’ perspective) and adjustable characteristics and expected correlations between these characteristics (technical perspective).

### 3.2 The HoQ

#### 3.2.1 Users’ perspective

First, the users’ perspective was examined. It was represented by a surgeon who frequently utilises medical products, e.g. stents. It has to be taken into account that the whole research project rather focuses on the degradation process itself than on a specific product. Nevertheless, to achieve a high level of comprehensibility the interview was based on this application example.

The aim was to identify the characteristics that should be considered for inclusion into the design of the medical product. These design characteristics should be distinguished in necessary and desirable aspects. Another issue was that some characteristics have to be
adjustable. The interview was concluded with a description of the actual market situation. Thereby, difficulties of currently available (alternative) products were mentioned.

Figure 3 shows all mentioned characteristics and priorities (10 = highest possible priority, 1 = lowest) from the users’ perspective. It became apparent that the most important components for this kind of stents are the buffer effect and the biocompatibility. Both aspects are related to the reduction or avoidance of complications after implantation. To avoid these complications seems to be more crucial than ease of use, or, in this case, the ease of the implantation itself from the surgeons’ perspective.

<table>
<thead>
<tr>
<th>Buffer Effect</th>
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<tbody>
<tr>
<td>Brace Diameter</td>
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<td>Biocompatibility</td>
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<td>Start of Degradation Process</td>
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<td>Radial Force (Diameter Shape Retention)</td>
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<td>Stent Length (6mm - 3cm)</td>
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<td>Stable Length</td>
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<td>Stable Length after Implantation</td>
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<td>Stable Diameter of Cross-links</td>
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<td>Adaptiveness to Bloodvessel</td>
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Figure 3: Controllable parameters from the users’ perspective

3.2.2 Technical perspective

The technical perspective is represented by the project partners from the fields of chemistry, physics, engineering and textile applications. The analysis aims to identify technical parameters that can be included into and influenced during the project. For this purpose we conducted a survey based on expert interviews regarding the controllable and potential factors to optimise these components. In addition we asked, similar to the users’ perspective, for the actual market situation and possible difficulties in producing large quantities of the medical product.

Figure 4 includes technical aspects from three interviews. The parameters mentioned can be divided into two basic categories: Aspects related to the final product (stent), e.g. mechanical properties or microgel content, and parameters regarding the choice of the material properties, e.g. choice of microgel, crosslink density of microgels, or choice of polymer structure. From the technical point of view the microgel content and the parameters of spinning process are the most important components.

| Crosslink Density of Microgels |
| Choice of Microgel, e.g. Particle Size |
| Microgel Content |
| Fibre Diameter |

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3.2.3 Combination of both perspectives

The consolidation of both perspectives is presented in figure 5. Besides the combination of the technical and the users’ point of view in the lower part, it includes the correlations between the technical parameters (in the “roof”). It also shows the presumed direction of correlations, e.g. the connection (- -) between the share of microgel and the spinning process implies that more microgel reduces the ease of spinning the fibre. It is conspicuous that the most important components from the technical perspective are contrary to their optimisation direction. This indicates the necessity of a compromise solution.

The central section of figure 5 shows the values of different combinations from both perspectives. A value of 0 indicates that no connection between the relevant factors exists. The higher the value the more important the connection. It is remarkable that the two perspectives use different terms for an identical parameter (in this case “brace” from the medical point of view and „fibre“ from the technical one). This suggests that using the HoQ as a basis for improving interdisciplinary communication is appropriate.

The bottom row depicts the actual calculation results. A high value indicates more importance of the component from both perspectives. It appears that components regarding the choice and share of microgel are most influential.

After the finalisation of the interviews, the HoQ was presented to the project members on a meeting. It is important that the HoQ is not only seen as a result but rather as a basis for intensive discussion. Thus, the presentation to the partners was highly relevant. Applying the HoQ offers the opportunity to uncover different goals or disagreement. In this specific case, it was recognised that the technical perspective considered the thinnest possible structure to be desirable. From the medical point of view, this was seen more differentiated: One the one hand, the thinnest possible structure is desirable as well as it facilitates the process of placing the stent within the vessel. But on the other hand, the diameter of the stent may not be too thin as it has to line the whole vessel.
Figure 5: House of Quality for an interdisciplinary research project

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<tr>
<th>Priority</th>
<th>Crosslink Density of Microgels</th>
<th>Choice of Microgel, e.g. Particle Size</th>
<th>Microgel Content</th>
<th>Fibre Diameter</th>
<th>Fibre Porosity</th>
<th>Localisation of Buffering Additives</th>
<th>Temporal Regulation of Buffer Exposure</th>
<th>Mechanical Properties, e.g. Elongation</th>
<th>Spinning Process</th>
<th>Stitch Density</th>
<th>Choice of Polymer Structure</th>
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Buffer Effect
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Stent Length (6mm - 3cm)
Stable Length
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Stable Diameter of Cross-links
Adaptiveness to Bloodvessel

Priority: 10, 5, 10, 5, 5, 5, 5, 5, 5, 5, 10, 20, 27.5, 3, 10.5, 6.5, 5, 10, 15.5, 15, 2.5
4 Discussion

Besides the traditional application of the HoQ which is the aggregation of users’ needs and technical potential, it may also be a useful tool for communication within the framework of interdisciplinary research projects. It is especially appropriate for uncovering different goals or disagreements within the project. The method also seems to be promising with regard to diverse discipline-specific terminology, especially as it becomes possible to “translate” respectively standardise the different languages. It is important to note that HoQ should not be seen as a result but rather as a basis for discussion processes and development of new ideas: “The journey is the reward”. Contrary to a first intuition, not the resulting numbers but especially discussing the items and their correlations provide value for ongoing research projects.

The main limitations of the study are due to the limited number of participants, especially from the users’ perspective. The expert interviews provide project-specific statements regarding the application of the HoQ. Hence, it has to be taken into account that the implementation of the HoQ in other interdisciplinary projects probably needs to be modified. Consequently, it is possible that the method is not applicable for every project.

Future research should conduct a more extensive evaluation of the appropriateness of the HoQ for interdisciplinary projects. Due to the increasing importance of international cooperations, it is desirable to incorporate additional linguistic and cultural differences into this evaluation.

References:


Rapid Development of ICT Business Services by Business Engineers Independent of Computer Scientists

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Abstract
Current software development requires computer scientists to create and to adapt services to new or changing needs. In addition development and maintenance of software is time and cost intensive. Customizing of standard software is laborious. Software engineering research approaches as Domain Engineering, Model Driven Software Engineering and Product Line Engineering try to increase the abstraction level of the specification of the models to reduce the required time and money to build applications and services but they still demand the implementation by computer scientists.

In two projects supported by the CTI (Commission for Technology and Innovation of the Swiss Confederation) we analysed how to achieve a higher level of abstraction and how to specify database-centric business services in a manner business engineers are able to create and to adapt services completely by themselves. Besides the methodology to specify these services (data structure, business rules, etc.), methods and technologies to hide all technical aspects (infrastructure, software architecture, versioning etc.) entirely from the business engineer had to be developed.

In this paper an according graphical notation to specify services or complete applications is discussed. The methods and technologies to hide technical aspects are not part of this paper.

The developed graphical notation consist of six different diagram types. They represent different aspects of the services (process map, business rules, data structure, organisation chart, user interface and data queries). To create executable services with these diagram types an IDE (Integrated Development Environment) was developed. This IDE is called Posity Design Studio (PDS). All diagrams drawn with the Posity Design Studio can directly be executed without any further coding. To increase the efficiency of creating new services a business wizard to specify use-cases and to generate the corresponding diagrams was integrated into the Posity Design Studio.

Our main findings are:

› The graphical notation allows specifying executable services completely by diagrams. In that way the usage of common programming languages is no longer necessary nor desired.
› Graphical domain-specific languages empower business engineers to build business applications and services with little effort and without the help of computer scientists.
› The graphical notation is platform independent. Therefore it’s possible to specify applications and services that can be executed on several platforms at the same time.
Skilful structuring of the notation (design of the levels of abstraction) allows even novice users to make limited adjustments to the applications or services.

Additional abstraction levels increase the productivity and adaptability of applications and services.

**Keywords**

1 **Introduction**

Other industries have a natural transition from specification level to physical level. Specifying a building with plans and constructing the building are obviously two different types of activity. IT Industry has no such natural transition, there is no inherent modelling gap. Today usually the requirements are described by the business engineers and translated into program code by software engineers. The specification gets more detailed, but there is no obvious leap or modelling gap. Therefore three questions arise:

1. Does a modelling language (specification language) exist that can be handled by non-computer scientists (without textual program code) and that can describe ICT business applications and services entirely. In this case the application or service can be build based on this specification (model) without any further program code, without software engineers and without modelling gap.

2. Assuming this modelling language exists, is it possible to introduce different abstraction levels within the modelling language so that business engineers with different know-how can provide and change the specification without extensive knowledge of details (e.g. change a workflow / status flow).

3. What are the possibilities to provide an assistance (hereinafter referred to as a wizard) on a higher abstraction level than the modelling language to generate specifications in the modelling language?

There are several attempts to build such a modelling language. A broadly known concept is the Model Driven Architecture® (MDA®) of the Object Management Group® (2014). These concepts separate the business model and the technology model in two parts. Therefore at least for the technological model computer scientists are needed. In addition the specification of the business model usually requires additional program code.

This paper shows a solution how a modelling language and the associated integrated development environment (IDE) can fulfil the requirement to enable business engineers to specify a business application or business service without the help of computer scientists. In addition this paper tries to give a deeper insight into how to solve, respectively how to answer the three questions mentioned above.
Within the next chapter we will introduce the six diagram types that build the modelling language, followed by a short introduction to the mechanisms of the IDE that prevent a technology model. The third chapter enlists the different levels of abstraction and the consequences of this structuring. The subsequent chapter shows methods to extend the modelling language with wizards. After the deeper introduction to modelling languages the main results are summarized, followed by a discussion of the findings and the conclusions.

2 Modelling Language

Modern programming languages have to fulfil various requirements such as efficiency, maintainability, portability, debugging support, etc. The considerations in this chapter apply only to the main problem mentioned in the first question: Does a modelling language exist that can be handled by non-computer scientists (without program code) and that is able to describe the IT solution entirely – hiding all technical details?

The analysis of existing approaches such as MDA (Model Driven Architecture), BPMN (Business Process Model and Notation) (Großkopf, A., Decker, G., Weske, M., 2009), ARIS (Architektur integrierter Informationssysteme) (Davis, R., Brabaender, E., 2007) and many more revealed several severe problems:

› The modelling language requires additional program code or the elements of the notation are representatives of program code – the notation is based on the code world (in most cases on an object-oriented approach).
› The modelling language generates program code (e.g. Java) but has no hundred per cent round-trip engineering functionality.
› The modelling language does not cover all necessary parts of the model for a complete specification or some parts of model are defined multiple times.
› The modelling language requires computer scientist to participate in one or more steps of the implementation process (e.g. setup of the infrastructure, deployment of code).

In order to avoid these problems a new modelling language was elaborated. This modelling language has the following characteristics:

› The modelling language is limited to specify all necessary parts of business applications and services. Languages with focused, limited scope are called domain-specific languages (DSL). Hereinafter we call the modelling language Posity-DSL (PDSL). Languages with a limited scope have an increased productivity, an improved quality and they have a better maintainability (Reinhartz-Berger, I., Sturm, T. C., Cohen, S., Bettin, J., 2013), but are only applicable in the predetermined domain.
› PDSL does not generate code or require any program code for specification.
PDSL does not require computer scientist in any work process.

PDSL consists of six diagram types. Each diagram type specifies a part of the complete model. The diagram types of PDSL are based on existing diagram types that are extended with necessary elements on one side and reduced by not required elements on the other. This simplifies the usage of these diagram types for business engineers familiar with diagrams used for the specification of models.

The following sub chapters explain the diagram types of PDSL. The process and the module diagram will be shown in more detail to give a better impression of the extensive potential of the diagram types. The remaining diagram types are shown in less detail. They will illustrate the functioning of PDSL as a whole.

2.1 Process Diagram

The process diagram (Fig. 1) is an adaption of the Business Process Model and Notation (BPMN) (Großkopf, A., Decker, G., Weske, M., 2009). The process diagram is mainly used to specify following information:

- Processes (blue arrows): There are different types of processes. Processes without business logic (system processes without module or manually executed processes) are used to organize and document the structure of the process model – processes can be nested in one another. Processes that are connected to modules (a hooked light blue square, containing the business logic) are executable processes. In order to control the access of the users to the processes it is possible to determine a role for each process.
- Workflow (blue lines): The workflow is used to define an automated processing order of the activities of a user. Different types of gateways (green diamonds, automatic or by questioning) optionally allow to determine the next process to execute.
- State flow (green lines) and status boxes (green rounded rectangle): While the workflow defines the process sequence to be executed, the state flow defines the sequence of states that data (optionally, defined per table) can traverse. Process diagrams offer the possibility to specify valid states of input data to a process as well as the states of resulting output data after processing has finished.
- Events (red bullets): Events provide asynchronous, timer based handling of the workflow or the state flow (the diagram in Fig. 1 shows an event used within a state flow).
This diagram is the specification of the application, there is no generated program code. Changing the diagram (e.g. changing the state flow) instantly changes the behaviour of the application.

2.2 Data Model Diagram

The data model diagram (Fig. 2) is related to the crow foot notation (Barker, R., 1990). In this extended version it holds all required information to completely define the data structure and has design elements (e.g. table references, connector joins, etc.) to work with very large data models.

2.3 Query Diagram

Reading and writing of data is specified in the query diagram (Fig. 3). The representation of the query diagram is derived from the representation method of the data model diagram.
2.4 Module Diagram

The module diagram (Fig. 4) is an extended data flow diagram (Yourdon, E., Constantin, L.L., 1975) and defines the business logic. It contains:

- Components (rectangles): Components (function blocks, e.g. calculating the square root of a number, show a message) have input ports (on the left) and output ports (on the right) receiving and sending data.

- Data flow (lines, color depends on data type of data flow): The data flow represents the flow of data through the components. Therefore the lines connecting the components define the execution sequence of the components.

- Control flow constructs (rectangular substructures, e.g. sequence, while loop, case): Control flow constructs similar to Nassi-Shneiderman boxes (Nassi, I., Shneiderman, B., 1973) extend the module diagram and allow to define the module logic consistent with the philosophy of structured programming (Fig. 4 shows a module with a case structure). Also recursive constructs, modules calling modules, are possible.

- Module events (frames of module): Each module diagram consists of one or more module events. In the diagram, a single module event is shown at once. Due to scroll or select the individual module events can be viewed. The name of the module event is below the name of the module (Fig. 4 shows a module event named ‘Save’). Module events are triggered by the start of the corresponding module, when a button is pressed on the user interface (e.g. a save button), by the module itself, etc.
According to domain-specific languages all diagrams, especially the module diagram, support business driven functionalities. Common problems such as time zone (including daylight-saving time), currency handling (including ledger currency), number ranges, multilingual support, etc. are an integral part of the diagram types.

2.5 User Interface Diagram

The user interface diagram (Fig. 5) defines the graphical presentation of data to the user. Depending on the users role the data can be modified. The user interface diagram is aligned to the query diagram.

2.6 Organisational Diagram

The organisational diagram (Fig. 6) is used to define the structure of the company and the associated roles. This roles can be assigned to users and define the access rights the user has within the application.
2.7 Integrated Development Environment (IDE)

Using this six diagram types of PDSL an entire application containing any number of services can be constructed, no additional program code or specification in any form whatsoever is required. The integrated development environment used to draw these diagrams is the Posity Design Studio (PDS). Similar to other development environments PDS supports additional features such as debugging tools, regression testing, deployment, use of multiple environments (e.g. test environment, training environment), etc. to facilitate the development process.

To hide all technical aspects the infrastructure and architecture of the runtime environment is predetermined. These technical aspects are invisible at all time. Some details are:

- Typically all data is stored in SQL servers in the cloud. This applies to the data of the application as well as for the data of the diagrams (metadata).
- The infrastructure for rich client (deployed using ClickOnce mechanism) on MS Windows systems and web apps (implemented with an application browser) is automatically created.
- The general structure of the user interface (e.g. look-and-feel of user interface, general items, etc.) is predefined.

3 Levels of Abstraction

At first glance, the diagrams appear to have the same level of abstraction. A closer look reveals that this is not really true. The process diagram is based on the module diagram, extended with workflow and state flow. The user interface diagram (GUI) is based on the query diagram. The query diagram is based on the data model diagram and the module diagram on the user interface diagram and the query diagram. The organisational diagram is influencing several diagrams.
This hierarchy of information is not chosen or composed randomly. This levels of abstraction are chosen to give business engineers the maximum of flexibility with a minimum of necessary prior knowledge. Two examples will show the effects:

1. In the current state flow (Fig. 1) an invoice is printed (second process step) after the order is completely processed (first process step), but now we want to print the invoice before the order is completely processed. A simple change of the state flow sequence in the process diagram will cause the system to be adapted to the new situation (Fig. 8). No business logic has to be changed; the logic of the state flow is represented in the process diagram. And of course one can also implement both state flows in parallel. This is possible due to the fact that the state flow is explicitly specified in the process diagram and not on the ‘lower’ abstraction level of the module diagram.

2. During the live cycle of applications often additional information has to be stored in the system (e.g. if we want to store the middle name of a person in addition). In common systems the database and the programs have to be changed to implement this additional requirement. PDSL avoids as far as possible to handle details of the information within the module diagram (for example listing individual attributes). To add an additional information item (e.g. an attribute) just the data model diagram, the concerned query diagrams and user interface diagrams have to be extended (adding the attribute). With very little work the information can be modified and stored, no module diagram has to be changed.
4 Expansion Levels of Abstraction

The previous paragraphs gave a brief insight into the effectiveness of different abstraction levels. This mechanism of abstraction can be used once more. In PDSL two areas for higher abstraction levels can be distinguished. The first one concerns the specification of complete use cases, the other one concerns the customization of an application for different customers.

4.1 Patterns for Use Cases

The PDS (Posity Design Studio) offers different patterns for use cases. A pattern for a use case represents a common way to work with information, e.g. editing a header record and its sub items in a list (e.g. editing a sales order and the order items). After selecting the pattern the basic work to do is to specify the selection of the affected data and how this data will be merged. Subsequently extending this information with further details (e.g. which events shall be generated, which data will be editable in the user interface, etc.) the PDS wizard will generate the according query, module, process and user interface diagrams. If necessary, the generated diagrams can be manipulated such that they fit the required use case exactly.

Like other wizards, the PDS wizard has no round-trip engineering for changes done in the diagrams. Changes of the diagram that do not fit into the pattern of the wizard cannot be represented in the pattern. To get some flexibility and extendibility the use case patterns themselves contain extension points to integrate functionality that is not part of the pattern.

The PDS wizard is very flexible and powerful. Therefore it’s possible to create complex use cases and to cover a wide range of requirements.
4.2 Customizing Applications - Questionnaire

In practice applications are used more than once, implemented use cases are reused. But different companies have different requirements and the reused use cases have to be modified. Customizing use cases is again time and cost intensive.

In PDS it’s possible to specify different variations within the diagrams and to combine these variations with questions (e.g. a question about the type of company and the activation of processes). The application gets customized by answering the questionnaire.

The questions of the questionnaire are not independent from each other. E.g. if a process gets deactivated by a previous question there is no need to ask another question that would deactivate this process again. The questionnaire takes these dependencies into account and only asks questions that still (after answering some questions) take influence on the application.

It’s not necessary to answer all questions of the questionnaire at once. It’s possible to answer only some questions (the questions can be prioritized), test the effect on the application, and then to return to the questionnaire. Alike it is possible to answer questions of a particular business department only (e.g. production), as the questions can be assigned to processes of the process diagram (not to confuse with a question about a process).

5 Main Results

› The proposed graphical notation with six different diagram types allows to specify executable ICT business applications or services completely by diagrams. The usage of common programming languages is no longer necessary nor desired.

› Graphical domain-specific languages empower business engineers to build business applications and services with little effort and without the help of computer scientists.

› The graphical notation is platform independent. Therefore it’s possible to specify applications and services that can be executed on several platforms at the same time.

› Skilful structuring of the notation (design of the levels of abstraction) allows even novice users to make limited adjustments to the applications or services.

› Additional abstraction levels (wizard and questionnaire) increase the productivity and adaptability of applications and services.
6 Discussion of Findings

It’s not surprising that it’s possible to specify applications and services with a graphical domain-specific language, although only few solutions exist in practice (for the technical field, e.g. LabVIEW). Two facts of the diagram language are noteworthy: (1) The proposed language uses only six diagram types and (2) these diagram types are variations of well known diagram types, some of them are even well known in business management.

The usage of the graphical domain-specific language (PDSL) enables business engineers to implement applications all by their own. Therefore all technical details have to be hidden from the business engineer. This is only possible by predefining these technical details, for this reason the technical structure is more or less immutable.

Abstraction is a powerful instrument to achieve model languages that are simpler to use. A carefully defined language allows specifications on different levels of abstraction, in such a way also unexperienced business engineers can adapt some logic of the application. Limiting the operational area of the modelling language to a specific domain (database-centric business applications) made the language more efficient and more comprehensive, but of course the language is restricted to the domain.

Productivity has been increased considerably by introducing a wizard. Because the wizard generates diagrams, it’s possible to adapt and to extend the generated diagrams with details that cannot be specified within the wizard. However, this leads to gaps within the two abstraction levels, a complete round trip (from diagram to wizard) is no longer possible.

7 Conclusion

In the introduction three questions have been asked, they will be answered here:

(1) Yes it’s possible to create a domain specific-language without any textual program code. PDS was applied in several projects in daily practice and has shown the potential for efficient software development.

(2) Different abstraction levels simplify the use and the readability of the model. Even users with limited knowledge are able to make basic adjustments to the model.

(3) Tools with higher abstraction level accelerate the development of applications, but at a certain point new abstraction levels (wizard, questionnaire) lead to an information gap which disables round-trip engineering.

PDS shows that developing applications is possible without computer scientists and we are convinced that development is cheaper and faster. Unfortunately we could not make any surveys, which show whether and how much cheaper and faster the development of applications with PDS is.
The use cases still have a great potential to increase efficiency. For further enhancements, it would be important to investigate which additional use cases should be implemented, how these use cases exactly should be implemented and how they can be designed and extended to improve the effectiveness of round-trip engineering.

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The Identity Matching Concept: a collaborative planning infrastructure for integrating communication content.

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Abstract
In corporate and marketing communication, the effect of a communicated content on a target audience is not sufficiently predictable. To achieve customer satisfaction requires the company to overcome “Identity Gaps” between message and perception, identity and image, promises and services (Meffert et al. 2002). The methodically planned integration of customer-related content (thematic plots of a company’s philosophy and branding; integration of customer needs etc.) is difficult to put into practice for companies, and represents a research gap in marketing sciences (Bruhn 2009, Erbach 2011).

This study meets the challenge of integrating and matching preconditions, interests and individual needs considering cultural background, individual identity and the particular circumstances of a target audience. The Identity Matching Concept employs a powerful, open-ended, interrogative identity model (“Identity Matrix,” see Fig. 1) to achieve the impartial integration of content between participants and subjects of communication.

The interdisciplinary research underlying the Identity Matching Model relates marketing theory with social psychology, communication sciences and semiotics. To date, the research has been verified in case studies with a variety of companies and organisations with the particular objectives being the optimisation of both external communications and the internal organisational structures of the companies.

The Identity Matching Concept is an information structuring approach that integrates cognition theory with the use of semiotic identity triads. It can be described as (1) a theory to gain new knowledge (heuristics) and (2) as an approach based on structural sciences (auxiliary sciences). Of central relevance to business and economics, the Identity Matrix Model is sufficiently flexible to apply to a wide variety of scientific disciplines and ecological, intercultural, and even political contexts.

Identity Matching is, in essence, a scientific preparation of data that enables integrative thinking and aims at cooperative action: Barriers to understanding are eliminated or reduced, previously unforeseen solutions are made apparent, and the ability to act is greatly increased. Rendered and tracked through flexible computer software, Identity Matching employs a dynamic, flexible knowledge archive to integrate expert knowledge and crowd thinking.

Keywords
Customer integration, content integration, collaborative planning infrastructure, integrated communication
1 Need for an identity-oriented symmetrical communication

The individualisation of production and communication is a constant challenge for commercial enterprises and consumers. Contributing to this challenge is the constant proliferation of technologies that accelerate innovation in materials, production and communications. Social networking technologies increase the mobility of consumers as diversified target audiences in differentiated market segments. Further, the online access of customers to any kind of product information fundamentally shifts corporate relationships: companies find themselves more and more in the position to be a directly communicating partner with their customers. Catchwords like “One-to-One-Marketing” characterise the change from a bulk selling philosophy in marketing towards a cooperative communication with the consumer (Nowak/Phelbs, 2005). The customisation of products and services ranges from mass customisation, the offering of a set of selectable components, and even the manufacturing of complex single objects (Da Silvera, 2001).

Closely related to these phenomena is the psychologisation of products and communication within branding campaigns. Products and their communicated attributes aim at maximum relevance to expose the individual identity of customers. “Social markers” are especially powerful in the field of fashion, body care, cars, living, travelling, and consumer electronics. In Mass Customisation, the consumer becomes a “prosumer”, merging the attributes of producer and consumer (Piller et al, 2004). A product affirms the consumer, establishes identity, and offers a positive identification with the producer. Interpreted according to Jung (1997), the increase in meaning of producer and product as a carrier of identity for the consumer signifies a compensation of a loss, or the balancing of a perceived deficiency on the part of the consumer. As contexts of meaning, the worlds of products and brands provide an orientation to develop individual identity and enhance an individual sense of inner coherence (Keupp, 1999).

The comprehension of identity and communication therefore assumes unprecedented importance to the Marketing Sciences. The reciprocal adaptation of producer and consumer traditionally takes place within an almost non-graspable ‘black box pool of information and interaction offerings’ (Bruhn, 2009: 11). The psychological target for both producer and consumer is to achieve identification with the counterpart or subject of communication (in terms of an emotional involvement with and assimilation of an idea, matter, or person). The feedback between the communication partners hypothetically aims at approximating identities, denominated as Identity Matching (Erbach, 2011).

According to a research gap described in Marketing Sciences, the methodically planned integration of customer-related content (thematic plots of a company’s philosophy and branding; integration of customer needs, etc.) is difficult to put into practice for companies. It is necessary for integrated communication to refer to approaches of Decision Theory, Systems Theory, and Behavioural Sciences (Bruhn, 2009).

Beginning in Section 2, below, this paper introduces an identity-oriented infrastructural approach to integrate and match content between different partners or subjects of
communication. Section 3 describes options for the application of the Identity Matching Concept, while Section 4 offers examples of reality-based case studies, followed by a final commentary in Section 5.

2 Identity Matching as an interdisciplinary approach

An outgrowth of a 2011 dissertation (Erbach, 2011), the Identity Matching Concept draws on research in Corporate Identity (Birkigt/Stadler/Funk, 2002), Integrated Communication (Bruhn, 2009), Identity-Oriented Branding (Meffert/Burmann/Koers, 2002), Relationship Marketing (Belz, 2003), Mass Customisation (Piller, 2004), and also to advertising and branding strategies (Schweiger/Schrattenecker, 2009). Furthermore, approaches adapted from Communication Sciences were included: the Uses-and-Gratification approach, the research on Persuasive Communication, and theories of Involvement (Schenk, 2002). It was of great relevance to include the temporary understanding of the notions of identity according to Social Psychology (Keupp/Höfer, 1998) and of communication according to Systems Theory (Schmidt, 2000). The dissertation’s primary objective to develop an application model to integrate and match communication content in a planned manner included a theory and model of Semiotics (Trabant, 1996; Bense, 1969).

The basic assumption of the Identity Matching Concept is (hypothesis): When an identity scheme (Identity Matrix) is applied to both participants (or subjects) in a communication, it impartially compares and matches various contents of the communication in a planned manner.

![Structured "Black Box" of Communication](image)

Fig. 1: Integrating and matching content with an Identity Matrix (Erbach, 2011)

The purpose of building an identity-oriented content matching structure was challenged by the task to implement and utilise interdisciplinary research findings to the notions of (1) identity and (2) communication within (3) a clearly structured applicable model:

1. the dynamic understanding of identity according to Social Psychology (Bohleber, 1998; Keupp et al, 1999),
2. the notion of communication between separated communication systems according to Systems Theory (Luhmann, 1995; Schmidt, 2000), and
According to Social Psychology, identity is the experienced unity of a person, an organization, a nation, or an even bigger entity. The development of an individual identity (Keupp/Höfer, 1998) is a dynamic process of integration and adaptation (matching). The correlation of cognition and communication integrates intra-individual development stages (internal learning) and inter-individual influences (external mirroring) within a permanently reciprocal interplay (interaction). In consequence, the first challenge in building a model is to provide a structure with a high degree of content-customisation.

The notion of communication according to Systems Theory (Luhmann, 1995; Schmidt, 2000) postulates: There is no “information” in our environment. There are only light waves, sound waves, and other signals. “Information” happens only in our mind as a result of our interpretation of these signals (see Fig. 6). In consequence, the second challenge in building a model is to provide a symmetrical value-neutral structure, in which the participants can produce and read signals and reciprocally interpret these signals as “meaning” according to their individual understanding of reality.

According to Semiotics (Greek: semion = sign), everything is a sign: Living beings, as well as objects, ideas and events (Trabant, 1996). The „Semiotic Triad“ of Charles Peirce (1839-1914) represents a highly effective yet minimal interpretive structure for representing an unlimited variety of content. It describes any content as an entity or sign in its triadic relation as “object” with an “interpretant” and its appearance as “representamen” (Peirce). In consequence, the third challenge in building a model is to first schematise “identity" as a “sign" and then to transform the triadic steps into an Identity Matrix to apply it to both participants of the communication.

As a result of merging these interdisciplinary findings, the Identity Matrix (Erbach 2011) differentiates the semiotic triad of a “Sign" into an “Identity Triad“ (Fig. 2) according Social Psychology. The Identity Matrix increases our understanding of an „Identity" by further analysing and coordinating its inter-individual (external) characteristics "subject, profiling, presentation" with its intra-individual (internal) characteristics as sub-triads “substance, localisation, expression”.

Fig. 2: Converting the Identity Triad to the Identity Matrix (Erbach, 2011: 124, 125)
Converting the three sub-triads into a chart generates the *Identity Matrix*, which than can be customised for any participant or subject of communication. The subject of communication could be a company or an individual. In Fig. 2, the Identity Matrix is applied to a fictional individual, the businessperson „John Doe“, 34 years old. The *intra-individual stages* of John Doe represent the internal characteristics (vertical) of the identity that he presents to others in *inter-individual steps* (horizontal). For purposes of identity analysis and content integration (or development), one can read (or complete) an Identity Matrix in each direction (Erbach, 2011: 128, 129):

Inter-individually (horizontal) as

› Substance: “Characteristics > Potentials > Skills”
› Localisation: “Influences > Position > Contacts”
› Expression: “Conscience > Statements > Role Play”

Intra-individually (vertical) as

› Subject: “Characteristics > Influences > Conscience”
› Profiling: “Potentials > Position > Statements”
› Presentation: “Repertoire > Contacts > Role Play”

Combining the *Identity Matrix of John Doe as a 34-year-old businessperson* (following Fig. 3, left) with the *Identity Matrix of a Fashion Company* (Fig. 3, right) allows matching the content of the two communicating partners in a planned manner. The Fashion Company can closely align its branding campaign with John Doe’s preferences (demonstrated for the two information modules “Conscience” and “Repertoire”, Fig. 3, middle).

*Fig. 3: Matrix for Identity Matching applied to fashion branding*
Equally important, the Matrix can also be used to understand John Doe as the „initiating“ participant who „chooses“ the company (or brand) in a manner that reflects his values and needs, to define how fashion should be for him. Conversely, the Matrix could be used literally as a tool in which John Doe and the producer cooperate in a custom-made process to produce John Doe’s business suit.

A company can align and present its own identity contents for any purpose with various target audiences. By matching analogous identity modules with communicating partners (shareholders, co-producers, business partners, deliverers etc.), any corporate relationship can be adjusted to achieve the best possible consensus. The Identity Matching Concept provides a range of tools and methods to integrate, develop, and match content. They have been developed and applied in several case studies: (1) Mini Audit to detect problems and needs in organisations, based on the identity-oriented information modules of the Matrix for Identity Matching; (2) Questionnaire to individualise the information modules of an Identity Matrix according to a detected problem or defined target; (3) Skopos” (target of improvement) to implement in each information module to plan improvement for each structural element as well as for the process; (4) Matching Indicators with a scoring system to detect the matching degree for each module before and after an Identity Matching process; (5) Iteration follow up to realise long-term objectives systematically (Fig. 11). To make these instruments accessible for easy use, the Matrix for Identity Matching will be programmed as an interactive multi user interface and database.

3 Possible uses of the Identity Matching Concept

The most elementary purpose using the Matrix for Identity Matching is for (I) a single Identity Description (Fig. 2 and Fig. 4, left) to define an organisation or individual as participant of a communication (self-description or according to research). The Matrix can as well describe any other subject of a communication (product, idea, event etc.).

![Fig. 4: Basic applications of the Identity Matching Concept](image-url)
If the Identity Matrix is applied to other participants or subjects of communication, it allows the comparison of products, competitors, markets, concepts, etc. (Fig. 4, middle, II: *Identity Comparison*). As introduced above, the most creative application is as introduced above to use the matrix for the planned (III) *Identity Matching* of participants or subjects of communication by systematically comparing and matching identity-oriented content (Fig. 3 and Fig. 4, right).

The value-neutral structure of the Matrix is in every respect integrative as well as productive. It does not “compete“ with other communication models, marketing instruments or strategy consulting tools and methods. To the contrary, it allows for the integration of other approaches within the semiotic information modules (see “I“ in Fig. 4) and even the comparison of these with one another as “identities“ according to the Identity Matrix (see “II“ in Fig. 4). Becker (2009) even structures the marketing instruments semiotically according to his triad “Marketing Spheres of Activity“ (as “sign“ or “identity“) within the triadic relation of “Product Performance, Profiling Performance, Presentation Performance“ (Becker, 2009: 489).

As a strategic tool the Identity Matrix can (a) support other strategies and models with information generated in the matrix, or (b) integrate other strategies within the information modules of the matrix, or (c) develop one’s own specific strategies according to detected needs and targets in the matrix. If any information is missing, it can easily be updated or added within the information modules. Taken as a whole, the Matrix for Identity Matching is a *dynamic information archive of an organisation’s global knowledge*.

The *Identity Matching Concept* provides multiple kinds of use for the communication partners and the communication itself. Using it as a “Meta-Model“ for planned communication, it corresponds with the notion of communications in Systems Theory (Fig. 5).

![Fig. 5: Corporate Communication according to Systems Theory (Schmidt, 2000; Bruhn 2009)](image)

*Fig. 5: Corporate Communication according to Systems Theory (Schmidt, 2000; Bruhn 2009)*

However, the Matrix for Identity Matching also allows a company to observe and participate in the process. It is a down-up as well as a top-down planning model for content integration and development. As “Communicator 1“, the company can describe its own identity (Fig. 5, blue) in all intra- and inter-organisational aspects of the Identity Matrix as the experienced “reality“ in a given role. Based on the same matrix the company can furthermore describe the identity of the communicating partners as “Communicator 2“ (Fig. 5, green). This enables the company to define and describe the specific position
(role) and content within this relationship (communication) on the Matching Matrix (fig. 5, black). Optionally, target audiences may be invited to describe themselves with their needs and expectations. For both the company and a target audience the roles may change between senders and receivers according to the intent of the communication. The Identity Matching Concept can be applied to any setting where the planned integration of contents is promising or desirable – from holistic integration and agreement processes to individual relationships within groups and between members. The following are examples of possible applications in an economic setting:

› Development of commercial identities directed at specific target groups (corporate/brand identity; product development; communication; CRM)
› Planned orientation and mapping of corporations, organisations etc. according to general and specific objectives (stakeholders, competitors, market)
› Goal-oriented development of organisational and process structures (integrated manufacturing, optimisation of internal processes, controlling)
› Development of knowledge bases and learning systems for specific target groups (knowledge archive of the company, interdisciplinary co-production)
› Structuring of research fields and cooperation in R+D, integration of research and practical implementation, quality management

4 Identity Matching applications in case studies

The author has applied the Identity Matching Concept in several instances since first developing an initial Identity Matrix-related questionnaire in 2005 as part of a dissertation. The following concrete, real-world examples represent different categories of structural and communicative functions of planned content integration:

› 1st Case Study: Development of organisational structures for new business divisions and a branding system (“Fix International Services”)
› 2nd Case Study: Complex knowledge organisation and information presentation for a study program (“MBA Brand Management”)
› 3rd Case Study: Dynamic process design within a collaborative infrastructure integrating the producer/client company and its engineering teams for optimisation of work flow and production (“Engineering”)

The first project (identity development for a company) refers to an individual level. The second project opens up a larger scale of knowledge organisation (MBA Programme), and the third project represents the broad scale of industrial applications (Engineering). These selected examples are merely creative precedents. They do not represent a how-to instruction, but rather give an impression of the variety of uses and customisation of the applied Identity Matching Concept. Each project was executed in detail in close cooperation with the companies’ management and leading employees.
**1st Case Study: Development of organisational structures for new business divisions and a multilingual Branding System (“Fix International Services”)**

In 2005, the family-owned enterprise Fix Übersetzerdienst (Fix Translation Services, founded in 1946) was threatened by competitors. The Identity Matching workshop (Fig. 6) was designed to structure the company’s services into business divisions (marketable products), as well as to develop a new branding for the company (umbrella brand) and its services (single brands). The company’s history, competence and high-quality services had to be re-shaped for a sustainable business development in international markets with a distinctive competitive new image.

Using the Identity Matching instruments “Questionnaire“ and “Matching Indicators“ with the Fix management, the results were developed “from the inside out“ the company in cooperation with an advertising agency (Fig. 7).
2nd Case Study: Complex knowledge organisation and information presentation for a study program (“MBA Brand Management”)

The Identity Matching Concept was used to develop the curriculum and brand identity of a new MBA Program in Brand Management for a private University in Germany (2007). The matrix infrastructure guided the development and implementation of the entire study program to structure general knowledge, individual course content and subject matter, and to align each of these program elements with the qualifications, expectations, and needs of the managers participating in the co-op program as students (Fig. 8). Branded itself as “Executive MBA Brand Management” the curriculum included a five-term distance-learning program requiring periodic on-campus attendance, with an M.B.A. degree awarded according to the European ECTS grading system for master programs. The innovative aspects of using a symmetrical planning infrastructure for an education program include:

› integrating the target audiences in advance (conducting interviews with the student-managers attending the course to design the “customer matrix”),

› planning the courses as “required teaching content” and selecting and briefing the professors according to the given structures and intended objectives, and

› designing the process and locations of knowledge transfer (“teaching”) most suitable to the target audiences (distance-learning, periodic attendance, topic and volume of the seminars related to relevant temporary challenges in brand consulting business, etc.)

Following wide publicity of the new program’s goals, contents, and curriculum in both online and print sources, twenty-nine managers from all over Europe applied for the program’s initial twenty-one openings.
3rd Case Study: Dynamic process design within a collaborative infrastructure integrating producer/client and engineers for best project status (“Engineering”)

This current Identity Matching research project aims to match technological content between producer and engineers to improve efficiency and results in automotive engineering process design projects. The purpose of this application is to establish a high-performance “co-production-unit” consisting of infrastructure, database and people: To handle complex content in a clear and transparent way in any richness of detail needed.

The research objective is to apply the semiotic triadic model of the Identity Matrix to optimise an automobile company’s engineering process (Fig. 9). The aim is to apply and customise the system in a real pilot project, and to develop and optimise a customisation operation tool and database for planned communication (visualisation, documentation).

The expected benefit for the producer/client company is to produce a real-time project status of the matching degree (fulfilment according to all important parameters). The benefit for the engineers is to document the exact status of quality of the input-data of the task (what is fact, assumed or unknown) and to invite the client to give feedback (specification). The benefit to process controlling is to abstract the results from complex information (engineers) for controlling and the client regarding checklist parameters (status feedback of the solution). Realising the importance of every team member and his/her task and knowing the interfaces between the different working places in the complex apparatus is the learning outcome for all participants.
Expanding this “dynamic apparatus” (Fig. 9) through its semiotic structure and connecting it with other knowledge archives under a general objective (i.e. “innovation by connecting sciences”) would build a temporary fractal figure as the cognitive and geographic mirror of knowledge-organisation in its real-time status, volume and performance (Fig. 10). At any stage and level, the triadic information system enables the particularisation and linking of any subject of communication. The actual promise of a structured, planned communication between a producer and his engineers can be transferred to other sciences and interdisciplinary communication processes (Fig. 10: two applications of scientific content matching). By extension, industry, education, healthcare, and other relevant organisms in the globalised society can potentially benefit from the application of ideas the model offers.

![Identity Matching Concept](image)

**Fig. 10: Matching worlds of knowledge within an infrastructure of collaboration**

### 5 Conclusion and outlook

**Summary:** The Identity Matching Concept can be applied to a wide range of marketing tasks for content integration. This is explicable with the underlying semiotic triadic data structure. The timeless *Semiotic Triad* “object, interpretant, representamen” (Fig. 2) of Peirce (1839-1914) refers to an elementary human *cognition structure* described in Neurosciences (Roth, 2001, 2007) and Psychology of Action (Oerter/Montada, 1998): Recognizing (“object”), evaluating (“interpretant”) and choosing (“representamen”). The *Identity Triad* “subject, profiling, presentation” with its sub-triads “substance, localization, expression” (Erbach, 2011) is a substantiation of Peirce’s Semiotic Triad for communication planning: The *Identity Matrix* (Fig. 2) integrates (or creates), compares and matches content systematically. Its semiotic genesis explains why the *Matrix for Identity Matching is value-neutral*: It can represent any content as “sign” (Peirce) or “identity” (Erbach) and interrelate it to any other content within its symmetrical infrastructure. That is why it has a nearly universal applicability to interrelate no matter which content.
This is the fundamental requirement for unlimited “content integration”: In a communication between different participants, content changes from situation to situation, and from moment to moment, representing the entire spectrum of “intended meaning” and “meaning understood” (Köck, 1991). That is why content is not just “calculable” like an integral unit, as assumed by Bruhn (2009) for the research gap in integrated corporate communication: The effects of content integration are not as easy to plan as the formal integration (marketing instruments, design elements, etc.) and temporal integration (scheduling).

**Limitations:** The Identity Matching Concept cannot enable marketing planners to “calculate” the effect of a message. However, planners can understand the context in which a “John Doe” develops his values, perspectives, expectations and perception and learn from him. They can directly integrate his input into their communication planning as provider of 100% authentic information to enhance comprehension. The shift of the traditional paradigm of a one-sided control of the market towards a symmetrical customer integration requires a new planning repertoire and associated new skills and instruments, which is precisely what the Identity Matching Matrix offers.

*Integrative thinking and cooperative action* are forward-looking cultural qualities. They must be experienced as organisation and individual, and cannot be just “taught”. Using an Identity Matching software as a transparent participative multi user interface can help develop individual interaction dynamics outside the classical corporate controlling instruments (Eccleston/Griseri, 2008). On the organisational level, this requires the management and the employees to “break the mold” and support the new spirit in a comprehensive organisational and communicative effort. The participants need to experience Identity Matching in a positive way. A cultural change needs time.

**Recommendation:** Identity Matching does not “compete” with other systems or methods (see Fig. 4). It is possible to introduce the concept step-by-step in operating units to structure a single project, or to coordinate multiple projects, or to manage a business division, or the entire corporation. Sustainable change management works in steps of learning, integrating existing influences, elements, and participants in appropriate roles within an atmosphere of constructive cooperation (Cowden, 2013).

**Conclusion:** For marketing sciences, the Identity Matching Concept makes a useful interdisciplinary contribution to the research gap of planned content integration. Identity Matching combines all inwardly and outwardly directed development stages with the related processes of an identity (i.e. product, organisation, subject, content, etc.) as a subject of communication in relation to a counterpart (i.e. market, competitor, target groups, etc.).

For companies, their employees and customers, Identity Matching leads to a sustainable improvement in the relationships by making optimal use of available resources and expanding joint opportunities for action. Iterating Identity Matching processes increases potentials and depletes barriers (Fig. 11).
Outlook: Managing global corporate knowledge with the Identity Matching infrastructure supports integrative thinking and cooperative action in any desired direction and dimension. Companies, employees, and customers build a “co-production-unit” integrating internal and external talents. Corporate knowledge is the capacity to produce knowledge and bring it to the market. Handling the information complexity as a living organism using given or new structures, technologies, human resources and potentials may be impossible to plan beforehand. Nevertheless, it is possible to let such an organism grow by itself and to moderate it on the fly under proper guidance and leadership. With its mutable semiotic infrastructures, Identity Matching provides a scalable intra- and inter-organisational framing to support or adjust any corporate objective. The company’s interest-driven Identity Matching knowledge archive includes all interfaces, options and potentials to act, as well as lessons learned. This highly dynamic frameset enables a corporate development as steerable adaptive growth reaction on the market.

Suggestions: Further research is needed in order

› to make the “triadic value-neutral symmetrical information-infrastructure” accessible with a set of well-prepared tools and prototypical applications ready to customise and use,

› to provide the Identity Matching Concept as a (1) theory to gain new knowledge (heuristics) and as a (2) structural (auxiliary) science to any other field of knowledge, communication and technology where desired,

› to educate individuals and organisations using and moderating the matching infrastructure and instruments for self-development and planned cooperation with other organisations and individuals in an Identity Matching Academy,

› to describe, communicate and publish the Identity Matching Concept as a research approach, technology, and set of applications with multiple benefits for any appropriate target audience (as this paper begins to do).
References


Visual eHealth – An ICT Innovation and Dissemination Strategy to Improve our Well-Being

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Abstract
Healthcare activities take place in a multi-disciplinary environment and on a cross-organizational scale. Parties involved are: patients, doctors, hospitals, therapists, laboratories, insurance companies, the government and the research community. Knowledge transfer, more precisely, the transfer of technological innovations to health applications is highly regulated and typically focused on a clinical „from bench-to-bedside“ approach. Due to new socio-technical developments, personal eHealth applications supporting well-being, fitness, and health activities are considered as an area with a high adoption rate for innovations. Visual eHealth as a research strategy addresses the improvement of healthcare with interactive visualization and visual analytics in digital tools. Automated image processing and interactive visualization are required for transforming the promises of personal and clinical eHealth into reality. In public health, visual analytics of big data can contribute to improved guidance in medical care. We highlight three visual eHealth services and outline open issues concerning the shift from clinic-focused to patient-centred innovation.

Keywords
eHealth, visualization, visual analytics, my virtual body, eHealth services, eHealth innovation strategy.

1 The Promises of eHealth

Health care is one of the largest segments of our economy (7-17% of GDP in developed countries). Information and communication technologies (ICT), in particular the Internet and mobile communication, in tandem with the ever-increasing availability of computing power is changing our lives in all aspects. The potential benefit of eHealth is highly appraised including the prevention of medical errors, a reduction in unnecessary tests, improved efficiency and health care quality, faster information exchange among healthcare providers and organizations, increased patient engagement, facilitating the identification of public health threats, and fostering health-related research. Although the mentioned benefits could lead to tremendous improvements in health care quality and at the same time to cost reductions (FDA, 2014; AHRQ, 2014), ICT is only slowly adopted in the health sector compared to other industries. According to the European Union eHealth Action Plan (EU, 2012) healthcare lags at least 10 years behind virtually every other area in the implementation of IT solutions.
An exemplary case is the electronic health record (EHR). The technology for EHR exists for over two decades and there is a common understanding that the electronic exchange of health information will improve health care quality and lower health care costs. Several federal EHR projects were conducted and only a few succeeded with wide acceptance. Even Google Health, a personal health information centralization service introduced in 2008 by Google, was cancelled in 2011 due to lack of widespread adoption. Patient safety and privacy concerns are often mentioned as main reasons for the conservative situation. Additionally, there seems to be a variety of other practical, cultural and systematic reasons not to widely accept digital information technology in the health sector.

2 Innovation in eHealth

Innovations are mainly driven by R&D activities within private companies and by the public sector in research projects at universities. Currently the transfer of science to business in eHealth is heavily dependent on big players in the Medtech industry selling medical devices and integrated software solutions to the clinical sector, especially to hospitals and large health organizations. Slow adoption rates of ICT-based innovations are due to the complex socio-technical ecosystem in clinical health (large organizations, manifold workflows, diverse stakeholders, governmental regulations, lack of interoperability standards). Beside the clinical health sector with its slow innovation adoption rate, both personal health and public health have recently gained attention in applying ICT in new ways.

In the public health sector information technology such as management information systems and databases are widely used to support epidemiological surveillance, disease prevention, and quality monitoring in health organizations. Public health profits from recent developments in cloud computing, handling of big data, analytics and data mining. These improvements are highly needed to better integrate healthcare and medical research data. Generating data is expensive, so once it is there, it’s worth making the most out of it by reuse. In order to move from clinical trials to analysis of large existing data, there is a demand for free and open access to empirical research data and health records (relating to Open Data).

Similarly, the personal health sector is in fluctuation. This is mainly due to a growing majority in our society heavily using ICT such as Internet-connected personal computers, smartphones, and tablets in business and in private context. Therefore, people have certain expectations to get access to health services by digital means. These expectations also influence eHealth in the clinical sector, e.g. by doctors bringing their own devices into hospitals and by patients that want to become more actively involved in decision making and therapeutic processes. Recent technology developments in Web 2.0, mobile computing, and wearable sensors together with easy deployment via Internet and App stores provide new opportunities to transfer novel technologies economically to consumers. Wearable devices and Apps for fitness and health enabling self-
monitoring are often categorized as Health 2.0 (participatory health) and Patient 2.0 (the informed patient). Speculations on Apple’s entry into the eHealth business indicate potential market transformations in the personal eHealth sector.

3 Visual eHealth

Interactive visualization and visual analytics are core technologies for transforming the promises of eHealth into reality (Shneidermann, 2013). Visual tools improve the communication between medical professionals and non-experts (Fig. 1). In the clinical context, medical professionals are trained to gather information from 2D image slices. Computer-based processing of image data acquired by computed tomography (CT) and magnetic resonance imaging (MRI) scans is very common. In personal eHealth a comprehensive display of medical artefacts using diagrams, 2D images and 3D models helps user in interpreting complex data. Insight into data is supported by interactive exploration (visual filtering, drill-down) and automatic processing of visual data (such as image analysis with automatic feature recognition). Furthermore, automatic processing of medical images is necessary for providing efficient computer aided diagnostic services.

![Fig. 1: Improving communication in eHealth with visual tools](image)

4 Visual eHealth Case Studies

In the following section, we describe in greater detail examples of visual eHealth applications and services. We present three case studies: 1.) Pervasive eHealth: ‘My Virtual Body’, 2.) Improving patient-doctor communication and 3.) Reusing medical images for osteoporosis fracture risk assessment. These use cases demonstrate how interactive visualization and visual analytics are applied to improve communication and provide image-based eHealth services.

4.1 Pervasive eHealth: ‘My Virtual Body’

The first use case combines new technology, namely body sensors and mobile devices, to empower the patient in monitoring and understanding their health status. We envision, that a patient manages medical data such as images from medical scanners, blood
analysis values, photographs and data from other body sensors on a personal, mobile device. In addition to just using the mobile device as storage, in our solution an intelligent software layer combines relevant data, simplifies and enriches data and most importantly, displays the data in an interactive visual way. See Fig. 2 for an overview of such an application. The advantage of this patient-centred approach is better engagement of the patient in the health process due to the visual representation of complex data. Furthermore, the transfer of relevant medical history to new practitioners is simplified and the patient is empowered to obtain medical information from new services outlined in coming sections.

![Image of medical data analysis](image)

**Fig. 2: Pervasive eHealth: Integration and visual enhancement of personal medical data.**

### 4.2 Improving Patient-Doctor Communication

This second potential new visual service relates to the underutilization of medical image data. More precisely, medical images are acquired with the main purpose of radiologic diagnosis. Medical images, as all medical data, belong to the patient. Nowadays, medical images are typically distributed in digital form to the patient on a compact disk. However, a trained professional rarely explains this complex information to the patient. In the best case, the radiologist annotates a cross-sectional image and marks the area of interest, which is saved as part of the radiological report. The doctor might share this annotation with the patient during the discussion of the report. We hypothesize that the interactive presentation of radiological report outcomes in a 3D model, along with annotations, aids explaining the current health problem to the patient. Broadening the understanding of the health problem and the potential solutions will engage the patient, ultimately resulting in improved outcome, e.g. shorter recovery times due to increased compliance. Radiologists are already thinking about utilizing radiological reports in new forms for improved communication (Kahn, 2009). Research has shown that communi-
cation of radiologic findings to fellow physicians is improved when so-called structured reporting is utilized (Schwartz, 2011).

We propose the following ICT application: An interactive visual tool enables automatic rendering of relevant anatomy in 3D space in addition to the 2D slice view utilized by the radiologist for diagnosis. The 3D view supports spatial localization of anatomical findings. The radiologist performs diagnosis according to a predefined protocol for structured diagnosis (Kahn, 2009; Schwartz, 2011) coupled with standardized terminology (SNOMED CT, http://www.ihtsdo.org/snomed-ct/) and adding annotations to the slice view. Annotations are automatically transferred to the 3D view. See Fig. 3 for an overview of the proposed radiologist reporting view and the corresponding patient view. The resulting annotated image data consists of original images, 3D visualization of anatomy, radiological annotations and diagnostic report. This data may subsequently be consolidated using a rule-based engine and distributed to the patient for explanation of the diagnostic outcome. Additionally, the complete data might be distributed to the physician. This tool will form the basis for discussion of the problem and treatment options. In addition to the patient data, corresponding healthy information from a database might be added for further clarification.

Combined with 'My Virtual Body', this could lead to a perpetual patient-centred communication application. On the journey from sickness to health, the patient virtually carries the data in original and simplified (understandable) formats to the practitioners involved. Any new practitioner accompanying the patient will be able to synchronize and add relevant new data.

Fig. 3: Radiologist diagnostic interface using standardized structured radiologic reports (left) and resulting annotated patient viewer with slice and 3D views.

**4.3 Reusing Medical Images for Osteoporosis Fracture Risk Assessment**

As emphasized previously, medical image data is underutilized. In addition to incorporating this type of data in the patient-doctor communication, here we propose to offer diagnostic services taking medical images as input. This is particularly interesting when
additional services are offered to analyse existing images. In these situations, there is no additional cost in terms of image acquisition and more importantly, no additional exposure to radiation (in case of CT), risk of allergic reaction to contrast agents and traumatic experience for claustrophobic patients (in MRI). The goal is that such image analysis services extract additional information from existing images, effectively re-cycling image data to add value, benefitting the patient and health system.

A specific use case shall highlight this potential: Approximately one in two women and one in five men suffer bone fractures related to osteoporosis after the age of 50 years (SVGO, 2010). Fractures predominantly occur in the femur, vertebra and extremities and result in a high financial burden on the health system. More importantly, these fractures may also result in reduced mobility and even death. Therefore, it is important to correctly identify patients facing an increased fracture risk in order to intervene early via pharmaceuticals or lifestyle changes. Unfortunately, the current method to identify these individuals (areal bone mineral density assessed by dual x-ray absorptiometry) does not capture all persons at risk. In fact, approximately 80% of hip fractures occur in individuals that have not been identified by this method (Stone, 2003).

One potential approach to remedy this situation is well established in the research literature. In this approach, virtual bone models are constructed from 3D CT images and virtual mechanical tests using finite element modelling are performed to infer the load the bone can withstand (Keaveny, 2008). By using such a fracture threshold identification of people at risk is improved. However, the method is not widespread in clinical practice. This is due to the rather complex processing pipeline needed to construct models from medical images, as well as the lack of available CT images acquired for osteoporosis diagnosis. While the former is an ICT challenge we are currently working on, relying on already existing image data can alleviate the latter point. There is a large number of CT images acquired every year for different diagnostic purposes. Interestingly, these images are often available for people above the age of 50 years (the target age category) and these images contain bones of interest: the femur, vertebral bodies or extremities.

Thus, we are aiming at establishing a software service able to accept existing CT images depicting bones of interest and returning a fracture risk report based on virtual mechanical testing. We are collaborating in a consortium lead by the ETH Zurich that comprises biomechanical experts (ETH Zurich and University of British Columbia, Canada), clinical experts (University of Iceland and Icelandic Heart Association) and image analysis experts (ZHAW and University of Bern) to automate the processing pipeline, improve the modelling and establishing clinical decision making thresholds.

5 New Innovation Strategies Needed

In order to fully realize the benefits of eHealth and to actually improve the quality of life, in either medical or economic aspects, ICT innovations have to be successfully implemented in personal, clinical and public health to gain positive network effects. The
above use cases underline this potential. However, the slow ICT innovation adoption rates we experienced in the last two decades call for evaluation of new innovation strategies to overcome the current situation: How should we organize an ICT-enabled healthcare environment where patient safety is protected and innovation is promoted?

Interesting research questions concerning eHealth are:

- How will personalized medicine, smart health and fitness monitoring, semantic-driven diagnosis, eHealth, etc. integrate into a future health environment?
- Which eHealth IT architecture (functional modularity, interfaces, exchange formats) will fit efficiency, safety, privacy, flexibility, and transparency needs?
- Which eHealth functionality has to be centralized, which parts can be run decentralized?
- What is the best way to move from clinical guidelines to clinical decision support systems based on semantic computing and deep learning?
- How do we create and maintain internationally valid medical knowledge representations (medical thesauri, rule bases for diagnosis, Semantic Web for health)?
- How do individuals value the balance between privacy concerns and missed eHealth benefits (in view of NSA, Google, Facebook, …)?
- Where does our society need public regulations in eHealth?
- How will the health business change if IT-driven health services become widely available?
- How can IT foster co-creation/co-production in health services?
- Will an international IT player be able to change the business (as disruptive Apple was in the music industry with iPod and iTunes)?
- How should uncertainty in diagnosis (done by human or by machines) be handled?

These might be questions that are not addressable within small, decentralized research projects typically run 1-4 years at universities. Being faced with long-term issues such as ageing societies, increasing healthcare costs, missing eHealth infrastructure, and health services that lags behind the needs of modern citizens, novel innovation scenarios might be evaluated to overcome the barriers to innovation:

- Does it make sense to run long-standing, international, interdisciplinary research projects (à la CERN) to gain progress in eHealth?
- How to power ICT-driven innovation within the public sector itself in order to unlock radical improvements?
Do we need large investments in eHealth infrastructure by the federal government (analog to traffic infrastructure)?

How to develop new and collaborative service delivery models across public, private and non-governmental actors?

How to promote co-creation of health services with an attitude of experimentation and entrepreneurship (with government and patients as entrepreneurial actors)?

Should we execute experiments in the small (within specific contexts) or better address eHealth solutions for all (the whole society)?

How to include community-driven activities (Open Source development, social media) to build a common eHealth environment?

The eHealth domain presents a huge challenge and many new opportunities to improve patient well-being. We consider Visual eHealth in personal and public health as a niche where the transfer of existing technology and small innovations might have a great impact. Novel partnerships for innovations in and operations of health services may emerge to realize the tremendous potential benefits of eHealth. An on-going collaborative effort between all stakeholders will hopefully lead to eHealth ecosystems that generate better health outcomes due to positive network effects.

6 Conclusion

Visual eHealth technologies have the potential to innovate medical activities and services by enhancing self-monitoring, self-awareness and self-service. We have demonstrated this potential by outlining three use cases. Common to these use cases is increased involvement of patients through health-related services. With this empowerment, communication and participation are improved. We hypothesize that this improvement will lead to an overall benefit to the entire health care system. While this sounds promising, we have stressed the need for a shift in the innovation process from a clinical trial and big industry driven approach to a more patient-driven approach with novel partnerships between citizens, clinics, industry, and the government.

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Getting to the TOP (Training-on-the-Project): Strengthening the Collaboration between Science and Business

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Abstract
Corporations are increasingly interested in getting quick access to the most current know-how generated by university research. Likewise, universities/research organizations are interested in gaining insight into industry’s needs related to technology development. Unfortunately, traditional forms of cooperation between science and business, such as contract-research, joint-research, or technology-transfer, often do not fill this need, leaving the potential for value creation largely untapped. Additionally in the last few years extensive efforts in the area of academic continuing education have been made to establish a further channel to bridge the gap between the academic and the economic world.

One way to enable effective “cross-organizational value creation” is the “Training-on-the-Project” approach (TOP) developed by the Freiburg Academy of Science and Technology (FAST). By connecting research and development with the development of competencies, TOP facilitates a sustainable capacity for innovation. TOP’s formula provides on-demand solutions and can be tailor-made to various science-to-business projects.

The results of initial pilot projects evidence the benefits of TOP for all parties involved:

› Corporations benefit by receiving answers to relevant questions, acquiring up-to-date scientific knowledge, and networking to acquire future personnel.
› Participants from the corporation benefit by acquiring new knowledge/competencies, boosting their motivation, and upgrading their personal networks in the scientific community.
› Universities benefit by establishing new partnerships for future projects, generating ideas for future research, and accessing additional funding.
› Scientists in the university benefit by gaining insight into the industrial perspective on R&D, contacting potential future employers, and upgrading personal networks.

Strongly tied to both R&D and continuing education, TOP exceeds the effects of traditional forms of cooperation between science and business and provides a promising new model for “cross-organizational value creation”.

Keywords
training-on-the-project, cooperation science and business, capacity for innovation, continuing education, on-demand-solutions
1 Introduction

For most technology-driven corporations, it is essential for the development of their capacity for innovation to use new research results that have been generated by universities and/or (public) research organizations. Therefore different forms of collaboration between science and the business-sector have been established: contract-research, joint-research, or technology-transfer. Although a lot of private and public money is being invested in contract- and joint-research and also manifold activities like regional networks, technology-clusters and -platforms, infrastructure for technology-transfer, are government-funded. Yet, the results lag far behind the expectations of politicians, scientists and businessmen/women.

In recent years, scientific continuing education has been recognized as an increasingly important path in science-to-business transfer. Typically continuing education prioritizes individuals, but recently a trend in emphasizing corporations as target groups in continuing education has been observed. And here also more cooperation between universities and enterprises in developing new training courses is postulated. In Germany federal and regional ministries support the development of new courses in continuing education through several programmes. This paper presents the concept „Training-on-the Project“ (TOP) as a new approach in continuing education. TOP effectively addresses some corporations’ criticism that current continuing education offerings do not meet industries’ needs related to content, feasibility of employee participation, and usability in practice.

In the next section, the idea and conceptual framework of “Training-on-the-Project” are described. Taking the example of a pilot project conducted by the Freiburg Academy of Science and Technology (FAST), section 3 illustrates how the approach works and shows the results for both science and business. Finally, section 4 summarizes the findings, points out the potential of the approach to improve cross-organizational value creation and the perspectives of this form of collaboration and provides some recommendations.

2 “Training-on-the-Project” in continuing education

From the corporate point of view continuing education often does not meet the requirements of either the participants in courses or companies’ human resources development. They rate courses and programmes as being too theoretical, of inadequate duration and demanding a workload that is not compatible with employees’ ability to combine their job with professional training. In response to these criticisms, the project FAST – Freiburg Academy of Science and Technology has developed a new format in continuing education.

The “mission” behind the FAST-approach is “Learning by doing research together”. The central aims of the project are to:
Create a new range of opportunities for academic continuing education
Develop a new format of “continuing education through research”
Improve the cooperation between the university and the business sector.

With this concept, FAST invites thinking of academic continuing education in a new way. FAST combines continuing education with research and development (R&D); however, in a reversal of traditional contract research where academics do research for industry, here an employee from industry comes to the university and does research there as a member of a scientific workgroup. The educational concept behind the approach is “Training-on-the-Project”: the development of competencies results from the joint work on a R&D-question and the exchange of knowledge and experience with the scientists (fig. 1).

The FAST-approach consists of three basic principles:

- a specific R&D-question of an enterprise is the starting point for defining a project,
- the so-called “training- and research project” combines continuing education with R&D,
- the corporation’s employee (temporarily) works in the scientific workgroup at the university – phases of presence at the university alternate with phases of distance learning.

The characteristics of the concept “Training-on-the-Project” are (fig. 2):

- demand-oriented: problems and needs of an enterprise on the one hand and the special scientific interest of the workgroup take centre stage.
- customized: designing the content as well as implementing the project are conducted in close coordination of enterprise and workgroup.
- flexible: phases of presence at the university rotate with phases of distance-learning while working in the company.

Fig. 1: Connecting company’s needs with university’s potentials
driven by outcome: there are concrete target agreements of what is to be developed in R&D and which competencies are to be developed during the project.

effective/sustainable: transfer and implementation of the results are guided by the FAST-Team to improve the chances of success.

Fig. 2: Concept: "Training-on-the-Project"

Through this procedure the conflicting interests of science and business can be merged into a productive cooperation that creates win-win-situations for university and enterprise - for the institutions as well as for the individuals involved (tab. 1):

<table>
<thead>
<tr>
<th>University/Science</th>
<th>Enterprise/Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>› Additional capacities for research (personnel)</td>
<td>› New method/procedure (tested, evaluated and ready for implementation)</td>
</tr>
<tr>
<td>› Scientific publications</td>
<td>› Technology-know-how</td>
</tr>
<tr>
<td>› New contract research projects</td>
<td>› New competences</td>
</tr>
<tr>
<td>› Stimulus for research strategy</td>
<td>› Feasibility study</td>
</tr>
<tr>
<td>› Additional income</td>
<td>› Scientific publication</td>
</tr>
<tr>
<td>› Contact with future employers for the researchers</td>
<td>› Certificate/credit points</td>
</tr>
</tbody>
</table>

Tab. 1: Benefits for university and enterprise
3  Access to new technologies via Training-on-the-Project – securing the competitiveness of a small and medium-sized enterprise

To illustrate how the FAST-approach works in reality the example of a pilot scheme is described. The description is geared to the phases of the “FAST-Process” (fig. 3):

Note: the enterprise is a globally operating manufacturer with approximately 70 employees producing commercial refrigerators and freezers for the health care industry and laboratories.

R&D-question: the enterprise was looking for more efficient refrigerators made from new material. But necessary expert knowledge to evaluate the feasibility was missing. A representative of the company came into contact with the FAST-Team at a conference.

In a personal meeting with the FAST-Team some days later the problem was negotiated in detail, and an initial plan for a project was outlined.

In the next step, the FAST-Team searched for a compatible partner at the University of Freiburg. Several conversations and meetings were needed to identify the right partner.

During the matching process the partners defined the concrete project design: the design of a feasibility-study was at the centre; one of the main goals was to develop a profound knowledge about different materials and technologies. The project teams were formed, consisting of a professor and two master-students from the university and the director and head of the development department from the enterprise.
While the study was being conducted, there were frequent meetings where the knowledge about materials was exchanged, requirements for the next steps were defined and “homework” assignments were agreed upon.

By the end of this process, the following results had been achieved (tab. 2):

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Individual</th>
</tr>
</thead>
<tbody>
<tr>
<td>University</td>
<td></td>
</tr>
<tr>
<td>• Input in teaching</td>
<td>• Insight „working in sme“</td>
</tr>
<tr>
<td>• Input further R&amp;D-questions</td>
<td>• Improvement in motivation</td>
</tr>
<tr>
<td>• Contact to industry</td>
<td>• Contact to industry</td>
</tr>
<tr>
<td>• Option on R&amp;D-project</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterprise</td>
<td></td>
</tr>
<tr>
<td>• Utilization of expertise for feasibility-study</td>
<td>• Development of competencies</td>
</tr>
<tr>
<td>for support decision-making process</td>
<td>• New expert knowledge from training-on-the-project</td>
</tr>
<tr>
<td>• Contact to science</td>
<td></td>
</tr>
<tr>
<td>• Option on R&amp;D-project</td>
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*Tab. 2: results of the pilot project*

In addition, the outlook is positive for ongoing cooperation with the possibility for even bigger R&D-projects with additional partners in science and business.

## 4 Conclusions and recommendations

The project FAST started with the task to develop a new format in continuing education that fits the needs of industry better than familiar courses in this area. The results of the first pilot projects to test the FAST-concept show that the “Training-on-the-Project”-approach is, in fact, a viable new option for initiating collaboration between science and business. As Figure 4 illustrates, FAST is effectively positioned among established forms of cooperation between science and industry (fig. 4):

*Fig. 4: FAST – between continuing education, R&D, and technology transfer*
Training-on-the-Project broadens traditional continuing education, complements contract- and joint-research and increases the value of knowledge and technology transfer (transfer occurs from head-to-head). It enhances traditional ways of collaboration, offering specific benefits that extend beyond the limitations of existing models.

No doubt, to tap the full potential of the FAST-approach, challenges and obstacles, such as those delineated below, will have to be addressed:

- Negotiating the “clash of cultures” between the academy and industry
- Finding pragmatic solutions for handling intellectual property rights
- Pricing and financing
- Convincing industry to take part and pay for FAST’s services
- Convincing researchers in the university to participate

Nevertheless, as the results of our pilot project indicate, FAST can successfully bridge the gap between the academic and economic worlds. Especially for small and medium-sized enterprises, FAST offers a low-threshold access to University-housed scientific research. Ultimately we hope to generate a new culture of innovation and cooperation on both sides – university and industry.

References

1 Solely the Federal Ministry of Education and Research provides 250 million € within the initiative “Aufstieg durch Bildung: offene Hochschulen” (http://www.wettbewerb-offene-hochschulen-bmbf.de/wettbewerb) to support academia in developing new courses and programmes.

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Customers as Investment Objects – a New Perspective on Marketing

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Abstract
Customers have always considered as one of the most important assets of a firm. The concept of Customer Equity (Rust, Zeithaml, Lemon, 2000) has given this idea a conceptual and methodological foundation. Marketing can then be seen as the attempt to maximize Customer Equity by corresponding activities. For doing this, we focus on the Customer Lifetime Value (CLV) and ways for its maximization.

While the CLV has become a well-studied concept in marketing with a lot of literature coverage, much less work has been done in developing methods how to increase CLV. As an active increase in CLV always requires some activities, it is coupled with costs, and a cost-benefit analysis has to be made.

We develop a new model for such a cost-benefit-analysis, by considering a customer as an investment object: A customer treatment incurs costs today, while, on the other hand, it generates returns in the future, over the lifecycle of the customer. Since a customer can receive different forms of treatment, there are in fact different investment options available. When trying to increase the CLV, these options have to be compared to each other.

By formalizing this approach in a quantitative model, we create a framework for describing the cost-benefit profile of an individual customer. With this framework, optimum treatments can be identified, and the optimum height of investment into a single customer can be determined.

Keywords
Marketing, CLV, customer equity, cost-benefit analysis.

1 Introduction

The notion of customer lifetime value (CLV) of customers has become a popular research topic during the last decade (see Reinartz and Kumar, 2003, Rust et al. 2000). It has been shown to be an important and useful concept in marketing, especially in micro marketing and direct marketing. The CLV is usually defined as the estimated present value of an individual customer’s future cash flows, including future revenues as well as future costs (Jain and Singh, 2002). Conceptually, the notion of CLV is defined on an individual customer level. However, integrating all customers of a firm, a natural extension is to define the customer equity as the sum of the future profits of all customers (Blattberg and Deighton 1996, Rust et al. 2004, Gupta, Lehmann, Stuart 2005, Villanueva and Hanssens 2007, Berger et al. 2006). Customer Equity is usually considered as a good proxy for the value of a firm (Gupta, Lehmann and Stuart 2005). For calculating the CLV, different models have been proposed. An excellent overview on CLV
models in a wider context of customer-base analysis is given by Fader and Hardie (2009).

The concepts of CLV and CE have been used for solving relevant management questions on, e.g., allocation of marketing spending, understanding the connection between market spending and financial performance, and optimizing customer relationship management (Rust et al, 2000, Gupta and Lehmann, 2003, Rust et al., 2004, Kumar, Lemon and Parasuramin, 2006, Villanueva and Hanssens, 2007). Especially in relationship marketing, CLV has become central (Berger and Nasr, 1998, Malthouse and Blattberg, 2004).

The present paper builds on this body of knowledge by applying the concept of CLV and CE for optimizing the customer treatment on an individual customer level. For this, we propose a new model of a customer as a set of investment options. We assume that each customer treatment is associated with costs which can be seen as investments in customers, as each marketing treatment is done to influence customers in order to increase the future profit coming from the customers. Thus, there is an expected return for this investment. In a CLV perspective, this return consists of an increase of the CLV, as the CLV covers all future profits of a customer. We can thus interpret a marketing strategy as an investment strategy whose ultimate goal is to increase the CE of the firm. So, each treatment has both costs and benefit, and we can apply a cost-benefit-analysis of the different investment strategies, which may be used for optimally investing in customers.

In this paper, we derive a quantitative model for implementing this idea, and we show how to apply this model in general and with some example cases.

The paper is structured as follows: In Section 2, we formulate the general model of a customer as a set of investment options. In Section 3, we derive a method of optimally investing in a set of customers, by using classical economic arguments from investment theory. Section 4 is a short conclusion.

2 Customer treatment: costs and benefit

2.1 General model

In this section, we describe our model for modeling customer treatments in a CLV framework, and we show how a cost-benefit analysis of a specific treatment can be done. We assume that a customer i is described by a CLV model, giving her customer lifetime value as a function of parameters which include behavioral ones. For example, the CLV may be calculated by the model of Rust, Zeithaml, Lemon (2000):

\[
CLV = \sum_{t=1}^{\infty} m \cdot \frac{r^{t-1}}{(1+d)^{t-1}} = m \cdot \frac{r}{1+d-r} \tag{1}
\]
where \( m \) is the annual margin for the customer, \( d \) is an annual discount factor \((0<d<1)\), and \( r \) is the retention rate \((0<r<1)\). In this case, \( m \) and \( r \) are customer individual parameters, describing the behavior of a customer, and typically differing for different customers, whereas \( d \) is a global parameter which is identical for each customer.

Many different CLV models have been proposed in the literature (see e.g. Fader and Hardie (2009)). Our approach is not based on a specific CLV model but can be used for any CLV model.

The second ingredient of our model is the formalization of marketing actions and customer treatments. We assume that we consider a specific treatment period, for example the next year, where different marketing actions can be applied to a customer. For example, the firm might plan to send a specific marketing offer each 3 month during the next year. A specific customer may get the whole set of the four offers, but the marketing department might also decide to send him only two out of these four offers.

In general, we assume that a treatment \( T \) is composed of a set of different marketing actions or campaigns. We assume that \( N \) different campaigns \( T_j, j=1,…,N \) are run, and that each customer receives a subset of these campaigns. In practice, when the marketing department plans to launch \( N \) different campaigns during the next planning period, not all \( 2^N \) possible combinations of treatments are typically taken into account. In most cases, some of these treatments are excluded, for example because a specific treatment would result in too many customer contacts, or in customer contacts in a too short period. In addition, there may be rules on customer level which exclude treatments, for example when a customer has declared that she does not want to be contacted by phone.

So, with \( N \) planned marketing actions, the number of feasible treatments \( M \) is smaller than \( 2^N \), and, in many cases, \( M \) is customer dependent.

Any treatment \( T \) should influence the behavior of the customer, e.g. trigger some additional revenues, or increase the customer loyalty. In a CLV context, this should be reflected in the CLV of the corresponding customer. So, assume that customer \( i \) is exposed to treatment \( j \), we expect that the customer lifetime value \( CLV_i \) is changed, ideally it is increased.

An important property of a treatment \( j \) is thus the change of \( CLV_i \). We denote this change with \( \Delta CLV_{ij} \):

\[
\Delta CLV_{ij} = CLV_i(\text{with treatment } j) - CLV_i(\text{w/o treatment})
\]  

The reference case is that customer \( i \) does not get any treatment at all, and the effect of the treatment is the change of the CLV under this treatment. Note that the quantity \( \Delta CLV_{ij} \) can be considered as the net benefit of the treatment. This benefit includes more than the direct reaction of the customer to the marketing actions, for example a one-time additional sales. Since the CLV includes the total future behavior of the customer, any changes in the future behavior that are created by a marketing action is integrated as well. As an example, a marketing action that increases the loyalty of a customer without changing the sales also leads to an increase of the CLV.
Every treatment also incurs some costs. This is the second element for modeling a treatment. We denote the cost of treatment \( j \) by \( C_{ij} \), and we allow the costs to depend on the specific customer \( i \). Note that \( C_{ij} \) are not the costs for the campaign but rather the costs per customer of a campaign. Summing up these costs over all customers that are subjected to the campaign yields the total campaign costs.

So, a treatment \( j \) which is applied to customer \( i \), is modelled by the two quantities cost and benefit: \((C_{ij}, B_{ij})\), where we identify \( B_{ij} \) with the change of CLV: \( B = \Delta \text{CLV}_{ij} \). For a given customer, the set of all possible treatments can be visualized in a twodimensional cost-benefit space as shown in Fig. 1. In Fig.1, a set of 15 different treatments is shown. The treatment 1 has costs \( C_1 \) and a benefit \( B_1 \), whereas the treatment 2 is described by \((C_2,B_2)\).

![Fig. 1: A set of \( M \) possible marketing treatments for a specific customer can be modelled as a set of \( M \) points in a 2-dimensional cost-benefit space. The cost dimension denotes the costs of the treatment, and the benefit is the change of the CLV of the considered customer.](image)

Note that a visualization such as in Fig. 1 is customer specific as each customer may react differently to a given treatment. In general, different customers thus have different such pictures, even if the set of treatments is identical.

### 2.2 Example

As an example, we consider a service provider which serves customers continuously. The customers pay for the service with a monthly subscription fee. Examples for such providers are telecom providers or video rentals such as Netflix. In addition, the service provider sells products like a retailer which are related to the service. For example, a video rental might sell video DVDs, in addition to the rental service.

The company plans to run four marketing campaigns in the next 12 months, one each three months. The campaigns are for selling products, but are expected to increase the customer loyalty in general as well.
We assume that it is January, and the first campaign will run this month. The second campaign is planned for April, the third for July, and the last one for October. The campaigns have different costs of 10, 15, 4, and 18, respectively. These costs are cost per customer, and are identical for each customer.

Each customer can be exposed to any combinations of these campaigns. For example, a customer may be selected for the first and the third campaign. This treatment would have costs of \( C=10+4 = 14 \). There are \( 2^4=16 \) possible treatments, including the reference treatment of excluding the customer of all campaigns. We code a treatment with a sequence of four binary numbers \((a_1, a_2, a_3, a_4)\), where \( a_k \) is either 0 (customer will not receive campaign \( k \)), or 1 (customer will receive campaign \( k \)). For example, the treatment \( T=(1,0,0,1) \) means that the customer is selected for the first and the fourth campaign, but is not subjected to campaigns 2 and 3.

The CLV model is assumed to have the form of Eq. (2), with an annual discount factor of 0.1 (10% discount rate).

We consider a customer with an annual margin of \( m=120 \), and an annual retention rate of \( r=0.7 \). This means that the probability that this customer is still a customer one year from now is 70%. We can transform this to a monthly retention rate of
\[
\hat{r} = 0.9707, \\
\text{since } 0.9707^{12} = 0.7.
\]

The CLV without any campaigns would be
\[
CLV(T=(0,0,0,0)) = 10 + \frac{0.9707}{1+\hat{d}} \cdot 10 + \frac{0.9707^2}{(1+\hat{d})^2} \cdot 10 + \frac{0.9707^3}{(1+\hat{d})^3} \cdot 10 + \ldots
\]
\[
= 10 \cdot \frac{0.0087}{1+0.0087-0.9707} 
\]

where \( \hat{d} \) is the monthly discount factor (\( \hat{d} = 0.0087 \) in our example), and each term of the sum denotes the profit of a month in the future.

As for the effect of the marketing campaigns, we assume the following:

- The probability that the customer reacts to the campaign is 30%, in which case an additional one-time margin of 20 is obtained in form of an additional sale.
- If the customer reacts to the campaign, her annual retention rate is increased to \( r=0.9 \) (or \( \hat{r} = 0.9913 \)) for the following 5 months, then it drops back to 0.7 as before. This means that it is very unlikely to loose this customer in the five months following a sale.

So, there are different effects of the treatment of a customer:

- A treatment increases the expected margin. The more treatments, the more additional margin is created. This increases the CLV of the customer.
- A treatment increases the loyalty over a certain period of time, if the customer reacts. Thus it increases the lifetime of the customer, and accordingly her CLV.
For example, consider a treatment $T=(1,0,0,0)$ where the customer only receives the first marketing campaign. The CLV then can be calculated as

$$CLV_i(T=(1,0,0,0)) = 0.7 \cdot CLV_i(T=(0,0,0,0)) + 0.3 \cdot \left( 20 + 10 + \frac{0.9913}{1+d} \cdot 10 + \frac{0.9913^3}{(1+d)^3} \cdot 10 \\
+ \frac{0.9913^3 \cdot 0.9707}{(1+d)^3} \cdot 10 + \frac{0.9913^4 \cdot 0.9707^2}{(1+d)^6} \cdot 10 \\
+ \frac{0.9913^4 \cdot 0.9707^3}{(1+d)^7} \cdot 10 + \frac{0.9913^5 \cdot 0.9707^4}{(1+d)^8} \cdot 10 + \ldots \right)$$

The CLV under treatment $T=(1,0,0,0)$ is identical to the reference CLV with 70% probability (in the case where the customer does not react to the campaign). With 30% probability, there is an additional sales contribution of 20, and the CLV of the subscription revenues is changed by changing the churn rates for the four months after the campaign. Other treatments can be calculated similarly.

Fig. 2: Plot of the 16 possible treatments of a customer in the cost-benefit space. Each dot denotes a specific treatment, i.e. a selection some of the four planned campaigns. The treatments are indicated for some selected treatments.

In Fig. 2, the change $\Delta CLV$ vs. the costs of each of the 16 possible treatments are shown. The treatment $(0,0,0,0)$ has no costs, and $\Delta CLV=0$. The cheapest treatment consists of a single campaign in month 7, i.e. the treatment $(0,0,1,0)$. This incurs costs of 4. Since the acceptance probability is 30%, the expected additional sales is $0.3 \cdot 20 = 6$,
which is discounted with the factor $0.9913^7 = 0.9404$, since the sales is in month 7. As can be seen in Fig. 2, this increase of $0.94 \times 6 = 5.64$ does not account for the full increase of the CLV – an additional increase in CLV is obtained by the change of the retention rate in case of acceptance. Taking both effects together, an increase of 11.8 is achieved. The next cheapest option is $T = (1,0,0,0)$, which generates costs of 10. The change in CLV is a bit higher since the sales is earlier, thus less discounted. Additionally, the change in retention rate is earlier, thus leading to higher expected submission revenues than for treatment $(0,0,1,0)$. Treatment $(0,1,0,0)$ has costs of 15, and a $\Delta$CLV which is in between the ones of $(1,0,0,0)$ and $(0,0,1,0)$.

The treatment $(1,0,1,0)$ generates costs of $10 + 4 = 14$, and $\Delta$CLV$=25.7$. Since the acceptance probability of the two campaigns has been chosen to be independent, each campaign adds an expected additional sales of 5.64. The rest of the CLV increase is generated by the increased customer loyalty, and is a nonlinear function of the number of campaigns.

So, each possible treatment can be assessed with respect to its cost and its benefit, a visualization of which gives a complete overview of the different options that are available for the customer. The task is now to choose one of these options (see next section).

Remarks:

- The example demonstrates that non-trivial effects such as the superposition of different campaigns, with a mix of additional sales and change of the retention rate can be modelled. However, it should be noted that the approach also works for even more complex dynamics. An example for more complex dynamics has been shown in Heitz et al. (2011). There, a non-Markovian state-space dynamics with complex dynamical rules has been studied. The only requirement is that a CLV calculation can be performed, but the CLV model to do this calculation can be chosen freely, and according to the specific case.
- Restrictions such as choosing the acceptance probabilities as constant for all campaigns and independent from each other, can be released. The calculation of the CLV becomes more complicated, but the general approach is still feasible.
- Furthermore, both the costs and the change in CLV can be made customer individual, as done in Heitz et al (2011). In this case, a plot such as Fig. 2 becomes a description of the choices for a specific customer. We will come back to this in the next section.

3 Optimum treatments

3.1 The Pareto frontier

In the last section, we have shown that a specific treatment of a customer can be viewed as an investment option with associated costs and benefits, and can be visualized in a
two-dimensional cost-benefit space. In this section, we will analyze the task of finding an optimal treatment for the customer.

When analyzing Fig. 1 or Fig. 2, it is immediately clear that there are some treatments that make no sense, since they are more expansive than other treatments, but yield a lower benefit. So, when faced with the decision problem of which treatment to choose, we should sort out all treatments that do not lie on the Pareto frontier (for an introduction in multi-criteria optimization and Pareto optimality, see e.g. Censor (1977) or Da Cunha and Polak (1967)). In Fig. 3, the Pareto frontier of the treatments of Fig. 1 is shown. Each treatment on the Pareto frontier is Pareto-optimal: There is no other treatment in the whole set of treatments that generates more added CLV with lower costs.

Choosing a treatment on the Pareto frontier makes sure that, for the given invested money (costs of the treatment), there is no other treatment that generates more value. In this sense, the treatments of the Pareto front are all optimal.

However, there are still different options available. The treatments of the Pareto frontier have the property that, for increasing costs, they yield increasing benefit. So, the more we invest in a customer (in the form of marketing campaigns), the more we get in return (in the form of additional CLV). Thus, the Pareto frontier can be interpreted as a characteristic of the customer as an investment option: We have a choice of how much we would like to invest in a customer, and each investment has a specific return.

Given a specific customer, we could now determine the optimum treatment by maximizing the difference between investment and \( \Delta \text{CLV} \):

\[
\Delta \text{CLV} - \text{costs} = \text{max.}
\]  

This would lead to a maximum return on investment, expressed in the chosen metrics of the CLV. When done over all customers, this would, in turn, result in an optimal marketing budget. However, in practical applications it is often not possible to apply this
simple method since there are restrictions on the total budget for marketing, or there are operational restrictions such as the number of available agents for outbound calls, or channel restrictions, or the like.

In the next subsection, we therefore propose a more general way of optimizing the marketing activities over a given customer base, by introducing a budget constraint.

3.2 Marketing optimization

In this section, we investigate the question of finding the optimum treatments for a given set of customers under a specified budget constraint.

Let’s assume that we consider a set of M customers i=1,…,M. We denote the costs of a specific treatment j of customer i with C_{ij}, and the resulting benefit (in terms of ∆CLV) by B_{ij}. The budget constraint thus reads

\[ \sum_{i=1}^{M} C_{ij} \leq B \]  \hspace{1cm} (5)

with a given total budget B. The task is to determine the optimum treatments T_i for each customer such that the sum of the benefits is maximal:

\[ \sum_{i=1}^{M} B_{i,j(i)} = \max \]  \hspace{1cm} (6)

where j(i) denotes the treatment of customer i.

In order to address this problem, we decompose the investment into a customer in a sequence of partial investments: We start with the leftmost treatment (i.e. the treatment with minimum costs), and increase the investment stepwise by adding more budget.

In Figure 4 (a), we start with treatment A, with is the minimum investment that may be chosen for this customer. Note that, in most cases, treatment A is the origin (C,B)=(0,0), if there is the option to have the NULL treatment for this customer. However, this may not be the case, as marketing rules might force at least a minimum treatment. The second partial investment might, in principle, lead from A to B, to C, or to any other treatment on the Pareto frontier. However, in order to get the maximum return for this second investment, one should choose the partial investment that generates the maximum added CLV per invested dollar. This requirement leads to the selection of the partial investment leading to policy B. The third partial investment leads to policy D, after which it is policy F that is chosen (see Figure 4 (b)). Note that this procedure omits some of the treatments of the Pareto frontier. We call the remaining treatments, i.e. the treatments A,B,D,F, the optimum-investment frontier.
Fig. 4: The investment in one customer can be decomposed in a sequence of partial investments, starting with the leftmost treatment and increasing the investment by sequentially increasing the budget for the customer, taking into account only treatments on the Pareto frontier. (a) After the initial investment for treatment A, the second investment step may lead to any other treatment on the Pareto frontier. However, treatment B yields the maximal added value per invested dollar. (b) Sequence of optimum partial investments with decreasing returns.

In Fig. 5, the optimum investment frontier of the customer of the example in Section 3 is shown (cmp. Fig. 2)

Fig. 5: The optimum investment frontier of the customer of the example in Section 3.

We call the ratio of added value and partial investment the Marginal Cost Effectiveness MCE (cmp., e.g., Uddin et al, 2013).

$$MCE_k = \frac{\Delta B_k}{\Delta C_k}$$

where $\Delta B_k$ is the additional investment in step $k$, and $\Delta C_k$ is the additional benefit obtained in step $k$. 

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It can be shown easily that, for the case of a large number \( M \) of customers, the optimum investment strategy is the following:

1. Allocate the minimum investment level \( m_i \) to each customer \( i \). Reduce the available budget by \( \sum_i m_i \).
2. For each customer: calculate the MCE for the partial investment leading to the next investment level on the optimal-investment frontier.
3. Find the treatment with the highest MCE. Say this is customer \( j \).
4. If the available budget is greater than the necessary amount for the partial investment of customer \( j \), then
   a. Increase the investment in customer \( j \) by this partial investment
   b. Reduce the available budget by this amount
   c. Go to Step 2.
   d. If the remaining budget is smaller than the necessary amount for the partial investment of customer \( j \), take the customer with the next smaller MCE and go to start of step 4.
   If there is no partial investment that can be done with the available budget, then stop.

For the case of a continuous optimum-investment frontier, this optimum solution is equivalent to the Equimarginal Principle, also known as Gossen’s Law (Gossen 1983). The Equimarginal Principle states that the optimum allocation is characterized by the fact the derivative \( \frac{dB}{dC} \) is equal for each customer, and is a well-known principle in economics.

Note that the problem of optimal allocation is an investment problem, but it cannot be solved by optimizing each customer individually. The central issue is not to find an individually defined optimal investment level for each customer. In contrast, the optimal investment levels are found by comparing different partial investment options (for the different customers) and choosing the best one. The basic property which is used for deriving the above defined procedure is the concavity of the optimal-investment frontier, i.e. the fact that returns are decreasing with increasing investment.

As a result, we end up with specific treatments for each single customer, which in turn defines the optimum treatment policy for the considered customer base.

As an example for demonstrating this procedure, we re-analyze the example of Section 2, assuming that we have three different customers:

- Customer 1 has exactly the properties as stated in Section 2.
- Customer 2 has a higher margin of 20/month, instead of 10/month. Thus, the CLV of customer 2 is higher.
Customer 3 has again a margin of 10/month like customer 1, but his acceptance probability is only 20% instead of 30%. So, his CLV is identical to customer 1, but the change of CLV in response to a campaign is smaller.

In Fig. 5, the optimal-investment frontiers are shown for these three customers. As can be seen, the investments in customer 2 generally create a higher additional benefit than for customer 1 or customer 3.

In Table 1, the numerical data for the three customers is shown. For each investment step, the resulting value of benefit B and the MCE of the corresponding investment step is shown.

<table>
<thead>
<tr>
<th>costs</th>
<th>Δcosts</th>
<th>customer 1</th>
<th>customer 2</th>
<th>customer 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>MCE</td>
<td>B</td>
<td>MCE</td>
<td>B</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
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<td>4</td>
<td>11.7876</td>
<td>2.946899</td>
<td>17.93285</td>
</tr>
<tr>
<td>14</td>
<td>10</td>
<td>25.68096</td>
<td>1.389336</td>
<td>39.77203</td>
</tr>
</tbody>
</table>
As can be seen in Table 1, when allocating a given marketing budget stepwise to the pool of customers, the first partial investment is to be made for customer 2: investing 4 for getting an increase of CLV of $\Delta B = 17.93$, corresponding to $MCE = 4.48$. The second investment is the first partial investment for customer 1 ($MCE = 2.95$), leading to additional investment of 4, and additional CLV of 11.78. The third investment is the second partial investment for customer 2, with an additional investment of 10, and additional benefit of 39.77 - 17.93 = 21.8. This investment has an $MCE$ of 2.18. The fourth investment is now on customer 3, with an investment of 4, and a return in form of additional CLV of 7.86.

We can now proceed with this procedure until the total budget is used.

For example, if a total budget of 50 is given, then we end up with the following solution: We should invest 29 in customer 2, 14 in customer 1, and 4 in customer 3. In terms of treatments, this corresponds to treatment (1,1,1,0) for customer 2, (1,0,1,0) for customer 1, and (0,0,1,0) for customer 3. The total investment is 29 + 14 + 4 = 47. The next possible investment would lead to a total budget which is larger than 50.

Note that the solution of the investment problem not only leads to an optimal investment over the complete set of customers, but also to the optimal treatments for each individual customer.

### 4 Conclusion

We have presented a method for optimally investing in customers in the form of marketing treatments, such that over a set of customers, the investment yields to maximal total return in form of increased customer equity. The basis for this method is a model that describes a customer as a set of investment options, each option corresponding to a specific treatment. Each investment option is described by a cost-benefit pair, the cost meaning the treatment costs, and the benefit meaning the increase of CLV of this customer under the chosen treatment. We have seen that the set of investment options can be reduced to a subset of the optimal-investment frontier, which selects the Pareto-optimal treatments that fulfill the addition requirement that each partial investment has an optimum return on investment ($MCE$).

By decomposing the total investment in the customers into small partial investments, we could derive a budget allocation heuristics which is optimal in the case of a large number of customers, making sure that the total investment yields a maximum increase of the customer equity.

The model can be applied to arbitrary CLV models, and is thus generally applicable to a large number of marketing problems.
References


Innovars: A path for building and cultivating a learning community

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Abstract
The implementation of effective strategies for Technological Transfer (TT), from the research context to the context of the production of goods and services, is one of the basic conditions for the competitive development of local and national economic systems. In recent years, the Italian Universities, with different intensity of effort and effectiveness, have profoundly changed their organizational structures in order to oversee the interface with the industry. Great emphasis was given to support the recognition of entrepreneurial opportunities related to the research results and their conversion into products/services to launch on the market, as well as the start of new businesses. The new entrepreneurial initiatives, undertaken by researchers to exploit the results of their scientific researches, appear on the market with a plurality of business and organizational models. These models, although successful in the short term, are likely to lose competitiveness in the long time. Only a model of knowledge management and organizational learning could be able to promote a cross-organizational value.

This article aims to answer the following questions: which models are able to support a University to fully realize its third mission (doing business)? How innovative ideas, through researches, can become successful business?

The article intends to address these questions, presenting a growth model among Research-Innovation-Enterprise based on co-partnership of three categories of players:

› Pre-incubators of innovative ideas;
› Spin-Offs and Spin-Outs
› Public-Private Laboratories

The model was built, and is still in phase of execution, at the University of Salento. The methodological approach is based on:

› Empirical analysis based on the study of the territory/market of reference and the study of the University as a body, that generates knowledge;
› Theoretical analysis: studying the interaction of three approaches: Process Approach (industrial satellite activities); Product Approach (Valley of Death); Rainforest Approach.

The article shows results/outputs achieved until now, presenting the main steps faced for the creation of the proposed model; it, also, shows future activities for the fully implementation of the organization architecture.

Keywords
1 Introduction

With considerable delay compared to other Countries with a high level of development, after the entry into force of Law 297/1999 many Italian Universities started, from the early years of the new century, to promote the launch of enterprises originated from the research activities of professors and researchers, recognizing them as spin-offs, and in some cases, taking stakes.

In this context, the University of Salento has moved with great rapidity, promoting the launch of more than 40 spin-offs. These enterprises, operating in different sectors, move with a specific purpose: to transfer the results of research on the market in order to generate business opportunities.

The global competition has seen, and still sees, such enterprises involved in a process of growth, that in many cases is very difficult because expertise and funds are reduced and oriented to the realization of the innovative product/service proposed.

For this reason, have been overlooked cross activities, such as: scientific valorization and dissemination, internationalization, human resources management, etc., essential for the companies to cope with the pitfalls of the growing global competition.

On November 20th, 2013, some professors and researchers of the University of Salento founded the Association Innovars: the purpose is the creation of a dynamic operative tool, able to support members in all the strategic-managerial activities.

Innovars is, therefore, conceived as an association for the promotion of Spin-offs and Start-ups of the University of Salento, because the founding members belong to this context. Later, the members decided to present themselves differently. This new approach has changed the vision of Innovars, transforming it in a Regional Association, whose purpose is to support the territorial development of the single companies, spin-offs and start-ups, helping them to create a network and to cooperate among them, thanks to the support of a team of professionals with interdisciplinary skills and a well-structured network.

In particular, Innovars intends to expand its process of knowledge production, oriented to design initiatives and common services, starting from needs, interests and Vision, about which, members are bearers.

In order to achieve these goals, the Association started a participative action research in a systemic framework (RAP-s) (Patera, 2013) leaded by Espéro Ltd.,1 aimed at identifying the main aspects characterizing the context, in which, innovative Spin-offs and Start-ups of the University of Salento interact, as actors involved, because of their institutional Missions.
2 The Participatory Action–Research process in a systemic framework (RAP-s) for facilitating/monitoring organizational learning in Innovars

Materials and Methods:

The route taken by Innovars requires action-research devices (Reason, 2011) to maintain and nurture, over time, the growth of a learning community able to adopt both a shared organizational culture and knowledge management tools. From this point of view, a learning organization (Argyris, 1999) is able to establish reflexive processes and learning devices, adequate to cope with the changes both inside (Innovars members) and outside (external actors and contexts). On this pathway, learning processes are essential and constitutive of these organizations (Nonaka, Takeuchi, 1995). These learning organizations are supported by action-research devices aimed at facilitating and monitoring the dialogue among several experiences, knowledge and skills of the members, offering tools to increase the level of autonomy and interdependence among its members and, between them and the external environment (Schön, 2003). Organizations, with an added value, consciously think of themselves as self-organization. In this sense, they change their patterns of interaction among members and the external environment, through self/collaborative learning processes (Colazzo, 2008). Starting from these concepts, the organizational learning processes among members of Innovars can be facilitated and monitored, in terms of self/collaborative building of knowledge/decisions/actions. Moreover, the organizational learning processes make available to members of Innovars, information, experiences related to a certain topic (knowledge domain), shared decision-making processes and the implementation of effective/success actions for change (JCSEE, 2003).

In this context, Espéro Ltd. (Spin-off - University of Salento and member of Innovars) is carrying out a participatory action-research in a systemic perspective (RAP-s) process, aimed at nurturing the development and training of members within the practice community of Innovars. These organizational learning processes facilitate/monitor the building of a shared vision negotiated decisions and concerted action. Rap-s device aims to promote an organizational culture to improve both knowledge management processes and the development of organizational and core competences, in order to address the challenges of the current complexity (Wenger, McDermott, Snyder, 2002).

The participatory action-research carried out by Espéro Ltd. through a RAP-s device, is oriented to develop organizational skills for the activation of participatory evaluation/planning processes for the improvement of the organization (services, processes, products, etc.). From this point of view, purpose of the RAP-s device is to facilitate and monitor a participatory process among members of Innovars, starting from their own interests, needs, knowledge, skills, practices, experiences in order to develop
a shared vision that can be translated into a set of concerted decisions, actions and shared assessments.

The RAP-s device, is based on 6 macro-phases: Involving, Mapping, Visioning, Strategic Choice, Acting, Learning Evaluation

The RAP-s device is based on the approach of empowerment evaluation (Fetterman, 2000), aims to train the groups involved in a program or in a process of evaluation/design practices. These practices could be considered as tools for the recruitment of a conscious attitude about problems to address, objectives to define, solutions to find. Moreover, these practices could be an incentive for the establishment and review of the ongoing projects, for which the groups, work (Stufflebeam, 1994). In this sense, participation and evaluation are both sides of the same coin, as they are two convergent and complementary ways to ensure an active role to the participants (Patton, 2010).

Furthermore, RAP-s enhances governance processes between top-down decision-making processes (Managing Board) and bottom-up decision-making processes (Members).

RAP-s, in the framework of empowerment evaluation and of Fourth generation evaluation (Guba, Lincoln, 1989) aims to involve members in the development of shared perspectives of change, with reference to the definition of objectives, procedures, results.

3 RAP-s. A first step towards results

Results: RAP-s started on October 2013 and will end on February 2015. At the time of submission of this paper, the RAP-s is in Strategic Choice phase.

Operational Plan:

Involving: (June - September 2013)

› Preliminary analysis
› Client analysis (Innovars Managing Board) through questionnaire and Swot-d;
› Calibration of RAP-s device with Innovars Managing Board;
› Education and Training CEE (students of Master “Center of Entrepreneurial Engineering) – Unisalento”). CEE is involved both as a support in the evaluation/participatory planning process and as an additional subject for the RAP-s activities;

Mapping. (October-Dicember 2013)

Ex-ante evaluation, profiling and mapping of the needs of the spin-offs of the University of Salento. The research involved 34 spin-offs of the University of Salento, coordinated by Espéro Ltd. with the support of CEE. Reports, with the results of the Mapping
Phase, were returned to Members, as a moment of awareness and learning evaluation, during the I° Deliberative workshop of participatory evaluation/planning - Visioning phase.

Visioning (January-February 2014)

The I° Deliberative workshop of participatory evaluation/planning has involved Innovars Managing Board, Innovars members and spin-offs/start-ups, not yet part of Innovars and a representative of the Technology Transfer Office – University of Salento. During the I° Deliberative workshop of participatory evaluation/planning, were explored scenarios of change, desired by the participants, in terms of common services managed in collaborative manner by members of Innovars and supported by the CEE staff (Planning, Communication, Training, Networking, Lobbying, etc.).

In this phase, has been realized a II° Deliberative workshop of participatory evaluation/planning, that involved Innovars Managing Board, Innovars members and spin-offs/start-ups, not yet part of Innovars and a representative of the Technology Transfer Office – University of Salento.

During the II° Deliberative workshop of participatory evaluation/planning were explored scenarios of change, desired by the participants, in terms of integrated and interdisciplinary services managed in collaborative manner by members of Innovars and supported by the CEE staff.

Reports, with the results of the Visioning Phase were returned to Members, as a moment of awareness and learning evaluation, during the III° Deliberative workshop of participatory evaluation/planning – Strategic Choice Phase.

Strategic Choice, (March – April 2014)

Currently, it is being defined the III° Deliberative workshop of participatory evaluation/planning. The III° Deliberative workshop will use methodologies and techniques attributable to the wide framework of participatory evaluation/planning (Swot-d, Logical Framework, GOPP/PCM), aimed to define, in detail, both the common services and innovative integrated services emerged from the Deliberative workshops of Visioning and consistent with the results of the earlier Mapping phase.

Acting (May – September 2014)

In this phase it will be implemented the shared and integrated services, developed during the 3 Deliberative workshops of participatory evaluation/planning. In this phase it has been prepared a report of evaluation research.
Learning Evaluation (October – February 2015)

Through appropriate Evaluation Settings and Tools will be assessed, in a participatory way, services/products developed by participants during the Deliberative workshops and their implementation (Acting phase).

4 Discussion

Innovars is built on the logic of the Rainforest Model; the new theoretic paradigm of the innovation proposed by Victor Hwang and Greg Horowitt (Hwang, Horowitt, 2012).

This model states that: as in a pluvial forest, the plants grow according to chaotic schemes but together contribute to the maintenance of the whole forest, so, even in the modern economy, the start-ups are originate as chaotic and fortuitous rain forests, but in fact linked among them, in order to strengthen each other.

The growth is possible thanks to knowledge sharing: I have an idea and I share it with you and you do likewise with me.

The three factors that generate opportunity to create business are: people with good ideas, people able to do their best, capital.

With the knowledge that the young start-uppers have the need to be connected to a network able to identify an “oasis” which gives the opportunity to experience and create a “Silicon Valley model”, Italy-oriented.
This network is structured on three levels (see figure 1):

The first is composed by Laboratori dal Basso and Idee Innovative, in pre-incubation phase. It is a structure of creative talents able to develop competitive projects that, if properly supported, can become spin-offs and pass to the second level.

The second level, in the mid, between Laboratori dal Basso and Public-Private Laboratories, is composed by spin-offs and spin-outs, that are “gemmation” of a new entrepreneurial initiative, from one or more persons, from an organization (the University) or pre-existing company. The survival of the Spin-offs is connected to the real market request, existing on the territory, and the know-how of intervention of the spin-off itself.

To this level belong all the types of spin-offs: industrial, university and academic.

At the third level, there are Public-Private Laboratories. The process starts from the Rain Forest to the Laboratori dal Basso, in pre-incubation phase, spin-offs provide platforms (tangible and intangible) that will be customized on the basis of the sector of application, through properly Business Models, in the public-private logic.

The Public-Private Laboratories are called to realize, in a continuous way, integrated and coherent systems of “research-training-innovation” that can influence the sustainable economic growth of the context of reference. These Laboratories achieved value results and advantages by the collaboration between public and private sector, highlighting the industrial, socio-economic, occupational impact; they are, also, able to attract private capital and funds, reducing, over the years, the percentage of public financing.

The three-level structure, abovementioned, allows the coexistence of the point of view of process and product, bridging their gaps. In particular, the point of view of the product is ensured from the top-down approach, starting from the research, up to the product definition, according to the market’s needs, avoiding the so-called “Death Valley” typical of the Silicon Valley’s system.

At the same time, it is ensured the point of view of the product, according to the bottom-up approach, because, from the bottom ideas and the industrial system are offered new services useful for the market, having available satellite-activities, already semi-structured.

The three-level system is set as “Campus of creative people”, interconnected with actors of the industrial and public-private system, able to develop projects in competitive times and, therefore, able to attract private capitals.
5 Conclusion

During the 2013 the Association has started various activities in order to pursue the institutional Mission (see figure 2).

These events are focused on the launch of initiatives and projects of local development (Kublai on the ground), to raise awareness young people to the legality, during the start-up of an enterprise (Summer school GIÀ of Libera – Association names and numbers against mafia), the presentation of incentives for the new enterprises of the South aimed at innovation and valorization of the results of the research (Smart&Start-Invitalia).

The Association provided support for the creation and the networking of the Street Ideas Lab, an informal network of Associations, result of the experimental action recognized by the University of Salento and oriented to the diffusion, on the territory, of the culture of youth entrepreneurship based on innovation. The informal network is now, constituted by the following three Associations: The Qube (ICT), Iproject-ideasLab (Tourism, Culture and Environment), BioBang (Biotechnologies).

Innovars was, also, partner of the University of Salento for the organization of the V edition of the Innovation Exhibition, with the presentation of several initiatives.

During the 2013, the Association started a path of participative research-action, in order to promote training and growth of each member, through the activation of Deliberative workshops, in the community under construction.

The path has the aims to realize a learning community able to adopt operational and guidance tools for the promotion of knowledge management among members, in terms of auto/co-managed services.

Such path has seen the conclusion, in the 2013, of the needs’ mapping phase, with the help of ad hoc tools such as: questionnaire and interviews. The early months of 2014
were dedicated to the return of the mapping results, useful to program, in an effective way, the activities to carry out in 2014.

The operational plan of 2014, sees Innovars involved in these activities: promotion of events (presentation of the university program BEST “Entrepreneurship e Management”, at the Santa Clara University in California – Silicon Valley), consolidation activities of the Association and the eco-system, to which the Association belongs.

In this regard and considering the growth of critical mass for Innovars, through the acquisition of new members it was, unanimously decreed, the establishment of the Association for public act, in order to recognize the legal status.

The Association will endow itself, of a Ltd. of services for lobbying and design activities, monitoring of tender, scientific dissemination and strategic protection of the know-how, in order to develop profitable activities it is envisaged the establishment of an operational and representative headquarters in Bruxelles.

Endnotes

1Naica SC - Società Cooperativa (www.naicasc.com);
2Espéro s.r.l. – Spin-off – University of Salento (www.netespero.net);
3Paragraph 1 has been written and edited by A.Corallo, F.Errico, R.Bray
4Paragraph 2 “Materials and Methods” has been written and edited by S. Patera under review of Prof. Corallo;
5Paragraph 3 “Results” has been written and edited by S. Patera under review of Prof. Corallo;
6RAP-s device has been designed by S. Patera (Espéro srl). Mapping of Needs process and tools have been designed by A. Manfreda (Espéro srl). Questionnaire and Customer satisfaction’s tools have been designed in collaboration with E. Del Gottardo (Espéro srl) and under review of Prof. Corallo;
7Paragraph 4 has been written and edited by A.Corallo, F.Errico, R.Bray
8Paragraph 5 has been written and edited by A.Corallo, F.Errico, R.Bray

References


Evaluating Services and Associated Business Models Using a Multi-Tier Framework

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Abstract

Through the last centuries the importance of services has been steadily increasing from both, the enterprises’ and the overall economics’ point of view. However, empirical and practical evidence shows that the development of new services, which in turn may require new business models, frequently happens ad hoc, unsystematically, and without explicit performance evaluation. In part, this follows from the fact that companies are deficient in concrete concepts, methodologies or exemplary processes supporting the evaluation of service and business model prototypes. As a result, such prototypes are all too often launched on the market following a trial-and-error principle. To address this issue, a framework for evaluating service prototypes and associated business models is proposed. This framework, developed on the basis of a comprehensive literature review, consists of three layers (Business Process, Subprocess, and Workflow) which provide insights into different levels of abstraction. Necessary artefacts for the evaluation process are modelled top-down whereas the analysis and evaluation takes place bottom-up. By interpreting distinct layer views (old, desired, and current situation plus capability level) recommendations for action at the specific layer can be deducted. In order to warrant holism these views are additionally composed of different evaluation areas based on the balanced scorecard perspectives. Through the generic orientation the framework can be tailored to meet the heterogeneous service landscape’s needs. Furthermore, it represents a holistically applicable performance management tool. During the next three years the framework will be iteratively field tested by evaluating a new smart service concept of an industry partner as well as refined and improved based on the gained insights in several iterations.

Keywords

services, business models, service development, prototypes, evaluation, framework

1 Introduction

Today’s society has reached an age of service. Goods are generating a progressively smaller share of the gross value added and obviously many companies are beginning or rather trying to make a shift towards service orientation (Kreuzer, Ehrenhöfer, & Weitlaner, 2013). This development cannot only be observed in all industrial countries. In fact the service economy is also becoming increasingly important in China and India (Neely, 2013). The worldwide rising significance of services is, not least, attributable to the increased demand for all-in-one solutions and individualised products. Nowadays, goods can be produced globally and are very similar, if not identical, due to the growing competition (Ehrenhöfer et al., 2013). In order to strengthen their position on the market
and to differentiate themselves from competitors, firms more frequently offer product-related services (Bundesministerium für Bildung und Forschung, 2009). In general, services exhibit a considerable potential for growth and innovation from both, the vendor’s and customer’s point of view (Lay et al., 2010).

The addressed change towards a service-based competitive strategy is not new. Though, a crucial landmark was reached in recent years through the increasing use of information and communication technologies (ICTs) (Neely, 2013). By these means, new services and product-service-systems (Edvardsson, 1997), such as remote control or monitoring, are made possible. Simultaneously, new technologies can only be commercialised with the help of new services in the majority of cases. Thus, ICT and services interact strongly with each other (Kreuzer & Aschbacher, 2011).

Services also influence business models to a large extent. Both science and practice lack a common definition of the business model term. This work seizes on the idea of Osterwalder and Pigneur. The two authors compare business models with the implementation of business strategies from a conceptual and architectural point of view (Osterwalder & Pigneur, 2002). These models therefore provide the basis for business processes as well as information systems and describe how value is created, delivered, and captured within enterprises (Osterwalder & Pigneur, 2002; 2010). The associated business models must be permanently examined and adapted as needed in parallel to the development of new services. The systematic development of services, involving also certain business model aspects, is therefore of major importance (Ehrenhöfer et al., 2013). However, empirical and practical evidence shows that new service development frequently happens ad hoc, unsystematically, and without explicit performance evaluation. A study among Austrian small and medium-sized enterprises showed that a share of 46 % designs services ad hoc and only 21 % of the 55 surveyed firms are guided by a documented approach during service development (Aschbacher & Kreuzer, 2010). A similar trend became apparent from a comparison between the countries Austria, Germany, and Switzerland in 2011 (Schäfer & Kohlbacher, 2011).

In part, this circumstance follows from the firm’s perceived lack of concrete concepts, methodologies, or exemplary processes supporting the evaluation of service and business model prototypes. As a result, prototypes of this kind are all too often launched on the market following a trial-and-error principle. In order to address this issue, a framework for evaluating service prototypes and their associated business models is proposed in this paper. It is designed (i) with a practical orientation and (ii) in a generic way to meet the needs of the heterogeneous service landscape as good as possible. The holistically applicable performance management tool should facilitate and support both, the handling and development of service and business model prototypes. The aim is to provide an easy to use guide where each company has the opportunity to choose as they see fit.

The remainder of this paper is organised as follows. The next section briefly describes the underlying research methodology. Afterwards the developed framework is intro-
duced by simultaneously referring to theoretical and practical foundations. Methods and tools that should be applied when performing a concrete service prototype evaluation following the new methodology are discussed subsequently. Finally, the conclusion and future steps are presented.

2 Research Methodology

Preferably a holistic framework is intended to be designed in order to evaluate service prototypes and their associated business models and to test and validate it with reference to its utility. The sole examination of financial outcomes of a service is not the primary objective. Rather the service’s impact, including benefits and efforts, on a company should be analysed from a broader perspective. Accordingly, not only financial parameters but also potentially weaker ones, addressing the internal and external firm environment, are required. In order to achieve this purpose, a design research approach was followed.

Design research has its origin in engineering and the sciences of artefacts and falls back on a large set of foundations and methodologies. It represents a problem-solving paradigm aiming at the creation and evaluation of technological artefacts in order to meet organisational needs and develop associated theories (Cole et al., 2005; Hevner et al., 2004). Hence, the approach basically contains two main activities, namely build and evaluate (March & Smith, 1995). The generated outputs or artefacts are rather versatile and include constructs, models, methods, and instantiations (March & Smith, 1995) or in other words software tools, system development methodologies, or conceptual frameworks (McNaughton, Ray, & Lewis, 2010) – as in the present case. The performance of the resulting artefacts is evaluated in respect of the value or utility that it provides to both, organisation and developers (Cole et al., 2005; McNaughton, Ray, & Lewis, 2010). Within the context of this research project the build-evaluate loop is iterated multiple times. The framework will be tested by evaluating a new smart service concept of an industry partner. The obtained findings provide the basis for the framework’s further refinement and improvement.

3 Service & Business Model Evaluation Framework

Especially the offer of ICT-enabled services is often based on sophisticated business models which in turn might lead to complex process landscapes. Thus, in order to be able to perform a detailed evaluation of services and their corresponding underlying business models, it is vital to follow well-known approaches in process structuring and modelling respectively at the first tier. This is encouraged by the fact that both services and business models have the process construct in common. Instead of trying to depict the organisational behaviour by means of a single unified process Schantin (2004) recommends using a hierarchical modelling approach. Related literature describes several
ways to decompose business processes in order to obtain a tiered process view model. Besides slight differences in terminology Davenport (1993), Scholz and Vrohlings (1994), and Roberts (1994) basically describe very similar decomposition strategies, all of which are advocating a three level approach (e.g. process level, subprocess level, and activity/task level). Earlier work of Jakob (1980) and Haist and Fromm (1989) suggests an even more fine grained process hierarchy by using up to five different levels of abstraction. With these aspects in mind, the developed service and business model evaluation framework (SBMEF) also reflects a hierarchical design. This approach helps to address the various needs of different stakeholders which themselves operate on different levels of abstraction.

Consequently, the proposed SBMEF is decomposed into three layers, namely the business process layer, the subprocess layer and the workflow layer. The modelling of all necessary artefacts for the evaluation process is done top-down. Firstly, the business process layer’s artefacts will be created before tackling the artefacts of the subprocess layer and finally completing the most detailed artefacts on the workflow layer. In contrast, the analysis and evaluation themselves are done bottom-up, since the evaluation results of downstream layers pose a necessary prerequisite to perform an evaluation in upstream layers. As the management should have the possibility to gain a quick insight into the most important evaluation results, the SBMEF provides for a summarisation mechanism by means of an executive dashboard. Figure 1 illustrates these relationships.

Clearly, the business process layer represents the most abstract layer. Its main function is to provide an understanding of rough coherences between the main business process and the business model on the one side, and the organisational environment on the other side. For instance, this refers to relations between the customer, necessary partners, the organisations’ strategy, and other environmental influences such as trends or legal obligations.
The subprocess layer goes one step further by analysing the composition of the business processes. In this respect it is identified which departments are affected due to their involvement during the fulfilment of the service and business model offerings.

Obviously, the workflow layer is the most detailed one. It breaks the subprocesses down into single activities and considers all affected individuals as well as the necessary resources for a process.

Each of these layers is further composed of four main views: the old situation, the desired situation, and the actual situation of the service and business model as well as the accomplishment of defined capability levels. Figure 2 shows an exemplary schematic illustration of the four views for the business process layer.

![Fig. 2: Four views for each process layer](image)

The views’ names were chosen to be self-explanatory. Briefly speaking, they address the following aspects:

- **Old situation** – reflects on the experiences with preceding service and business models by means of historical data.

- **Desired situation** – deals with a forecast by defining clear targets and goals that should be achieved based on a new or adapted service and business model in future.

- **Actual situation** – refers to the evaluation of the currently employed service and business model prototype, which is primarily done to see progress when compared with the old and/or desired situation.

- **Capability level** – related to the very basic ideas found in SEI’s CMMI for Services (CMMI Product Team, 2010) the capability of the service and business model prototype should be assessed during the evaluation.

Additionally, the analysis of these four views yields one major outcome of the SBMEF, namely the deduction of recommended actions at each specific layer by interpreting the results of their respective views. These recommendations are specific for the implicitly addressed stakeholders, as the views themselves are geared towards different target
groups. During the first application of the SBMEF this interpretation and deduction is exclusively performed manually. Therefore the quality of the resulting recommendations for action might exhibit a bias due to the imperfect objectiveness of the evaluation team. Based on experiences from successive applications of this evaluation framework, generic interpretation rules and events together with associated recommendations for action can be collected in order to simplify and standardize the evaluation procedure. Table 1 represents an exemplary listing of typical questions for the business process layer whose answers foster the deduction of recommendations for action during the evaluation:

<table>
<thead>
<tr>
<th>Questions</th>
<th>Recommendations*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do we address the right customers with our new service offerings?</td>
<td>address new / different customer segments</td>
</tr>
<tr>
<td>Are the involved partners suitable for the outsourced parts?</td>
<td>look for new partner support</td>
</tr>
<tr>
<td>Could we reduce the number of partners or do we even need more partners?</td>
<td>exclude unnecessary / inappropriate partners</td>
</tr>
<tr>
<td>Do we focus on our core competencies?</td>
<td>get rid of activities outside your core competencies by outsourcing to suitable partners</td>
</tr>
<tr>
<td>Do the new / adapted service offerings fit our business strategy?</td>
<td>change your offerings or adapt your business strategy accordingly</td>
</tr>
<tr>
<td>Have we reached the desired maturity level on this layer?</td>
<td>hold or increase the quality to reach the desired capability level</td>
</tr>
</tbody>
</table>

*depending on the respective answers

Tab. 1: Typical questions on the business process layer in order to derive recommendations for action

Finally, the SBMEF allows for a holistic analysis within each of these views by introducing separate evaluation areas. These areas resulted from considerations which are similar to the intentions behind the four perspectives of the balanced scorecard (BSC) (Kaplan & Norton, 1992). Table 2 shows the mapping of the original BSC perspectives and SBMEF’s evaluation areas.

<table>
<thead>
<tr>
<th>SBMEF</th>
<th>BSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financials</td>
<td>Financials</td>
</tr>
<tr>
<td>Customer</td>
<td>Customer</td>
</tr>
<tr>
<td>Employees &amp; Partners</td>
<td>Learning and Growth</td>
</tr>
<tr>
<td>Process*</td>
<td>Internal Business Process</td>
</tr>
</tbody>
</table>

*Business Process | Subprocess | Workflow (depending on the level of detail)

Tab. 2: Mapping of SBMEF’s evaluation areas and BSC perspectives

In addition to the original BSC views (Financial, Customer, Learning and Growth, Internal Business Process) the SBMEF contains a separate evaluation area called “Miscellaneous Influences” which addresses aspects that do not naturally fit well into any other view. Amongst others, this complementary area deals with aspects like environmental impacts, market factors, and safety or security risks. These adaptations and extensions are necessary since the BSC exhibits various weak points (see e.g. Anderson and McAdam (2004) or Neely, Gregory, and Platts (1995)). One of its major drawbacks is the lack of outward orientation, especially the competitor perspective. Precisely because
firms are largely faced with an environment of ever-increasing competition, such aspects are captured within the framework’s miscellaneous evaluation area. Potentials in terms of human resources, equipment, data, and information rate among the performance dimensions of services. A service depends to a large extent on human capabilities, know-how, and attitude whether or not these resources are internal or external – intangibles in general. As the BSC clearly fails in addressing these facts, the initial “Learning and Growth” perspective is therewith expanded.

In Figure 3 the above discussed views are exemplarily depicted for the desired situation.

It is recommended to carry out the evaluation based on the BSC-based areas for each of the three process layers and their respective four views. However, this represents the ideal case and is by no means a stringent necessity. The suggested evaluation framework not only allows for customisation but even encourages service and business model-specific tailoring. For instance, if the performed evaluation refers to an utterly new service and business model prototype without relation to a preceding one there will of course be no historical data available to generate a corresponding view. As a matter of fact, the old situation cannot be addressed during the evaluation in this case.

In order to avoid misunderstandings it should be noted that the BSC-based evaluation is not only limited to the workflow layer. The presented process structure of the framework can indeed be viewed as zooming into the lowest level of detail regarding process execution. However, in the present work the BSC is regarded as management tool at all organisational levels. The collection of data or metrics, whose target values as well as themselves should be derived from the corporate strategy at the top-level, is started at the bottom organisational level, as already noted. This data flows upward to the next level and is aggregated in order to provide the upper management with a reduced set of (strategic) performance information within their area of responsibility. By these means pyramids of key figures are created, as shown in Figure 4, meeting the needs of different stakeholders in terms of managers on each level of the organisation. In addition, the
strong orientation of both services and business models towards customers and commerce is considered on each level of evaluation.

![Fig. 4: BSC-pyramids of key figures](image)

4 Striving for Operationalisation of the Evaluation Framework

The SBMEF, as presented in the previous section, is a concept or methodology respectively. Its application during the evaluation of a real-world service and business model prototype therefore requires concrete methods and tools which address at least (i) the measurement of costs, effectiveness and business value, (ii) a structured decomposition of organisational resources, and (iii) a pool of figures to calculate metrics and analyse key performance indicators. Undoubtedly, the process decomposition as described above requires the existence of specific structured workflow models which can be analysed and possibly expanded by e.g. resources. Service blueprints (Shostack, 1984) or micro process models (based on notations such as BPMN or EPC) can act as starting points.

4.1 Costs, Effectiveness and Value

A vital aspect within the SBMEF is to gain a deeper understanding of the different underlying cost structures of service prototypes. Without concrete financial insight, it would not be feasible to make well-grounded economic recommendations gearing towards continuous improvement. Two well-established models to analyse costs in their entirety are Total Cost of Ownership (TCO, Gartner Group) and Total Economic Impact (TEI, Forrester Research). However, numerous other firms in the IT field (e.g. Giga Information Group, META Group, or Fraunhofer IAO) have been dealing with cost analysis methodologies during the last three decades as well. Thus, various forms of TCO exist, all of which differ slightly. Standardisation efforts, although being claimed regularly from many sides, have not yet been successfully accomplished. There is still dissent when it comes to details concerning the concrete calculation and weighting of cost factors, not to mention the lack of broad agreement on which of them have to be considered at all. Reichman and Staten (2008) conducted several studies in which they found concrete evidence that only a relatively small number of companies tries to apply TCO concepts for IT decision-making. In fact most of them are not even able to perform accurate cost analysis as meant by TCO. According to Reichman and Staten (2008)
these pseudo TCO-based analysis methodologies are a result of, e.g., poor understanding of TCO concepts, cost analysis based on weak data, little systematic and ongoing measurement, or insufficient tool support. TEI is a methodology developed to make up for the mere cost focus of traditional TCO-based analyses. TEI aids companies with their technology-related decision-makings and to communicate value propositions of products and services. Besides costs, TEI incorporates benefits, risks, and flexibility when it comes to the evaluation and comparison of investment options.

Obviously, each variant has its strengths and weaknesses, which suggests that there is no “one size fits all” solution for the evaluation of hybrid service offerings. Instead of measuring every single aspect for the sake of completeness, efforts should be made to apply a reasonably effective model mix which aids decision-making. The following strategy, which is based on recommendations found in (Reichman & Staten, 2008), seems to constitute a solid foundation for the financial evaluation and management of hybrid service offerings within the context of the proposed SBMEF:

› Step 1: apply a TCO-based analysis periodically, e.g. every 2-3 years, to create the baseline of overall operational costs.
› Step 2: improve on this by using a variant of relative cost of operations (RCO) which is regularly applied to quantify incremental changes in relation to the baseline.
› Step 3: finally also incorporate TEI aspects to better understand risk-optimised service transformations.

### 4.2 Resource-based View

In its entirety a company can be regarded as a compilation of different resources (humans, physical goods, technologies, etc.). These resources are the source of competitive advantage when they are valuable, rare, imperfectly imitable, and un-substitutable (Barney, 1991). Although there are multiple ways to categorise resources, the approach of Volery (2005) is deemed most convenient during the application of the SBMEF. The author suggests dividing resources into six categories, namely financial, physical, human, technological, organisational, and reputation-related ones. With the help of these resources companies handle their business activities. The unique focus on pure process criteria when performing evaluations could lead to the circumstance that e.g. high process performance is achieved whilst resources are utilized poorly (zur Muehlen & Rosemann, 2000). Within the scope of an SBMEF-based analysis it is thus necessary to identify a set of resources within each investigated category initially. In this regard, it is considered imperative to determine which resources (i) are required for / affected by the service or business model prototype and (ii) must actually be considered as part of the ongoing evaluation procedure. The latter fact addresses the issue that different organisations might not give equal priority to all resources. Therefore, the opportunity is provided to focus on a subset of resources of particular interest only.
4.3 Pool of Key Figures
There are numerous definitions of the term key figure. Controlling and its elements and instruments try to coordinate information (Gladen, 2011). Measuring, examining, and controlling require a basis to rest on and key performance indicators (KPIs) represent such a foundation. A possibility to describe, explain, and predict facts is provided by employing a number of relevant key figures (Wagner, 2010). In general it can be said that with the help of KPIs the complex information within organisations can be represented in a comprehensible manner in order to act as a basis for efficient and effective decision-making. According to Wagner (2010) it is equally important to have a clear idea of the evaluation goals right from the beginning. Despite the fact, that there are, of course, several ways to structure key figures, it is very useful in the context of the SBMEF that KPIs or rather their categorisation is in accordance with the defined BSC-based evaluation areas. During the development of the evaluation framework and as a preparation for the first field-test a relatively large number of key figures (approx. 300) has been identified by reviewing relevant literature, e.g. McNaughton, Ray, and Lewis (2010), Gladen (2011), Wagner (2010), or Kütz (2009). However, this pool solely served as a comprehensive overview of available KPIs which might be considered within the scope of an analysis or evaluation respectively. It is certainly mindless to calculate all of them as such an approach would be far too expensive. Furthermore, variables lose meaning when too many of them are in place (Wagner, 2010) – i.e. measuring for the measurement’s sake. This implies that the employed KPIs should be chosen with care, focusing on those of particular interest for the specific enterprise.

After the relevant KPIs have been identified and selected, intended realistic and ambitious target values should be determined (the specification of upper and lower bounds would constitute an alternative). By these means it is ensured that a service or business model prototype is pit against something. The final constitution of the KPI pool should contain both, quantitative and qualitative parameters. Especially the latter cannot frequently be measured in a direct way due to lack of data or effort of ascertainment. In such cases, it is necessary to draw on the assessment of experts (e.g. competitive position on the market), surveys, or auxiliary indicators (e.g. fluctuation rate or rate of sick days as indicator for employee satisfaction).

Subsequently, the concrete measurements should be performed. A continuous and ongoing monitoring of key figures allows for comparing at different points in time (e.g. old, new situation), illustrating developments, and deriving projections. In addition, the KPIs serve as a basis for the management summary, feed the executive dashboard, and could also be used for benchmarks.

5 Conclusion, Discussion and Outlook
In this paper a newly developed multi-tier framework for evaluating service prototypes and associated business models is presented. It is inspired by several theoretical concepts as well as practical considerations and tries to cover the need for a concrete con-
cept, methodology, or exemplary process in order to perform a service prototype evaluation. The SBMEF’s hierarchical three layer design is based on the consideration that the needs of different stakeholders can be addressed in a more appropriate way when the evaluation layers are geared to the operative levels of abstraction. Necessary artefacts for the evaluation process are modelled top-down whereas the analysis and evaluation takes place bottom-up. The three layers resulting from process decomposition are supplemented by an executive dashboard. On each layer four different views are distinguished enabling the deduction of concrete recommendations for action, e.g. by comparing the service prototype’s target performance with the actual one. In order to conduct the evaluation as holistically as possible and not unilaterally (e.g. purely finance-oriented), a BSC-related approach is pursued at each view. However, without an appropriate trunk of methods and tools such an assessment is not feasible, which is why the multi-tier concept represents solely a skeleton. Such enablers can be e.g. TCO, TEI, the resource-based view, and a pool of key figures.

The application of the SBMEF is not only limited to prototypes. It is conceivable that also existing services and business models can be evaluated by following the presented concept. The focus of the evaluation might be shifted as, first and foremost, concrete information regarding market performance is broadly available. Therefore, it can be said that the introduced framework clearly supports companies in assessing and realising services, identifying areas of improvement, and directing resources.

The present work contributes to both academia and industry. It represents one step towards the development of a holistic and generic evaluation framework for service and business model prototypes. Companies benefit from the fact that the framework can be customised and scaled to their specific needs. This is an important property as (i) each firm is virtually unique, following their own strategies and values, and (ii) services themselves are highly heterogeneous. Therefore, the focus can be laid on what is relevant and of interest for a firm without losing sight of potential other internal and external influences. At this stage it cannot be guaranteed that the SBMEF entirely meets the expectations as proof of concept is still required. The first field-test that will be conducted during the implementation of a new smart service concept of an industry partner is still pending.

Notwithstanding the above, the initiated, three-year lasting build-evaluate loop will provide valuable insights in order to enhance the SBMEF. Simultaneously, it should also be incrementally expanded in this context. For instance, it is intended to include a pool of survey questions in order to better address the perspectives of employees and customers. By these means, performance zones of tolerance shall be implemented following the ideas of Parasuraman, Zeithaml, and Berry (1994) and McNaughton, Ray, and Lewis (2010). It should be mentioned in this context that it might not make sense or may not be possible to gather fine-granular data on the lowest evaluation area levels. An example is the measurement of customer satisfaction for activities that do not directly involve the external customer. In such a situation this item has to be initially measured on a higher level, relying e.g. on survey data, and thence further aggregated.

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The evaluation methodology outlined in this paper represents a very profound approach which might turn out to be impractical - for want of practical validation. The three layers, four views, and five evaluation areas span a scope with a maximum of 90 evaluation perspectives. Despite that comprehensiveness it is recommended to perform the evaluation holistically. This may result in initially higher effort (e.g. for first-time data collection) which lays the foundation for further, ongoing evaluation steps and cycles respectively. Nonetheless, companies can decide for themselves whether they want to approach incrementally to the evaluation by narrowing down the procedure to selected layers or views which refers back to the customisability of the framework.

It is the research project’s long-term objective to fully automate the evaluation framework – most notably to reduce the potentially high effort for its application. This not only involves the collection, aggregation, and analysis of data but also the wizard-like deduction of recommendations for action (business intelligence). The possible involvement of external parties in the evaluation process might make the accomplishment of this goal difficult as this requires the conduction of surveys. Nevertheless, a semi-automation which in a first version covers realistic parts such as the analysis of key figures seems feasible.

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References


Churn prediction based on text mining and CRM data analysis

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Abstract

Within quantitative marketing, churn prediction on a single customer level has become a major issue. An extensive body of literature shows that, today, churn prediction is mainly based on structured CRM data. However, in the past years, more and more digitized customer text data has become available, originating from emails, surveys or scripts of phone calls. To date, this data source remains vastly untapped for churn prediction, and corresponding methods are rarely described in literature.

Filling this gap, we present a method for estimating churn probabilities directly from text data, by adopting classical text mining methods and combining them with state-of-the-art statistical prediction modelling. We transform every customer text document into a vector in a high-dimensional word space, after applying text mining pre-processing steps such as removal of stop words, stemming and word selection. The churn probability is then estimated by statistical modelling, using random forest models. We applied these methods to customer text data of a major Swiss telecommunication provider, with data originating from transcripts of phone calls between customers and call-centre agents.

In addition to the analysis of the text data, a similar churn prediction was performed for the same customers, based on structured CRM data. This second approach serves as a benchmark for the text data churn prediction, and is performed by using random forest on the structured CRM data which contains more than 300 variables.

Comparing the churn prediction based on text data to classical churn prediction based on structured CRM data, we found that the churn prediction based on text data performs as well as the prediction using structured CRM data. Furthermore we found that by combining both structured and text data, the prediction accuracy can be increased up to 8%.

These results show clearly that text data contains valuable information and should be considered for churn estimation.

Keywords

churn, churn prediction, text mining, text data, random forest, CRM
1 Introduction

In the context of analytical marketing, customer churn prediction becomes a major issue for firms. As it is known that retaining customers is far more profitable than acquiring new ones, there is considerable focus on retention campaigns (Henning-Thurau & Hansen, 2010). If the churn probabilities on a single customer level are known, marketing can focus its retention programs on the customers with high churn probability, thus increasing the efficiency of those programs.

Personalized customer data can be divided into two major different data types. One is the structured data, which covers information about the customer typically stored in CRM databases. The other type is text data, also referred to as unstructured data. Text data may originate from emails or transcripts of phone calls with call centres, or other customer contacts over digitised channels.

For churn prediction, the analysis of structured data is the classical approach. Structured data has been the primary information hub for the past decades (Ngai, Xiu, & Chau, 2009). As more and more customer text data is becoming available, one might argue that using this data for churn prediction could improve the churn models. Methods for analysing text data are available from a rich body of literature in the field of computer science. Covering machine-based analysis of texts and different approaches of extracting information, have been developed (Feldman & Sanger, 2006).

As in the past mainly structured data was used for churn prediction, the goal of this paper is to investigate how customer text data can be used for churn prediction, and whether using text data in addition to structured data can influence the churn prediction accuracy. To analyse this problem, we use a test data set with anonymized customer data from a major Swiss telecommunication provider. The data set contains both structured and unstructured (text) data for more than 20’000 randomly selected customers. First we analysed the structured and unstructured customer data separately and compared the results. Second we combined the two data sources to investigate whether the combination leads to an increase in the churn prediction accuracy.

The structured data is taken from the provider’s operative systems, such as CRM or ticketing systems. This data has been used previously for churn prediction by the firm. The text data consists of anonymized emails and transcripts of phone calls between customers and call centre agents for matters of questions, complaints and administrative reasons. This data has not yet been used for churn prediction.

After the introduction, this paper provides an overview over the related literature, followed by a description of the theoretical methodology used for the churn prediction. Then a description of the available customer data is given, complemented by the application and the results of the methodology on the data. A final conclusion sums up the paper.
2 Related literature

In recent years, a large number of machine learning and knowledge discovery techniques have been proposed and applied to the problem of customer retention in the domain of CRM (Berson, Smith, & Thearling, 2000). Originally introduced in the finance sector, customer retention has found its path into other fields, such as telecommunication. Within customer retention, the task of identifying the customers most likely to churn is of crucial importance (Keaveney & Parthasarathy, 2001).

With CRM becoming a critical success factor in today's business environment, academic research produced a vast number of articles covering all areas of CRM. Especially applying data mining methods in order to gain customer knowledge is well-covered in literature. (Ngai, Xiu, & Chau, 2009) present an extensive literature study for data mining techniques in CRM. They revise more than 80 papers, published between 2000 and 2007, many of them covering the domain of customer churn prediction.

Most papers concerning customer churn, as collected by (Ngai, Xiu, & Chau, 2009) focus on structured data and various data mining techniques such as decision trees (Xie, Li, Ngai, & Ying, 2009), logistic regression, support vector machine (Yu, Guo, Guo, & Huang, 2011), artificial neural networks, etc. Most of those methods are based on supervised learning and use a single prediction model. In the past years, those single model approaches have been replaced by hybrid classification models with the goal of increasing the prediction accuracy ((Huang & Kechadi, 2013); (Khashei, Hamadani, & Bijari, 2012); (Tsai & Lu, 2009); (Lee & Lee, 2006); (Coussement, Benoit, & Van den Poel, 2009); (De Bock & Van den Poel, 2011); (De Bock & Van den Poel, 2012)).

Parallel to churn prediction using structured data, approaches of integrating the Voice of Customers (VOI) to CRM have been developed. The data for VOI analytics is gained through direct or indirect questioning, with data being either structured data from surveys or unstructured (text) data from emails, transcripts or free text answers in surveys ((Aguwa & Monplaisir, 2012); (Chang, Lin, & Wang, 2009)).

Labour-intensive manual text mining approaches first surfaced in the mid-1980's, but during the past two decades this field has advanced drastically, accompanied by technological advances, especially in computer science. Through these advances, text mining has gained vast attention throughout science and business. Several methods have been developed to classify texts and analyse content for unsupervised mapping of texts (Kao & Poteet, 2006).

Despite the extension of text mining, it has rarely been applied in CRM. Text mining methods for customer churn prediction are mostly non-existent in literature. One example of text mining applied to churn prediction was published by (Coussement & Van den Poel, 2008). They combine text mining with the analysis of structured data. Their research showed that the churn prediction accuracy can be improved by combining the two data sources. With a follow up paper, (Coussement & Van den Poel, 2009) integrate the emotions from client/company interaction emails, in order to improve customer at-
trition. In this paper the focus is on improving the churn prediction accuracy by combining structured and unstructured data. Our method follows the same approach but uses a different statistical prediction method and a different feature selection.

3 Methodology

In this section, the methods used for getting from the original customer data to the final churn prediction are presented. The methods are described on a theoretical basis, and their application on the real data will then be described in section 4.

Figure 1 shows the complete process from the data sources to the final churn prediction. The first step is to collect the data from the data bases. After having established the data basis, several pre-processing steps are necessary in order to structure the original data, so that it can be used in a prediction model. The last step is to apply a suitable statistical model on the pre-processed data to estimate the churn probabilities for each customer. The methods underlying the steps are described in detail in the following paragraphs.

3.1 Structured and unstructured Data

Structured data is defined as data that resides in fixed fields within a record or file. Relational databases and spreadsheets are examples of structured data (Enterprise, 2014). Structured customer data is usually stored CRM systems and typically includes personal information, subscribed services and/or products and sociodemographic information. In contrast, unstructured data refers to information that does not reside in traditional row-column database structures. Unstructured data files include text and multimedia content.
Examples are emails, text documents and further forms of texts (Enterprise, 2014). In unstructured data the information content is not stored within a specific field, but is hidden in the content of the text itself. Gaining information from texts requires extensive pre-processing steps in order to reveal its information content.

For training statistical prediction models with supervised learning, the training data has to be labelled. For the case of churn prediction, each customer is assigned to either the class *churn* or the class *no-churn*, based on the observed behaviour in the past.

### 3.2 Pre-Processing

Pre-processing of the structured data includes checking of consistency and relevance of the variables. The relevance of each data field is to be checked due to the usually large quantity of data available in the CRM system, and a variable selection has to be made. Furthermore there might be the need to combine and convert the raw data into new variables with more valuable information content.

The pre-processing of unstructured data is necessary for structuring the text data in a way that allows the included information content to be analysed by a certain method. According to (Hippner & Rentzmann, 2006), text pre-processing can be split into three main categories. The approach referred to as *Morphologic Approach* is likely to be the most widely spread approach in text mining because of its low complexity, high quality of the results and computational cheapness. The two other approaches called *Syntactic Analysis* and *Semantic Analysis* are of a much higher complexity. The morphologic approach focuses on simply counting the words occurring in a text, whereas the syntactic approach analyses the relationship between words within sentences, with the focus on extracting information on certain syntactic units. The semantic analysis tries to understand the text, comparable to what humans do while reading.

For our investigation, the morphologic approach was chosen because of its simplicity, computational effectiveness and the kind of texts we have. The texts for this project are mainly transcripts of phone calls and emails. While the writing quality of the emails is decent, the transcripts usually consist of many abbreviations, key words and incomplete sentences. Therefore a syntactic or semantic approach would be difficult.

Before applying any pre-processing steps, the texts of the same customer are aggregated. As some customers can have several texts these are merged into one document. Each customer can thus have only one document, but in one document there can be multiple texts. Creating a document is done by simply attaching one text to another. We choose to do so, as the churn prediction is on a customer level rather than on a text level, and therefore each customer should only have one document.

Applying the morphologic approach, all semantic information is neglected. Each document is converted into a high-dimensional vector of weighted frequencies of the occurring words. Thus each document is of the length $n$, with $n$ being the number of different words occurring in a specific document. The so called *Bag of Words* (BOW) is a representation of all distinct words occurring in all documents and is of size $N$. 

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Having disjoined the documents, they are pooled in a Term Document Matrix (TDM). In this matrix, each document is represented as a line, and each column corresponds to one word of the bag of words. Each cell of the matrix represents the count of the one specific word in one document. So the TDM is of size $D \times N$ with $D$ being the number of documents and $N$ the size of the BOW.

![Figure 2: Example of conversion from text to Term Document Matrix, where Doc stands for document](image)

As a transformation of the raw documents to a TDM typically leads to a very large and only hardly manageable size, several raw text cleaning steps are crucial. The aim is to reduce the number of words as much as possible in order to keep the size of the BOW small. Thereafter, further steps of selecting only the relevant words are performed in order to further reduce the size of the TDM.

In the first step of cleaning the documents, special characters and punctuation are removed, followed by the replacement of the acronyms with their radicals, by using a reference list. Next, all the words are replaced with their stem, e.g. `complain` is the stem for `complained`, `complaint`, `complaining`, etc., by using Porters algorithm (Porter, 2006). Stemming drastically reduces the number of words and increases the information retrieval performance (Kraaij & Pohlmann, 1996).

After the stemming process, all stop words are removed. Stop words contain either very little or no information content, e.g. `are`, `the`, `at`, `from`, etc. The removal is done by using a pre-defined list of standard stop words extended with application-specific terms.

The remaining words build the basis for the creation of the TDM. In the process of building the TDM, all the words with very low occurrences, e.g. less than three, are removed as these usually contain clerical errors or are artificial words, not recognized by the stemmer or the stop word list. Having cleaned the texts and represented them in the TDM, the next step is to further reduce the number of words by an appropriate feature selection.

### 3.3 Feature selection

(Do, Hui, & Fong, 2006) state that feature selection aims on removing irrelevant and noisy information from the data, by focusing on relevant and informative features only. Applied to text mining, the goal is to reduce the number of words in the TDM for further statistical modelling, as the words of the TDM can be understood as features. For
churn prediction, only those words having significant information content with respect to the churn probability should be selected.

We use labelled data (churn or no-churn) as training data. This can be taken advantage of by using a supervised method for the feature selection process. One approach to assess the relevance of the features is to measure their distinguishing ability between the two classes churn and no-churn. We chose the Discriminating Power Measure (DPM) (Chen, Lee, & Chang, 2009), a supervised method which focuses on discriminating words in the context of classification problems.

The DPM score is established by using the following notations. Let \( w \) be any word, its presence or absence in class \( i \) is defined as follows:

- \( A_i \) number of documents with word \( w \) and belonging to class \( i \)
- \( B_i \) number of documents with word \( w \) and not belonging to class \( i \)
- \( C_i \) number of documents without word \( w \) and belonging to class \( i \)
- \( D_i \) number of documents without word \( w \) and not belonging to class \( i \)

The total number of documents is \( N = A_i + B_i + C_i + D_i \), the total number of documents in class \( i \) is \( M_i = A_i + C_i \) and the total number of classes is denoted by \( m \). With these notations, the DPM score for word \( w \) is defined as follows (Chen, Lee, & Chang, 2009):

\[
DPM(w) = \sum_{i=1}^{m} \left| \frac{A_i}{M_i} - \frac{B_i}{N - M_i} \right|
\]

The fraction \( A_i / M_i \) can be interpreted as the probability of word \( w \) occurring in a document of class \( i \), where \( B_i / (N - M_i) \) is the probability of the same word occurring in a document not belonging to class \( i \). The DPM is the absolute difference of these two probabilities, summed up over all classes. The higher the DPM score for a given word \( w \), the more discriminate power is contained in it.

Based on the DPM, the words can be ranked according to their discriminative power. For the text analysis, we only use the first \( k \) words of this list, thus reducing the BOW to one with a higher selectivity.

The issue remains to define the number \( k \) of features to be selected. In order to find the optimal number of words for the TDM, a graphical approach is chosen. The words are ordered according to their DPM score and then plotted against their rank. From left to right the graph is typically rapidly decreasing, ending in a long flat tail which is cut off.

### 3.4 Modelling

The goal of the statistical model is to assign each customer a churn probability, based on the available data. Several methods can solve this problem, such as Naive Bayes, logistic regression, support vector machines etc. We decided to use random forest (Breiman, 2001) because of its easy application and ability to handle big data sets. Despite not be-
ing widespread in text mining, random forest has become an often-applied method in data mining. It is also suitable for handling a TDM because it can deal with big numbers of variables.

The random forest model is trained with labelled test data. For the training, we used a five-fold cross-validation: The training data is split into five parts. The model is then fitted on four parts, and the fifth part is used for evaluation of the prediction accuracy. This is repeated five times, so that each data point is predicted once (Hastie, Tibshirani, & Friedmann, 2001).

3.5 Evaluation criteria

Validating the performance of our model is a critical step. We decided to use the lift chart, as is an excellent way to show the performance of models. The lift is a measure of the effectiveness of the predictive model. It is calculated as the ratio between the results obtained with and without the predictive model. The lift chart shows the likelihood of responses from customers based on the predictive model and randomly chosen list of customers. The model is performing well if the response within the target segment is much better than the average for the population as a whole ((Jaffery & Liu, 2009); (Wikipedia, 2014)).

As an example, let’s assume that the data has an average churn rate of 25%, and the model has identified a customer segment with an average churn rate of 75%. Then the lift of that segment is 3.

In the lift chart, the customers are ordered decreasingly according to their predicted churn probability. From that, the lift is estimated continuously over all the customers. The lift is represented by the y-axes and the deciles of the ordered customers are on the x-axis.

4 Empirical case study

4.1 Empirical data

In our study, we used anonymized data, obtained from a major Swiss telecommunication provider. Its product portfolio includes internet, digital TV and digital phone. The customers can choose between several product combinations and sub-products with different pricing models. Customers pay a monthly fee, depending on the subscribed products. The customers are in a contractual setting with the firm and can only end their contract with a two month cancellation period after the first 12 months. When an ordinary customer cancels the contract the services by the firm and the payments by the customer continue until the defined cancelation date.

The company has a structured CRM data base where contract related data is stored together with customer data, sociodemographic data, and usage data. Furthermore, all customer care related emails and transcripts of phone calls to the call centre are stored.
in a separate database. A customer becomes a churner when the provider receives a con-
tract cancellation letter or phone call and it is clear that the customer cannot be held by
any taken retention action.

Anonymized customer data of a six month observation period was selected at six corre-
sponding snapshot dates. At each snapshot date, the customer data up to six months pri-
or to the snapshot date was extracted, and a 30 days survey period after the snapshot
date was used to define whether a customer is a churner, thus providing the labelling.
Figure 2 illustrates this data selection method.

As the number of churning customers at each snapshot date is small compared to the
non-churning customers, an oversampling of the churning customers was applied
(Nisbet, Elder, & Miner, 2009). More specifically, all churning customers for each sur-
vey period were selected and then complemented with a random sample of non-
churning customers, selected at the same snapshot date. This leads to a customer sample
on each snapshot date with approximately three times as many non-churning customers.
So, the oversampled average churn rate is about 25%.

In order to show the beneficial effect of including unstructured data into the churn pre-
diction model, only customers with existing text data were considered for this case
study. Table 1 summarizes the data characteristics.

<table>
<thead>
<tr>
<th># of customers</th>
<th>20191</th>
</tr>
</thead>
<tbody>
<tr>
<td># of churners</td>
<td>5356</td>
</tr>
<tr>
<td># of structured variables</td>
<td>305</td>
</tr>
<tr>
<td># of words in TDM</td>
<td>12105</td>
</tr>
</tbody>
</table>

*Table 1: Data details*

4.2 Data processing

The structured data mainly contains anonymized information about the customer, socio-
demographic information, part of usage information, etc. As the provider has used the
structured data for churn prediction before, we used the pre-processing and feature se-
lection that has been already done by the provider for building the prediction models.
The unstructured customer data, which consists of anonymized emails and transcripts of phone calls, was pre-processed as described in Section 3.2. The first step is the raw text cleaning where all punctuation and special characters are removed, followed by the replacement of the acronyms with their radicals. Next the words are reduced to their stem and then the removal of the stop words is done. Following these pre-processing steps, the resulting TDM had 20191 rows (documents) and 12105 columns (words).

Based on the TDM, the DPM score for each word is estimated as a basis for the feature selection. As described in section 3.3, the determination of the number of features was done by a graphical approach. The DPM score is calculated for each word of the TDM. Then the words are ordered in decreasing order, according to their DPM value, and plotted against their index, where the index is equal to the rank in the order. Figure 3 shows the results for our data set; the x-axis is the rank of the words and the y-axis represents the calculated DPM score. For better readability, the graph is restricted to the 1000 features with the highest DPM value.

Figure 3: DPM score of the 1000 words with highest DPM value, plotted in decreasing order. The vertical dashed line marks the 400th word and the horizontal dashed lines marks the DPM value at the 400th word.

Figure 3 shows that the most discriminating features have a DPM score of about 0.27 wherefrom the score decreases rapidly. For the features from 1000 to 12000 (not shown in the figure), the drop of the DPM score is less than 0.01. In contrast, the drop for the first 1000 features exceeds 0.25. By using only the first 400 features, 95% of the total DPM range is covered. Based on these considerations, the number of features used for the TDM was set to 400. To further verify this selection, the prediction model was run with several numbers of features and the lift was compared. It turned out that more than 400 features did not increase the lift, while going below 400 features affected the performance negatively.
4.3 Churn prediction

For the churn prediction, two different cases are built. The first case is a comparison of the churn prediction on structured and unstructured data, respectively. The churn prediction on structured data serves as the benchmark as it represents the way churn prediction has been applied to date. The churn prediction on unstructured data illustrates the information content of the text data with respect to predicting churn. The second case is the combination of both structured and unstructured data for churn prediction. All predictions are done by using random forest as a predicting model, using five-fold cross-validation for the performance evaluation.

4.3.1 Churn prediction with structured and unstructured data

Figure 5 shows the lift, using structured and unstructured data separately on the prediction model. The structured data contains 305 variables and the TDM has 400 features, selected by the DPM criteria.

![Lift chart of structured and unstructured data](image)

Figure 5: Lift chart of structured and unstructured data, respectively, using random forest. The x-axis shows the cumulative ratio of the ordered model scores and the y-axis shows the lift. The bold line represents the estimated lift of the structured data; the dashed line shows the estimated lift of the unstructured data.

The lift of the structured data starts on a very high level, before decreasing. At the first decile, the average lift is around 2.7, which corresponds to around 70% of correctly classified customers. This means that within the 10% of the customers with the highest predicted churn probability, about 70% actually churn. This lift serves as the benchmark.
The lift of the unstructured data starts high as well, despite not quite reaching the benchmark. At the 10% mark, the lifts become identical, before the unstructured lift loses after the 20% mark compared to the benchmark.

Despite these differences, it can be stated that the amount of information about the churning behaviour is similar in both data sets. Additionally and more generally, it can be stated that the unstructured data clearly holds significant information on the churning behaviour.

4.3.2 Churn prediction, combination of data

Having analysed the two data sources separately, the remaining question is whether the combination of both data sources is able to outperform the benchmark. The combination of the two data sources is straightforward, by adding the two data sets together, creating a new data set, now containing 705 variables (305 structured, 400 words), and applying the same random forest approach to this extended data.

Figure 6 shows the lift of the model, using both data sources, and the lift of the benchmark.

Figure 6: Lift chart of structured data, using random forest. The x-axis shows the cumulative ratio of the ordered model scores and the y-axis shows the lift. The bold line represents the benchmark; the dashed line shows the estimated lift of the combined (structured and unstructured) data. The red lines show the increase of the lift at the first decile

Figure 6 shows clearly that the combined approach exceeds the benchmark significantly. At the 10% level, the combined approach shows an improvement of about 7.5% for the classification precision with respect to the benchmark. This improvement can be attributed to the additional information of the added text data.
5 Conclusions

The main goal of this paper was to investigate whether the combination of structured and unstructured customer data can increase the customer churn prediction precision, compared to using structured data only. We were able to show that the combination of the two data sources does increase the prediction precision of up to 8%. Furthermore we found that the unstructured data itself holds significant information on the churn probability. The information content of the text data is nearly as high as the information content of the structured data.

Based on these results, it can be stated that customer text data does hold information which complements the structured data. Thus, retention marketing campaigns can be directed more exactly by using text data in the churn prediction models, increasing both the efficiency and the effectiveness of the campaigns.

References


http://en.wikipedia.org/wiki/Lift_%28data_mining%29 abgerufen


Measuring Value Created Through Corporate Social Responsibility in Value Creation Chain

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Abstract
This paper present a conceptual framework for measurement of value created through CSR. The method of GQM (Basili, et al., 1994) was chosen for creating this value measurement framework. The framework takes in to account value creation possibilities through all four responsibility types proposed by Carroll (1999) and considers aspects of shared value (Porter and Kramer, 2011). Further adjustments of this framework will be made after surveying experts of CSR and VCC. Development of such framework would allow to measure all value created through CSR independently who has received it – company, stakeholders or society.

Keywords
corporate social responsibility, value creation chain, value measurement

Introduction

Problem. There is a discussion in academic society that CSR not always helps to create value higher that its implementation costs. It leads to assumption that implementation of CSR activities might be detrimental for some companies and the whole idea of CSR might be not enough sustainable in reality. But such assumption can’t be reliably verified without measuring all value created through CSR.

Methodology which enables measurement of value created through CSR in whole VCC would allow checking particular cases when value created through CSR seems lower than costs of CSR implementation. Such tool would build a foundation for further research of value creation through CSR and would help to determine reasons why created value might be lower than costs in each particular case. As for instance:

(1) if wrong CSR initiatives were chosen for implementation (i.e. wrongly chosen stakeholders);
(2) if CSR implementation level has not yet reached the break-even point;
(3) if not all value was measured.
The aim of this research is to propose a methodology for measuring value created through CSR which might be further developed and adopted for value measurement not only in a single company, but in the whole VCC.

The conceptual framework for measuring value, created through CSR, is developed based on theoretical research. Further verification by survey of experts of CSR and VCC should be held to improve the framework and adopt it to particular type of VCC. The suggestion on how to measure value created through CSR was proposed by adopting:

1. theoretical framework of value creation through CSR (Jonikas, 2013)
2. the method of GQM (Basili, et al., 1994) as main form of framework
3. the nine step social-welfare analysis methodology (Boardman et al., 2006), applied in Walmart CSR case by Malts et al., 2011.

This paperwork consists of three parts: value creation through CSR, framework for value measurement, conclusions and insights on further development.

2 Value creation through CSR

Theoretical framework (Jonikas, 2013) was developed from viewpoint of single company which is the part of VCC. The suggested framework conceptually shows all possible areas of value creation through CSR as well as beneficiaries of created value. This framework was improved by suggesting possible value expressions proposed by most researchers (Figure 1). There might be three major groups who can claim for a part of created shared value: society, stakeholders and company itself. Though there are many possibilities for value creation through CSR, scholars note some major problems especially related to CSR and stakeholders conjunction. Juščius (2007), Yuan, Bao and Verbeke (2011) pointed the situation that, societal stakeholders’ increasingly demand for CSR initiatives, and simultaneous corporate managers require that any such initiatives should improve business performance. Such situation has triggered various alternative strategies to integrate CSR in prevailing business activities, but not all of them are successful. One of most perspective strategy tends to be based on concept of shared value suggested by Porter and Kramer (2011). Shared value is defined as policies and operating practices that enhance the competitiveness of a company while simultaneously advancing the economic and social conditions in the communities in which it operates. Quite related approach was given even earlier by Nohria and Ghoshal (1994). Shared value creation focuses on identifying and expanding the connections between societal and economic progress. Some scientists (Vaitkevičius, Stukaitė, 2009; Valackienė and Micevičienė, 2011) acknowledge that CSR discussions often fall into to a logical trap. If some socially desirable activity is profitable, then it is best described as “intelligent operation of the business”. If the socially desirable activity is not profitable, then companies will not voluntarily undertake it unless required to do so by law or regulation. When private profits and public welfare are aligned, CSR seems to be irrelevant. Companies will undertake this activity driven by their self-interest, even if they call their actions as CSR,
and shared value will be created. Such value creation through CSR seems to be more sustainable, because it’s emergence less depends on corporate interests and government regulations.

Speaking about value creation, an important point of view should be noted that CSR is becoming a business strategy and not only a theory (Juščius, Pukeliūnė and Šneiderienė, 2009). Furthermore most of recently performed empiric CSR researches focus on value received by companies. Though, value for stakeholders mostly remains as a secondary topic. Talking about financial value created through CSR, more outstanding view was presented by Visser (2010), Margolis and Walsh (2001) who said that, value creation through CSR is more than just financial profitability. The goal is economic development, which means not only contributing to the enrichment of shareholders and executives, but

Figure 1: Conceptual framework of value creation through CSR
improving the economic context in which a company operates, including investing in infrastructure, creating jobs, providing skills development and so on. Furthermore company benefits received through CSR could be generally grouped into:

- **financial value** - Griffin and Mahon (1997), Margolis and Walsh (2001), Aras, Aybars, Kutlu (2010), Vyser (2010), Ioannou and Serafeim (2010);

Apart those value creation possibilities through CSR, scholars note quite many problems especially related to CSR and stakeholders conjunction. Juščius (2007), Yuan, Bao and Verbeke (2011) pointed the situation that, societal stakeholders’ increasingly demand for CSR initiatives, and simultaneous corporate managers require that any such initiatives should improve business performance. Such situation has triggered various alternative strategies to integrate CSR in prevailing business activities, but not all of them are successful. And while there is no holistic framework how to measure value created through CSR, decision making on CSR implementation still remains subjective and one-sided in most cases.

Theoretical and empiric researches confirm that value creation through CSR is feasible independently to company size particularly on the factors that translate into marketing benefits (Bocquet and Mothe, 2011; Vancheswaran and Gautam, 2011). As it is confirmed, small companies can also introduce radical innovation based on their CSR involvement. Results advise that small companies should decide which dimension of CSR is central to their strategy, and how they could use their strategic CSR to develop radical innovation, thus taking advantage of their CSR orientation to further develop value creation and innovation performance.

As F. Januszewski (2011) noted in his research, the aim of the identification of key customers is to facilitate the optimal allocation of resources of the company. Not all customers are equally important for the company, and the company is not able and should not try to acquire and satisfy needs of each customer. The same should be said about company stakeholders. Not all of them are equally important for the company, because implementation of CSR initiatives brings different value to stakeholder groups. Purely from the economic point of view, the company should adjust its CSR policy towards those stakeholder groups where the largest shared value is created at lowest costs of CSR implementation (highest “profit” of CSR implementation independently who will get the largest share of created value).
3 Framework for value measurement

The method of GQM (V.R. Basili, et al., 1994) was chosen for creating this value measurement framework.

- Objectives and goals for GQM method were adopted from conceptual framework of value creation through CSR in separate member of VCC proposed by D. Jonikas (2013). Main objectives are to measure value created through CSR and received by company, stakeholders and society. Goals of this method go deeper and describe more specific areas where or to whom the value might be created.

- Questions for the framework where chosen based on acknowledgement that CSR consists of four kinds of responsibilities: economic, legal, ethical, and philanthropy (Carroll, 1999; Aras and Aybars, 2010; Gholami, 2011; Valackienė and Micevičienė, 2011). As authors suggested different variables to reveal value in each part of CSR, the range of questions might and should be expanded after surveying experts of CSR and VCC.

- Metrics were found the most challenging part of this framework. There already has been made a distinction between value creation and value appropriation, recognizing that, in some cases, organizations that create new value will lose or will have to share this value with other stakeholders, such as employees, competitors, or society (Nohria and Ghoshal, 1994; Makadok and Coff, 2002; Chatain and Zemsky, 2011; Porter and Kramer, 2011). Therefore, researching value creation through CSR, Porter and Kramer (2011) suggested the concept of shared value. Four types of value (D.Jonikas, 2012) should be taken into attention while developing metrics for this framework: not shared exchange, not shared use, shared exchange and shared use value.

CSR implementation in VCC was confirmed by Cruz and Boehe (2008) who proposed a new concept called “Sustainable global value chains” that might stimulate an emerging research field. Their research showed that such value chains might gain additional benefits including: bargaining power, differentiation strategy and awareness strategy. Sustainable global value chains, compared to conventional commodity global value chains, are influenced by certification agencies that usually set and enforce product and process related parameters. These environmental and social parameters impose new costs on the chain and may decrease the price competitiveness of CSR products. Consequently, the chain is driven towards a differentiation strategy, focusing on specific market segments that are willing to absorb CSR products. Though CSR as a distinct form of product differentiation in the whole VCC has been acknowledged for more than decade, it still depends on particular success factors named by Reinhardt (1998).
## Table 1: Conceptual framework for measuring value created through CSR

Value is created and extracted in a network of relationships, and value can best be understood holistically as a function of the entire network. Network externalities such as information cascades, demand queues, social contagion, bandwagons, herding, and
path-dependence in the cultural industries have been explicitly analyzed by Kretschmer et al. (1999) – amongst others. According to Hearn, Roodhouse and Blakey (2007), new value creation is achieved through manipulation of information and the characteristics of information are very different from ordinary goods. This is especially important while analyzing value creation chains and transfer of information.

The recent literature on standards in global value chains has emphasized the power of lead firms in defining standards and codes of conduct, as well as the ways in which CSR pressures can alter the nature of governance within the value chain (Altenburg, 2006). This tendency suggests that companies might receive different value and take different costs of CSR action while implementing the same CSR policy.

Some authors additionally offer to use the term of multi-stakeholder partnerships (that bring together public and private actors) as local stakeholders take more influence in the formulation, implementation and monitoring of CSR standards within global VCC (Prahalad and Ramaswamy, 2002). This might provide greater scope for coordination and harmonization of CSR amongst society, thereby reducing the need for individual brands to undertake their own audits of CSR implementation.

4 Conclusions and further development

Value creation through CSR is mostly researched only from the perspective of a single company or group of stakeholders, but not holistically in a whole VCC. There are various suggestions on value measurement methodology, but when it comes to measurement of shared or use value, it's difficult to find any methodology convenient enough for practical implementation. The proposed framework is a conceptual idea which should be developed in few ways:

(1) any new benefits invoked by CSR implementation should be reviewed and, if needed, - added to question section of this framework;
(2) there should be added more metrics and rules for their calculation in order to make this framework more objective and precise;
(3) system for measurement of use value in practice should be clarified;
(4) particular industry or business field, because value creation through CSR might be very different in specific industries;
(5) the framework should be adopted to measure value creation through CSR in whole value creation chain in order to check the cumulative costs and benefits of CSR implication.

The holistic framework of value creation assessment would be most helpful evaluating CSR integration into VCC:

- companies seeing that shared value gained through CSR can cover CSR implementation costs could be encouraged to join such social initiative;
companies already engaged in CSR could see which initiatives are most beneficial for them, society and stakeholders and could put more effort on those particular initiatives.

Therefore simple and easily applicable framework for measurement of value creation through CSR would be highly beneficial for small but innovative companies.

References


Agile Methods in a New Area of Innovation Management

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Abstract
In our fast changing world the traditional approaches of long term strategic planning and distinct Research and Development (R&D) teams might not fit the promptness of change currently taking place. As a result, more and more companies focus on capabilities of their employees and organizations to launch agile new products or re-design the core processes and business models of the company. Especially large mature companies face the challenge of transforming into this new area of management. New structures and frameworks help these companies to transform into an innovation driven enterprise. This paper aims to provide guidance in applying different frameworks in practical use. For example, a Three Canvas Model is presented that allows to operationalize the business model canvas, including the innovation success factors viability, feasibility and desirability. The model supports the definition of the customers and their needs and the joint definition of the product vision as a basis for developing the product with agile processes or for managing a project. Furthermore, the model supports the linkage between early phases (front-end innovation and upstream innovation) and the actual development phase (downstream innovation). To get a good linkage a clear vision is essential and is seen a key success factor. Applying the model in real business environment has proved that it helps to foster agile product management and agile product innovation. Still more research is necessary to determine how established organizations can better act in an agile way. The agile tools are still ”piecemeal” and rarely integrated across all processes. But this must be seen as an optimization potential for organizations in the future. However, the development of continuous agile practices that are vertically and horizontally coherent, takes agile leadership as well.

Keywords
Agile Methods, Design Thinking, Product Vision Canvas, Lean Entrepreneurship, Early Phases of the Innovation Process, Agile Product Management

1 Introduction
The usage of agile methods is becoming increasingly important for companies. However the SwissQ Trend and Benchmark Report 2014 has revealed that agile approaches are mainly used in software development. For other parts of the organizations, like IT management or product management, agile approaches are much less used (SwissQ Software Development 2014, 2014:14). To fully benefit from agile approaches in developments, the whole processes and culture of the organization should at least be aware of agile development methods. Especially product management should use agile approaches to a reach a higher maturity level.
However, agile methods are applied mainly in software development projects. The most popular agile method in software development is Scrum (SwissQ Software Development 2014). In most cases Scrum is applied in single teams, developing a specific piece of software or product. In some cases the projects run on a larger scale and multiple teams are involved.

Nevertheless, there are some approaches for the agile development of physical goods. Sobek et al (1999) and Liker (2006) recognized for example that Toyota is using the lean principle beyond manufacturing for any technical or service processes. They described the development process as a “set-based concurrent engineering” approach, whereby prototypes are used in an excessive manner and a broader range of possible designs are followed in parallel, while certain decisions are delayed. According to Liker, this approach may be the fastest and most efficient way to develop vehicles. (Liker, 2006)

A global study by IBM (2010) observed businesses that have increased their agility and improved business outcomes. The results were significant.

1. Growth in new business improved more than 100% year-to-year
2. Cost reductions of more than 100 times were achieved
3. Innovative solutions directly improved brand image
4. Process life cycles were reduced from months to days
5. Call center volumes were expanded with no increase in staff
In summary the complexity is increasing in our fast changing world and operational agility becomes more and more important. However, the change from a traditional to an agile organization is challenging. Nerur et al. (2005) discuss the challenges of migrating to agile methodologies. He distinguished management and organizational, people, process and technology issues. Figure 2 categorizes and outlines the critical success factors.

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<th>Management and organizational</th>
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<td>• Organizational Culture</td>
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<td>• Organizational Form</td>
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<td>• Management of Software Development Knowledge</td>
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<td>• Working effectively in a team</td>
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<td>• High level of competence</td>
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<td>• Customer relationships—commitment, knowledge, proximity, trust, respect</td>
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<td>• Change from process-centric to a feature-driven, people-centric approach</td>
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<td>• Short, iterative, test-driven development that emphasizes adaptability</td>
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<td>• Managing large, scalable projects</td>
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<td>• Selecting an appropriate agile method</td>
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<th>Technology (Tools and Techniques)</th>
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<td>• Appropriateness of existing technology and tools</td>
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<td>• New skill sets—refactoring, configuration management, JUnits</td>
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Figure 2: Innovation Capabilities for agility, Nerur (2005: 76)

Very often a wide gap exists between different departments and organizational entities within a company. Coster (2013) terms this phenomenon the “agile business gap”.

Stanford University started research programs to understand why organizations fail in bringing new ideas into the organization. Leifer (2012) describes it as the challenge of “how to bring it home”. The research is based on various Design Thinking projects with major industry partners around the globe. While the ideation and prototyping phase runs mostly smoothly, the implementation phase is a disaster in most large organizations. A study by Lewrick et al. (2012) analyzing the impact of Design Thinking projects of large companies with university partners, also identified that the implementation of the developed ideas became the biggest challenge in innovation success. The implementation for most ideas was started, but received multiple changes in the development process. The final products or services did not include the critical functions needed to be successful. In other instances, the solution focused finally merely on the design rather than on the functionality. Interviews with various stakeholders revealed that many decision-makers relevant for the implementation have not participated in the early definition of the problem, the innovation journey, experiencing the customer and the design and prototype interaction. Figure 3 depicts a typical agile process. Knowing the journey seems to be essential to accept and appreciate the final solution. Not knowing the journey might be confusing for stakeholders not involved in
the process, because in most cases the “planned solution” comes to the “expert mind” first.

Consequently, transforming customer needs into product requirements asks for a joint understanding of the complete situation (problem- and solution space) in the team. This can be supported by visualization of the ideas and moderated processes. The visualization of a product vision is beneficial.

Applying the philosophy of the business model canvas to create a product vision might be one way to engage stakeholders during an early stage and to bring them to develop a common vision. Existing methods and tools like the empathy map or the product vision canvas are useful to succeed. Osterwalder (2011:131) states that the Empathy Map, a tool developed by visual thinking company XPLANE, is a good way to start and to create really simple customer profiles and to go beyond a customer's demographic characteristics.

Pichler (2012) defines a product vision board or product vision canvas in order to describe and visualise the vision and the product strategy. It helps to capture and validate the ideas and assumptions about the target group, the user needs, the key product features, and the value created for the company developing the product.

### 2 Definition of Terms

The definition of innovation varies across sub-fields of innovation research. Schumpeter (1934) defines innovations as “The commercial or industrial application of something new, a new product, process, or method of production; a new market or sources of supply; a new form of commercial business or financial organization”. A broader
definition is stated by Drucker (1985). He considers innovation as the process of providing new improved capabilities or increased utility with a strong emphasis for market orientation.

Lewrick (2007:30) summarizes innovation as a “creative and complex risk taking endeavour to create and market an invention successfully, utilising all capabilities of a firm, to achieve significant incremental or radical improvement in a product, service, process, technical feature or due to administrative changes”. This view defines innovation precisely as something successfully implemented and emphasizes the importance of utilizing all innovation capabilities.

Hereby, a stakeholder becomes of paramount importance to the creative process. However, many stakeholders with strong interest are never involved (Nonaka and Takeuchi, 1995; Amabile, 1996, 1998).

The term “agile” is used to describe a set of values in the development process for products or services. In addition, there are several methods and tools that can also be considered “agile” and are used in support of these values. “Agile” was properly originated in the manufacturing industry as a way to increase productivity, promote innovation, and reduce risks associated with rapidly changing market demands. (Patton, 2009; Kettunen, 2009). However, most of the literature refers and provides examples related to agile software development.

A vision (understanding of business goals and objectives) for the intended innovation or project is important for today’s agile methods. Jeffries et al. (2000) highlights, “your chief weapon is business value”. Augustine (2005) adds that “agile methods are popular in the business community because they force concentration on business value above purely technical pursuits.”

3 Problems Addressed

Especially the early phase of the innovation process is crucial to success and characterized by high uncertainty. Agile methods might be one path to engage customer and user needs from the beginning of the development project. This supports the effort to determine the needs and requirements in an iterative approach. It is commonly agreed that successful innovations are characterized by the facts that they consider customer and user needs (“desirability”), the product concept (“feasibility”) and the business perspective (“viability”) in a consistent manner. However, the complexity in all the products and processes increases and the need for operative agility is seen as a key factor of success.

The business model and the product need to be developed in parallel. Both are strongly interdependent. However, in existing traditional companies the business model is mostly given and fixed.
The available methods are strong with regard to viability, which can be determined and visualized with the business model canvas. For the other two criteria mentioned above, there are no valuable canvas models described. However, in an iterative approach like Lean or Design Thinking etc., the findings from customer insights must be documented and the learnings integrated. A tool for learning about product and customer/user needs is missing. The developers/designers and the line managers must develop hand-in-hand and in parallel, so that influencing each other becomes of paramount importance.

Several canvas models are currently proposed by various scholars and practitioners. Examples of such models are the “Project Canvas” by openPM (OpenPM, 2014) or the “Consumer Trend Canvas” for analyzing consumer trends proposed by Trendwatching Inc. (Trendwatching, 2014). Gradually more visualization and canvas are applied in organizations. Obeya-rooms are good example for such a visualization.

4 Objective of the Paper

A literature review and our experiences in implementing ideas and moderating series of design thinking workshops in large organizations provided the foundation for expanding the canvas methods towards “desirability” and “feasibility”. The paper conceptualizes a product vision canvas, which is meant to be a derivate of the business model canvas. In addition, we propose a customer/user profile canvas, which helps to emphasize with the potential customer or user. The overall objective is to create a solid tool which fosters the elaboration and communication of the (product) vision and that can be used in different approaches and challenges, by applying for example lean innovation/entrepreneurship, Design Thinking etc.

5 Introduction of the Three Canvas Model

There are different challenges a team must overcome when starting an agile or lean development process. The team must come to a common understanding and deal with different ideas and options at the same time. Often the team composition changes,
especially when the development process starts. In agile development processes, the product is not or cannot be specified in all details. Therefore, the team’s common understanding about the future product, the customer needs and the business is essential. The right level between abstract/high-level and concrete/detailed must still be found. An adequate visualization tool supports this process.

Management concepts related to lean entrepreneurship make use of the business model canvas. There are many reasons for increased usage of canvases in the context of user centric design, lean innovation and business design. This reaches from the support of team work to enhanced goal-oriented discussions. However, in many technology driven companies and many innovation processes, the starting point is not the business model, but the customer needs and/or in rare cases the product itself. In fact, the product and the business model needs to be developed in parallel.

After the ideation and idea selection phase, the customer needs must be substantiated and the business and product concept needs to be developed. For this, the three canvases can be used. After having determined the product and business concept, both needs to be implemented in parallel (see figure 5).

Figure 5: Three model Canvas – Life Cycle

Following an agile innovation process or lean approach, the hypotheses (related to the business model and the product) are iteratively tested with customers and the learnings are integrated in the next iteration cycle. In a waterfall approach, the business plan and the market requirement specification document is derived from the canvases.
The Three Canvas Model presented at a workshop at the Product Management Festival (Link, 2013) allows to operationalize the business model canvas and integrate it with the innovation success factors viability, feasibility and desirability (see figure 5 and 6). The model supports for example the definition of the customers and their needs and the joint definition of the product vision as a basis for developing the product with agile processes or for managing a project.

The Three Canvas Model has been tested with various stakeholders in large organizations and projects. Especially product managers (in their roles as product owners), have been advanced in the early phase of the development projects. The tool supports the linkage between early phases (front-end innovation and upstream innovation) and the actual development phase (downstream innovation). Furthermore, the tool provides evidence that fostering agile product management and agile product innovation is worthwhile indicated. However, the adaption of other capabilities also becomes of paramount importance - particularly capabilities related to culture, management and leadership following agile principles.

5.1 Principles of Usage of Canvas

The canvas is printed on large scale (A1 or preferable A0) and attached to the wall (see figure 7). The canvas is completed stepwise by the team, which should be composed interdisciplinary. Avoid writing directly on the canvas; write on a Post-it, put the Post-it on the canvas and fill out the canvas step by step completely. By writing things on Post-
it, items can easily be changed or replaced. In addition, hypotheses or ideas can be included in the canvas, even though they are tested only at a later stage.

While following an iterative path (e.g. build – learn – measure or empathize – define – ideate – prototype – test) one will learn more about different items on the canvas. This way, the canvas can be updated after each iteration. Different coloured Post-its can be used to indicate different customer segments or the maturity status of the item (e.g. first hypothesis, tested or verified item).

Print as a poster… …use it in a team… …complete it with post-its

Use for example colours for different customer segments… …create a lot of options

Figure 7: Usage of a canvas

It does not matter with which canvas the completion process is started. One might also work on all three canvases in parallel. However, it is recommended to work early in the process with the user profile canvas in order to better understand the customers/users or stakeholders.

The experience of using the Three Canvas Model has revealed that is beneficial to have clear learning objectives / hypotheses to test in iterations and to document the findings to be shared with the team and the client. After some/many iterations one will have an increasingly clear view about the users/customers as well as maybe on the business model and can then focus on improving the product / product specification. It is also recommended to develop variants of the idea/concept/approach. Thus, a set of canvases are created and the most promising approach can be selected. It is also possible to use other artefacts (like prototypes, pictures, drawings, etc.) instead of just written Post-its.

In the following, the three canvases are described in more detail.
5.2 Business Model Canvas

The business model canvas has been co-developed with many scholars and practitioners (Osterwalder, 2011). Mainly in Europe, the business model canvas has been used in many cases by many different companies and universities. Swisscom IT Services started for example in 2011 to describe all business entities in business model canvas as part of the three year strategic planning process. The pyramid of canvas supports the definition of the overall value proposition and the provision of a better understanding of the entire product/service portfolio.

In general, the business model canvas can be used for established companies or start-ups, for industry or service companies, for B2B or B2C businesses.

The business model canvas has been amended by the following elements (see figure 8) in order to establish a better connection to the other canvases and to document the importance of a clear problem statement and a vision. The problem statement is stated in a question: Which main problems does the business help to solve? In the building block Business Vision the vision is written in one sentence. Since a business model is often used for a product portfolio, a separate building block has been used.

![Business Model Canvas](http://www.businessmodellgeneration.com)

Figure 8: Business Model Canvas, adapted from (Osterwalder, 2011)
5.3 Product Vision Canvas

The product vision canvas (see figure 9) follows the basic structure of the business model canvas proposed by Osterwalder (2011). Principally, the product and business have to be developed in parallel. In established enterprises, this is often not the case and it is distinguished between product innovation (with a fixed business model) or business model innovation (with a more or less fixed product).

The underlying idea is a kind of translation and concretisation of the business level into the product level in order to better see and understand the interdependencies between the two.

The Value Proposition of the business model shall emerge in the real “Value/Utility” of the product. A product can be a physical good(s) or service(s). Often a product fulfills various values like other competitor products and in order to highlight the real differentiating aspects, the building block “key differentiator” is added. Ideally, the key differentiator is also a key of the “Value Proposition” of the business model. The product must finally be successfully used by the “End User” and the value or the product is made available by a good “Usability”. If, e.g. the Human-Machine-Interface (HMI) is not well designed, the user cannot fully benefit from the functionality. If additional stakeholders have needs that shall be covered with the product, they can be described in the building block “Stakeholder”.

Similar to the building block “Customer Relationship”, the user also has an emotional connection to the product which needs to be created and to be aware of. This is described in the block “Emotional relation / branding”.

![Figure 9: Product Vision Canvas](image)
Like in the business model canvas, the middle part of the canvas explains the “what”, the right side explains the “whom” and the left side the “how”. The product can be looked at from three different aspects, all having an influence on the product cost structure. The “key functions” define the key functions of the product, including functional and non-functional requirements and legal framework conditions. The “key components” look at the product from a physical point of view, e.g. which electronic, mechanical and software elements are required. Also on the product level, a “make-or-buy” decision can be made. Some of the key components might be bought. In order to consider this, certain interfaces must be available. The same is true for the possible “key partnerships” of the business model: some interfaces are required to benefit and implement the partnership. Therefore, a building block “interfaces” is used. Once the left side is clear, the (target) “product cost structure” can be determined and verified. The “Revenue Streams” are translated into the “Product Price”.

The Product Vision Canvas is made to be used in the IT environment, where agile development approaches, like Scrum or Kanban are often used. A key success factor for these project is a well-defined product vision which can be communicated and shared with the team. This is especially beneficial when the team composition changes - e.g. between upstream innovation (product concept phase) and downstream innovation (development phase).

### 5.4 User/Customer Profile Canvas

In an iterative approach, like Design Thinking or Lean Start-up, the first iteration loops are often used to better understand the user/customer. Tools like the Empathy Map, Personas or the Value Proposition Canvas supports this learning process. There is a big benefit, if the team members have the same understanding about the customer/user and their needs. Therefore, an own canvas is proposed with the following building blocks (see figure 10).

The building block “Market & Trends” describes the driving forces and the trends from a rather analytical approach. It marks the influencing factors from a wider level. The “Influencers” are the people influencing the buying decisions more directly. In a B2B context, this comprises the buying centre, while in B2C, the influence of family members or friends can be considered. The “Persona Description” refers to the description of the fictional character that represents the user. The “Use Cases” describes all possible scenarios that can happen while using the product. The key tasks before, while and after the usage shall be considered, as well as a systemic perspective.

On the right side of the canvas, the elements of the “Value Proposition Canvas” have been used to better understand the user’s job. The “Job to be done” is described, as well as the “Pains” and the “Gains” the user has while doing his or her job.

The center of the canvas is used for a “Mood board” which can be used as a collage to better visualize the user.
In the period from April 2013 to February 2014, we have tested the Three Canvas Model in various workshops at major Swiss companies in the ICT, Energy and Finance and Automotive industry as well as in Universities. From our observations and interviews we have found a set of benefits using the canvas model in general and more specifically the advantages of the extended Three Canvas Model.

The major benefits of using the canvas in general are the following:

- Foster joint understanding and collaborative product definition
- Easy to use and to update
- Visual and intuitive → enhances communication
- Iterative: Very agile and can be constantly adapted
- Focus on key aspects and helps to stay focused
- High information density in the canvas
- Enhances goal-oriented discussions and creativity
- Forces to think in a structured way
- Inconsistencies become visible
- Allows easy creation of additional options (variants)
- Operationalization of the business model
- Supports integration and visualisation of new insights
- Defines assumptions that can be tested

**Key advantages of using the extended Three Canvas Model:**

- Foster joint understanding and collaborative product definition
- Clear product vision can be derived, communicated and if required be adapted
- Operationalization of the business model
- Inconsistencies (also between product, user and business model) become visible
- Learnings concerning the user and stakeholders can be visualised
- Gives a good overview of the most important aspects

For most of the participants, the customer/user centric approach has been the biggest benefit. Participants already familiar with the business model canvas particularly appreciated the extension of the model. Most of the line managers highlighted the advantages of providing a common understanding to various stakeholders in the company and as well within the team by applying the Three Model Canvas in an early innovation phase. The major constrain was missing time in the day-to-day activities to complete and discuss all the canvas models. The tool is seen as especially beneficial when the team changes and to get a common and clear understanding of the whole concept for the development team. Most participants wish to organize off-site workshops with the diverse team members to meet and discuss.

**6 Conclusions and recommendations**

In order to make full use of an agile approach, not only R&D but the whole organization must be adapted. Most of the organizations use agile and traditional approaches in parallel (SwissQ Software Development 2014). The “scaled agile framework” (SAFe) has showed a strong growth in usage in the last year and is seen as a good basis for the future enhancement of agile principles in the downstream innovation process. (Scaledagileframework, 2014)

In the upstream innovation agile principles are used (e.g. Design Thinking), but they are not sufficiently connected to the downstream-innovation processes. A joint framework would be beneficial. In addition, the people within the upstream innovation should remain in the project and people with a key role in the downstream innovation should be part of the upstream innovation team. Special attention shall be paid to the understanding of the three canvases of all new downstream team members. It might be helpful for the new downstream team to work a few iterations on improving the Three Canvas before really starting the downstream innovation process. This makes the project their “own” project and fosters and deepens the true understanding.
The proposed tools can support this, but should be integrated in an overall framework (including processes, roles, team composition etc.) and an agile leadership culture. The Three Canvas Model is a first approach to set the right product vision and correct level of customer/user empathy. Our observations and interviews with participants in various workshops at large organizations in Swiss companies have shown the benefits of the Three Canvas Model. This model fosters the multidisciplinary discussion by providing a good overview of the important criteria. Furthermore, the end users or stakeholders become more central in the early phase of the ideation process and the model has been perceived as a very agile one, especially for defining the product vision.

Further research is necessary to determine how established organizations can be agile. The agile tools are still "piecemeal" and rarely integrated across all processes. But this is a further optimization potential for the organizations in the future. For the development of continuous agile practices that are vertically and horizontally coherent, it needs agile leadership.

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Second Generation Recommendation Engines in a SME B2B Context: A Case Study

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Abstract
Recommendation systems are artificial intelligence systems that have found a wide range of applications notably in e-business contexts, providing benefits such as automated cross- and upselling in addition to a reduction of transactional costs on both the demand and the supply side. They have been widely accepted by large enterprises but SMEs trying to adopt and implement similar technologies must face the problem of scarcity of transactional data. As a case in point we present the obstacles that a recent SME venture ran into and needed to overcome in order to provide the customers with a satisfying sales experience. We will touch upon both the marketing and machine learning aspects of the platform and discuss several techniques that have been key in the successful implementation of expert knowledge extracted from the experience of the company’s founders.

Keywords
recommendation engines, B2B marketing, technology transfer, machine learning, expert systems

1 Introduction

Unless it is the straight rebuy of a given item, procurement processes in the b2b-industries can be quite costly both on the customer’s and the vendor’s side. We describe the development and implementation of an online platform that substantially reduces procurement and sales costs for industrial goods especially in the case where there is a broad choice of completely different goods that are all capable to fulfil the customer’s fuzzy demands. This requires traditionally an extended search phase on the procurement side and thereafter a lot of sales support and consulting by the vendors with well-trained personnel.

In order to solve this problem, expert and recommendation systems have found wide application in very diverse b2c environments, e.g. amazon.com, yet the number of successful implementations in b2b ecommerce is rather limited and literature about the subject is scarce. Drawing insights from marketing science and machine learning, an online recommender system was developed in collaboration with a start-up company. Its founders have broad knowledge of the market in consideration (promotional items), which is an indispensable prerequisite to solve such a business case.
The system consists of an online recommendation system on the demand side and a tender platform on the supply side, i.e. it is a two sided platform. The recommendation part is based on various machine-learning techniques (Bayesian Nets, bio-inspired algorithms), translating expert knowledge into a working inference engine that offers a narrow choice of optimal products for the given application and current business circumstances.

The tender platform, on which 3rd party vendors make quotes on the chosen products, guarantees that the customer finally receives the best price to performance ratio, taking into account any given time horizon and volume of products needed. The user benefit of this platform consists of a considerable reduction of time and cost in the procurement and sales processes both for customers and suppliers.

The platform is self-learning, which is a prerequisite for the cross- and up-selling features included. Moreover contextual information about customers and vendors as well as about market trends further enhances the recommendation process. Therefore it is a second generation system (see Adomavicius & Tushilin, 2005).

Major barriers that must be overcome when implementing such a project are:

1. The donation of a promotional item to a specific target group is linked with a specific communication goal, e.g. image transfer, brand recall or the stimulation to buy. Therefore the customers’ communication goals, i.e. core of his marketing campaign aimed at a specific target group, must be described by a comprehensive set of variables to be processed by the recommender system. We call these “demand variables”.

2. A database that maps the “demand variables” on another set of “product variables” that describe the real-world items/products both in hard and soft attributes, like sexy, trendy and youthful or traditional, on appropriate scales that correspond to the perception of specific target groups.

3. Scarcity of real-word transactional data to initialize, continuously feed and update the recommender system.

The really big challenges are contained in (1) and (2) because there the fuzzy world of marketing and customer perception is matched with the clear-cut world of physical objects and machine algorithms. Point (3) is just a fact of life that one must deal with.

This paper sets the focus on machine learning, data mining and simulation with limited or scarce data that are typical for a SME. Aspects that are related to business strategy, business models and customer insight are described in a forthcoming paper in a marketing journal (Reinhold & Reinhold, 2014). Thus the following description of the business case is restricted to the essentials.
2 Business Case

The market volume for promotional items sold in Switzerland amounts to about CHF 600 million a year. The approximately 250 specialized SME dealers buy their supplies from around 150 domestic and foreign manufacturers and process approximately 80,000 transactions on an annual basis.

The traditional procurement process evolves typically as follows:

1. Marketing management decides to support a particular campaign with promotional items.
2. One person is then given the task to find promotional articles that will fulfill the goals of the campaign with target group. This search is either done offline or online in large promotional item catalogues and databases.
3. Since there is a choice of about 50’000 different promotional items available, the product range is overwhelming and in many cases several vendors are contacted for advice.
4. Finally marketing management will settle upon one or several promotional items. Purchasing will call for quotes from selected dealers. Although the item itself may come right off the shelf, in all cases it must be branded before delivery with the logo of the donor company. This compulsory ingredient branding is unique in the whole procurement process.
5. Eventually, the deal will be closed.

Although there is a vast choice of products available only a very narrow and restricted subset will finally be put on order. Obviously customers initially want to browse in a gigantic supermarket but will in 90% of the cases settle in the end upon the same old choice (straight rebuy) or upon some trendy articles that are “in” for give-aways at the moment. In the latter case, it may only take a couple of months before clients’ tastes have shifted to different product preferences. The sales person or recommender system must adapt to the new fashion fast. Some articles however are all-time winners, like the Swiss army knife. Some products are no-go in certain campaigns: The Swiss army knife is obviously a no-go promotional item for airline companies.

This process displays a lot of potential for reduction of inefficiencies that can be remedied with modern, intelligent IT-tools.

3 Recommendation system

With the advent of widespread ecommerce in the early 2000s, recommendation engines have gained dramatically in importance (Adomavicius, 2005). Online retailers rely on them in order to sell, cross-sell and up-sell and the phrase “customers who have bought X have also bought Y” has been imprinted in the internet’s collective unconscious.
Solutions to different problems have been devised in order to suggest personalized recommendations even to users that have no purchase history on the given platform. Generally, these approaches can be separated into two classes, collaborative and content-based filtering (Basu, 1998, Claypool, 1999).

Collaborative filtering takes advantage of user profiles and their similarity to other users. The similarity measure depends on the available data on the user profiles and the spectrum of items these profiles are associated with. A thorough understanding of the product catalogue and its characterization is not necessary as recommendations for a given product are based on the similarity between the given user and past users that have been associated with the product, i.e. have bought or liked it.

Content-based filtering on the other hand depends on the characterization of the items and a user profile that links the user’s preferences to the items via more or less complex algorithms. Past transactions and likes by the user as well as the similarity between potential items and items bought in the past are taken into consideration.

In the business case at hand, several peculiarities of the commercial give-away market withstood a straight implementation of these basic concepts and we resorted to implementing a system that took advantage of the knowledge by experts in the field and past transaction data of companies in the same market.

3.1 Initial training

When small and medium enterprises prepare to launch an online recommendation system they suffer from a sparsity of data that is rooted in the limited amount of traffic they are able to generate. Whereas large enterprises can make use of a robust number of early adopters in order to representatively train their engines, SMEs suffer from a lack of statistics. Their early adopters are few and far in between and training an expert system on their behaviour leads to heavily biased outcomes. In some cases hiring test users can remedy the situation but this has proven costly in many situations and a bias cannot be ruled out as the test users generally are not restricted by real-world money constraints.

In the case at hand, obtaining initial data on the 2000 or so article groups from users was difficult, if not impossible. Especially in the initial stages of the recommendation engine, where collaborative filtering strategies were not available due to the lack of sufficient traffic data, different sources of knowledge needed to be incorporated. We then resorted to a strategy that was heavily based on the expert knowledge of the company’s founder, creating a ranking for the article groups with respect to several attributes, much like an integrally known utility matrix used in collaborative filtering approaches, given by one expert only. In addition to an item profile we then create user profiles based on questions asked on registration of a given user and campaign, and then generate recommendations of items with a classification algorithm.
3.2 Algorithm selection

Given the above constraints of data sparsity and the diversity of the article groups and since a Naive Bayes classifier (Bishop, 2006) is arguably the simplest approach to tackling a classification problem, in a first step we have opted to pursue a strategy based on such a naive Bayes classifier of the products given the campaign data and the expert knowledge obtained by the ranking of the products by the company’s founders: Given a set of features \( \Omega = \{F_1, \ldots, F_n\} \) one is interested in the probability \( P(C|F_1, \ldots, F_n) \) of an assignment to a class \( c \) of \( C \). If the features in \( \Omega \) are considered to be conditionally independent of each other, one speaks of a naive Bayes approach (see Figure 1 (left)). Then, the classification probability can be expressed as \( P(C|F_1, \ldots, F_n) \propto \prod_{i=1}^{n} P(F_i|C) \) given all the classes have equal prior probability. For given feature values \( f_1, \ldots, f_n \) the classification itself is then given by \( \arg\max_{c \in C} \prod_{i=1}^{n} P(F_i = f_i|C = c) \). The naive Bayes approach to the classification problem turns out to be quite robust with respect to violations of the conditional independence property (Zhang, 2004; Langseth & Nielsen, 2006) and therefore is the tool of choice at least in the beginning of many projects.

![Naive Bayes and Bayesian Net](image_url)

Although yielding promising results, the independence assumption turned out to be too restrictive for our purposes and we continued to extend the classifier to a Bayesian Net.

Allowing now for dependencies between the features in \( \Omega \), the probability distribution does not factorize as easily anymore as in the naive case. We can nevertheless find a streamlined expression if the dependencies are such that, heuristically speaking, they have a directed cause and effect relationship and do not lead to any circular structures, i.e. no feature is its own cause and effect. Features that can be arranged in such directed acyclic graphs, where every feature has a set of features it depends on (its parents) and a set of features it influences (its children) form a Bayesian Net and the corresponding probability distribution can be written as (renaming \( C \) as the feature \( F_0 \) for notational...
convenience) \( P(F_0, \ldots, F_n) = \prod_{i=1}^{n} P(F_i | Pa(F_i)) \) where \( Pa(F_i) \) denotes the parents of \( F_i \) (see Figure 1 (right)) (Bishop, 2006).

Abandoning the independence assumption has enabled us to incorporate more intricate causal relations between the chosen features which in turn led to results that were matching the user’s requirements significantly better than those obtained by the naive Bayes classifier.

3.3 SMEs & sparse data & the long tail

Distributions of transaction frequencies of articles and article groups in the promotional item market, as is the case in many other markets, possess a long tail of products that are very rarely sold. In contrast to other „physical goods“ markets, where an online store has the advantage over a brick and mortar business that storage is possible and affordable, an online platform for promotional items cannot profit from an identical difference, since promotional items usually exist in large catalogues alone until an order has been placed. A long tail of very rarely sold products exists nevertheless and obtaining transaction data on such products is ipso facto hard to obtain. While they do exist in the extensive catalogues and the repertoire of a good promotional item sales person, and constitute an important proof of competence to the customer inclined to buy, their vanishing contribution to the overall transaction history of a promotional items company make it difficult to evaluate their role, frequency and importance in the buying process. It is important to stress that the long tail encountered in the case at hand arises due to the lack of reliable past transaction data and presents a problem to every web platform that relies on data obtained from small and medium enterprises. Thus, contrary to many physical goods retail situations where the online retailer can take advantage of low-cost storage space and thus answer the demand of less popular items, in the present case, the online retailer suffers from the long tail of products.

3.4 Simulation

As opposed to many e-commerce retail cases in which recommendation engines should not recommend the same product to a customer after it has been bought once, in the field of promotional items, especially when the client belongs to a large company, recommending best selling goods that have been proven popular is an effective sales strategy. Furthermore, an analysis of past transactional data shows that there is a strong bias towards a few select articles, constituting a large part of all the transaction histories. The sales distribution then falls off quickly, having a large tail of products that are sold very infrequently. We have used these transaction data to run tests – typically with 10 Mio. random campaigns – in every stage of the recommendation engine, checking whether our probability based approaches reproduce this sales distribution. In order to do so we have simulated the outcomes of randomly chosen campaign and user profiles and have compared them to the existing data. We have then adjusted the prior probabilities where there was a significant gap between the simulation output and the real world data, in order that the two distributions match, providing us with a measure to
counteract the absence of sufficient information on past user data or information obtained from the behaviour of early adopters.

4 Conclusions and recommendations

In order to make recommendation engines accessible to SMEs, the collection and training of initial data needs to be adapted to the constraints these enterprises are subjected to. Whereas they profit from the same up- and cross selling opportunities as large enterprises, their size renders the accumulation of training data impossible if no other data source than the group of early adopters is taken into consideration. Using the example of a SME venture in the Swiss promotional items market, we showed how past transactional data of a brick-and-mortar company together with simulations of possible user and campaign profiles can remedy the situation. The key to overcoming the challenges that recommender systems pose to SMEs lies in the modelling and simulation of both the recommendation and the machine learning process. As a conclusion and practical guide to recommendation systems for SME, we suggest that people interested in adopting such systems start by asking the following questions (Reinhold & Reinhold, 2014):

1. To what extent do we have access to expertise on customer needs, decision and purchasing behaviour as well as existing market offerings?
2. Do we have access to even a rudimentary database of transactions from which we can infer a prior distribution for the most popular products?
3. Do we have the necessary know-how and substantial customer insight that is required to generate and link the “demand variables” with the “product variables” listed in the text?
4. Do we have the necessary expertise and resources to run, analyse and display large test sets with more than 10 Mio. cases/transactions?

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University Science and Innovation Business: a Case of Successful Russian Business Incubator

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Abstract
Some 30 years ago in Russian Federation entrepreneurship constituted criminal offense. This legacy results in severe lack of entrepreneurial competences in Russian universities, albeit the technology potential is still relatively high. The lack of interest from the local industry towards open innovation leads to the situation, in which success stories in tech transfer and innovation commercialization are rare and constitute exceptions rather than being a rule. The only industry in Russian Federation which works with innovations as successfully as anywhere in the world is ICT.

But situation is about to change, due to economical and political factors. WTO membership brought about strong fears of lagging behind the competitors, and quite a few Russian big industrials (Rostecotechnologiei, Uralmash-Izhora group, Alrosa, Aeroflot, etc) are implementing strong open innovation programs. Still the dialogue between the industry and the universities needs strong facilitation to bring success.

We discuss the case of the best Russian business incubator, Ingria, in application to supporting university entrepreneurship. The instruments we use include attraction of international business student teams to assist tech scientists in market and strategy research, independent international technology assessments, venture capital involvement, meetings with big industrials, training and consulting. We partner with 15+ universities across Russia, Finland and Israel, and a number of business incubators worldwide. The incubator hosts ca 80 resident projects, with 70% in the ICT area, others include hardware, materials science and biomedical. We attract annually US$10-15 of predominantly seed funding into our projects.

Keywords
Include 5-6 keywords. The first keywords should be taken from the title. Please separate keyword by comma.

1 Introduction

Historical background. To understand the state and the directions of development of the Russian innovation and technology development system one should take into account the following facts of the country’s recent history:

› 30 years ago, in the Soviet union time, entrepreneurship was a criminal offence. Any kind of money-making as a personal goal was viewed as greed and lack of true personal integrity, the latter best manifested by a person working hard for the benefit of the country and deeming sufficient what the country provides in
return. In the R&D area, the major driver was supposed to be scientific interest and usefulness for the country, and any sort of commercialization of R&D results was unheard and unthought of.

During the 1990-ies, the situation drastically changed to complete liberalization of economy turning wild, partly due to the Russian habit of taking any ideology to extremity. In the society the role model of a capitalist/gangster took top privilege, and the formerly respected role models—professors, engineers, designers and professionals in general, - became associated with the status of a loser. As a result the country’s R&D potential was substantially lowered due to:

- Loss of human potential to emigration. Different estimates give different numbers, but the order of magnitude of 250 thousand most active R&D related people leaving the country within 10 following years seems a correct estimate.
- Loss of human potential to business. Younger and active people were dropping science en masse, accepting new role models. The majority of successful businesses which started in 1990-es, were created and developed by former students in physics, mathematics and engineering science.
- Decay and severe underfunding of R&D infrastructure, which made top-tier university research simply impossible.
- Decay of former research-to-industry ties and the decay of industry itself. The privatization led to severing traditional ties between the industries and within industries, with former close partners in tech development receiving different owners and, sometimes, different nationalities. The new owners in turn wanted to turn the cheaply acquired assets into quick money, which further worsened the situation. The only industry that was overlooked in the privatization process was the IT-industry, as it did not have tangible assets which could be reprofiled and/or pawned to the banks. As a result, modern Russian IT-industry is one of the best in the world, which cannot be said about any other industry.

New face of Russian science and innovation. In 2000-ies due to heavy income from oil and gas industry mostly, the issue of funding in R&D became less and less of a problem. Universities were receiving lavish funding, mostly to buy up-to-date research equipment (see e.g. Fursenko 2008). New blood came to the university system, especially in the IT-related spheres. The younger generation is much more commercially minded than the old Soviet schools, which deepens the generation gap between the 60-70 year old professors and 20-30 year old new researchers. The 40-50 year old are almost absent in the system, lost due to emigration and other reasons listed above.

Refurbishing of Russian science came hand in glove with the federal initiatives to boost technical innovations. In a short period of time hundreds of business incubators and technoparks sprang to life (see e.g. RVC1 (2014)). Concomittant explosive growth of venture investments (from puny US$20M countrywide in 2010 to US$1Bln in 2012
according to RVC2 (2014). Most of the venture capital though is concentrated in the IT and mobile areas, which now represent a modern industry with enough big, medium and small companies, venture, M&As and young business-oriented population.

The major challenge still remain in other industries. Although under political pressure to modernize and innovate, and in a fear of loss of competitiveness due to WTO, the traditional industries are still only weakly responsive to innovations. One of main reasons for this is human factor. To develop a good hardware technology much more time and resource is needed. The younger generation scientists are simply not yet at the required level of professionalism, and the older generation is not prone to things practical and commercializable. Moreover, lack of foreign language command simply deprives the old schoolers of major information sources in their professional areas, lowering the quality of their endeavors.

**Challenges for modern Russian business incubators and technoparks.** Given the above, a successful business incubator in Russia cannot simply concentrate on one task of bootstrapping and helping to develop startup projects. It has to play a role in revival and reconstruction of the whole ecosystem, reaching out with a helping hand to Universities and R&D institutions on one side, and to the big industrials on the other side. We do not only come to the universities for project ideas and teams, but we educate students and faculty in all things related to high tech business. We help teaching people with money how to do venture investments. We educate the industry, showing them practical aspects of Open Innovation concept and applications, from the top officials to the rank-and-file R&D staff. Ingria is a vivid example of such a success story.

## 2 Ingria business incubator: a success story.

**History.** In 2007 in the city of St.Petersburg a technopark project was initiated, in an organizational form of an open stock society 100% owned by the City of St.Petersburg. While everybody understood that the construction work itself will take much effort without any tangible impact on the innovation ecosystem. To amend for this, in 2009 a business incubator was launched within the technopark, as a small pilot project. It received the name Ingria, which was the name of the Finnish tribe living in the area long before Russian and even Swedish presence.

For reasons which could be a subject of at least another full size paper, if not a novel, the technopark was never constructed, at least by now. At the same time what seemed as a small pilot within the whole technopark project grew into one of the most reputable and successful Russian business incubators, ranked in the TOP-5 by Russian Forbes Magazine.

Ingria from the very start was aiming to work with not just small business, but with innovative technology startups. Ingria is funded by the subsidy from the City of St.Petersburg budget, which constitutes US$1,5-2M annually. It does not take stakes in the resident companies, and it charges a small residence fee of nearly 90 Euros per
month. To enter Ingria the project must file in an application which is reviewed by the inhouse Board of Experts, granting right of residence if the project meets the criteria of acceptance. The right of residency is also limited to the startup companies registered in St.Petersburg.

Statistics. Ingria nowadays hosts over 80 resident startup companies, of which nearly 30 rent additional office space. 70% of our residents are in IT software sector, but 30% are represented by projects in medical technology, materials science and nanotech, machine tools and so on. Over 100 companies graduated from Ingria already, some having served the maximal allowed term of 3 years, some simply outgrowing the facility. A typical innovative startup comes to us as a team of 3-6 people, while before leaving their personnel grows to 40-60 people. The churn rate is about 25-30% per year.

Successful growth of Ingria in numbers is represented in Table 1 (the data for 2013 is not analysed yet):

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residents</td>
<td>12</td>
<td>63</td>
<td>70</td>
<td>86</td>
</tr>
<tr>
<td>Revenues by residents, US$M</td>
<td>2,3</td>
<td>5,4</td>
<td>11,2</td>
<td>20,2</td>
</tr>
<tr>
<td>Investment attracted, US$M</td>
<td>-</td>
<td>3,4</td>
<td>12,6</td>
<td>15,3</td>
</tr>
<tr>
<td>Total staff of the residents</td>
<td>-</td>
<td>416</td>
<td>597</td>
<td>776</td>
</tr>
<tr>
<td>Events at Ingria</td>
<td>59</td>
<td>128</td>
<td>129</td>
<td>205</td>
</tr>
</tbody>
</table>

The data shows rapid growth of the incubator activities. In 2009 among the 12 projects accepted for residency most were obscure things like innovative condom packages and tea-and-sugar pouches. Currently not only the number of the projects has increased, but their quality is substantially higher than at the beginning. This happened due to the overall explosive growth of startupping activity in Russia, as well as to good quality of Ingria services. The total number of projects we annually see comprises 1500-2000 annually.

The total amount of venture investment attracted has also grown rapidly. The US$15,3M attracted in 2012 were, in fact, put into 18 resident companies, which represents a hefty US$850K in the average per company, a pretty good result given the early stage of the majority of our residents. The results for 2013 and 2014 were not analysed yet, but an estimate for the 4 months of 2014 is already at US$4M of confirmed deals. But our resi-
students are just not speculative investment eaters, which is backed by their revenue numbers.

The figures of the number of events are also quite impressive. We host more events than a much bigger federal Skolkovo project, with the marketing budget smaller by a factor of 400.

3 Instrumentation

Ingria has developed numerous instruments to help the projects to develop.

VC-day. This event is a roadshow of projects in front of the investors. We choose a general topical area for the event, then take 100 projects within this topical area (not necessarily our residents only), and put them through a short (1-3 day) accelerator program. Then we select about 20 of those, and have them pitching in front of 20-30 venture investors. Typically after such an event over 30% of the projects engage in negotiations with the investors. The total number of venture funds we practically work with is over 50. This mechanism is a major driver for attracted investments numbers.

Demo-day. It is almost the same as VC-day, but the audience comprises industry – manufacturing companies (like Rosttechnologii and Izhora-Uralmarsh) major software houses (like EMC and Microsoft), major banks, etc. This activity we started only in 2013, but a couple of acquisitions already happened. The latest was a US$1M deal between our mini-CNC designing startup and a major Russian manufacturer.

Advisory Day. This activity facilitates meetings between startups and mentors – seasoned entrepreneurs which, for various reasons, offer their services to startups. The total pool of mentors is over 60. In 2013 over 50 applications for mentorship were received, of them 20 from Ingria residents and 30 from external projects.

One-to-One. These events facilitate one-on-one project presentations in front of venture investors or industry or mentors, one project per one investor/industrial company/mentor.

Open days Ingria. On a regular basis we host events with prominent speakers and gurus of technical entrepreneurship for our residents and outside audience. In 2011 the most prominent speaker was Steve Blank, who spent nearly 3 days in Ingria, working with resident startups personally. In 2014 Bob Dorf (Dorf 2014) also had a motivation/consulting session with Ingria projects. One important remark. Typically to bring a speaker of such level costs a fortune. We get them at no cost, simply offering our conference facility to those who bring such speakers to town in exchange for free participation for our residents. As Ingria facility is well known across St.Petersburg, many event organizers use this option, providing many nice freebies for our companies.

Startup Lynch. This regular monthly event is aimed at giving a project professional, harsh and sometimes politically incorrect critique. We often explain to our residents that our harsh opinions are determined not by evil desire to be rude, but by passion to help
them fight their way to success. Many projects, as resident, as external, come for this event, and most of them say afterwards that this critique was of great value.

**Student consulting.** Each term we receive from 2 to 8 teams of business school students which do consulting work for our startup companies. Since the launch of this activity in 2011 34 consulting projects were accomplished. The majority (23) were done by teams from Graduate School of Management, St.Petersburg State University (GSOM), the rest by students of the Laurea University in Finland. GSOM (ranked 60) is the only Russian business school which falls within top-100 world business schools according to the Financial Times rating. The topics for consulting vary from product and customer development to business and financial modeling to market entry strategies and geographies. The overall quality of the reports is rather good, with some of them nearing the Frost&Sullivan quality. This is because the ambitious international student teams use abundant resources (newsfeeds, databases, market analysis reports, etc) which their schools purchase for them to use in their studies. The cost of such service for a startup is zero.

We now have enough material to describe the exact value both parties to these consulting jobs extract. For the startup, the direct value is the report itself, which incorporates a lot of information from closed sources inaffordable to the startup otherwise. There is also a very important indirect psychological value, especially for the hardware startup projects lead by old school professors. A typical Russian natural science/technology professor, at the age of 60, views marketing, consulting and management professionals as crooks, which eat away the resources which could be put to better uses, for example, for purchasing yet another piece of equipment. When communicating with these eager and aggressive student teams the project leader of this kind starts seeing very high value in business knowledge, sometimes offering temporary or permanent paid positions to these students once the consulting project is over.

The benefit for the other side, the student team, is also substantial. First of all, most of the business schools, at least in Russia, teach corporate management mostly, teach how to be a middle-manager at Gazprom. Dipping in the startup culture the students see this funky startup “management upside down”, when the strategy comes the last, pivots ruin any projections and project management is not advisable in many cases. On the other hand, for the student such work often means huge reward. In corporate culture, if you launch some initiative, you are lucky if you see some implementation of it before you retire. In a startup a 20-minute consultation can change the fate and the direction of the project altogether. The students immediately see the results of their work.
4 Special programs and partnerships

**Web-ready competition.** In 2009 the first competition of projects in Internet and mobile app area was launched by Ingria. Since then it grew from a medium scale local St.Petersburg event to the biggest international project contest in Eastern Europe.

<table>
<thead>
<tr>
<th>Number of applications</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of applications</td>
<td>425</td>
<td>431</td>
<td>579</td>
<td>584</td>
<td>700+</td>
</tr>
</tbody>
</table>

The competition has a two-stage selection process, accompanied by a business accelerator program, road shows for semi-finalists and finals. Apart from the projects, Web Ready attracts all the Russian VC beau monde, with over 30 venture funding deals struck as a result of each competition. In 2013 it was held in Skolkovo, and in 2014 it received funding from the Russian Venture Company, alongside with other sponsors. In 2014 or early 2015, in agreement with and with partial funding by the INFECAR agency of Las Palmas, Gran Canaria, the Web Ready Global Track competition is planned for launch in Las Palmas.

**I2U program.** In 2010 Ingria launched the program of complex interaction with universities. By 2014 over 20 universities, including 4 in Finland, 1 in Israel, and the remaining in St.Petersburg and across Russia, joined the program. The particular activities include, but are not limited to:

- Student consulting (as described in Section 3) with GSOM and Laurea University in Finland
- Working with University startups and business incubators, sharing experience and partnerships
- Attracting university faculty as external experts for our Board of Directors and Startup Lynch
- Participation in summer schools on Tech Entrepreneurship (Fablab Polytech school, UMNiK Polytech Summer school, SumIT and others), organized by partner universities.
- Organizing and launching international educational and training programs for faculty and students on tech entrepreneurship, tech transfer and commercialization, management of research infrastructure, and related topics.

Our next endeavor within the I2U program will be launching by the end of 2014 a Demola franchise in St.Petersburg.
Demola. Originally started in Tampere as a place where the students solve the technical problems for corporations as part of their education, quite similar to what we do with the student consulting. The initial formulation of the task for the corporation is free of charge. However, if the corporation approves the result of the students’ work and is willing to implement it, then the corporation has to pay for the IP-rights. In three years of Demola operations in Tampere, over 1000 students created over 200 prototypes of products and services, of which 80% were approved and paid for by the corporations. The total revenue for the period was over Euro 2.5M, with 90% of the revenues going to the students and 10% retained by Demola.

In January 2014 Ingria signed a memorandum of partnership with Demola, and right now the launch process is in full swing. To keep this as an interuniversity affair, we partner with the two best technical universities in St.Petersburg – SPbSU IFMO and Polytechnical university, which also co-invest in the launch process. The official launch is scheduled for December 2014, and starting from 2015 we plan to attract more universities in St.Petersburg to the project.

Tech transfer center. Our work with the universities and other technology sources naturally lead us to technology transfer. The Tech transfer center Ingria was launched in 2012. Right now its activities include assessment of commercial potential of technologies, Demo-days and One-on-One meetings with industry. In 2015 we expect substantial up-scaling of the Center’s activities, as the City of St.Petersburg Administration is currently working out a funding budget for such up-scaling. We will hire at least 10 more experts and we expect to make the center a commercially viable unit within the next 5-7 years, a leading unit of this kind in St.Petersburg. The mission of the center includes high quality service in worldwide commercialization of technologies developed by the R&D community in St.Petersburg and Russia at large, as well as attracting best early stage technologies from all over the world to Russian industrials.

International competence center. Given the historic view of the situation with innovations in Russia, there is a lot of competence still missing in the country. Very few people in Russia understand the nature and the processes of tech transfer and commercialization, for example. Talking to a typical TT unit at a university, one may get an impression that tech transfer comprises patenting the invention, putting the patent on a web site and passively waiting until somebody will be interested in purchasing the license. This naturally leads to unbelievably low efficiency of the TT process, with the leading Russian universities getting shameful 20-30 thousand dollars a year in royalty payments – an over thousandfold difference compared to the world’s best practices. To amend for this we amalgamated our international educational activities with our partners worldwide into a competence center, partly funded by the Russian venture company. We launch and operate educational programs on entrepreneurship, tech transfer and related topics together with our partners in Israel, Finland and US. The total number of people
who used our educational services is well over 300, including university students and faculty, startup teams and other elements of the innovation ecosystem.

**Soft-landing.** Our own unpublished research (2010) showed that Russian market is very attractive for foreign small tech companies, especially from smaller European countries. Together with Nienschanz industrial group from St.Petersburg we studied the cases of several thousand small tech companies in Finland, Israel and Sweden. The result was that nearly 25% of high tech companies we contacted were interested in entering Russian market, because of its size and the current country’s drive to modernization. However, differences in business culture and legislature hinder the process of seamless crossborder technology exchange.

In view of these results we launched a soft landing service for foreign startups at Ingria. The soft landing package includes a fully equipped workplace for the company representative plus a comprehensive consulting package. The company rep comes with the tourist visa, as soft landing is not doing business yet. We guide the project through our vast partner network, helping to find, if necessary, clients, investors, resources, government connections and future staff. It takes 2-3 months to form an opinion whether to go ahead an open Russian operations, or forget it altogether. In any case with our service the risks of failure become substantially lower. However, the service has just been introduced, and we cannot evaluate its efficiency yet.

**Partnerships.** With our limited financial resources, yet very broad scope of activities, we rely heavily on our partners in St.Petersburg, Russia at large and worldwide. In Russia we advocate the point of view that the network is much more valuable than each unit of the same. Each technopark and business incubator in Russia has its own competitive advantage. Our main advantage is that we live 150 km from the Finnish border and thus were prone to international activities right from the start. Our network in Finland involves several organizations from each region. We use this to the benefit of our residents and clients, especially knowing that different regions in Finland, as in almost any European country, fiercely compete for the foreign business. This competition yields us the opportunity to negotiate much better deals than from the start. The Finnish dimension, almost obvious for the startups in St.Petersburg, is a near revelation for a startup from, say Kazan. On the other hand, Kazan as the capital of Tatar national republic, enjoys vigorous support for innovations from all the levels of authority, the president of the republic himself being a frequent visitor to Kazan IT-Park. As a result, b2G type projects are very easy to start in Kazan and through our Kazan partners. Farther to the East, the Khabarovsk business incubator envies our ease of dealing with Finland -- going for lunch to China on a daily basis across the Amur river! Having them as partners we can add Chinese dimension to our startups.

Our Israeli and Finnish partners participate in our educational activities, as well as in tech transfer endeavors. We often hire each other for subcontracting commercial contracts and/or various grants. Recently we added the nestGSV business incubator in Silicon Valley and Gen3-Korea company to our partner network.
5 Conclusion

Ingria business incubator has gone a long way from a small pilot project to a major international innovation hub in St.Petersburg. The most important lessons we learned on our way of very efficient and rapid development are the following:

› In a rapid development situation with innovations like in today’s Russia a successful incubator should reach out and help all the ecosystem, connecting universities to industry, startups to venture government to innovators.

› The incubator should take a heavy burden of educating each and every element of the ecosystem, from startup teams to high-rank government officials and industry decision makers

› Not a single, even excellent, business incubator unit can create enough value. Only a network of such units, each having unique competitive advantages, will be powerful enough to create a right ecosystem

› Universities are of principal importance, as they provide technologies, competence and, most important, human resource

› Only if the network reaches outside the country, a necessary critical mass for the ecosystem can be reached.

References


Designer and Cross-Organisational Innovation – A Provisional Structuralisation

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Abstract
In the last decades the concepts of design and innovation have expanded. Recent innovation theory explicitly links the concept of innovation with successful integration of knowledge into new and working items ‘transformation of knowledge form various actors or research result into working artefacts’ (Pavitt 2005: 88). Consequently recent innovation perspectives highlight the importance of communication and integration of external knowledge and resources. Examples for these perspectives are open innovation, networked innovation (i.e. Chesbrough 2003a, Schienstock, 2001, Lehenkari, 2006). Parallel to this conceptual expansion of innovation, we can state an expansion of design into new innovation practice. The role of the designer as a facilitator of innovation processes and as catalyst or promoter of (provocative) future visions is well explored in design research. However, the value and outcome of cooperation with designer in cross-organisational innovation has not been subject of extended design research. And in order to understand the potential beneficial relation between innovation and design, management research has so far mainly studied design as ‘powerful, effective and broadly accessible’ approach (Brown, 2009). There is little knowledge about the benefits of collaboration with designers in innovation processes. The ill-structured conception surrounding the idea of designers in innovation processes calls for investigation to provide more clarity and common understanding. This will give more clear indications on potential profit of the cooperation and ways of organizing the cooperation time wise and control the outcome. To collaborate with designer in innovation process differs from using design thinking as an innovation approach, in that designers can contribute to negotiation processes i.e. by bringing visionary proposals to the discussion table, enabling participation or improving visibility of opportunities.

This paper discusses design in relation with integration and communication processes in cross-organisational innovation. We present a provisional structuralisation of design and innovation. The structure outlines different dimensions of designer in innovation and presents the potential benefit of cooperation with designers in innovation processes between organisations. Finally, it draws preliminary conclusions on possible outcomes and on phases, cooperation with designers could be beneficial. Thus, the paper contributes to the understanding of the relation between designers and cross-organisational innovation. The structuralisation draws on existing literature in the design discourse as exploratory interviews with partners from research projects.

Keywords
Design, Innovation, Structuralisation, Integration, Negotiation, Bridging, Participation, Change

1 Introduction
In the last decades the concept of design and the concept of innovation have expanded. Innovation has included aspects of transformation (of knowledge and resources into artefacts) and design practice has expanded into new fields of practice Examples for this
expansion are design in service innovation and collaborative innovation-settings well documented in the DESIS-network\(^1\).

But in order to understand how designers contribute to cross-organisational-innovation processes, management research has so far mainly studied design as ‘powerful, effective and broadly accessible’ approach (Brown, 2009). The cooperation with designers in the context of cross-organizational innovation has not been the subject of extended research yet. However, it is only with clear indications on potential profit of the cooperation and ways of organizing the cooperation time wise, that we will be able to manage expectations and control the generation of results. Cooperation with designers differs from applying design approach to the management field in that designers can contribute to the negotiation processes and facilitate and provoking change i.e. by bringing proposals to the discussion table, enabling participation or improving visibility of opportunities.

The term ‘design’ is ambiguous. It describes both activity and outcome and it can be described in a broad sense (with a meaning that comes close to ‘project’), or in a more narrow sense that is connected to ‘form giving’ (Koskinen et al., 2011: 7). Even though the term itself is ambiguous, much design research literature specifically opts for one specific meaning - either ‘form giving’ or ‘planning’. On the contrary, many times we observe that design research is avoiding a definition all together or prefers to refer to even bigger, more open (and often considerably older) philosophical or sociological concepts, that avoid any kind of allocation of design to either one of the two meanings above. An example of this tendency is the reference to Herbert Simon’s definition of design as something that “consciously turns existing situations into preferred ones” (Simon, 1969). However, the interest of this paper lies on why, how and when to include designers in innovation. This is why we apply a more pragmatic definition that links design to competences and skills taught in Art and Design Schools (Koskinen et al., 2011). Thus, we focus on concrete design competences instead of abstract definitions of design. And ‘design tools and methods’ are tools and methods used and taught in the context of design schools.

The innovation-2020-agendas focus on transformation entails the inclusion of a wide range of public and private stakeholders and/or organisations. Consequently the innovation process is in need of transformation as well. Innovation processes applied in private companies consisting of step by step development are not able to include a wide range of stakeholders and react on diverging agendas and changing goals flexibly enough. After all, if we accept the requirement of including the renewal of society as a major goal of innovation agenda, innovation cannot be about ‘the commercialisation of technological change’ alone (i.e. Rothwell and Zegveld, 1985). Thus, key issue for assessing successful innovation have changed: Innovation is seen as the ‘transformation of knowledge form various actors or research result into working artefacts’ (Pavitt 2005: 88). Thus, recent innovation perspectives highlight the importance of communication

\(^1\) Design for Social Innovation and Sustainability-Network: http://www.desis-network.org/content/about-us, accessed, 12.5.2014
and integration of external knowledge and resources in innovation processes. Examples for these perspectives are open innovation, networked innovation (i.e. Chesbrough 2003a, Schienstock, 2001, Lehenkari, 2006). Communication is the ‘imparting or exchange of information, ideas, or feelings’ (Online source, Collins Dictionary: communication). Parties or people involved in cross-organisational innovation processes need to be able to transmit information, ideas or feelings successfully across different groups or organisations, in order to reach accordance on future visions or goals and ways to achieve them. Thus, communication is one of the principal foundations for all cross-organizational innovation work. Communication is considered successful, when information reaches the intended recipient. Consequently it is first of all dependent on communication means (like the voice, e-mail, workshops etc.). However, reaching a recipient does not mean, he or she already understood the information as intended. Communication is highly dependent on pragmatic factors like circumstances of communication, intension of sender and recipient disposition for reception (Homberger, 2003: 259). And disposition for reception is strongly linked to situation and conditions a recipient is in. Intensions on the other hand are strongly linked to a cultural background of a person or group. ‘Culture’ is what unites a certain civilization or group of people. It is a shared and inherent sense of hierarchies, values, beliefs, ideas and knowledge, ‘which constitute the social action’ (Online source, Collins Dictionary: culture) – including communication. As culture is rarely made explicit its values and beliefs are silent companies of all communication. Likewise situate elements are affecting communication. Both are source of misunderstandings and misinterpretations in communication and negotiation processes in cross-organisational innovation processes in need of integrating knowledge and resource into one body of knowledge and activities. To collaborate with designer in innovation process can contribute to communication processes and facilitate and provoke change i.e. by bringing proposals to the discussion table that enable and provoke discussions and act as mediation tools, thus developing joint visions or goals. However, little is known about when, in what phase or what ways this could be valuable for innovation processes between organisations and what would be the outcomes of such a cooperation.

This paper discusses design in relation with integration and communication processes in in cross-organisational innovation. We present a provisional structuralisation of designers in innovation describing main groups of elements of the relation. The structure outlines design and innovation dimensions and stresses the potential benefit of cooperation with designers in cross-organisational innovation processes. Finally it draws preliminary conclusions on possible values and outcomes of cooperation with designer in innovation processes and it isolates process phases, the cooperation should be most beneficial for. Thus, the paper contributes to the understanding of the relation between designers and cross-organisational innovation and potential benefit of cooperation.
2 Methodology

There is little knowledge on the benefit of designers in innovation. The vague conceptions surrounding designer’s activity in innovation processes call for investigation to provide more clarity and common understanding. This should lay grounds for more fruitful discussions and development of integration of designers in the innovation-field. This paper seeks to provide such common understanding by proposing a framework of design in innovation processes. The aim is to summarize how design activities and multifaceted innovating processes are perceived in current design literature. We will focus on structuring by finding common characteristics, goals and values of design activities in innovation processes going beyond organisation boundaries (i.e. including local communities, municipalities or other stakeholders).

This study is based on a review of selected literature and on empirical research (exploratory interviews) from two innovation projects conducted at Lucerne University of Applied Arts and Sciences in collaboration with several organisations. The study does not aim to present an all-inclusive literature review, but rather focuses on selected key texts, relevant to the research because they review expanded design moving into the field of innovation. Thus, they provide a good picture of how the activities in innovation are perceived by the design community. The texts chosen for review can be divided into three groups. The first group consists of conceptual texts often quoted or considered central to the design and innovation discourse. The second group contains case study research, reflecting on current design activities in the context of complex innovation processes (i.e. Malmö Living Lab, DESIS-Lab or 27ième region). The third group consists of three special issues of design journals dedicated to a) the challenges in participatory design (DesignIssues: Volume 28, Number 3 Summer 2012), b) interpreting Design Thinking (Design Studies, Volume 22 (2001) and c) the design and innovation relationship (DesignIssues: Volume 30, Number 1 Winter 2014). The selected articles were screened for characteristics or qualities describing the design and innovation relation. These characteristics were clustered according to main themes. Thus, main issues where isolated, described and grouped with respective design activities, skills and competencies. We call this the design and innovation dimensions. The emerging dimensions contain overall themes and design activities, goals and competences and skills.

In addition to clustering the descriptions, explorative interviews with project partners were led and screened for relations between innovation and design. Special focus was given to the value and usefulness of the cooperation with design in innovation process. The interviews were semi-structured, explorative in nature and included discussions between the interviewer and interviewee. All interviews were conducted between winter 2013 and spring 2014 and involved people from the German part of Switzerland. The interviews where not systematically analysed. Instead they were scanned for indications on possible benefit and outcomes of the cooperation. Nevertheless the transcriptions of the interviews gave indications on possible focus elements or issues. These exploratory interviews were conducted with two groups of (former) partners from projects conduct-
ed in collaboration with more than one organisation. The Swiss Commission Technology and Innovation (CTI) funded one project. The other was an undertaking by the organisation involved and by the Lucerne University. Project one was set in the cultural sector: A group of researchers (including ourselves) from the Department Art and Design in Lucerne cooperating with five museums, an external consultancy collective and the association of Swiss Museums, to explore opportunities and challenges of social web for the museum. Most partners were participating with two people in the project. People chosen for the interviews where project managers typically not very familiar with the concept of including designers in innovation processes. In the second (still ongoing project) another research group in Lucerne developed new ways of dealing with the needs of withdrawal and privacy of psychologically impaired patients in a clinic in Switzerland. Partly the innovation consisted of a new kind of room installation that allows for the individual to withdraw and create different atmosphere with light. But partly the innovation also consisted of new ways of including patients into development and decision processes of innovation processes. Interviews took place with one of the involved patients, with the responsible doctor, with the head of the clinic and one of the researchers at Lucerne University of Applied Sciences and Arts.

3 Literature review and indications from exploratory interviews

3.1 Review of selected literature - five dimensions of designers in innovation

In order to understand the potential of designers in fields outside the traditional design disciplines (mainly concerned with finding solutions for project briefs) the focus of design research has been centred on three main conceptual frameworks: a) Design for Social Innovation and Sustainability (D4SIS) and Design for Services b) Transformation Design c) Participatory Design. In each of the fields we have detected five recurring themes: 1) Discussions 2) Negotiation 3) Participation 4) Bridging 5) Empowerment. These themes link to the central innovation requirements of enhancing communication and integration processes needed for new types of collaborations with a wide range of public and private stakeholders and/or organisations. ‘Discussions’ are ‘examinations or considerations of matter in speech or writing’ (Online source: Collins Dictionary: discussion) – thus, consist of communication between different parties or groups of people. And negotiations are discussions leading to agreements. ‘Participation’ links directly to communication in that without people participating in it, there will be no communication and no integration of knowledge and resources at all. Implicitly, including people concerned can also generate the required support in the implementation process and will lead more likely to needed adaptation and to sustainable solutions (i.e. Barosso, 2013). The fourth dimension ‘Bridging’ between languages or worlds is indirectly connected with communication but takes centre stage when it comes to cross-organisational inno-
vation and the confrontation between different words, visions and ways of going about things. ‘Empowerment’ in the context of innovation is about finding ways of giving people or groups the authority to take innovative actions themselves.

Designers communicate and integrate through negotiation, participation, bridging, empowering. Communication and integration is present in design through these activities. We did not find clear indications concerning the innovation phase best qualifying for collaboration with design. This means, the activities are not situated within a specific phase of innovation process (i.e. development or implementation). But the five recurring themes can be associated with fuzzy front activities – before clear ideas are formed. They are part of the exploration of very wide question like ‘how can we improve security aspects in public transport’. Thus, design as support of innovation can be extended to the whole innovation processes.

In this chapter we will have a closer look at the statements made about design in innovation found in design research literature. According to the three main conceptual design and innovation frameworks this chapter is divided in three sections. The first, going into D4SIS focus on enabling, provoking discussions and participation and drawing links to the development in Service Design. The second, taking up the participatory design focus on integration of user knowledge and on negotiation. The third, describing the focus of Transformation Design and building-up innovation culture. Finally we are clustering the activities and isolating the five main design innovation dimensions.

3.1.1 Design for Social Innovation and Sustainability (D4SIS) and Design for Services

The first group of design research, dealing with design in innovation processes, is the Design for Services-framework. It is fundamentally about the reorientation from design being concerned with a distinct and fixed service propositions, to design concerned with results that makes a multiplicity of interactions possible (platforms, structures, ecosystems). This transformation affects the entire design world. But, with the increased importance of service industry, the effects of this transformation are most evident in service design. Thus, it is not surprising that this transformation was described in a specific service design framework (Meroni and Sangiorgi, 2011). The respective design framework describes a transformation towards service design that is working in collaborative teams and is able to integrate knowledge and resources from different stakeholders. Many of services developed include solutions where ‘the final users collaborate to provide solutions’ in collaborative services (Baek et al. 2010). These new service provision conception lead to the new and respective Design for Service-Framework by Anna Meroni and Daniela Sangiorgi.

Main issues of Design for Services goals include collaborative work, integration of knowledge and resource, improving visibility of opportunities, amplifying social entrepreneurship and understanding conditions and influences. Thus, the main issue of Design for Services lies with humans as ‘value to cultivate’ (Manzini in: Meroni and Sangiorgi, 2011: 3). And consequently the role of design must be another, too: Designers
will be concerned with getting to know the kind of resource and with integrating these resources, instead of designing options for human interactions in new service offerings. This new role is described as that of the facilitator: ‘Most of the contents of Design for Services-framework refer to the role of the designer as an actor able to listen to users and facilitate the discussion about what to do (ibid, 5)’. Listening and facilitating discussion between actors is one main issue. Another is to ‘bring proposal to the discussion table that are capable of going beyond what the user community could have imagined’. ‘Proposals that provoke discussions’ and ‘proposals that motivate in such a way, as to be open to discussion’ (ibid). Thus, Manzini highlights the role of design as both facilitator and provocateur. In addition to visualizing the ideas of users and stakeholders, he sees the role of design in stimulating the group by ‘feeding the discussion with original visions and proposals. Visualizing is supplemented by ‘visioning’ (ibid, 5). Thus, design for services, is taking advantage of the fact that design proposals are often provoking decision-making processes that were not part of design brief (which usually does not include process goals). In fact – if we look back at personal experiences with design briefs and presentations – we often realized that the design presentation was not so much about the actual design, but about reaching agreements in the group, and to integrate divergent opinions (the group consisting of i.e. client, marketing production and project partners etc.). Design for Services acknowledges the value and the potential of this process of defining, reconsiderations and redefining. Negotiation related goals take centre stage of design activities.

The second group of design research, dealing with design in innovation processes, is connected to the first by a joint focus on designing something for a specific group – instead of designing something. Additionally, the two design fields are linked through research programs from the DESIS-network and respective researchers from universities such as the Politecnico di Milano, Kolding School of Design, Malmö University etc.. DESIS ‘is a network of design labs, based in design schools and design-oriented universities, actively involved in promoting and supporting sustainable change’ (from DESIS-Website). The focus on ‘Social innovation’ refers to a reorientation to ‘new ideas that work in meeting social [instead of technical] goals’. In the context of design it helps to reframe the focus of design from design that is concerned with finding a solution to a project brief (be it product, service or interface etc.) to design that is concerned with isolating problems and defining the nature of these problems as well as formulating adequate solutions to it (Parker, 2009: 19). However, in most other context the term ‘social innovation’ leads to more confusion then clarity (i.e. the term ‘social’ can be understood in different ways). Thus, the term ‘social innovation is not used as a separate kind of innovation in this paper. Instead we prefer to refer to new innovation settings (cross-organisational) and transformed innovation outcomes (services, roles, perspectives, new ways of operating etc.).

2 http://www.desis-network.org/content/about-us, accessed, 12.5.2014
Key DESIS-activities includes the documentation, systematisation as means to promote of D4SI-activities, methods, tools and experiences. Case studies connected to DESIS-network mostly focus on the benefit of design in innovation projects with social issues (i.e. with local communities). This includes the support of participation through design methods, as well as trough enabling the collaborative development of both technologies and participation processes concurrently (Manzini and Staszowski, 2013). Additionally it involves the building and creation of new alliances required for these innovations by designing ‘meta-services oriented to stimulate and facilitate interpersonal encounters’ (Cipolla, 2007: 153) and providing toolkits with step by step process describing central concepts like scenario building and prototyping etc. (Manzini and Jégou, 2009). It also covers improving scaling and diffusion of promising initiatives through isolating key features, as well as amplification of social resources by giving visibility to what is there (Manzini and Meroni, 2007). And it includes the focus on ‘have[ing] the freedom to ask questions and think critically’ and ‘elaborate critical thoughts’. (Manzini and Staszowsky, 2013: ii). More recent projects include a focus on providing appropriate environment for innovation projects with social issues by ‘developing public authorities capability to backup local bottom-up initiatives’ by anticipating problems and appropriate conditions (Manzini and Staszowski, 2013: 152) and emphasising the democratic aspects of inclusion people concerned and finding ways of empowering people to take action themselves (ibid.). And others again describe design activities as infrastructuring “where activities carried out are aimed at building long term relationships with stakeholders in order to create networks from which design opportunities can emerge and stakeholder can innovate together.” (Hillgren et al. 2011:169). Finally, Seravalli is coining the concept of ‘composing together’ where she is highlighting the co-creation aspect of Design4SI. Thus, she is emphasizing the collective exploration ‘creation of possible alternative future prospects’ (Seravalli, 2013: 208).

A more critical account is included in recent case studies looking at the long-term effect of some of the DESIS-projects i.e. 27ième Région (a French project, concerned with peripheral regions in need of social and economic perspectives). A lack of skills in implementation (regarding economical- and organization issues) and a risk of reinventing the wheel by ignoring evidence and field experiences is acknowledged (Mulgan, 2009: 35). Additionally the D4SI-community is attested a lack of theories of change (Parker, 2009).

Key features of D4SIS include increase visibility to promising initiatives, resources and opportunities, creation of new alliances required for these innovations, scaling and diffusing of promising initiatives, focus on enabling and supporting public participation and empowerment of collective exploration.

D4SIS does not include bridging words directly. Bridging between worlds is most prominent in the field of participatory design, which leads us to the next section.
3.1.2 Participatory Design – Design and negotiation

Participatory design prominently links design practice to bridging between designers and user. To bridge, is to provide a path over a road, river or obstacle (Collins Dictionary). Participatory design uses performative objects, such as mock-ups, prototypes, and design games to act as boundary objects between developers and users. The sociologist Susan Leigh Star suggested the notion of boundary objects as key in ‘maintaining coherence across various social worlds’ (Star and Griesemer, 1989: 393). A ‘world’ is a universe or on environment resembling the universe in that fix rules and laws are ruling movements. In this case different boundary object can bridge between the world of the designer and the world of the user: worlds are united by social rules, defining social practices. The basic assumption of early participatory design was, that by observing and interrogating the design process with boundary object more closely, social conventions would emerge in the process of designing and could be addressed by new designs (Ehn, 1988). Design, was seen as an emancipatory practice, able to question existing social practices and use of computer artefacts. To question social practices is also to see them as social constructions, instead of given facts. And participatory design (i.e. Ehn, 1988) explicitly makes the link from design to Wittgenstein’s language-game-philosophy. Wittgenstein’s idea of language-game is first of all an interrogation of basic assumption about the world being out there for us to detect, describe and change. Instead the world is a ‘social construction’ and this construction of the world (its rules, conventions) are commonly rendered invisible – they are ‘hidden in the background’ and ‘intersubjectively accepted’ (Ehn, 1988: 54ff). Design was seen as actively and ‘meaningful participation in intertwined language-games of design and use’ (Bjögvinsson, 2012: 105). Thus, by actively interrogating use, design engages in some of the invisible construction, some of the rule making. A similar approach can be found in critical design movement that develops artefacts questioning everyday use of objects. Additionally, the artefact includes potential, alternative solutions and practices. However, critical design was aimed mainly at designers rather than processes external to the world of design (Fuad, 2008).

The concept of ‘Things’ developed participatory design practice towards the focus of negotiation. ‘Things’ describes the idea of developing ‘potentially controversial design objects and matters of concern’ that lead to meaningful negotiation between partners. Things are ‘modifying the space of interactions and performance’ and frame ‘a space that permits a heterogeneity of perspectives among actors, who engage in attempts to align their conflicting objects of design (Bjögvinsson, 2012: 104). With the concept of Things the focus in participatory design was shifted from improving objects and social worlds, towards organization the relation between the designers and the user or other stakeholders, in order to reach meaningful solutions. Thus, negotiating took central stage. One of the key principles lies in the understanding of a situation by involving users and stakeholders in the design process. And design is seen as long term ‘infra-structering’ where design and innovatin opportunities may emerge more organically:
“Infrastructuring is characterised by a continuous process of building relations with diverse actors by quite a flexible allotment of time and resource. This more organic approach facilitates the emergence of possibilities along the way.” (Hillgren et al., 2011: 179).

For the context of collaborative development Things and the use of prototypes are described in relation with the development of joint future visions and the building of trust (i.e. Seravalli, 2013).

Main issues are negotiation and bridging between people or groups of people. Additionally participatory design deals with developing meaningful artefacts that act as boundary objects, giving visibility to social construction, understanding and engaging in a situation.

3.1.3 Transformation Design – Design and building innovation culture

The Transformation Design-framework was developed in the context of RED. As such it is closely connected to the RED activities ‘that develop new thinking and practice on social and economic problems through design-led innovation’\(^3\). RED is part of British Council activities that has been promoting the improvement of design in the products of British industry since 1944. More recently the focus shifted to promoting ‘design’s ability to transform organisations, products, services and even lives’\(^4\). Transformation Design – similarly to Design for Innovation and Sustainability (D4IS) – is about applying design in new territories with multi-layered and complex (social) issues. Unlike D4IS Transformation Design explicitly includes the support of people and organizations in achieving desired changes linked with these proposals by introducing design skills into organisations involved. Thus, it is asking design to ‘shape behaviour of people, systems and organisations’ (ibid.). Key features of Transformation Design are the involvement of diverse stakeholder, the transfer of design skill and the building of innovation culture.

3.1.4 Four main dimensions containing five main themes

Analysis of the selected literature resulted in four main groups of elements (roles, contexts, goals and knowledge & skills). These where named according to the elements they contain: roles, contexts, goals, knowledge and skills. These groups contain the characteristic used to describe the relation between designers and cross-organisational innovation processes in design research. Additionally we detected five main themes popping up in the activities of designers working in innovation processes between organisations: discussion, negotiation, participation, bridging and empowerment. We will use the five themes to structure the dimensions. Thus, we will present a first sketch of the structuralisation of designers in innovation that will be tested with the statements from the exploratory interviews (3.2).

\(^3\) http://www.designcouncil.info/mt/RED/about/, accessed, 10.5.14

\(^4\) http://www.designcouncil.org.uk/about-us/what-we-stand, accessed, 10.5.14
Designers in innovation – as depicted in design research literature – is seen as supporting innovation activities – it is not made innovation. Instead design is described as enabler, facilitator or provoker of discussions leading to ideas going beyond the imaginable. They are described as catalyst of future visions. These are different roles emerging from design research literature. Also there is a focus on specific contexts or partners: projects are a) situated or connected in a local community b) connected to social services or c) linked to organisational strategy projects or social entrepreneurship (where new organisations are build in connection with social values and responsibility). Designers in innovation don’t want to innovate per se. They have a series of goals that can be associated with communication and integration processes (main themes are bridging, participation, empowerment and discussion/negotiation). Recurring goals include continuous match making, inclusion and involvement of stakeholders, identification of controversies and issues of concern and enabling of participation and empowerment. A small list of skills, experiences and knowledge is listed supporting these activities including knowledge on iterative design methodology and the use of scenarios, prototypes and mock-ups in order to try use before use and in order to generate discussions and include knowledge from experts. A wide experience with participatory negotiation processes gets mentioned, where design propositions are used as intermediaries for discussions and negotiation that are capable of generating original visions and new proposals going beyond what the user community or stakeholder group could have imagined. Additionally knowledge on artefacts, processes and services and the production of these things also are applied. Thus including designers in innovation contains four main dimensions: roles, contexts, goals and skills & knowledge.

Main themes as depicted in design research literature are 1) Discussions 2) Negotiation 3) Participation 4) Bridging 5) Empowerment. They all link to communication and integration. In other words, communication and negotiation is present in design through discussions, negotiations, participations, bridging and empowerment. We will use these elements to describe the dimensions in terms of main roles, contexts, goals and knowledge involved. Thus, we will arrive at better understand the characteristic of each of the dimension.

The five supporting types each contain specific activities and methods.

(1) Discussion

Listen and facilitate discussions between actors. Facilitate the discussion about what to do, by feeding the discussion with original visions and proposals that are capable of going beyond what the user community could have imagined (visioning). Introduce potentially controversial design objects and matters of concern’ that lead to meaningful negotiation between partners. Research conditions, requirements and needs with ethnographically inspired design tools (user diary, observations (filming, sketching etc.). Thus, support the understanding of conditions and influences through user/people-studies. Improve visibility of opportunities and resources and social constructions by visualising and systematize information. Collect and document promising initiatives to
make promising initiative visible. Think critically and establish critical thoughts. Introduce manipulative representations of ideas that can be experienced and tested. Support of trust building through the use of prototypes. And support of innovation opportunities through continuous match making (of partners).

(2) Negotiation (negotiation = discussion that is set up to produce agreement)

Negotiation includes the integration of stakeholder-knowledge through the use of performative artefacts (mock-ups, prototypes, scenario-building. It comprises the production of proposals that motivate in such a way, as to be open to discussion. Use of visualisations and visioning to support visibility and openness of the discussion.

(2) Participation

Participatory activities with use of design artefact, to facilitate co-creation of possible alternative and/or joint future visions. It is about anticipating problems and appropriate conditions for the inclusion of people. Thus, supporting and facilitate inclusion of people concerned through the use of design methods (i.e. design games, user diaries, prototyping etc.). It includes creation of meta-services oriented to stimulate and facilitate interpersonal encounters and support the creation of new alliances.

(3) Bridging

Bridging focuses on the use of performative objects, such as mock-ups, prototypes, and design games to act as boundary objects between developers and users and stakeholders aiming at coherence across worlds. Bridging between people and their worlds also includes the support of building and creation of new alliances required by designing meta-services oriented to stimulate and facilitate interpersonal encounters.

(4) Empowering

Give people the authority to take innovative actions by transferring design competences and providing toolkits with step by step processes-cards, tips etc. describing central concepts like scenario building and prototyping etc. Thus a provisional model of designers in innovation looks as follows.

<table>
<thead>
<tr>
<th>Discussion</th>
<th>Negotiation</th>
<th>Participation</th>
<th>Bridging</th>
<th>Empowering</th>
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</thead>
<tbody>
<tr>
<td>Roles</td>
<td>Enabler, facilitator, provocer, catalyst</td>
<td>Enabler, facilitator, provocer</td>
<td>Enabler, facilitator</td>
<td>Enabler</td>
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<tr>
<td>Contexts</td>
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<td>Social service context</td>
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<td>Organisational context - strategy process</td>
<td>Organisational context - strategy process</td>
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<td>Organisational context - strategy process</td>
</tr>
</tbody>
</table>
Goals

- Trust building
- Identification of controversies and issues of concern
- Improving visibility of opportunities
- Understanding conditions and influences
- Provoke discussions
- Produce joint future visions

Skills & knowledge

- Visualisation skills
- Knowledge from experience with iterative design methodology (i.e., the use of scenarios, prototypes, mock-ups)
- Knowledge on the architecture and production of artefacts, (processes and services)

<table>
<thead>
<tr>
<th>Skills &amp; knowledge</th>
<th>Goals</th>
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<tbody>
<tr>
<td></td>
<td>Trust building</td>
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<td>Enabling of participation</td>
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<td>Building relations with divers actors and facilitates the emergence of possibilities along the way</td>
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<td></td>
<td>Integrating social resources and expertise</td>
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<td>Understanding conditions and influences</td>
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<td>Frame a space that permits integration of a heterogeneity of perspectives</td>
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<td>Enabling empowerment</td>
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<td></td>
<td>Transfer of design skills</td>
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<td></td>
<td>Amplifying social resources and entrepreneurship</td>
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<td>Create networks with stakeholders</td>
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<td></td>
<td>Enables empowerment</td>
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<td></td>
<td>Design skills</td>
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<td>Experience (to path on) with iterative design methodology (i.e., the use of scenarios, prototypes, mock-ups) and with participatory tools (i.e., probes, user diaries, design games etc.).</td>
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<tr>
<td></td>
<td>Knowledge from experience with participatory tools to include stakeholder (i.e., probes, user diaries, design games etc.)</td>
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<td></td>
<td>Knowledge from experience with the use of boundary objects to maintain coherence across various social worlds and languages</td>
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<td></td>
<td>Infrastructering activities aimed at building long term relationships with stakeholders in order to create networks</td>
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<td>Infrastructering activities aimed at building long term relationships with stakeholders in order to create networks</td>
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</table>

Table 1: Structuralisation of designers in innovation: Main dimensions and content of these dimensions as depicted in design research literature

As depicted in table 2 the role of the designer as a facilitator of innovation processes and as enabler, catalyst or provoker of discussions and future visions is well explored in design research. Central issues of design include support and facilitation of discussions, negotiation, participating, bridging and empowerment. Design research is associating clear roles, contexts, goals and design skills with these issues. Thus, designer in innovation processes between organisations is something that we can get a good picture of. However, literature does not contain clear indication as to when, in what phase of innovation collaboration with designers is useful. Regardless of all the current discussion in design research cited above, the different design movements and disciplines (i.e. participatory design) have failed to come up with a comprehensive conception of the benefit and outcomes of cooperation with designers.
3.2 Empirical evidence

In the following section we describe empirical evidence from interviews with partners. The reportings from partners was used to form hypotheses about different kind of possible values of design in innovation processes. We also drew preliminary conclusions on the outcomes of the cooperation.

In addition to the reviewed literature five partners from a previous project (2012) and three partners from a current project where interviewed. Additionally, the designer leading the later project was questioned. The interviewed partners where asked to report on their experience from the project. Interviews were scanned for indications on possible benefit and outcomes of the cooperation.

Interviewees expressed few explicit values of including design competences in innovation process (see table 2). Typically they would underline the importance of providing an open space and time out to explore and undertake a joint journey that is able to overcome professional rivalries and languages. Implicitly additional qualities where identified. I.e. credits given to the designers work where rated as implicit statements for valuable outcomes of the cooperation with designers.

| Increase of support of ideas | The more we practice participation, the more we understand the value of participation for the respective business. The more design can help to include expert perspectives, the more solid consent is reached with experts. The greater a project is a matter of one’s heart, the greater care is exercised, the higher the trust between partners (the designer is taking care of the project). The better a designer can implement insights into new prototypes, the greater trust from involved experts will be. The bigger the expertise and an immediate clear idea of what relevant issues are – the bigger trust is between partners (design was providing prototypes). The more power play – the less affective design inclusion. (Implicit indication towards design weakening the power play) The more a project is set in the management level – the more open is the journey towards strategic questions. |
| Increase of possible appropriation | The more an unmet need can directly be addressed – the greater is the supports and the acceptance of changing something (not clearly linked to design). The better/continuously people affected are included – the more appropriation can be reached and cost reduced. |
| Increase of orientation and competence for the introduction of novel ways of operating (change) | The more design competences can facilitate confrontation with other viewpoints/languages – from other companies is providing orientation/reinforcing own view. The greater the success of a prototype the greater the interests and significance of an idea. Address relevant/ latest issues – increase orientation and competence to introduce novel ways of operating/ know where one stands/ ‘what we know’ – where we need experts. The more people of organisation have the possibility to experience new technology the better they will be able to make sense of it for their own work (for future use); be able to formulate specification for prototype project. The better/continuously people affected are included - the greater is support, stimulation of enthusiasm, common base; and the smaller are fears, the faster participants are made responsible partners (design included people affected). |
| Decrease costly production | The earlier prototyping is included, the more we can avoid costly production. The more design competences are included the greater the chance that findings from praxis will be translated into an idea or product. |
| Provide exploration, space and a way out of the companies own reality | The more design competences can facilitate the inclusion of "Opposing views" the less an organisation will be trapped in its own reality. The more design projects the more creative freedom/time-out can be provided; space to explore, to discuss values, to undertake joint journey. |

*Table 2: different kind of values of design in innovation as depicted in the interviews*
As depicted in table 2 implicit values from inclusion of design competences include the increase of support of ideas and change; increase of possible appropriation, orientation, significance and competence to introduce novel ways of operating and decrease costly production and overcome professional rivalries. But these values merely cover part of the dimensions described above. Possible benefits are placed elsewhere or at least contain differing emphasize. Important aspects from the interviews included: provision of orientation, support of ideas by including knowledge and critique from experts, adoption of novel ways of operating leading to a decrease in costly production for products lacking support. Giving orientation or support ideas does not necessarily include active discussions or negotiation. However, the increase of appropriation can be associated with forms of successful negotiation or even integration. Additionally similar aspects are associated with different goals: bringing unexpected proposition to the discussion table is linked with feeding and provoking discussion able to go beyond what users or stakeholder could have imagined in design research literature. A similar aspect emerged from the interviews (‘Going beyond the companies reality’), but it was associated with providing exploration space and opposing views as benefit. It wasn’t linked to any pro-active activity like provoking discussions or reaching joint future visions. There is a difference in the level of the influence. But both descriptions stress the importance of introducing novel, surprising elements into the discussion. It is the unexpected that is valuable. Thus, the need for new collaborations and inclusion of a variety of stakeholders can’t be approached with the organisations own problem solving methods.

And ‘empowerment’ is not emerging as possible value from the interviews. ‘Bridging languages’ does only show up indirectly in the statement about overcoming professional rivalries and reaching solid consents. And trust building seems to heavily depend on the level of involvement of a designer into a project (make it his/her own project and make it a matter of his/her heart).

The difference in perception of the value (in design research literature and in innovation practice with designer may result from the small sample of interview). But the difference also suggest that integration, bridging and, empowerment are less frequent outcomes of designers being active in innovation processes – and might be more difficult to achieve. And it suggest that some of the goals (like trust) have multi-layered aspects that might not have been looked at sufficiently by design research yet.

4 Provisional structuralisation of the designer and innovation relation

The evaluation of the first structuralisation of designer in innovation (table 1) with the outcomes from the exploratory interviews resulted in a revision of the structuralisation. Characteristics that were not confirmed were deleted. Characteristics taken from the interviews are blue.
<table>
<thead>
<tr>
<th>Goals</th>
<th>Discussion</th>
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<td>Enabling of participation</td>
<td>Create networks with stakeholders</td>
<td>Identification of controversies and issues of concern</td>
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<tr>
<td>Improving visibility of opportunities</td>
<td>Building relations with diverse actors and facilitate the emergence of possibilities along the way</td>
<td>Produce joint future visions</td>
<td>Create networks with stakeholders</td>
<td>Improve visibility of opportunities</td>
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<tr>
<td>Understanding conditions and influences</td>
<td>Integrating social resources and expertise</td>
<td>Stimulation of enthusiasm and common base to reduce fears and increase responsibility of participants</td>
<td>Increase of orientation and competence to introduce novel ways of operating</td>
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<td>Increase of orientation and competence to introduce novel ways of operating</td>
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<tr>
<td>Knowledge from experience with iterative design methodology (i.e. the use of scenarios, prototypes, mock-ups)</td>
<td>Knowledge from experience with iterative design methodology (i.e. the use of scenarios, prototypes, mock-ups)</td>
<td>Knowledge from experience with the use of boundary objects to maintain coherence across various social worlds and languages.</td>
<td>Knowledge from experience with participatory tools to improve visibility of opportunities (i.e. probes, user diaries, design games etc.)</td>
<td>Knowledge from experience with participatory tools to improve visibility of opportunities (i.e. probes, user diaries, design games etc.)</td>
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<tr>
<td>Table 3: Revised structuralisation of designers in innovation processes. Blue = Additional characteristics of the dimensions from interviews</td>
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The table is a provisional structuralisation. More elements will probably have to be added to the dimension (i.e. to the contexts). Nevertheless we feel that the four dimensions cover the content of the relationship between designers and innovation processes organ-
isations. Evaluating table 1 with the statements from the interviews suggest a concentration of designer work in innovation situation negotiation and facilitation. Emphasize is given to the reach of orientation, appropriation. The provocation of productive discussions or the emergence of joint future vision is less part of the benefits perceived by partners. And empowerment does not seem to be a focus in the perception of project partners at all. Instead, what becomes important is ability to formulate project specification and the prevention of inefficiencies through the production of inadequate products. Consequently emphasize is given to visualisation skills and the use of iterative and participatory tools and methods to improve visibility of opportunities. Infrastructure activities aimed at building long-term relationships and the transfer of design skills to empower people to take innovative actions themselves become irrelevant.

5 Conclusions and recommendations

In order to understand the value of design in innovation processes, research has so far mainly studied design as a tool to enhance innovation capabilities of non-designers. Apart from this, the contribution of designers for innovation process has not been the subject of design or management research. Inclusion of designers in innovation processes has been looked into S4SIS, in the design for Services-framework in participatory design theory and in Transformation Design. However, the value and outcome of cooperation with designer in cross-organisational innovation has not been subject of extended design research. The ill-structured conception surrounding the idea of designers in innovation processes calls for investigation to provide more clarity and common understanding. This will give more clear indications on potential profit of the cooperation and ways of organizing the cooperation timewise and control the outcome.

This paper discussed design in relation to communication and integration processes in cross-organisational innovation processes. It drew on selected literature in the design discourse as well as on a series of exploratory interviews with partners from innovation projects. We presented a provisional framework containing four dimensions describing the relationship between designers and innovation processes with five recurring themes. Usually design activities in innovation processes can be associated with the fuzzy front end of innovation processes. This paper emphasizes the potential of including design activities throughout innovation process. The analysis from the exploratory interviews suggests a focus on negotiation and facilitation of participation while bridging and empowerment could be less frequent and might be more difficult to achieve.

References


A Method for Design Thinking

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Abstract
This paper is about a method on design thinking for any kind of innovation. It is suggested that design thinking should be approached as de-sign thinking, as a way of thinking experience, opposite to now days mostly celebrated, customer living experience. It combines two distinctive paths. The first is deriving from Heidegger’s phenomenology from the discourse on thinking and the second from Bejan’s constructal principle. De-sign thinking for innovation as a method, will be experimentally developed and validated in a virtual living lab. As opposed to open innovation, de-sign thinking leads to a genuine and free from passivity or activity of the subject, non-willing open to innovation comportment.

Keywords
Design thinking, Living Lab, mass customization, co-creation, open innovation, Heidegger, Bejan

1 Introduction

A paper on design thinking cannot and should not follow the usual structure of a scientific paper with start, middle and end. Nevertheless for facilitating the transition from scientific reasoning to design thinking, we will take the usual path that scientific papers follow.

The reason why companies are turning towards the way designers think, that they think in order to create value, is an obvious one from their side: in order to be able to innovate quicker and more efficient than their competitors. Innovation is important for the viability of an organization, a fact that has been supported by numerous publications since the early fifties. Weber (2011) has undertaken an extensive literature review on the importance of innovation for organizations. Design thinking as a term, is used today increasingly by marketing, even in disputable situations, mainly because such a new term sells. It sells, but really the question is, what it sells.

Marketing positions value, and in doing so, it challenges the market. An essential characteristic of modern marketing is positioning in the sense of challenging. Challenging is also a way of revealing. Through the challenging positioning something emerges, that has form within the space of the market. When marketing challenges something towards revelation until form is shown, we talk about topos. Topos is the essence of modern marketing but itself has nothing to do with marketing. The question is how can modern marketing help the human being and at the same time not opposing it. It is claimed here that design thinking can be the answer if approached through phenomenology. In Tsigkas (2009), form is presented as the context of relations in space, which will constitute a topos. Topos makes these relations concrete in space. Innovation has a special kind of topos.
The use of the words, design and thinking, thinking and design leads to an unforced relationship of philosophy to design and vice versa. Philosophy addresses always the essence (αλήθεια) of the matter, by asking “what is”, and design addresses the form (μορφή) (Alexander, 1964:15), by asking “how is”. Opposite to the opinion of Alexander (1964:15), who claims that form is the solution to the problem, while the context is the problem, it is argued here, that because form is the context (Tsigkas, 2009), it is both the problem and the solution to the problem. This is an important statement and claim, because technology, for example, should be viewed as both, the problem and the solution to the problem. Therefore innovation is called to answer the question of what problem is invited to solve, being at the same time the problem. As such technology must break the vicious cycle of being the problem and at the same time the solution to the problem. This is possible only if the essence of technology is determined, for the essence of technology is to uncover, to bring something to revelation, thus eliminating the vicious cycle. Technology reveals form (Be-stand) thus becoming the placeholder of innovation that has a position on its own right without becoming an object (Gegen-stand), and in this way not staying opposite to the human being. By establishing form (Tsigkas, 2009) through technology, innovation finds its topos (Gestell). Therefore, design thinking must necessarily answer the principal question: how through thinking, topos is designed and at the same time, how through design, topos is thought of. In other words, the question is how one might through unlocking the signs (de-sign) within the form bring the topos of innovation into its appearance (αλήθεια). The question here that should be answered is what is unlocking the signs, and how is this done or realized. These questions lead to the primordial question of what is thinking and how do we reach to this.

Design thinking is design of topos, in which thinking experience is grounded. It is a novice way of thinking in science, further that the usual reasoning, evolving recently in great speed aiming at establishing an environment of activities that stimulates innovation for products and services as well as the infrastructure to support such activities. Usually practitioners as well as scholars use the term innovation process when referring to the way the innovation activity takes place. However, the word process implies that innovation evolves in the form of steps or events, but this is not true. Innovation has no beginning and no end and therefore it can be neither a process nor a procedure and above all it does not know the outcome before it occurs, while a process does. Innovation is a phenomenon, something that appears, that is uncovered. As a phenomenon, innovation is the result of thinking that becomes reality as the most efficient flow motion among others possible (Bejan and Merkx, 2007). De-sign thinking is exactly about that: how to stimulate flows of thinking that move along efficient paths towards forms (contexts) and at the same time how forms (contexts) generate further flows of thinking in a continuous perpetual fashion. Even business strategy should be set under the scrutiny to relocate in order to facilitate the appearance of innovation instead of hindering it. Business strategies should not act as roadblocks or constraints towards innovation on the contrary innovation should become business as usual. Although innovation has no beginning and no end, de-sign thinking has entry points. In this way de-sign thinking can be supported by a method that allows for anyone in the organization or outside of it to become part of the creation business as usual activity. How that is possible is the subject of this paper. The
method supports any kind of innovation including technology, product or service as well as organizational innovation.

The structure of this paper is the following. In the second section, the relation between design and innovation is discussed. In the third section, the relation between thinking and innovation is presented. In the fourth section, the issue of design thinking from the perspective of Heidegger’s phenomenology is presented. In the fifth section a roadmap leading to the development of a method is presented. It combines Heidegger’s discourse on thinking and the constructal principle of Bejan, in order to create innovation topoi in a business as usual way.

2 Design and innovation

It is a widespread opinion that the general term design has an ambiguous meaning inherent in the term. In many ways it is considered in the broadest sense of changing existing situations into preferred ones (Simon, 1975:55). This is a more general definition that can apply in the most cases of coming confronted with design, either from the engineering or the architectural perspective or even the organizational perspective. Although from that perspective, design is an activity with common root despite its different meanings, design thinking must be defined in order to establish a common understanding of its essence before using it. In order to facilitate this task we decided to look first at the two terms that constitute design thinking separately before combining them. In this section therefore we will examine the term design from the engineering and architectural perspective in order to reveal the essence of design. What is really a fact today, is that the growing complexity of engineering design reduces the distinction between it and design in architecture. The increasing involvement in engineering design of the human dimension brings the two main pillars of design i.e. engineering and architecture so close together, that a common ground of understanding starts developing that can help practitioners and philosophers come to a more integrated understanding of the phenomenon of design. There has been considerable work performed of current philosophical and ethical work on design in bridging the literature on design in engineering and architecture. In Vermaas et al. (2008:3) it is argued that:

*Despite its diverse manifestations in engineering and architecture all design can increasingly be seen as aimed at the same goal: production of our material environment and the way in which we are designed to live in that environment.*

One of the most influential designers of the 20th century, Alexander tried to introduce rationality in design and his diagrams (patterns) became famous. By stating that the ultimate object of design is form, he accepts the fact that the world is neither regular, nor homogeneous. An irregular world tries to compensate for its own irregularities by fitting itself to them and thereby takes on form (Alexander, 1964:15). Bejan’s theory of contractuals is similar to that of Alexander. This situation can be paralleled to organizations that expose themselves to flows of the market that are increasingly personalized as many of one (see mass customization). Indeed Alexander lived and worked in a time that mass production was at its peak, where time and motion studies backed god-divined productivity and therefore design targets were mainly directed into fulfilling cost targets with respect to quantity. Away from
mass production and its stride for homogeneity and central planning, marketing uses differentiation through innovation as a competitive advantage. In conjunction with the widespread belief that, continuous or discontinuous or even radical innovation is the key for sustainable profitability, organizations are pushed (by been pulled) to re-think the way of managing and conducting operations. In this world of differentiation, as opposed to being alike, conventional theories on developing and managing environment of continuous or discontinuous innovation reach their limits. This happens because of the difference on the basics of management theories and approaches. Economies of scale are under pressure to give up room to economies of scope and further to economies of one (Tsikas, 2012). In such a world of extreme differentiation, organizations need to re-define the context and re-think, therefore re-design the way they are formed in order to exploit irregularities that show up in a differentiated world. The new challenge of Marketing is to dis-close and to un-cover such irregularities for creating new opportunities for innovation. The new challenge for organizations is to find ways of re-adapting their operating and management structure in a sustainable fashion to such irregularities. The new challenge for science is to support radical differentiation and personalization as opposed to homogeneity. Science in general is known to strive for dis-covering laws with general validity. Science main objective is to explain, through experiments or theoretical ways, behaviours of various phenomena. Scientists have been drilled and educated to conduct research their life long. The world of innovation though is a different world. Here what is needed is a science that will augment and expand this way of thinking. In the past design also was fallen a victim of science when design was viewed or treated as a science (Science of Design or Design as a Science). Although useful aspects may be gained through treating design as a science by conducting research on design and design methodologies, what is needed for responding to calls for innovation and all its flavours, is to treat science as design, and therefore move from science thinking to design thinking.

3 Thinking and innovation

According to Heidegger (2007), questioning is the belief of thinking. Questioning claims Heidegger, is building on a path. This path is the path of thinking. Heidegger (1960) in Gelassenheit (Discourse on Thinking) distinguishes wisely between two types of thinking: calculative thinking and meditative thinking. Science does not think in the way thinkers think claims Heidegger (1954). The term technology includes the term τέχνη (technology), which in the philosophy of the Greeks means knowledge. Science is systematically organized knowledge that is basically a result of calculative thinking. Calculative thinking though does not ask for the meaning of technology it produces. Organizations compete mainly using calculative thinking, the way science thinks. Technology is based mainly on this type of thinking that is certainly indispensable, but it remains true that, this is a special kind of thinking. Heidegger (1954) in his Discourse on Thinking says about calculative thinking:

Its peculiarity consists in the fact that whenever we plan, research, and organize, we always reckon with conditions that are given. We take them into account with the calculated intention of their serving specific purposes. Thus we can count on definite results. This calculation is the mark of all thinking that plans and
investigates. Such thinking remains calculation even if it neither works with numbers nor uses an adding machine or computer. Calculative thinking computes. It computes ever new, ever more promising and at the same time more economical possibilities. Calculative thinking races from one prospect to the next. Calculative thinking never stops, never collects itself. Calculative thinking is not meditative thinking, not thinking which contemplates the meaning, which reigns in everything that is.

Further in the same script Heidegger claims:

Meditative thinking demands of us not to cling one-sidedly to a single idea, nor to run down a one-track course of ideas. Meditative thinking demands of us that we engage ourselves with what at first sight does not go together at all.

This is a completely different way than the one-track, often one-sided way of calculative thinking. It is clearly not a process. Heidegger calls for a different way of behaving towards technology. He calls for a simultaneous yes and no to technology, because as he mentions:

Our relation to technology will become wonderfully simple and relaxed, if we let technical devices enter our daily life, and at the same time leave them outside, that is, let them alone, as things, which are nothing absolute but remain dependent upon something higher.

He calls this comportment toward technology which expresses “yes” and at the same time “no” by an old word “releasement toward things” (Gelassenheit zu den Dingen). He claims further that having this comportment things are no longer viewed only in a technical way but the production and use of machines demands of us another relation to things, that it is not a meaningless relation. As an example he mentions, proper for his time, that farming and agriculture have turned into a motorized food industry. Furthermore, he claims that the meaning pervading technology hides itself. But if we explicitly and continuously heed the fact that such hidden meaning touches us everywhere in the world of technology, we stand at once within the realm of that which hides itself from us, and hides itself just in approaching us. The one, which shows itself and at the same time withdraws, is the essential trait of what Heidegger calls the mystery. Heidegger calls the comportment, which enables us to keep open to the meaning hidden in technology “openness to the mystery” (Offenheit für das Geheimnis). Releasement toward things and openness to the mystery belong together, he adds. They grant us, so Heidegger, the possibility of dwelling in the world in a totally different way and he suggests that they promise us a new ground and foundation upon which we can stand and - endure in the world of technology without being imperilled by it. According to Heidegger, releasement toward things and openness to the mystery give us a vision of a new autochthony, a new topos we would say, which someday even might be fit to recapture the old and now rapidly disappearing autochthony, especially in today’s mobile society, in a changed form. By considering technology the problem and at the same time the solution to the problem, it is exactly the right attitude for approaching this kind of thinking, that Heidegger calls meditative for a “yes” and “no” to technology and at the same time open to the mystery that technology carries within itself. It is the path to arrive at innovations that
support societies to develop and advance instead of going against them. Science must expand itself to account for this kind of thinking in order to re-form scientific knowledge.

We started with the question on thinking and we arrived at the point that one could discuss the consequence that Heidegger’s philosophy might have on the capability of an organization to innovate. We argue that, if releaseament toward things and openness to the mystery are awaken within the organization, then these organizations should arrive at a path that will lead them to a new ground and foundation of experience, in this case of thinking experience. On that ground the creativity will produce lasting works and will strike new roots that will constitute new topos for the organization. This new topos is the new autochthony for the innovating entity that is necessary for reaching a new home level of innovation. Meditative thinking opens up the mystery of innovation, while calculative thinking is only there to account for the economic result of innovation. A new approach to open innovation is born with the term open referring mainly to the way of thinking and not to whether this innovation comes outside the strict boundaries of the organization, at least not as propagated by the two main initiators of the term, Eric von Hippel (2005), and Henry Chesborough (2003). This new way of approaching innovation is coined here as openness to innovation (OTI) declaring a different comportment and way of thinking towards innovation.

Calculative thinking follows and subordinates itself to meditative thinking. If only calculative thinking prevails, then the consequence is that in the discourse of the competition organizations will be slowly but steadily driven into the turmoil of losing their topos. Without meaning calculative thinking is easy to drift away to fly from thinking. One-track, calculative thinking leads to thoughtlessness, a state that the organization might lose its autochthony, its topos (Tsigkas, 2009). Therefore, topos for an organization is its capability to meditative thinking. This is important for organizations because innovation will come from primarily meditative thinking, and not from calculative thinking alone.

Considering the above there is strong evidence that, meditative thinking and innovation are tightly joined. Based on that fact we argue that innovation is the result of thinking, especially meditative thinking. Especially in the so-called creative industries “learning to think” is a absolute necessity. Heidegger (1954) begins with the following:

\[ In \textit{what} is named thinking we arrive, when we think ourselves. In order that such an effort succeeds, we must be willing to learn to think. (In das, was Denken heißt, gelangen wir, wenn wir selber denken. Damit ein solcher Versuch glückt, müssen wir bereit sein, das Denken zu lernen). \]

In the next section we will support the claim that design is de-sign (Tsigkas, 2012) and furthermore, de-sign is the heideggerian thinking, in that it reveals (de-signs) the craft to hear the appeal of what is most thought provoking. Openness to innovation is the way to de-sign, based mainly on meditative thinking (Besinnung).
4 Design Thinking

Let us now return to the introductory statement on design thinking and the principal question: how through thinking, topos is designed and at the same time, how through design, topos is thought of. This question can now be answered through a meditative way of thinking, called openness to the mystery of things, that characterizes all those who are open to innovation. Figure 1 illustrates what is meant by openness to the mystery of things. By approaching a ball pen with the lens of a camera, the mystery hidden in a thing appears. It appears something that has nothing to do with the actual object of the ball pen. This is a visible example, a way of simulating openness to the mystery.

![Fig. 1: Openness to the mystery of things](image)

The question is, how one might through unlocking the signs (de-sign) bring the thing to its appearance (αλήθεια). In the above example through the openness to mystery hidden in the ball pen a kind of topos appeared (de-signed), while at the same time looking through the visible signs that appeared one may think how this topos has been unlocked. Unlocking the signs though, would never have happened if the thinker would not have taken simultaneously a remote and yet close up position to the thing, if he or she would have not released him/herself into it. Releasement and openness to the mystery of the thing belong together. Positioning to the thing means to challenge the thing in order to reveal itself to open up its mystery, to reveal its topos. There is useful experience to be gained using meditative thinking. This may happen within the world, as well as within an organization for business as usual innovation. Similar happens when marketing positions the organization into the market. Marketing challenges the market through positioning into it. Challenging is a way of revealing. Through challenging, something emerges that has form within the space of the market, and when that happens the organization topos opens up to the world. Although topos is the essence of modern marketing, itself has nothing to do with marketing.

In this way open innovation turns into open to innovation (OTI) on a personal basis. There is no obligation or precondition for co-creation, as it is widely defined today in the existing scholar and practitioner literature. For any one is capable of innovating (Tsikkas, 2014) and any one can be open to innovation. Based on this fact, mass customization for example, can be re-viewed as a result of open to innovation thinking. Through mass innovation, technology can be re-thought and re-volutionised. A co-creation environment, which involves the user in the creative activity entangled in a calculative thinking environment, is substituted by a real
open and free from passivity or activity of the subject, non-willing comportment to innovation de-sign thinking topos. Such freedom is a condition for reaching real releasement and openness to the mystery of things.

We are now capable to support the claim that design thinking is thinking for de-sign. It is learning to think meditatively in the sense of Heidegger. Meditative thinking is a different type of thinking it is the reflection upon the appearance and disappearance of the thing. The human being de-signs, thinks, he or she is a thinker only when he or she meditates between the appearance and disappearance of the thing, the essence of the thing. It falls in the middle it falls in, in order to design to give sense (Sinn), both existence and meaning to thing. He or she listens to the call of the thing that calls to be de-signed, to be thought-of to be sensed. Therefore to de-sign means to think meditatively, to meditate for its appearance in-the-world. The flow of reflections on de-sign (thinking), the waves of sound calling up, call for releasement (Gelassenheit) for fulfilling towards the thing which calls for acquiring existence and meaning. The free flow of acquisition is obstructed by the irregularities of thought that drifts away due to the calculative thinking. Free flow must be facilitated, not by reforming, reshaping but through transposing and reposing so that “sounds” become louder, thought is attracted and flows through the path towards origin, towards appearance.

It is interesting at this point to join Bejan with his constructal principle (Bejan and Merkx, 2007:vii) where it is referred that freedom is good for all design called “better science”. Bejan and Merkx independently from Heidegger and many years later as he did, recognized the fact that science is not good enough for design and that design itself is a “better science”. For a better science to happen a different kind of thinking above and beyond calculative thinking is required. However, genuine freedom is achieved through non-willing. In Gelassenheit, by letting go of willing, one opens himself in waiting to be-ing in order to reach equilibrium. In Heidegger’s words:

\[ \text{In waiting we are open to be-ing itself and in being open to it, be-ing itself is let be and we are let-in to Gelassenheit.} \]

Furthermore, as discussed above, being open to innovation means to go through a flow of higher activity supported by Gelassenheit. For each individual a singular thinking experience occurs, but at the same time one thing is common: the time arrow. Waiting for the moment of equilibrium to come, time passes by, as there is a swinging movement in this first experience of thinking. If enough time passes, the isolated system settles into a state of equilibrium (no internal flows). Thought transitions and swings that take place can be assimilated to configurations (the drawings) of the things that flow. This tendency, this time sequence of drawings that the flow of de-sign thinking exhibits as it evolves, is a phenomenon that can be covered by the constructal law: not the drawings per se, but the time direction in which they morph (μορφή) if given freedom. No drawing is predetermined or destined to be or to become a particular image. The actual evolution or lack of evolution is a random sort of event. One can count on having the freedom to morph in undisturbed, in an open to innovation environment.

However, scholar research on design thinking goes in a completely different direction. For example at Hasso-Plattner-Institut (HPI) research on the issue of design thinking looks at
synthesizing ideas and goals by the team that is co-creating, with the intention to find something new, something ground breaking, and an innovation that sells (Plattner et al., 2012). In this research design thinking is approached from the fundamental calculative thought that is based on hunting-gathering pattern that looks at solving a certain problem. It distributes roles for hunters and gatherers as a sort of key experts and at the same time co-creation is performed through a limited number of potential customers. When the idea appears, it follows the normal and usual way of planning and executing. Ideas although may be many, they do not get all through to the surface depriving the organization from thinking and learning to think and therefore reach the state of becoming open to innovation. The main difference lies in the way design thinking research is concentrated on innovation through co-creation based upon the so-called user experience that is directed towards living and not thinking experience. The underlined philosophy of user living experience is based on the observation of the user by external agents (Brown 2009) and not the provocative thought of the individual, independently whether he or she is a user or not. Open innovation is in this case closed solicited by the users.

5 A road-map for a method on de-sign thinking

The question now risen is how to facilitate de-sign thinking. Quite clearly the way to de-sign thinking is to follow a path (μέθοδος) towards meditative thinking as approached in this paper.

The method should include the following steps:

(1) Learn to think through dialogs for reaching releasement towards the things
(2) Learn de-sign thinking for openness to the mystery of things
(3) Build a virtual living lab for practicing open to innovation
(4) Start a pilot with four representative members (a natural scientist, a scholar, an engineer and a teacher who will be an advocate of the heideggerian thinking)
(5) Use constructal principle for building up drawings of thought transitions
(6) Expand the pilot to various types of organizations
(7) Diffuse the method to a world open to innovation

6 Conclusions and recommendations

In this paper a method is proposed for enacting design thinking for innovation. The objective is that design thinking should be approached and methodically pursuit as “de-sign thinking” as a way of thinking experience, opposite to now days mostly celebrated customer living experience. The method suggests a combination of two distinctive research approaches: it combines two distinctive paths. The first is deriving from Heidegger’s phenomenology from the discourse on thinking and the second from Bejan’s constructal principle. De-sign thinking
for innovation as a method, will be experimentally developed and validated in a virtual living lab. As opposed to open innovation, de-sign thinking will lead to a genuine and free non-willing open to innovation comportment. Expected outcome of the method is the development of a road map to implementing de-sign thinking for various kinds of innovation. The method supports any kind of innovation including technology products and services creating organizations open to innovation.

References


A Marketing Research Tool for Conducting Online Experiments in University-Industry Relationships (UIR)

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Abstract

The rapid advances of information technology as well as its outcomes, such as as of the Web 2.0, have undoubtedly put a wide range of topics on the research agenda of marketing researchers. The attention of marketing researchers has been drawn to web experiments, which can be used to conduct online field experiments in online environments, because conducting such experiments has become not only more affordable and therefore increasingly popular but more relevant as well. The turn overs in e-commerce exceeding those of offline stores in some countries are just one example for the web experiment’s relevance.

The goal of this paper is to present and describe a research method for conducting such online experiments in a fashion that enables the use of existing, live web content, thus leading to a real world context within the experiment. Further the paper describes advantages this research method can have. This is done by comparing it to traditional methods as well as existing software and by highlighting the method’s advantages within the context of university-industry relationships.

The method or tool called Silent Surfer, drawn from theory as well as research methods of marketing and information science, has an interdisciplinary character leading to a unique way of conducting online experiments. The uniqueness lies in the integrated process of conducting the experiment as well as the “real world” online surrounding this method can offer. The Silent Surfer enables web experiments to be conducted in an integrated manner, by integrating e-mail, information pages, web experiment artifact with live web content as well as a concluding online questionnaire into a seamless process.

The Silent Surfer provides realistic “real world” context for conducting online experiments, whilst simultaneously reducing costs for conducting such experiments. By building on existing web content, the method enables quick and easy testing of ideas online. The Silent Surfer’s approach allows for the productive environment, such as the systems of an onlineshop, to be left untouched. Whereas by using traditional methods security issues prohibiting cooperation may arise, the Silent Surfer enables cooperation without raising such issues. The relevance of this advantage applies mainly to large enterprises, where productive systems and security issues are quite a delicate matter and typically not negotiable in favor of a university-industry cooperation.

The use of the Silent Surfer method can typically result in reducing costs, saving time and enhancing the quality of communication and therefore being beneficial to university-industry relationships relationships. Further, the tool provides a good example for the applicability of tools developed by scientific communities to solve problems of practitioners.

Keywords

Online Marketing, research tool, web experiment tool, A/B testing, research method, integrated online experiment tool
1 Introduction

Online research is interesting from a researcher’s as well as from a practitioner’s point of view. Argawal et al. (2004) stated this explicitly by concluding, that the internet provides great opportunities regarding online research (Agrawal et al. 2004, p. 671). In particular, the web provides an unprecedented opportunity to quickly evaluate ideas by using controlled experiments (Kohavi & Henne 2007, p. 959). Following this line of thought, it is therefore no surprise, that it is becoming increasingly common to conduct online experiments and to use online questionnaires (Barchard & Williams 2008, p. 1111). In addition, there is a trend called fact based marketing in marketing practice (Grover & Vriens 2006). In short, the money is allocated based on these facts (e.g. online marketing monitoring and controlling). As well as this being a more scientific approach than pure guessing on which campaigns work well, basing decisions upon customer data, is presumably more customer orientated as well. Kohavi and Henne (2007) stated, that with controlled experiments on the web, you listen to your customers instead of the Highest Paid Person’s Opinion (HiPPO) and this yields a higher return on investment (ROI) (Kohavi & Henne 2007, p. 959).

Despite the opportunities delivered by online experiments, Corley et al. (2013) reported that only 0.7% of the articles in the research field of Internet marketing had field experiments as underlying method (Corley, Jourdan, & Ingram, 2013, p. 184). They concluded that studies using lab and field experiments, observing for example purchasing behaviour, would be of particular interest to researchers and practitioners (Corley et al., 2013, p. 187). In line with this opinion and, especially in environments where the online context is relevant such as the electronic customer relationship management (Hwang, 2009) or online marketing (e.g. online advertising, Park et al. 2007), we argue that controlled online field experiments pose an interesting research method. Therefore, it is worthwhile taking a closer look at this method. Especially because this method can greatly reduce costs, time and inconvenience of conducting experiments (Horton et al. 2011, p. 423). After a brief summary of the status quo of online experiments, we will introduce an online tool which is capable of using existing web content to build web experiments and provide a holistic, integrated and platform independent approach for conducting web experiments.

2 Literature review

Online experiments are widely used in psychology (Kraut et al. 2004, Reips 2002, p. 244) and some researchers even build their own Social Lab (Garaizar & Reips, 2013) in order to conduct online experiments, that cover the research field of social networks. Some researchers argue, that major scientific advances are to be expected by using online laboratories and experiments (Horton et al., 2011, p. 424).

Reips (2002) analysed the different terms and came to the conclusion, that the terms ‘web experiment’, ‘on(-)line experiment’, ‘web-based experiment’, ‘World Wide Web
(WWW) experiment’ and ‘internet experiment’ are used synonymously for internet-based experiments (Reips 2001, p. 243). Further, some authors also use the term ‘controlled experiment’ (Fernandez, Insfran, & Abrahão, 2011) within the context of usability research. As distinctions among these terms are not topic of this paper, we will hereafter refer to experiments that are conducted within a web context as web experiments (e.g., which impact the design of an online shop has on consumers’ purchasing behaviour?), whereas the general method of distributing and conducting experiments via internet and without a web context, is termed online experiments.

Basically, an experiment divides a group of participants into at least two groups, a treatment group and a control group, whereas the treatment group is faced with a specific manipulation to observe the effect of the manipulation on the participants’ behaviour in comparison to the control group, which does not receive this manipulation. In case of web experiments, the treatment group’s manipulation occurs online, for example the manipulation of the design of an online shop. In online marketing this method is often referred to as A/B testing and usually consists of two versions of an online artefact.

Reips (2002) points out, that web experiments may be used to validate results from field research as well as from laboratory experiments (Reips 2002, p. 243). He even recommends the conceptualization of experiments as web experiments, whenever possible (Reips 2002, p. 244). Compared to other research methods, the online case can yield large sample sizes (Michael H Birnbaum, 2004) and thus potentially lead to high statistical power (see Kohavi & Henne, 2007, p. 963 for a detailed look into an extension of statistical power to the domain of web experiments). Apart from yielding large sample sizes, high realism, which is important (Davis, Golicic, Boerstler, Choi, & Oh, 2013), can be achieved with web experiments. The realism aspect is important, because it can contribute to a high external validity (Agrawal et al. 2004, p. 672). Horten et al. (2011) argued that web experiments can be just as valid as other kinds of experiments (Horton et al., 2011, p. 423), therefore this method does not sacrifice validity for other advantages such as large sample sizes. In scholar of information science, an integrative conceptual framework of consumer behaviour has been built and the relevance of context variables, such as the system itself, is evident (Saeed, Hwang, & Yi, 2003, p. 18). These theoretical aspects have been taken into account in the development of our tool.

A variety of software solutions to conduct online and web experiments already exists (see Table 1). Software for conducting A/B tests that is commercially available, usually has a very user friendly interface, for example the tools Optimizely (Optimizely, 2013) or the Visual Website Optimizer (Chopra & Gupta, 2013). Even Google Analytics provides a function for A/B testing (Wisniewski 2011, p. 55). In contrast to these practitioners’ tools, researchers have built tools that help to build and to conduct web and online experiments with a focus on specific research topic needs. Examples of this branch of tools are WEXTOR (U.-D. Reips & Neuhaus, 2002), OpenSesame (Mathôt, Schreij, & Theeuwes, 2012) or the PsyToolkit (Stoet, 2010). Some tools focus on the issue of distributing web experiments, such as Tatool (von Bastian, Locher, & Ruflin, 2013). The technical approaches vary from the use of common web technologies, such
as hypertext markup language (HTML) and hypertext pre-processor (PHP) (Göritz & Birnbaum, 2005) up to complex programming languages such as C (Riemers & Stewart, 2007). Some solutions come as an add-on to existing software, such as PEBL for MATLAB (Mueller, 2010). Ensemble (Tomic & Peter, 2007) has an integrated approach, but lacks the function of integrating live web content. Not only can the technology or domain play a role but also the users’ device for accessing the internet can be identified as important aspect. One solution, the MiniCog (Shephard, Kho, Chen, & Kosslyn, 2006) uses personal digital assistants PDA to conduct experiments. As tablet shipments are predicted to exceed those of mobile PCs by the end of 2013, and those of total PCs by the end of 2015 (Reith, Mainelli, & Shirer, 2013), an eye should be kept on the development of the hardware usage by users.

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<td>DEWEX</td>
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<td>Dynamic Interviewing Program (DIP)</td>
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*Table 1: Software overview*
In many cases practitioners are not willing to change anything to or tamper with their productive environment (e.g. online-shop) and use their customers as “guinea pigs” just to test a research idea or test a new online marketing campaign. However the as the Silent Surfer doesn’t require any changes to the productive environment, this could help overcome the practitioners “unwillingness” to engage in university-industry relationships for reasons linked to the productive environment (e.g. security concerns). Diminish such concerns is valuable because university-industry relationships may be seen as process and at the beginning of such a linkage uncertainties on both sides exist. In the following we therefore take a closer look at this process and its stages.

Authors in the field of university-industry linkages see these linkages, or rather the relationships within these linkages, as a process consisting of various phases (Filip, 2013; Plewa et al., 2013). According to (Plewa et al., 2013) these linkages evolve dynamically and can be classified into the stages pre-linkage, establishment, engagement, advancement and a concluding latent phase (Plewa et al., 2013). Further evidence for the dynamic nature of these processes can be drawn from the Tiple Helix model (Etzkowitz & Leydesdorff, 2000). The dynamics as well as the initial uncertainty about the parties involved, pose a potential risk for both parties, thus raising the topic and need of trust. Trust itself evolves dynamically as well (Lewicki & Bunker, 1995). Trust plays an important role in the initial stage of the relationship as well as in the latent phase where the intention of renewing such a relationship can be positively influenced by trust as trust has a positive effect on commitment, which in turn influences the intention to renew the relationship (Plewa & Quester, 2007). Considering these aspects it is especially important to emphasise the role of trust as well as the quality of communication within the relationship (Plewa et al., 2013). In Switzerland (Arvanitis, Kubli, & Woerter, 2008) have taken a closer look at the characteristics of university-industry relationships and report that low budgets and the lack of various resources hinder these relationships.

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*Table 1: Software overview (continued)*
(Arvanitis et al., 2008). Logically, cost and time savings are important motives for engaging into university-industry relationships (Arvanitis et al., 2008).

After these aspects we identify a gap, which can be closed with our method. First, the web context plays an important role and many tools still lack the support of near real world respectively web realistic experiences. Furthermore, some tools are proprietary and therefore limit the number of participants by this restriction. Other tools make it easy to build an experiment, thus reducing the setup effort. Unfortunately, these tools focus either on a specific topic (e.g. millisecond precise reaction tests) or cannot provide the web context functionality. As the web is based on freely available technology, researchers can build experiments that are intriguingly realistic by using existing web content. We claim that building the artefacts from scratch is often not needed and therefore our method uses existing and live web content, in order to focus efforts on the desired manipulation. Last but not least we see a need for improvement of the quality of communication as well as the need for reducing perceived risk in order to build trust in various phases of university-industry relationships. These aspects may be addressed with our method.

### 3 Approach

The Silent Surfer tool integrates the following components (see Figure 1): an e-mail invitation, an instruction page, an experiment artefact with manipulation as well as the randomization function between each artefact, and an online questionnaire. The e-mail contains a link, which leads the participant to an instruction or information page about the experiment. Depending on the experiment, this page contains information, for example a specific scenario, and explains that the experiment will start by clicking on a link blow the instruction text and that a questionnaire has to be completed at the end of the experiment.

![Figure 1: Silent Surfer's workflow](image)
The technical details of the Silent Surfer are excluded in this paper, as the focus lies on the research method and its applications. These will be published in the research domain of information technology in the near future. Nevertheless an overview of the Silent Surfer’s components is given in Figure 2. During an experiment, participants browse via the Silent Surfer tool. Within the tool an experiment is running with artefacts, of which at least one is manipulated. This artefact may contain live web content. This content is then manipulated and presented to the participants. It is further possible to add custom built content stored on the Silent Surfer server.

![Figure 2: The Silent Surfer’s components](image)

The Silent Surfer allows participants to surf freely on the artefact website as the contents are drawn from the web and therefore there is no restriction of the participants’ surfing behaviour. If required, restrictions may be enforced. Furthermore as the experiment runs in an online environment, the Silent Surfer logs the users surfing behaviour. The data from this behaviour can then be cross checked with the answers in the questionnaire and vice versa.

The Silent Surfer offers the possibility of observing real purchasing behaviour if this is required by researchers. The Silent Surfer’s manipulation method does not affect other functionalities of the web store, leaving it fully operational. Therefore participants can shop in a manipulated web store (e.g. Amazon.com).

An example of such a real world experiment is given in Table 2. On the left hand side you can see the original website and to the right the version changed by the Silent Surfer.

A further advantage of the Silent Surfer is the possibility of conducting longitudinal studies with the consent of the participants about the manipulation and analysis of their online surfing behaviour, leaving the participants blind to the intervention. In some research fields this is required (e.g., psychology). Nevertheless we would strongly advise
to use this feature with great caution, as ethical and privacy issues may arise and, depending on local laws, this may even have a legal aspect as well.

Horton et al. (2011) share the view on informing participants, as this is common in the research field of economics, but mentions other research fields, such as sociology and psychology as fields which may diverge from this “no deception” norm (Horton et al. 2011, p. 423).

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<td><img src="image1" alt="Original web website" /></td>
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*Table 2: Original and manipulated website*

Web experiments can greatly reduce costs, time and inconvenience of conducting experiments (Horton et al. 2011, p. 423). They provide proof for their conclusion with experiments conducted with Amazon’s Mechanical Turk as a source of participants for experiments covering the topic of labour market research (Horton et al. 2011, p. 423). In this aspect, the Silent Surfer is no different and we can report cost and time reduction effects for conducting experiments using the Silent Surfer.

To the knowledge of the authors, there exists no comparable tool, which integrates the components (e-mail, instruction page, experiment with manipulation (truly randomized) and an online questionnaire) in the manner presented in this paper, whilst simultaneously providing the possibility to build the experiment artefact with live web content. Thus, one advantage of the Silent Surfer is, that compared to exiting web experiment software, it further reduces the effort and the costs that usually come with the administration and initial setup of such online experiments.

Because the Silent Surfer is exclusively available to participants, the problem of robots influencing the results as this can be the case in classical online experiments (Barchard & Williams 2008, p. 1110) does not exist.
A/B testing is typically used with users exposed to two variants of an artefact: Control (A) and Treatment (B) (Kohavi & Longbotham 2010, p. 787). The Silent Surfer does not make any limitation to the number of treatment and control groups used in an experiment, therefore extending the simple case of A/B testing to A-N-testing possibilities.

Some tools are domain specific (e.g. psychology where millisecond precision is required, Stahl 2006). We do not claim that the Silent Surfer applies to all research disciplines equally (e.g. psychology, social science and economics) but the tool is open to a wide range of research disciplines conducting research in the web environment.

4 Main results, applications and discussion

Prior researchers requested a tool that enables them to evaluate ideas quickly (Kohavi et al. 2008, p. 140) in a fast and easy way. The Silent Surfer addresses this request and provides a solution for evaluating ideas quickly with controlled field web experiments. The integrative approach of the Silent Surfer Tool cuts costs in setting up and conducting web experiments. Furthermore it opens up a new possibility of providing researchers with a tool that can manipulate websites, without having to change anything to the productive and live system in the web. In addition, our tool accounts for the importance of integrating context into online experiments (Saeed et al., 2003) by using live web contents within the artefacts presented in the experiment.

Due to the cost and time saving characteristics of the Silent Surfer, it can play an important role for both parties in engaging in university-industry relationships. The cost and time saving aspects were mentioned as important motives for engaging in such relationships (Arvanitis et al., 2008). Even though the cost aspect was mentioned first, there are further motives for engaging in university-industry relationships such as access to specific capabilities to complement ones own (Arvanitis et al., 2008), access to highly qualified personell (Schartinger, Schibany, & Gassler, 2001) or the absence of an own R&D department (Perkmann & Walsh, 2007). Especially during initial phases of these relationships, where uncertainty is high, the possibility of quickly testing ideas and providing results can forrester trust and reduce uncertainty for both parties. Furthermore the Silent Surfer may be used to acquire industry partners by testing ideas within the university (e.g. by using student samples) and showing these results to potential industry partners. Due to the easy to use character and the possibility of quickly testing ideas, the tool may even be used in such a dynamic environment such as university-industry relationships, where new ideas may arise during the cooperation. Therefore the Silent Surfer is not only of great value in pre-linkage or establishment stages, but also in later stages where new ideas may come up based on the insights resulting from such cooperation.

The advantages of higher sample sizes, less financial and personal resources, higher external validity the higher degree of automation, as well as the around the clock experimenting are not achieved by sacrificing another important aspect, for example the real-
ism of the artefact. This lies in the way the Silent Surfer uses web content and manipulates it. The integration of an invitation e-mail, instructions page, experiment artefact as well as the subsequent online questionnaire has proven valuable for conducting web experiments. Given the wide range of advantages we want conclude by pointing out that this tool is platform independent and only requires a web browser for participants to be able to take part in the web experiments.

In the field of marketing research, the Silent Surfer can be used to conduct research on online advertising campaigns (e.g. A/B test different banners), pricing (e.g. increase current product prices in an online shop by 10%), conversion rates (Kohavi et al., 2008), influence of social media, click-through-rates or shopping cart dropout rates. The mentioned examples are non-exhaustive and could be complemented with many more applications, such as Real Estate sites (Kohavi & Longbotham 2010, p. 786).

It can occur that participants drop out because the realistic look and feel of the website can confuse them. They may think that they have been redirected to a live website. Even though the instructions may appear to be clear from a researcher’s point of view, it is important to control for the clearness and comprehension of the instructions. This can be assured by asking mandatory questions before the experiment is started. Privacy concerns may arise from online marketing research activities (Agrawal et al. 2004, p. 676). This applies to the method of the Silent Surfer as well, especially if the experiment is conducted with participants that are only aware that they are taking part in a study, but are left in the dark about the research question or topic. For an overview as well as practical advice see Barchard & Williams (2008). Closely linked to the security issue is the generation of traffic on the original live website, where the content for the experiment is drawn by the Silent Surfer. This issue can quickly turn into a real problem with dire consequences, if had conducte this web experiment, for example with an online shop and thus having induced higher traffic, due to the participants taking part in the experiment on the live online store. The store’s monitoring could have ordered more products or optimized the shop according to this new traffic pattern resulting from the participant’s behaviour. Therefore in a case where a high number of participants, and thus a high volume of traffic is to be expected, the website’s owner is to be notified in advance, in order to prevent negative consequences.

5 Limitations and further research

Hitherto, we applied the Silent Surfer in one field experiment after the proof of concept with a prototype had been finalized. Therefore, further research with the Silent Surfer needs to be conducted, in order to gain more insights to possible limitations of the tool and verify that the benefits of this approach apply to a wider domain of applications. During the setup of the field experiment we noticed, that only people with IT-knowledge were able to use the tool, as the manipulation of the online content needed programming skills. Therefore a next step in the further improvement of the Silent Surfer, is to provide a graphical user interface (GUI) with a “what you see is what you get”
(WYSWYG)-approach, hence rendering the Silent Surfer an easy to use tool for researchers without specific information technology knowledge or programming skills.

With a focus on university-industry relationships, it would be interesting to investigate the applications of the Silent Surfer in further detail to identify criteria which could be used to indicate especially favorable conditions for employing this method. Furthermore there may be limitations in very large projects with multiple partners which could differ from the usage so far and which we may not yet have come across.

6 Conclusions and recommendations

We have introduced a new integrated tool that enables controlled web field experiments in an integrated, easy to administer fashion. The tool uses live web contents where this is desired and is therefore able to provide a realistic experiment artefact that can be manipulated according to the researchers needs. This poses new possibilities of research that can be conducted on existing “real world” and live websites. We therefore urge researchers to make use of the various opportunities that the available technology holds, in order to conduct experiments as realistic as possible where this is appropriate and move on as well as refrain from using mock ups and screenshots just for convenience purposes.

Furthermore for practitioners this tool is interesting as they are able to conduct research regarding their existing website, without having to tamper with the productive webserver. We hope this tool helps in bringing researches closer together with practitioners to conduct research together, to gain new insight as well as generate hands on practical implications resulting in a win-win situation. By using existing live web content and thus reducing time as well as costs for quickly testing ideas, the Silent Surfer can contribute to forressing university-industry relationships.

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Overcoming Barriers to Successful Implementation of the Design Thinking Process

Kristina Tool1

1Kristina Tool Studio

Abstract
Many statistics demonstrate the high project failure rate within an organization. This paper will discuss how to keep design thinking from being just another ineffective supposed cure-all, to it being a truly effective strategic approach.

Design Thinking is becoming a popular way to innovate processes, services and products. Although awareness of the potential benefits is rising, barriers still remain to implement successfully design thinking as a methodology. By recognizing cultural aspects within an organization, one can find more relevant solutions to overcome such barriers, so that design thinking has a higher chance at succeeding.

A design thinking approach can offer a more effective way to meet stakeholder needs, albeit different from how an organization has operated previously. This different approach can be difficult to manage and can be met with resistance. Understanding what types of barriers exist can enable us to more successfully overcome resistance so as to reap the benefits of design thinking. This can be critical to success.

An organization may not be aware that their internal culture is creating barriers to optimizing the benefits that design thinking can bring or even if they are aware that they may not yet be “design thinking ready”, they need to understand what they should be doing to better set the stage for supporting success with design thinking.

By understanding design thinking values and where these values may differ from the values of a company’s internal culture, we can begin to make needed adjustments so that a more supportive environment can support this approach to problem solving.

This paper will examine two main barrier types which may prevent successful implementation of the design thinking process.

› “The Straight and Narrow”
› “The Scenic Route”

The paper provides examples and looks at the characteristics of these barriers, when they may occur and provides suggestions to overcome them in order to create an environment which supports, rather than hinders the design thinking process.

Keywords
design thinking, barriers, culture, user-centered, values

1 Introduction

Many organizations espouse that they are innovative; user centered and are open to or have already applied the design thinking process to innovate processes, services, products and business models. However, large project and business failure rates provide evidence that even
among companies which seek to achieve such goals and grow through applying design thinking, there is still something missing. What is it that is preventing organizations from reaching their desired results?

This paper recognizes the many challenges businesses face including high project failure rates and the desire of an organization to find a way to avoid large failures and succeed in an ever more complex and competitive global marketplace. It discusses the core values of design thinking and presents the argument that a company must have a culture with similar values; otherwise they will face internal obstacles in using design thinking as a strategic approach.

This paper focuses on the cultural barriers within an organization which are keeping them from maximizing the benefits of using the design thinking approach. It will examine two main barrier types which may prevent successful implementation of the design thinking process.

› “The Straight and Narrow”
› “The Scenic Route”

The paper provides examples and looks at the characteristics of these barriers, when they may occur and provides suggestions to overcome them in order to create an environment which supports, rather than hinders the design thinking process. The paper is organized as follows:

(1) Introduction
(2) Talking the Talk: The Gap between Talking and Action
(3) Project Failure Rates
(4) Design Thinking as a Solution
(5) Design Thinking Definition and Steps
(6) What is Company Culture and How Does It Influence Us?
(7) Two Barrier Types to the Design Thinking Process: “The Straight and Narrow” and “The Scenic Route”
(8) The Need for the Right Environment
(9) Design Thinking Values
(10) Conclusions and Recommendations
(11) Appendix: Proposed Questions to Determine Your Company Culture

2 Talking the Talk: The Gap between Talking and Action

A recent google search yielded these results:

“innovative business” About 4,930,000 results
There are many businesses that claim to be innovative, customer focused or user centered, but how many are truly prepared to operate in this way? Certainly there is no doubt that there is a sincere desire to create something better and to find innovative solutions to challenging problems. Many businesses are seeking to find new ways to succeed in an ever increasingly competitive global marketplace and worldwide, organizations are looking for new ways to combat major issues such as health care, education, energy and poverty.

Many are turning to design thinking as a process to help find solutions to these problems. However design thinking as not a magical process which exists only in a zone of perfection of rooms with white boards and multi-colored Post-it notes. Design thinking is applied in real world settings, in environments which may not be as equipped as they could be to reap the full benefits of the design thinking approach. Organizations who are serious about more than just jumping on the buzzword bandwagon will benefit from looking at how their cultural values diverge or align with those of design thinking and then considering how they make needed adjustments to create a more supportive environment.

3 Project Failure Rates

Statistics abound providing evidence on failure rates of projects, products and businesses. Industry sector, business size or age does not provide immunity from failing to reach goals. Failures include everything from going well over budget, to not meeting deadlines, falling short of targeted goals and even include complete business failure. A sampling below of the bad news:

*On average, large IT projects (those budgeted at more than $15 million) run 45% over budget and 7% over time, while delivering 56 % less value than predicted.*

(McKinsey 2012)

*According to a PDMA study, 76% of all new product launches fail to meet their revenue targets.*

(LeveragePoint 2013)

*On average more than ½ of all startups fail. Across industries failure rates range from 37% to 58%.*

(Statistic Brain 2014)

We can assume that such costly failures, and others like these, were not the intended outcome of the investment of money, time and effort. Businesses today are seeking to find the best paths to achieving goals while minimizing their risk of failure. This can be a tricky balancing act as not keeping up with the marketplace and not innovating will eventually result in stagnation and loss to competitors who have found a new and better way to create value. However deciding to innovate alone is not enough, as not knowing how to manage change and innovation can also result in failed projects.
4 Design Thinking as a Solution

Design thinking is one approach that businesses are turning to, to help them navigate the challenging task of finding innovative solutions to problems. Employing design thinking as a strategic approach can help to reduce the risk of big failure while still allowing a business to grow and move forward.

Design thinking can be used to achieve a number of different outcomes. It is an approach that can help a company innovate processes, services, products and business models. It can be used to help discover and develop a unique value proposition so that a company can distinguish itself in an increasingly volatile economy and competitive global market. Its series of steps are best suited for complicated problems. (It is likely overkill for simple problems such as deciding which kind of paper clips to buy for the office supply closet). Design thinking shines in more complex challenges, with multiple variables, where it is not possible to know the outcome.

In order for design thinking to be an effective strategic approach, the company culture must offer an environment which supports the necessary phases of the process. Which qualities and values inside a company culture support the design thinking process and which ones create barriers? We look first in more detail on what design thinking is and isn’t and what benefits it can provide.

5 Design Thinking Definition and Steps

Design thinking is not about a prettier/bolder/fresher logo (don’t let the decorative aspect of design limit your interpretation). It is also not only about brainstorming sessions that are fun for a day and then it is back to business as usual. Design thinking also does not stop at just “thinking”.

Design thinking is about thinking in a certain way in order to take action and move towards finding a unique and sustainable solution to a defined challenge. It considers who is experiencing the challenges of a particular situation and what is needed for that person (or people) to overcome those challenges. It is a dynamic process to discover what lies at the base of a particular challenge or a problem and then it takes steps to test solutions, learn from them, modify as needed to ultimately find a way a way to resolve the problem.

There are a number of definitions floating around about what design thinking is and there are many questions as to if it can even be properly defined. As the spirit of design thinking has adaptability as a core principle, I would argue that a strict “engraved in stone” definition is not needed, but it is necessary to have starting point for discussion. For the purpose of this paper we use the definition provided by Tim Brown, founder of IDEO:
Design thinking can be described as a discipline that uses the designer’s sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity.

He notes in his blog that the above may be too narrow a definition and added:

design thinking converts need into demand

This brings us a little closer, but neglects to provide those who are not designers, a clear understanding of the designer’s method. What designers do when designing a “thing” can also be used to design a solution to a problem. Good designers take a human centered approach to what they create. They empathize with the user and the individuals who will be using their product or service and consider how the person will behave and feel with the design. (The user in this case is the human at the center of human centered design and depending on the situation can be a customer, client, patient, student, or anyone for whom we are designing a solution, from this point forward this person will be referred to as the user.) Is there an unmet need, a problem to be solved? Design thinking looks for these unmet needs first and develops a solution from there. If something frustrates a user, or is not clear, or does not function well, the design should be improved. Design Thinking is the process through which the user’s real needs and desires are found and then a solution is provided.

The design thinking process is carried out in a series of steps (see fig. 1) starting first with understanding the challenge and progressing through to the testing phase. Along the path there is time to observe, bring in different points of view, ideate, prototype and test solutions. While not always a strictly linear progression from understanding to testing, these steps are considered components in the process.

Fig. 1: Design Thinking Steps Hassnoplassner Institute
Underlying these steps there are a set of values which provide the foundation for the design thinking process. These values place the user at the center of the process. Design thinking seeks to understand where the real pain points exist for the user of a system, a service or a product and works to address these needs and create an improved experience. A company whose values or culture do not support those of design thinking will find it even more challenging to successfully implement the process.

6 What is Company Culture and How Does It Influence Us?

The culture which surrounds us shapes our actions and behaviors. Oxford Dictionaries defines culture as:

*The ideas, customs, and social behaviour of a particular people or society.*

As an individual we are part of and influenced by multiple “cultures” simultaneously. From national and regional cultures where we live and were raised to corporate cultures where we work, each has a way to shape our behavior. (Think how the Swiss are different from the Italians.) One company will have a different culture from another. Within a company we may even have subcultures which vary by department or team, (How does the atmosphere in sales differ from that of research and development?) and we have situational culture (A client meeting versus company Christmas party). Each of these cultural layers shapes our environment and contributes to how we work and behave. (see Fig. 2)

![Fig. 2: Layers of Culture: Each layer has the ability to influence your environment and your behavior within your environment.](image)
A business’s culture can be apparent from the moment you enter its space. Imagine walking into an office with plush carpeting, oak paneled walls, and people in suits speaking in hushed tones. Where would you guess you are - a corporate law office or software startup? Even without seeing the company’s name, you probably would guess this type of atmosphere is more that of corporate law firm than startup. Culture can be clearly visible but it can be hard to measure and quantify what influence it has on a business’s ability to reach its goals.

How does one determine what culture exists and then how can that culture be modified if needed? Does adding ping pong tables and changing dress codes in a traditional company make it operate more “start-upy”? What about open space vs. private offices? Certainly physical environment contributes to a culture, but it is the underlying values which must be examined to really understand if the atmosphere can successfully support the design thinking process.

Booz & Company surveyed more than 2200 global business people and found that company culture has a big impact on making changes within a company but that there is a lack of attention paid to culture. 60% believed that culture is more important than strategy or the business model in making changes last.

The environment where design thinking is applied will have an impact on its success. The design thinking approach is not a one-time quick “fix it” for problem solving, it is a strategic approach which requires ongoing commitment from its participants. Design thinking often requires that a company change from how it is used to working to a style of work which may be outside of its comfort zone. For changes in work approach to last long enough to be effective, the right kind of culture should exist.

7 Two Barrier Types to the Design Thinking Process:

*The Straight and Narrow*

*The Scenic route*

Company culture creates a particular environment which can be recognized in how the people within it behave, how they are able to carry out their work and how they make decisions. These cultural mindsets result in encouraging or discouraging certain types of behaviors and actions within an organization.

In working with private businesses, the public sector and non-profits, I have encountered cultures which support the process and have achieved good results and also those who fell short of their goals. Those who fell short of reaching their goals usually fell into two types of cultures. These two types of company cultural environments make it hard for design thinking to succeed.
Culture type 1 *The Straight and Narrow*: Barrier creating characteristics of the Straight and Narrow

*Bias towards the past*
*Lack of diversity in leadership*
*Resistance to change*
*Sees failure as a stigma*
*Protection of fiefdoms*
*Paralysis through analysis*

The Straight and Narrow cultures feel more comfortable going from point A to point B without much deviation from their originally planned route. They may be quite efficient in getting from point A to B, but because their focus is narrow they are likely missing out on other opportunities. (See fig. 3) Straight and Narrow cultures are likely to be found in traditional, older and larger businesses.

![Fig. 3: The Straight and Narrow type of culture and their challenge in reaching a design thinking goal](image)

There is a preference to conduct “business as usual”. They may find old habits hard to break and fall back upon past success and their longevity and perhaps larger size as reasons not to move in new directions. These cultural types may be recognized, by phrases like “We have been here for 50 years.” “We have offices in seven countries.” “My grandfather founded this company.” “We have always done it this way.”

The Straight and Narrow types have some evidence to support not changing (and these types cling to evidence!) Having reached a degree of success they may argue: “Why change what has worked before?” While the Straight and Narrow types may have already achieved success,
they are likely seeing growth challenges today. In looking to continue to grow, they have turned to design thinking as an approach to open up new markets, or develop new products or services. However design thinking can conflict with their business as usual approach, as design thinking looks forward into what is possible, rather than looking only at what has already been done.

Straight and Narrow types might find trying something new “too risky”. While design thinking mitigates the risk of entering new areas through prototyping and testing, it still requires taking those first steps into something unknown and not yet proven. The bias towards the past can make these first steps hard for Straight and Narrow cultures.

This resistance to change found in the Straight and Narrow types is often compounded by a lack of diversity in leadership. If an organization’s strategy is decided based only upon input from people of similar ages, one gender, and similar experiences, it is much more difficult to see what other options might exist. Straight and Narrow cultures should examine how they can do more to expand their vision. Are they doing enough to bring in multiple perspectives from people with different backgrounds who can help to expand the vision and the opportunities for their business?

Straight and Narrows do not like to fail. Well this is not an exclusive trait to them, most people do not like to fail, but for Straight and Narrows, failing is viewed as something to be avoided at all costs, so much so that trying something new is avoided as failure may be the outcome. Making mistakes and failing are seen as stigmas, rather than opportunities to learn and improve upon.

Design thinking asks to try something new and to understand early in the process where it isn’t working. It does not want design thinkers to run from their mistakes and hide in embarrassment, but rather learn from them and make improvements through prototyping and testing, so that by the time the new idea is put out to market it is much more likely to succeed. As in trying and learning any new skill, one must stumble to learn where improvement is needed.

Straight and Narrows often come from traditionally structured organization with a clear hierarchy. This type of structure often discourages collaboration and exchange of ideas. This culture may encourage separateness and silos as it rewards internal competition more than considering the end user. Design thinking is a user centered discipline, not a departmentally centered one. So when a manager or executive feels the need to maintain control over his zone and feels an “us” vs. “them” attitude within a company, it can be hard to achieve the collaboration needed to make design thinking succeed. Leave the fiefdoms in the Middle Ages and consider the end user when making decisions.

Finally the Straight and Narrow types may be recognized by their calendars booked with meetings. Meetings to talk. Meetings to plan. Not much time allotted to “do”. In their love of data and proof they can suffer from a sometimes fatal disease of paralysis through analysis. The Straight and Narrows may salivate over big market surveys which reveal factoids, that they then can convert to graphs or if they are really feeling creative, maybe even an infographic, but often this information stops at the PowerPoint presentation and is not
integrated into their strategy and everyday actions. Much time is spent analyzing, dissecting and reproducing data in different formats, but where is it leading to?

Culture type 2 The Scenic Route:
Barrier creating characteristics of the Scenic Route

*Impulsive rather than strategic actions*

*Reactive rather than proactive*

*Inconsistent*

*Lack of clearly defined and expressed strategy*

At first glance, the Scenic Route type of culture may seem more open to the design thinking. They may be a newer business, a startup or a smaller business with the ability to be more agile and able to quickly respond to user needs. Like a road trip without an end destination, they may take time to find something new, but without an end destination in mind, it is hard to get where you need to go. As has been stated, design thinking is a strategic approach with a defined objective and while it encourages exploring many possibilities, it still has an overall aim to reach. (See fig. 4)

Scenic Route types may have much enthusiasm and a desire to “innovate” but decisions and actions may be made quickly as a flash of inspiration is achieved, rather than investing the time needed to understand what the real user needs are.

*Fig. 4: The Scenic Route type of culture and their challenge in reaching a design thinking goal*

They can be recognized but phrases such as “Hey wouldn’t be cool if…” or “I think we need a new logo, someone get a proposal for a new logo.” (or a new website, a new storytelling
The desire to try something new and think of better possibilities is essential for design thinking to succeed, however it must be combined with an effective strategy to reach the desired goal. Trying something new should be considered in terms of the user’s needs and also should be measured in some way so it can be determined if what they tried was successful, or where improvements could be made. In the enthusiasm to try something new, prototyping and testing may be glossed over and needed information from these crucial steps is missed.

Planning activities are less enticing pastimes for the Scenic Route types. They can be quite flexible but are often forced into changing direction as they encounter an obstacle that could have been avoided if enough of the big picture had been understood before acting. Scenic Route cultures often react to the situation presented in the moment, rather than preparing and developing a clear strategy to achieve a goal.

The lack of a clearly defined strategy often results in a lack of consistency in their actions and interactions with stakeholders. Without an underlying foundation to align their decisions and actions to, interactions with this kind of organization can be inconsistent. Information shared may be incomplete, unclear or conflicting with previously shared information, resulting in confusion for those inside and outside the organization. They may be able to be spontaneous or adjust to needs at the last minute, but without some foundation for guiding their decisions they may be generating unnecessary problems and not effectively learning from their mistakes. Scenic Route types risk having only a superficial curiosity about a given situation and are not digging deep enough to discover what the real needs of the user are.

So what values should a company seek to align its culture with in order for design thinking to succeed? What questions can you be asking to understand where your company culture currently lies? Following we will look at these values and how you can recognize your own company’s biases so that you may start to make the needed adjustments to prime your environment for design thinking success.

8 The Need for the Right Environment

We’ve seen how culture can influence our behavior and have looked at two types of company cultures which may be less supportive of the design thinking process. So if the Straight and Narrow and The Scenic Route cultural environments can make it hard for design thinking initiatives to achieve success what should we be looking for instead?

The design thinking steps have at their core certain key values. Understanding these values can help shed light on the reasons behind going through the design thinking steps and this understanding of how it works can make it easier for people to work in new ways. Once the design thinking values are understood it can be helpful to compare them to your own organization’s values. Where does your organization fall? Does your company have anything in common with Straight and Narrow or Scenic Route cultures? The degree and amount of
difference between your company’s cultural values and those of design thinking are important to acknowledge. If the differences are too vast it will be hard to benefit from design thinking, as your organization’s cultural values will clash and not support the challenging task of change.

The right environment has an enormous influence on how successful you will be in reaching your goal and maintaining the right environment is an ongoing process. Consider the goal of losing weight. This is not such an easy goal otherwise there would be many more six pack abs and far fewer love handles in the world. It is possible to lose weight even if you are surrounded by cakes and fried foods and those who tell you “why bother, just buy larger pants”, but it is much easier to fit into the skinny jeans if you are around those who encourage you to exercise at lunch and stock the fridge with apples instead of beer.

Design thinking can achieve many great results but it does not exist in a vacuum, it is meant to find solutions within real world constraints. Many of these constraints are particular to the problem being solved, but they can be compounded when an organization’s own culture contributes to creating barriers to employing the design thinking process.

9 Design Thinking Values

<table>
<thead>
<tr>
<th>CULTURAL VALUES</th>
<th>RESULTING ACTIONS</th>
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<td>Human Centered</td>
<td>Understand user’s needs</td>
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<td></td>
<td>Place user at center of strategy</td>
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<tr>
<td>Curiosity</td>
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<td>Non-judgmental</td>
<td>Gather multiple viewpoints</td>
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<td>Learn from mistakes and failures</td>
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<td>Risk taking</td>
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*Table. 1: Design thinking values and the actions they support*

**Human Centered.** At its core, design thinking is a human centered approach to developing strategy. It asks that those who use it have empathy with their collaborators and consider the reactions, feelings, behaviors and emotions of the people they are working for and with. It encourages those involved with the process to go beyond the superficial and to invest time in understanding what the real needs are, not only of the end user of a product or service, but for all of those who are involved with providing it.

**Curiosity.** A culture that encourages asking questions and taking the needed time to investigate why things are the way they are is essential for design thinking to be an effective approach. Curiosity is needed to ask questions and seek out alternative viewpoints. Design thinking is supported by bringing out your inner two year old and asking why and to keep asking why. Why does your customer buy from you? Why do they buy from someone else instead? Why do you organize your work in this way? Why does your colleague work in that
way? Why does the bathroom door open inside instead of out? Why must I wait so long for a reply?

Curiosity encourages imagining better possibilities; the “what ifs”. “What if we could do this better, cheaper, more easily, make people happier?” A culture that supports curiosity encourages you to be curious about why we behave the way we do and ask why, rather than just take for granted, that things are a certain way. Curiosity enables us to be open to new perspectives. It can be easy to dismiss a viewpoint that is different from ours, but before eliminating an opposing viewpoint, better to ask questions and consider it fully.

People with different experiences and backgrounds may notice something we do not. The “why” question often comes more easily when you are new to a situation. Once habituated, once settled in, it is harder to ask why and even harder to keep asking why to understand the real reason something exists; good or bad.

I live in Italy where, as a foreigner, I am frequently perplexed or pleasantly surprised about why things are done the way they are. I ask why questions every day. Why must I wait in line, why must I go to five different windows to buy the needed stamp? Why is the cheese so good? Why is there reluctance in giving change when I buy something? How do Italian women ride bikes so effortlessly in high heels and dresses? Why does it take three months to get internet installed in my house? Why do (sober) people not walk in a straight line?

The first answer I always get to my questions is a shrug and the response, Siamo in Italia. (We are in Italy.) as if this response is all I need to hear. Thank you but yes I am aware that we are in Italy, I see the occasional flag, the more frequently well-dressed person and hear the melodic language, but this is not the answer I am looking for. We may have a default answer, a Siamo in Italia type of response, which is meant to appease the asker of the “why’s” and move on, but like quickly responding to a two year old about why the sky is blue, it results in a change of topic and the real answer remains elusive.

We as humans have evolved through our ability to adapt to situations. Design thinking can help us in situations where we are over adapting. If we are merely tolerating something, we are missing an opportunity. Curiosity allows us to wonder about how we are adapting ourselves to situations; are we over adapting our behaviors rather than improving the situation? Where we see ourselves adjusting our behaviors, we should be asking what could be done to adapt the situation to better meet our needs, rather than adapting ourselves to the situation. It can be easy to fall into habits of repetition without always fully understanding why we are doing something.

Humans are not alone in repeating the same old behaviors without questioning. The case of the Cold War deer demonstrates a similar pattern of repeated behavior. Accepting what is, rather than questioning or trying something new seems to be a learned trait. A seven year study in the Czech Republic’s Sumava National Park, found that two populations of red deer have not been crossing the border, even though no physical barrier remains to stop them. An
electrified iron fence which divided what was then West Germany and Czechoslovakia, had kept the deer populations separate. After the fence was torn down in 1991 the deer were free to roam, yet they still remained in their own territory. Even today, newer generations of deer who had never seen the fence, refrain from crossing the border. Their lack of curiosity has been keeping them from exploring new territories.

In working to introduce more curiosity in your company you should examine where there could be behaviors being passed down which no longer benefit the organization. In what ways are you behaving like the deer? What behaviors exist inside your company because “We have always done things this way”? Where can you be applying these questions to your own culture, so that you can better apply this key question “of “why” as part of the design thinking process?

A warning about asking why, it will create more work, at least at first. It will create an effort to examine a behavior, a process even a belief and change something. This is not easy as it will likely disrupt things. If however you are an organization seeking to offer a service or product of “disruptive innovation” you must start with your own body and your own collaborators, so that you can more effectively ask why in other settings. If within your organization there have been attempts to change but they have faltered it may be that people are not asking why enough.

**Non-judgmental.**

*I’ve failed over and over and over again in my life, and that is why I succeed.*

- Michael Jordan

Design thinking asks us to suspend our desire to judge. This is hard as it seems humans love to judge, we even train to improve our ability to judge. We develop skills in critical thinking, and work to provide constructive criticism. These types of behaviors are useful and may stem from a sincere desire to make improvements, but they need to be used in the right moments. Judging can be particularly disadvantageous when the judgment prevents learning from the mistake and the desire to avoid the repercussions of negative judgment results in no longer trying something new.

An environment that punishes, or at best does not support, testing, failure, learning and improving, will likely lead to costly mistakes down the line or falling behind the competition, as someone else will always be out there willing to try something new and have a better chance at moving ahead. Design thinking recognizes that failure is part of the learning process and ultimately leads to improvement. As when trying anything new, mistakes will be made, but better to make them and reap the benefits from insights gained early in the process, where less has been invested and modifications are easier.

Companies that embrace the chance to “fail and learn” rather than”judge and leave” are the ones that are developing truly innovative solutions. Google X Labs, the semi-secret part of
Google that developed Google Glass, actually rewards failure. A quote from a BBC interview with Astro Teller of Google X Labs reveals their views on failure and judging:

*If you feel stupid, if I make you feel stupid because you tried something new and it didn’t work out, you are never going to try something new again. But if I create a culture, if we can create a culture together, where you feel stupid, because you haven’t tried something new this week, you are going to try something new every week.*

Failing is a situation which pushes us out of our comfort zone, but if we have a supportive environment we are more likely to be willing to take a risk to try something new. What are you rewarding and punishing within your company? What can you be doing to suspend judgment and learn from mistakes? What are the unwritten rules within your culture which are shaping behavior?

**Risk Taking.** Some company cultures may be the type to always do what has worked in the past, making it hard to break into new ground. How can design thinking help innovation efforts if a company is only repeating what has always been done?

As with being non-judgmental, risk taking must consider failure. A company culture must be supportive of trying something new, and allow for some mistakes. As we have seen earlier in the statistics on failure, large scale failure is far too prevalent but by taking a risk on something small, we can help to alleviate the risk of failing on a grand scale.

A mantra today in design thinking and innovation is fail early and fail often. Meaning do what you can early in the process to see where problems arise, allow for mistakes and then adjust. Design thinking looks forward into the unknown and this can be hard for those who want solid proof before taking action. Those seeking lots of data and numerous “proven” past examples may find the approach of moving into what is new uncomfortable, but design thinking is used to navigate what is not yet known or discovered.

Businesses can err on the side of moving too quickly or not moving at all. For some, the thrill of a new idea can seduce us into moving forward without first checking how it aligns with our strategy; alternatively many see challenges in getting past the talking stage. Talking can be fun; sitting around, sipping coffee, brainstorming, debating pros and cons, all of this can be stimulating, but what happens after the chit chat? Is it back to business as usual or does the talking lead to action and to moving towards a defined goal?

The design thinking approach to risk management guides us to action, but an action of reduced risk. It replaces past proof and looking back with its steps of understanding, observation, prototyping and testing, in order to reduce risk. It is important to move beyond the sticky notes of the brainstorm sessions to actually doing something. It is also important to make sure
that what you are doing is supported by what you have learned, by going through the design thinking process of reducing risk and not just jumping blindly off a cliff.

10 Conclusions and Recommendations

Design thinking has great potential to develop innovative solutions for complex problems, however incorporating design thinking methodology can pose challenges for a company whose values are not supportive of this approach.

A company’s culture can either create barriers for or support the design thinking process. Understanding your company’s values and the culture they create enables you to make a comparison to the values that underlie the design thinking process. It is worth examining where there are differences between your company’s value system and those of design thinking in order to understand if you are creating an environment that enables you to achieve your goals. By developing the right culture you can overcome the obstacles within your company that are creating barriers and move towards achieving success with design thinking.

11 Appendix: Proposed Questions to Determine Your Company Culture

Future potential includes the development of an assessment to understand internal cultural barriers for implementing design thinking as a strategy. The assessment can help an organization to gain a clearer vision of what they value and how this may support or conflict with the design thinking approach. Following is a sampling of questions which could be used to develop this evaluation to determine where a company lies on the cultural continuum.

**Human Centered:**
How does your company culture support employees to consider the needs of the end user?
Does your company allow your employees and consultants to take the time to invest in understanding the needs of the end user and relevant stakeholders?
Does your company allot the needed time and budget for qualitative field observations? Or does it use only quantitative or broad market survey data?
How often and to what level do you speak and observe the end user in the environment where your product or service will be used?
What guides your decision making?
How much is the end user considered in any decision?

**Curiosity:**
How does your company remove barriers to seeing and doing things the same old way?
How does your company encourage the asking of “why” and what happens afterwards? (Does it lead to action or is it for contemplation or complaining only?)
What are you doing to promote new ideas for doing something in a better way?
How much are daily obligations and short term quotas impacting the ability to question and try something new?
What is your physical environment like; does it encourage sharing and casual connections?
When evaluating your daily habits, how often is something done primarily because it has always been done that way.
Which behaviors exist inside your company because “we have always done things this way”?

**Non-judgmental:**
What is the composition of your leadership, how much variety does it contain in terms of age, gender, background, professional experience and life experience?
How do you incorporate outside and multiple perspective views to decision making and strategy development?
Is there a place for a new idea board (online or physical) which asks for positive feedback only?
What is your company doing to support making and learning from mistakes?
What is rewarded within your company?
What is punished within your company?
What can you be doing more of to suspend judgment and learn from mistakes?
What are the unwritten rules within your culture which are shaping behavior?

**Risk taking:**
What is the ratio of talking to doing?
Are new decisions and projects analyzed in comparison to: strategy, goals and user?
How closely are decisions aligned to: strategy, goals, user?
Where do you fall in the continuum of only talking to taking a blind leap?

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