

PLATFORM FOR OPEN COLLABORATIVE EXPLORATION OF PRODUCT INNOVATION OPPORTUNITIES

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PREFACE

This paper presents the design research based development of the ProspectBa platform, consisting of method and related tools for identifying future product innovation opportunities in an unfamiliar domain. The ProspectBa platform is a resource for exploring future business areas. It is also a solution to the common issue of *distributed cognition* in cross-organization innovation networks. The diverse body of knowledge about a domain, produced with the platform, has versatile application in the Front-End of product innovation and serves in the renewal of core capabilities. The three main platform components are the Prospect Mapping method, the Prospect Map system model and tool, and the online ProspectBa Studio blog. The Prospect Mapping method combines systematic design methods with a systems approach and scenario building for designing alternative systems of solutions to potential future needs in a domain. The Prospect Map system model defines design parameters and variables for creating a domain system image used in prospecting future needs and composing design briefs. The system model functions as a shared conceptualization of the domain; in this capacity it supports an emergent common understanding of opportunities among platform users. Common understanding is further supported by the systematic externalization of domain parameters and variables to the Prospect Map tool. The

ProspectBa Studio blog augments the Prospect Map tool, enabling archiving, annotating and sharing its contents online. The adaptive design-based Prospect Mapping process produces meta-foresight about the impact of trends, macro-foresight about the impact of future concepts and micro-foresight about how to exploit identified opportunities. These outcomes are founded on the domain system image, which systematizes the monitoring of their relevance and simplifies new knowledge-creation. Ultimately, the platform is a potential unifying solution to the heterogeneous Front-End of product innovation.

INTRODUCTION

In the Front-End of product innovation, exploring future innovation opportunities in unfamiliar domains is the ultimate form of experimentation. Seeking new opportunities beyond core competencies is necessary because at its best it can produce new ideas, new tools, and import new knowledge from outside the organization. According to Leonard-Barton (1995), experimentation ensures the current core capabilities of the company will not turn into future rigidities, impeding capitalization of new opportunities arising from unanticipated transformations in the operating environment. The ProspectBa platform has been designed to support experimentation; more precisely, the collaborative exploration of future product (and service) innovation opportunities. Components of the platform are the Prospect Mapping design-

oriented method, Prospect Map domain system model and tool, and the online ProspectBa Studio blog. Together they enable creating, sharing and reusing insight and foresight about future innovation opportunities in a domain. The platform solves three overall problems: the methodological problem of creating knowledge about future innovation opportunities; the design collaboration problem of supporting emergent common understanding of opportunities among collaborators; and the problem of applying the new knowledge in the product development organization. Ultimately, the platform is a step towards enabling the product innovation Front-End to function as a complex adaptive system.

PROBLEM AREAS AND RELATED SOLUTIONS

Identifying future innovation opportunities in a domain

According to Gerstheimer and Lupp (2005), the ICT industry is driven by four interconnected forces: technology push, market requirements and needs (migration pull), clear demands from market (market pull) and latent market needs (latent pull migrations). As a result of these forces, the industry is in constant migration from one information system to another. The aim of migration is “new or improved application possibilities and services, improvements to specific performance characteristics, quality and/or efficiency and achieving a market edge by introducing a new system” (Dömer 1998). Innovation in this context is the systematic transformation of the overall socio-technological system, and the development of services and applications that achieve use value and economic digital sustainability (Gerstheimer and Lupp, 2005). However, in migrating industries product innovation opportunities cannot be clearly identified because the boundaries of the product environment are constantly shifting. Therefore, innovating services and applications given a migration point of technological change and the

status quo of existing systems takes a farsighted and user-oriented approach. It involves exploring future spaces of possibilities connected with new technologies and latent future needs of consumers at the migration point of new systems.

Gerstheimer and Lupp (2005) claim identifying opportunities related to new technologies requires exploring the technological limitations and possibilities that influence product design. An understanding of these can be gained only through a systemic and systematic approach involving users. In the approach the possibilities and limitations of the new technology as seen from the end-user’s point of view are identified and organized into a system. The system is broken down into sub-systems, which are combined systematically into new concepts representing new possibilities associated with the technology. The new concepts are evaluated with users to learn what are the most desirable possibilities of the technology. Moreover, opportunities for adding value beyond the product need to be explored as well. The scope of value creation associated with a product can be widened to include secondary functions such as packaging, brand name, service characteristics like guarantee, insurance, distribution channel, after sales and maintenance. Moreover, it can be widened even further to encompass the product’s lifecycle, and ways of amplifying design, delivery, manufacturing, maintenance and recycling. In conclusion, both types of exploration necessitate combining systems thinking and the systematic exhausting of options.

In ICT innovation, focused on creating next generation systems from new and existing technologies, defining the innovation problem is more challenging than solving it. It requires identifying the future needs of user groups and their everyday application context at the migration point for a new system. Identifying future needs is a “wicked problem”: it has no clear goal, nor

clear criteria for testing its solution. According to Jonas (2003), an approach combining systems thinking and scenario building is needed to tame the wicked problem of future user needs. The approach begins with creating a system image of the present socio-technical systems where user needs and problems are known. Creating the image involves analyzing and structuring the present technological possibilities and user needs as well as their related socio-technical, legal and commercial considerations. The system image is systematically projected using different driving forces (scenario building technique), into the future, to the migration point set for new technology, to envision alternative futures for user needs in the domain. “Stocks” of solutions are designed in connection to the futures. Through the co-evolution of the problem and solution, a better sense of the future user needs and their implications is arrived at.

Supporting emergent common understanding of innovation opportunities in innovation networks

The systemic nature of migration driven innovation and its socio-technological scope make the Front-End of product innovation a complex knowledge intensive activity demanding different specializations. Companies have tackled the complexity of innovating by opening up their innovation process to involve external parties. As a result universities, open and collaborative research labs, corporate venturing and proprietary strategic research projects have joined the corporate innovation process. The result has been an explosion of different forms of innovation networks (Gorbis et al, 2002). The benefit of innovation networks is that research can be carried out concurrently in different venues to produce enhanced results and accelerated technology transfer. Moreover, when different perspectives are brought to the same problem tacit aspects of the problem can be uncovered: the problem and solution are enriched by multiple expertise and skills (Tormey et al, 2004). However, with

diverse innovation networks comes the challenge of managing distributed cognition, or the coming together of people with heterogeneous skills to share knowledge, skills, expertise and insights.

Managing distributed cognition requires capabilities for synthesizing disparate perspectives to a problem and dealing with vast amounts of information (Fischer, 2002). It requires a shared conceptualization of the innovation problem. *Shared* means “not private to some individual, but accepted by a group”, and *conceptualization* “emphasizes the abstract model of some phenomenon in the world by having identified the relevant concepts of that phenomenon” (Studer, Benjamis et al, 1998). Ontologies are an explicit formal specification of a shared conceptualization (Studer, Benjamis et al, 1998). Ontologies describe concepts and relations assumed to be always true independent from a particular domain by a community of humans and/or agents that commit to that view of the world (Guarino 1997). According to Tormey et al (2004), the use of ontologies enables exploration of the knowledge space with information systems. It supports knowledge capturing, structuring and sorting, distribution and using. Moreover, it facilitates the development of software tools, information systems in support of distributed innovation.

The role of tools, based on a shared conceptualization or ontology of the innovation problem space, is to enable the mapping of heterogeneous modeled knowledge in the heterogeneous network to homogenous system knowledge (Tormey et al, 2004). In other words, the tools are incorporated with or help from an agreed set of meanings about the innovation problem. Based on this agreed meaning (shared conceptualization) semantically dispersed information from across the extended innovation organization can be synthesized. As a result, specialists from different domains are able to understand each other and identify relevant sources of information for their work. Ultimately, tools based on a shared conceptualization enable organizing innovation for diversity and complexity.

Applying insight and foresight in product development

New knowledge about future domain opportunities should serve strategic decision-making, current product development or the renewal of core-capabilities. For it to have an impact, it needs to be shared, internalized by the organization and applied. This requires communicating the applicability and relevance of the knowledge. Moreover, it requires enabling the knowledge to be re-used for different purposes. Essentially, the problem of applying new knowledge has to do with the bridging the visionary Front-End phase with the efficiency and effectiveness driven New Product Development phase.

According to Poskela et al (2004), the Front-End presents the best opportunity for an organization to improve its overall innovation capability because it is the least understood and least managed of the three phases. Numerous approaches for bringing more control and measurability to the Front-End have been proposed and tried (Perttula, 2004). However, no single one has emerged as being universally better than the others (Perttula 2004, Poskela et al 2004). When considering the merits of Front-End processes Perttula (2004) concludes that processes should be combined or tailored to suit operations and culture. Formal processes seem to work best for incremental innovations by optimizing efficiency (Kim and Wilemon, 2002) while a less structured approach leads to more innovative results (Benner and Tushman, 2002). In general the recommended approach to managing the Front-End is to place emphasis on idea generation and concept design rather than on strict process. Product concepts serve as “bridge” between the Front-End and the NPD phases.

Product concepts are internal or external marketing material that should reflect a change with a product portfolio (Perttula and Säaskilahti, 1999). They encapsulate customer needs and

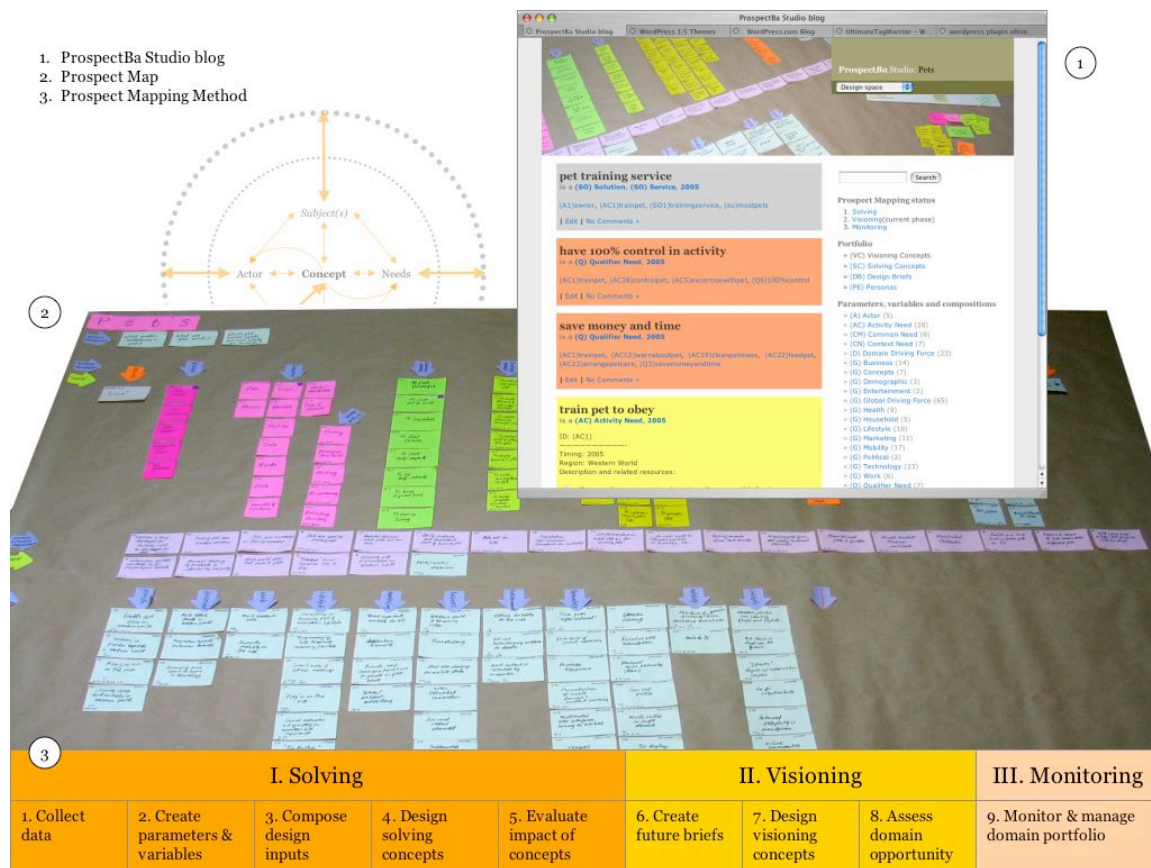
functions in the form of an application description where the technology, working principles and form are outlined. Orihata and Watanabe (2000) consider concept innovation or creating product concepts a prerequisite for product innovation. Similarly, Perttula and Säaskilahti (1999) claim concepts should be considered as a Front-End resource. The value of concepts in the Front-End lies in their versatility as a tool for decision-making and requirements capture but also in risk management, idea pooling, reputation building, and as sources of new features and testing material.

A further benefit of product concepts in the Front-End is that they can be treated and monitored as a portfolio of options (Perttula and Säaskilahti, 1999). Concepts can be managed as a portfolio by categorizing them based on when they are required (by the market) and the degree of associated technological uncertainty. The dimensions are positively correlated: the longer the time-horizon for when the concept is required, the less predictable or feasible is its technological implementation. Based on this logic are *visioning concepts* which belong 10 years into the future and have a high technological uncertainty. *Emerging concepts* are based on proven technology and belong anywhere from 5-10 years into the future. *Defining concepts* are required 2-5 years in the future and their technology is well understood. Finally, *solving concepts* are based on available technology and are required 0-2 years into the future.

PROPOSED UNIFYING SOLUTION

ProspectBa 1.0 is a platform for collaboratively creating, sharing, and exploiting knowledge about future product innovation opportunities in a chosen domain. The platform consists of the Prospect Mapping method, the Prospect Map system model and tool, and the ProspectBa Studio blog. As a platform it is re-usable, extendible, and enables the transfer of meaning from one domain exploration to another (see figure 1).

FIGURE 1
PROSPECTBA PLATFORM



The ProspectBa platform is used to create knowledge about future System Logics, i.e. approaches to customer needs and systems of solutions for them in a domain. The knowledge serves in strategic decision-making and the renewal of a company’s core capabilities. The Prospect Mapping method, at the core of the platform, is used to create a domain system image. The system image helps in identifying domain problems and projecting their future dynamics with driving forces. The projected domain problems serve as briefs for visioning concepts. The briefs and concepts together illustrate domain opportunities, i.e. System Logics. The domain system image consists of interrelated design parameters and variables defined by the Prospect Map system model. The parameters and variables form a design language for collaborators. It supports a common

emergent understanding of domain opportunities during the Prospect Mapping process. The emergent and evolutionary nature of the process facilitates forming flexible innovation networks to do the work. Moreover, the evolutionary nature combined with the systematical externalization of all design inputs and outputs during process, as well as the monitoring of discovered opportunities as a portfolio of options, supports the application of the domain knowledge in product innovation.

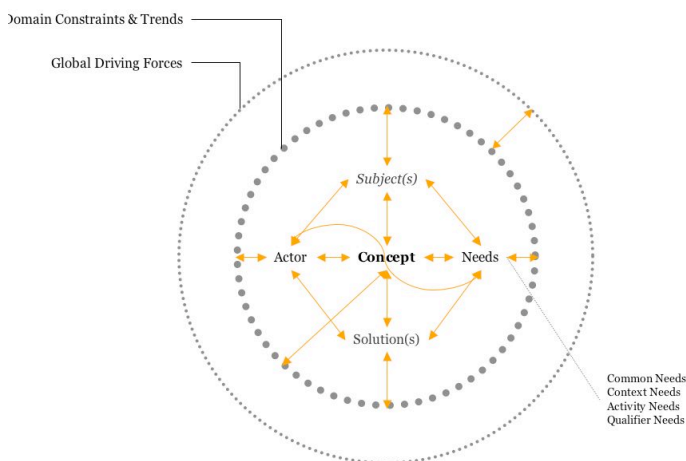
System model and map tool

The Prospect Map is both a system model of how to structure the domain in terms of interrelated design parameters and variables as well as a physical “map” for externalizing parameters and variables during the process.

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The system model is a lens through which a domain can be seen as a complex system with structure and emergent behavior. There are two overall categories of elements in the model: parameters and variables. The subcategories of parameters are Actor, Subject, Need, and Solution. The subcategories of variables are Domain Constraint//Trend and Global Driving Force. Together they are the lowest level conceptual elements in the system model. They are interrelated to reflect the phenomena and trends in the real domain. The domain system image emerges from the interrelated parameters and variables. It frames the domain for exploration and helps identify present domain problem areas and their origins. These problems are modeled with the system image parameters and variables. The system image and problem compositions are used to simulate domain dynamics (see figure 2).

FIGURE 2
PROSPECT MAP SYSTEM MODEL



Parameters and variables are “building blocks” with which the domain system image is constructed. They are also the building blocks

for systematically exploring contextual patterns in the domain system image that represent domain problems and opportunities. The parameters in the system model are Actors, Subjects, Needs and Solutions. They are controllable causes of desired controllable effects in the domain. The design process has power of choice over them: designers can choose which users or subjects to design for, what needs to satisfy, what solutions to support and what kinds of solutions to design. The dependent variables are Solutions and Domain Constraints/Trends. They are controllable effects in the domain and constitute of the factors that designers try to create or change through the design process. The independent variables of the system model are Domain Constraints/Trends and Global Driving Forces. They are external uncontrollable causes of uncontrollable effects in the domain. They cannot be controlled or influenced, but must still be considered when designing concepts because of their potential future influence on the domain (and parameters). Independent variables are the catalysts of domain dynamics.

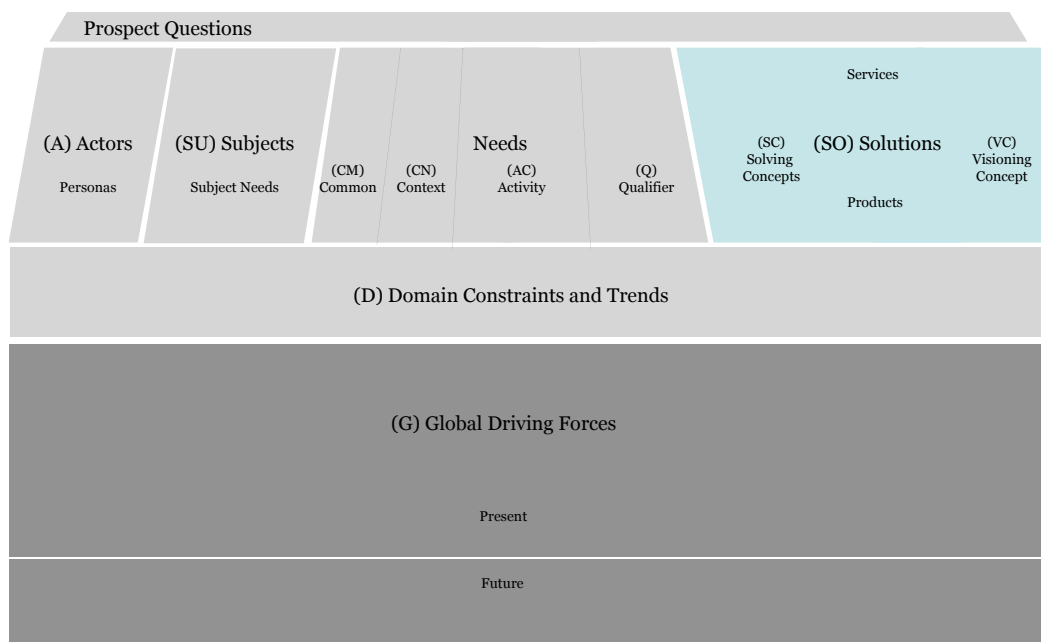
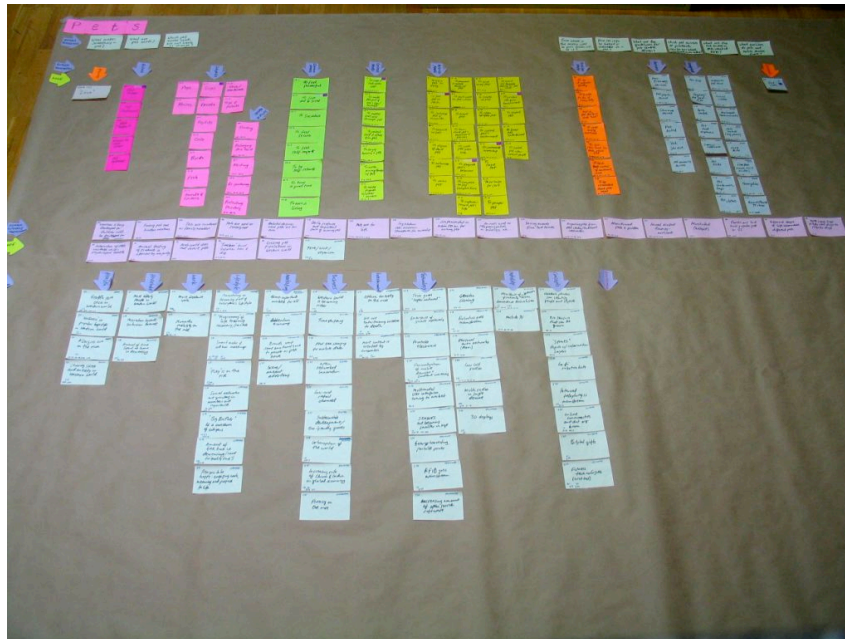
The Prospect Map tool is a large sheet of paper onto which different colored Post-It notes, representing design parameters and variables, are placed (see figure 3). The map supports the systematic externalization and categorization of domain design inputs and constraints. On the map the parameters and variables form options spaces of elements between which interactions can be resolved and defined and from which briefs can be systematically composed. Over the course of the Prospect Mapping process, the map evolves from an empty sheet of paper to one filled with Post-Its. In this regard, the map is a visual indicator of how the work is progressing.

Software tool

Tailored from the WordPress v.1.5 blog software, the ProspectBa Studio is a virtual knowledge creation setting. The blog lowers the hurdle to participate in the Prospect Mapping process. It is

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FIGURE 3
PROSPECT MAP TOOL



used to archive the contents of the Prospect Map, the portfolio of process results and any other insight and foresight created during the process. The blog augments the experience of the physical Prospect Map by enabling the annotation of map elements, briefs, personas and concepts. Moreover, it supports

filtering the element option spaces based on category, author, date and time, rating, connections with other elements, number of connections and related design inputs. With the blog participants are able to stay up-to-date on the work's progress and contribute to it regardless of time and place.

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Process

The Prospect Mapping process is a form of design inquiry and learning that takes the collaborators on a journey through a domain starting with the present and ending in the future. Through the process answers are sought to questions such as: Who are the domain actors? Who are their subjects? What are their needs? How are they satisfied? What influences or characterizes the domain? What may cause major changes in it? What are those changes? What is their impact on people, needs and solutions? The objective of the journey is to design future System Logics or approaches to actor needs in the domain and systems of solutions to them. The process combines systems thinking, concept design and scenario building into a design-oriented process with the following nine steps: set-up, analysis, synthesis,

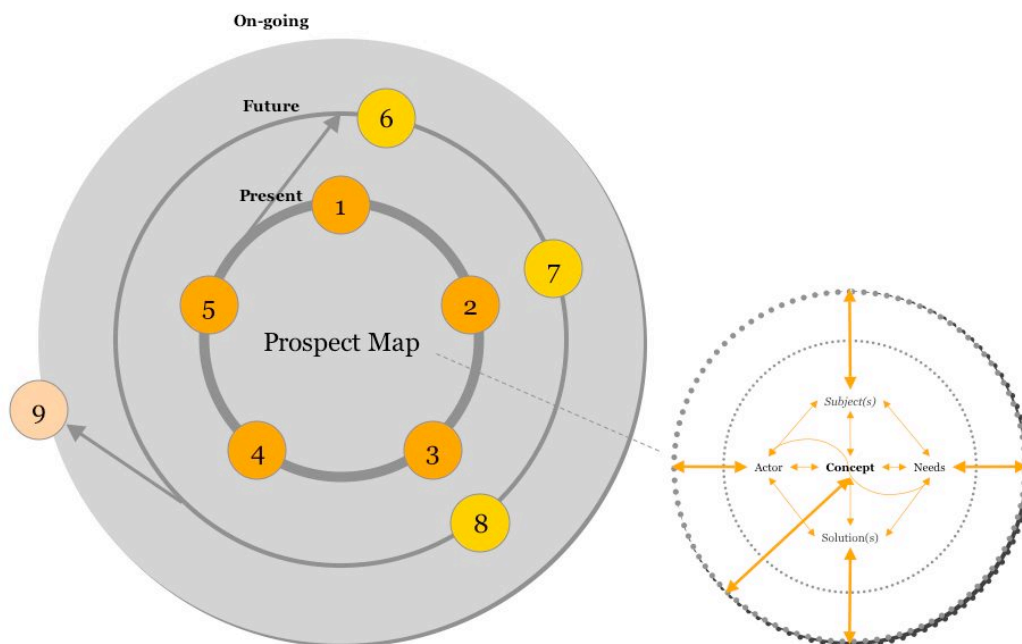
evaluation, projection, analysis, synthesis, evaluation and ending with ongoing monitoring activity. The steps are combined into four phases: Set-up, Solving, Visioning, and Monitoring (see figure 4). Even with formal phases and steps, the process and its outcomes are emergent and evolutionary.

The Set-up Phase deals with arranging facilities, setting-up infrastructure, recruiting participants and kicking-off the activity. The set-up for the process should always be adapted according to the planned diversity, complexity, openness and duration of the activity.

In the Solving phase, domain data is collected and transformed into parameters and variables for creating a domain system image used in exploring domain problems and for composing concept

**FIGURE 4
PROSPECT MAPPING PROCESS**

I. Solving					II. Visioning			III. Monitoring
1. Collect data	2. Create parameters & variables	3. Compose design inputs	4. Design solving concepts	5. Evaluate impact of concepts	6. Create future briefs	7. Design visioning concepts	8. Assess domain opportunity	9. Monitor & manage domain portfolio



design briefs. The parameters and variables are externalized to the Prospect Map tool where cause-and-effect and ownership relationships between them are defined. Next, personas and design briefs, or patterns formed by interconnected parameters and variables in the system image, are defined and extracted from the map. The briefs, based on the system model structure, describe contextual problems in the domain. Second level relationships of enforces-inhibits are resolved for the elements in the brief. This makes it possible to transform the brief into a future-oriented brief with relevant driving forces. Solving concepts are designed based on the present briefs. Finally, the concepts are evaluated with the help of domain experts to assess the domain system image's comprehensiveness and accuracy.

The Visioning phase begins with the transformation of present briefs into future briefs. There are two projection-based approaches for this. A brief can be transformed from within, by envisioning the future behavior of the independent variables it includes, or it can be transformed by adding new future independent variables to it. In both cases second level relationships enable to simulate how all of the other brief's elements change as a result of the driving forces. In this way the brief becomes future-oriented. Consequently, it describes a future domain problem arising from the applied driving forces. Visioning concepts are designed based on the future briefs. The phase concludes with the definition of future System Logics and their evaluation.

The Monitoring phase continues after the Visioning phase. The System Logics definitions, briefs and concepts, created in the previous phases are treated as a portfolio of domain opportunities. The purpose of the Monitoring phase is to ascertain periodically, the attractiveness of this portfolio. It involves monitoring driving forces that the System Logics are conditioned upon as well as other unexpected events that impact the domain.

DISCUSSION

Identifying future innovation opportunities in a domain

Systematic methods typically separate creative thinking and logical analysis by externalizing design inputs and providing analysis frameworks. In doing so they reduce design errors and enable more imaginative and advanced designs (Cross, 1984). Prospect Mapping is a systematic design method that enables the systematic exploration of opportunities and the projection of the opportunities, in the form of design briefs, to a future migration point.

In the Prospect Mapping method, the Prospect Map system model is used to transform domain data into parameters and variables, which are subsequently externalized to the physical Prospect Map and archived to the ProspectBa Studio blog. The Actor, Subject, Need and Solution parameters and Domain Constraints/Trends and Global Driving Forces variables are the lowest level problem factors in a domain. The need parameter in the system model is further divided into Common Needs, Context Needs, Activity Needs and Qualifier Needs following Patnaik's (2004) System Logics framework. The framework connects needs with different levels of product innovations from new features, to product and product families consequently, facilitating the communication and categorization of these opportunities. In all the elements of the system model form the vocabulary for describing opportunities in the domain from the point-of-view of an actor, in terms of needs, related solutions and the overall context as well as their potential dynamics.

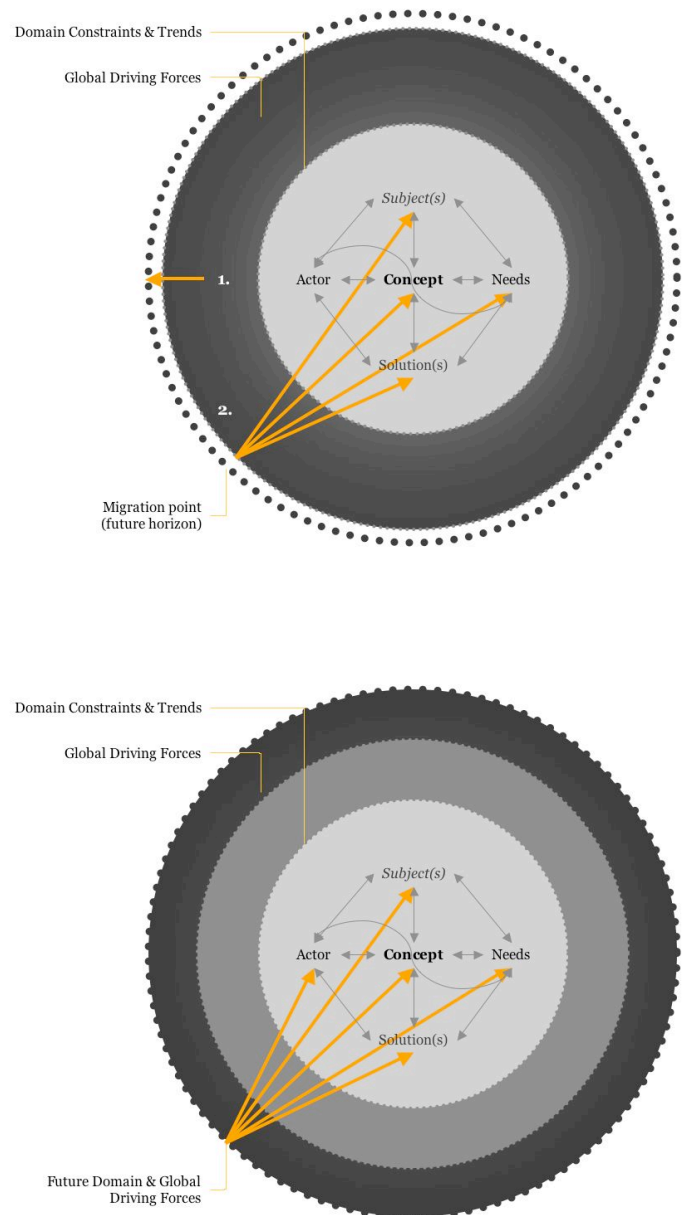
The first step in exploring opportunities in Prospect Mapping is to resolve and define mutual and contextual relations between the externalized parameters and variables on the Prospect Map. The interconnections, in terms of cause-and-effect and ownership, give additional meaning to each element, setting the conditions for the subsequent

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emergent and evolutionary exploration process. The interconnected parameters and variables form a domain system image, which evolves as new elements are added to it. Exploration of opportunities involves identifying and extracting patterns of related elements in the system image describing actor and subject needs and their context. Patterns can also be created from unrelated elements. In either case, the system image patterns are used as design briefs for concept design. By varying the combinations of elements in the briefs, including levels of needs, and their internal mutual relations, it is possible to systematically explore different level domain opportunities, either known or hypothetical, with different sensitivities to domain dynamics and the global environment.

The briefs are the basis for the prospecting/ projecting approach taken by platform to taming the wicked problem of future domain opportunities. There are two ways in which domain briefs can be projected to a future migration point (see figure 5). In the exploratory approach the brief's internal variables, Domain Constraints/Trends and Global Driving Forces, are transformed into future variables by extrapolating their own past or present trends into the future. Next, parameters in the brief are adjusted to reflect the future variables' impact on them. In the anticipatory approach, external future Global Driving Forces are envisioned and then added to the brief. After new mutual relations have been resolved the parameters and variables are adjusted. In both cases, the present brief is transformed into a future brief. By systematically varying the driving forces used for projecting the brief as well as their "impact" on its present parameters and variables, alternative future briefs can be generated effortlessly. Visioning concepts are designed based on the briefs. Finally, both future briefs and future concepts are evaluated with domain experts and stakeholders to create foresight about the domain and its opportunities.

FIGURE 5
EXPLORATORY (TOP) AND ANTICIPATORY (BOTTOM)
PROJECTION TECHNIQUES



Supporting emergent common understanding of innovation opportunities in innovation networks
Face-to-face encounters in workshops and evaluation sessions with domain experts, involving the physical Prospect Map, play an important role establishing a common context for the participants of the Prospect Mapping process. In these encounters the physical

map artifact serves as a boundary object uniting participants. However, it is the system model of the map that is the catalyst for emergent common understanding among participants. The system model is an agreed set of meanings about how to view the explored domain as well as how to identify and define innovation opportunities. It is a way to understand the masses of data collected about a domain; a homogenous model on to which heterogeneous data can be mapped. The system model works as a shared conceptualization of domain opportunities because it uses relevant concepts organized into a connectionist system to describe product innovation opportunities. It works like an ontology allowing the participants to speak the same language.

The system model connects Actor, Subject, Need and Solution parameters with Domain Constraints/Trends and Global Driving Forces variables to orient domain exploration to answer questions like: Who are the actors in the domain? What are their needs? Why do they have those needs? How are the needs solved? What causes, enforces or inhibits the needs? The focus of the work becomes exploring connections between customer needs and solutions, the domain context and broader global environment. The connections between needs and solutions are formally defined by the System Logics framework, which is embedded into the system model. Moreover, the system model enables domain insight and foresight to be externalized to the Prospect Map. Externalization augments the formation of common context in encounters and reduces the amount of domain expertise needed at the outset of the process. The team's latest understanding of the domain can be "read" from the Prospect Map, which means outsiders can be brought into the process flexibly, without having to spend lots of time orienting them.

The ProspectBa Studio blog further supports managing distributed cognition in the Prospect Mapping networks and lowers the hurdle to participate.

Applying identified innovation opportunities in product development and company renewal

The Prospect Mapping method produces a wealth of knowledge in the form of design parameters and variables; present domain system image; present and future design briefs; persona profiles; solving and visioning concepts; and System Logics descriptions of potential approaches to needs and systems of solutions. The resulting body of knowledge has high applicability and high variety, consisting of different kinds of insight and foresight with different applications in product innovation.

The Prospect Mapping method produces all three kinds of foresight identified by Fox (2005). It produces meta-foresight about the impact of driving forces on domain opportunities. The meta-foresight takes the form of future design briefs. It consists of macro-foresight about the impact of concepts on the domain, both in the present and in the future. Moreover, from the Prospect Map system image and briefs it is possible to understand the rationale behind concepts and their impact on the domain. This is a form of micro-foresight, i.e. the ability to see how the desired situation portrayed by the concepts can be attained.

The Body of Knowledge (BoK) classification proposed by livari and Linger (1999) is useful for analyzing the different types of knowledge created with the platform and how they can be applied by the product development organization. According to the classification knowledge varies in terms of concreteness (applicability) and generality (variety). From the BoK perspective, design parameters and variables have low concreteness and low generality. As single elements they cannot be applied, outside of the Prospect Mapping process. However, in the process they are the "building blocks" for composing higher-level design inputs. They are also used to monitor changes in the portfolio of domain innovation options.

Solving and visioning concepts have high generality and low concreteness. Concepts are a form of common language in the product development organization, instantly familiar as a media for conveying new ideas, idea pooling, reputation building, and as sources of new features and testing material. They encapsulate needs and aspects of the domain environment in a product or service description, appealing to intuition and the imagination. Concepts are applied in the Prospect Mapping process to complete the System Logics descriptions of domain opportunities and are “icons” of these opportunities.

The domain system image and System Logics descriptions have high concreteness and high generality, which makes them ideal for adaptation, application and judgement. The system image and System Logics are applied to making strategic product innovation decisions during and after the process. The System Logics framework enables exploring how the identified opportunities, described in terms of the framework, fit into existing offerings (Patnaik 2004). The system image enables updating the portfolio of domain opportunities after the process has ended. Based on it, second-generation scenarios can be created where internal driving forces are combined with external driving forces to envision business outcomes from specific strategies. For example, by incorporating new company strategies into the domain portfolio of options as new internal driving forces, their impact on the opportunities can be assessed. In sum, the bodies of knowledge analysis shows that the knowledge produced using the platform, has high applicability and high variety which makes it high valuable to the product development organization.

Re-using platform based knowledge about a domain can be encouraged by monitoring its relevance in face of domain and global changes. Monitoring, situated in the Monitoring Phase, focuses on following the development of Global Driving Forces that are part of the System Logics in the portfolio of identified domain innovation opportunities. To automate the

activity, keywords can be assigned to the driving forces and then tracked with software search agents on the Internet and in organization’s extra- and intranets. The responsibility of monitoring is delegated to an Evangelist, who is ideally a product manager from the New Product Development organization. This further improves the diffusion of the Prospect Mapping knowledge in the organization.

Towards a complex adaptive system approach to innovating

According to Sardar and Abrams (2001), a complex adaptive system is non-linear and dynamic and can be described as a group of independent parts interacting together to function as a collective whole. The ProspectBa platform displays characteristics of complex adaptive systems. The complex adaptive system principles of emergence, self-organization and evolution are inherent in the Prospect Map system model driven methodology and the design-based Prospect Mapping process. The approach to identifying opportunities using the system model is evolutionary. The process of identifying opportunities begins with low-level “building blocks” of parameters and variables, from which briefs or patterns are constructed and give behavior. After exploring different combinations of elements, promising briefs are arrived at. Using the behavior of the prioritized briefs, they are projected to the future and subsequently, are used to design visioning concepts, which again are evaluated and iterated. Through this reflective process, the designer and the system image, both evolve. The system image becomes a more accurate reflection of the domain’s underlying structure and behavior, and the designer’s own experience of the domain grows. Evolutionary processes are characterized by emergence, and this is also the case with the Prospect Mapping process. It follows Thackara’s (2005) blueprint of “sense and respond”. The process constantly adjusts to the feedback from domain experts. The domain system image is also emerging: when a new element is added, the repercussions ripple through the whole system but also potentially to the level of design briefs, personas and concepts.

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Because the domain system image is emergent and evolutionary, the process for creating it can be dynamic. It can be adjusted to the flows of information and the level of access to domain experts. At any point in the process, new information can be flexibly added to the Prospect Map domain system image to improve its accuracy or comprehensiveness. Similarly, people can be added to the process flexibly: outsiders are able to join the process without disrupting it and can begin to contribute to it quickly. In summary, an innovation network using the PropsectBa platform is able to integrate new information into its work at any step of the process, understand its impact and adjust its own composition of know-how, according to the emerging demands of the exploration.

CONCLUDING REMARKS

In conclusion, this paper has presented the ProspectBa platform as a solution to the problem of identifying future innovation opportunities in a chosen and potentially unfamiliar domain. The other problems of supporting emergent understanding of opportunities in the innovation network and applying resulting domain knowledge in product innovation are derivatives of the main problem. They served as heuristics for evaluating the quality and comprehensiveness of the solution to the main problem.

The theoretical framework behind the ProspectBa platform solution acknowledges that identifying future innovation opportunities is a wicked problem. Essentially, the framework prescribes designing future domain related product and service concepts as the means to learn about opportunities. It considers systems thinking and scenario building as the key enablers for future oriented concept design. The framework borrows ideas from systematic design methods such as externalizing design inputs and classifying them as parameters and variables. The parameters and variables form the domain system model, which enables generating design briefs describing domain problems and envisioning

their dynamics at a set migration point. The system model is the most valuable component of the platform. It enables understanding domain complexity, context and dynamics. It functions like an ontology supporting distributed innovation. Finally, it enables to create a body of knowledge about the domain with high applicability and variety.

The ProspectBa platform has potential as a product innovation resource. It presents an opportunity to offer design-based innovation exploration as an ongoing service. Future platform related work should focus on how to manage the emerging complexity of the domain system image during the Prospect Mapping process. Moreover, the applicability of the system model to modeling different kinds of domains needs to be put to the test. Finally, consideration should be given to leveraging the platform as a unifying resource in the fuzzy Front-End of product innovation.

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Note

At the time of writing this paper, Jokko Korhonen was Senior Designer, Satama Interactive Oy, Finland.

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