

Modeling innovation in complex large-scale financial organizations

A study performed at the ING Customer Experience Center
- part of ING Operations and IT Banking

Patrick A. C. Das

Master of Science Thesis

Modeling innovation in complex large-scale financial organizations

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of ING Operations and IT Banking**

MASTER OF SCIENCE THESIS

For the degree of Master of Science in Systems Engineering, Policy
Analysis and Management at Delft University of Technology

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December 19, 2013



The work in this thesis was supported by the ING Customer Experience Center



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Preface

This document represents my final work as a student of the Delft University of Technology. My studies allowed me to learn a lot and experience different systems in the world. After studying in Delft, performing research in Bangladesh and studying in Australia, ING offered me the opportunity to conduct a thesis in the organization.

That is why I first want to thank Lodewijk Bonebakker for offering me this opportunity and experience the duality of science and corporate organizations. Your extensive knowledge on a wide range of topics and the continuous feedback and discussions on innovation helped me a lot to structure my research and not focus on changing the entire world but just a part of it.. In addition, I want to thank my colleagues at ING for supporting me and answering all my questions. These discussions supported me, and I hope the organization, in finding an innovative way to model innovation.

Next I would like to thank my supervisors at TPM. First, Alexander Verbraeck for chairing my graduation committee and finding time all around the world to give feedback on my work. Second, Michel Oey for helping me to find the right balance between a scientific thesis and a practical advice for ING. Third, I want to thank Robert Verburg for exploring the immense database of academic research in innovation. The meetings I had with my supervisors continuously motivated me to realize this study. Next, I want to thank the interviewees for their time and effort to answer my questions and lastly all of my family and friends that supported me during my studies.

Delft, University of Technology
December 19, 2013

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Abstract

In this thesis, process models for innovation in complex large-scale financial organizations are contrasted with models in literature. As a result, elements which should be included in process models for innovation to increase the innovative capacity of these organizations are presented. To illustrate this, research was conducted at the ING Customer Experience Center, part of ING Operations and IT Banking.

ING, a premium bank in financial services is subject to specific dynamics in its environment that affect the innovative capacity of the organization. The structure of the organization proves to be very complex (i.e. a system with multiple interconnected elements and different ways of operations) which complicates institutionalization of processes models. Core competence of these premium banks in current society is trust and for this reason the organizations are highly risk-averse in delivering new products, services and business propositions.

The research was structured by using a conceptual design-science framework that allows one to assure relevance and achieve rigor in information systems research. First, an analysis to investigate the gap between the desired and actual levels of performance of the process for innovation was conducted. This reduced applicable foundations and methodologies in literature. Second, applicable models and theories were selected to assess differences between models and the case. Design principles were determined to structure the elements which a process model for innovation should include. Third, the design was conducted supplemented by fourth justification and evaluation of the design.

Specific enablers and barriers in the organization are present that affect the innovative capacity of the organization. Coordination mechanisms that evaluate on output prove to be perverse tools for innovation and operational excellence within organizations should be integrated thoughtfully with innovation to reduce the lead-time for delivery. A process model can only be successful if a culture, divisional climates and resources are created that allow for innovation. Leadership in the organization has to envision innovation and create room for corporate entrepreneurship, only then will a process model for innovation function and can the innovative capacity of an organization increase. In addition, a process model should have a spiral character that emphasizes the continuous and evolutionary effort of innovation. No beginning or end of the process is present and failures may lead to success in other

environments. When focusing on early problem structuring and determining objectives, organizational strategies and potential futures, progress and substance of the endeavor is believed to be achieved. Uniform, adaptable, flexible phases and process steps are required to allow for feedback and feed forward and quickly evaluate on feasibility of the effort. In this way the model can be fit to specific contexts, environments and project scales. A note is that radical innovation is not likely to be linked to organizational strategies and core competences, and thus will not likely flow through models.

Concluding, a process model for innovation can only be supportive if innovation is institutionalized in the genes of the organization. Hence, innovation should be supported and facilitated by top management directly. Differences between modeling of innovation in practice and theory is the fact that models are subject to specific organizational and environmental dynamics. A design of the elements which a process model for innovation should include, is constructed and in this model it is important that the continuous and evolutionary character of innovation is emphasized. By performing transparent decision-making and involving business management teams, external knowledge partners and employees; it is believed that the complexity of the process for innovation will be clarified and the effectiveness and efficiency of the endeavor will increase. Moreover, a culture for innovation should be created and a process model should not be coordinated on output, but on throughput. This requires proper knowledge capturing tools which should in addition focus on increasing collaboration with external knowledge partners to further integrate the external and internal environment.

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Chapter 1

Introduction

ING, as a premium bank in financial services has to keep innovating products, services and business propositions to meet customer demand and stay the preferred bank for customers. By implementing a process model for innovation it aims to increase the innovative capacity of the organization and reduce the lead-time for delivery (i.e. the latency between initiation and execution). But implementation of models for innovation in this complex large-scale financial organizations has proven to be difficult¹.

1-1 Innovation in complex large-scale organizations

Delivering new services and business propositions is what makes an organization competitive and allows sustainable business continuity (Volberda, van der Bosch, & Heij, 2013). Four indicators can be distinguished to determine the innovative capacity of an organization in the next sequence: the entrepreneurial capacity of an organization, the ability to allow for new business propositions, co-creation and technological innovation. Increasing the innovative capacity of the organization will result in new services and business propositions. In order to increase the innovativeness of an organization a structured approach for managing innovation should be institutionalized in the organization (Tidd & Bessant, 2009a).

Key elements that affect the institutionalization of innovation in complex large-scale organizations are the culture of the organization, the climate within divisions, internal power relations and the business strategy (Tidd & Bessant, 2009b). In order to institutionalize innovation in complex large-scale organizations, frameworks have been implemented and are adapted to constantly developing best practices of managing innovation. Managing risk of innovation by means of innovation processes is the core of the overall profitability of organizations (Tidd & Bessant, 2009c). Next to this innovation models should get rid of the notion of linearity and inhabit the complexity of such systems by using a holistic approach. The way in which organizations are structured heavily affects the success of innovation processes. Hence, the

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management challenge is how to go about building the kind of organizations in which such innovative behavior can flourish (von Hippel, 2005). Firms and sectors differ greatly in their underlying trajectories, depending on organizational features and it is of key interest how to institutionalize an innovation process within those organizations. Relationships within those organizations (i.e. knowledge systems) are subject to complexities and uncertainties which influence the successfulness of innovation (Lopez-Nicolas & Merono-Cerdan, 2011). In practice, organizations are subject to environmental and internal elements that affect the innovativeness of the organization. Which are the key elements that affect the innovative capacity of organizations and to what extent do these frameworks cope with the key elements that affect the innovativeness in practice?

Innovation in financial services

Innovation in financial services mainly focuses on the infrastructure and services rather than on new products. Financial institutions can be classified as information-intensive organizations. Its main purpose is to design and operate complex systems for processing information to make the provision of a service more sensitive to customer demand (Pavitt, 1984). It is important that innovation models implemented in these complex large-scale organizations comply with this classification.

The global financial crisis has drastically changed the financial industry and banking systems in almost every country in the world. Too few innovations in the years prior to the crisis also contributed to this collapse or, at a minimum, deepened the resulting recession (Hausman & Johnston, 2014). Moreover, the financial crisis provides a sobering reminder of what might happen when innovation fails to drive productive economic growth (Applegate & Harreld, 2009). That is why it is interesting to investigate how innovation models approximately five years after the collapse have been implemented in this industry, if models from literature fit the reality of these organizations and if it has increased the innovative capacity of organizations. Moreover, there is a pressing need to bridge the gap between knowledge and successful implementation of innovation (Cornell et al., 2013).

ING

ING Bank is part of ING Group and as a bank, has unique qualifications when examining the innovative capacity. What makes this case unique is that a core competence of banks is trust, brand image is essential and that for this reasons those organizations are highly risk-averse. Competition is fierce and losing trust can in the worst case lead to bank runs (Bauer & Ryser, 2004). Financial products and services are subject to monetary systems that safeguard the money supply in an economy, but hereby may impede delivery of new products and services (Antal & van den Bergh, 2013).

In order to investigate the implementation of an innovation model in a complex large-scale organization, a single case study will be conducted on ING. It proves to meet the requirements for a complex large-scale financial organization. ING is a large scale global organization in financial services. It has a complex structure when examining the sum of processes for operations and coordinating mechanisms to ensure business continuity. A detailed analysis will be presented in chapter three, in which the complexity of the organization will be further investigated.

Chapter 2

Research elements

In this chapter the elements that are of interest when investigating models of innovation in complex large-scale organizations will be introduced. First, a brief historical introduction in the innovation paradigm is presented (section 2.1). Second, the case will be briefly introduced (section 2.2) followed by the problem statement (section 2.3). Next, the research objective will be presented supplemented with the research questions (section 2.4). Lastly, the methodology and outline of the research will be presented to structure the approach (section 2.5).

2-1 Innovation

Innovation can be split in threefold, namely: product, process and business model innovation (von Stamm, 2008). Managing innovation within organizations has continuously evolved over time and organizations that consistently manage innovation outperform peers in terms of growth and financial performance (Tidd, 2006). Throughout last century managing of innovation has been embedded widely in organizational structures to sustain business continuity.

In the early research of innovation processes, technology-push models and market-pull models were the essence of the innovation paradigm in which closed models of innovation were the standard (Schumpeter, 1950). These first generation simple linear models of innovation were established in the 1960s. Linear models were too simplistic to cope with various factors that affect that innovation process. Closed models focusing on internal knowledge sharing evolved from simple models into multi-actor models which require high levels of integration internally and externally (Tidd & Bessant, 2009a). A shift towards network models with external linkages part of the innovation process were advocated by Rothwell and Zegveld (Rothwell & Zegveld, 1985). This was the start of academic research into innovation regarding external linkages and knowledge exchange of organizations. It can be stated as the start of a new paradigm in which open innovation models are the standard of managing innovation in organizations (Trott & Hartmann, 2009).

2-2 ING and its innovation approach

In order to reduce the lead-time for delivery, reduce costs and introduce new products, services and business propositions in the organization, an initiative to manage the risk of innovation has been implemented at ING Bank¹. ING Bank has adjusted its scope and aims to optimize different business units in order to sustain business continuity and serve the interest of customers, stakeholders and create value for shareholders because of a changing environment (ING Group N.V., 2013). By innovating products, services, processes and business propositions, the strategic change of scope envisioned by ING Bank can be achieved. In ING various decentralized initiatives for innovation have emerged through time and at this moment a centralized initiative is operational.

The ING Customer Experience Center (ICEC) is the innovation platform established in 2011 by ING Operations and IT Banking (OIB). It aims to facilitate a process for innovation for all of ING. OIB supports all activities for retail and commercial banking and the corporate staff in ING by providing the necessary IT systems and infrastructure (ING.com, 2013). In appendix A an analysis is presented on the organizational structure and governance. Through a structured process model the ICEC intends to increase the pace of experimentation and innovation, while reducing the associated risk of bringing ideas into practice¹. This center should be the organizational hub for innovation by stimulating and facilitating innovation. By integrating internal- and external knowledge, trends and technologies, the innovativeness of the organization should be increased.

2-3 Problem statement

The problem that will be researched in this study, concerns the implementation of innovation models in the financial sector, in particular process models for innovation. There is a need to contrast literature and practice of innovation models in complex large-scale financial organization. The problem statement that is the central theme in this research can be formulated as follows:

- **It is unclear what the differences are between process models for innovation developed in literature and models implemented in complex large-scale financial organizations; those organizations are subject to specific organizational complexities and uncertainties that influence successful innovation.**

In order to institutionalize a process model for innovation in complex large-scale financial organizations, various barriers are present that have to be overcome to enable successful innovation. Current best practices in academic literature stress the use of open innovation models that contain cyclic properties to cope with the multi-actor setting and environment in which organizations operate (Chesbrough, 2003; Kumar, 2013). By combining external expertise, technologies and knowhow with the internal organization it is believed that innovation will flourish and the innovative capacity of systems and organizations will increase (Berkhout, van der Duin, Hartmann, & Ortt, 2007).

By using a systems engineering approach, large-scale systems that have a complex character can be defined, developed and deployed (Sage, Armstrong, & James, 2000). It allows one to oversee the environment in which the system is embedded and analyze the interactions of the organization with

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its environment. In addition, it has the purpose to enable organizations to better cope with their environments to achieve their goals and objectives (Sage, Armstrong, & James, 2000b).

A systems view by Mitroff et al. (1974) elaborates upon the process of problem solving. In figure 2.1 the elements of the stages for problem solving are presented. By identifying the perceived problem, the conceptual model and the empirical model, all elements are incorporated to find a sound solution to the perceived problem. This meta-model shows there is no single road for solving problems, but rather an iterative way for solving problems in which the different elements are connected to each other and all are required for scientifically sound problem solving.

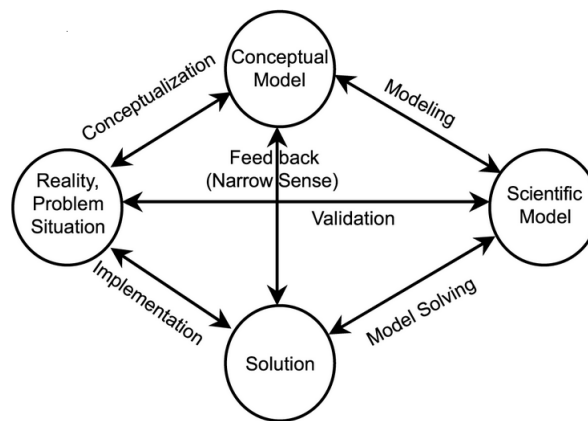


Figure 2-1: A systems view of problem solving by Mitroff et al. (1974)

2-4 Research objective and research questions

As already touched on before, reviewing academic literature of innovation process models and contrasting this with the practical implementation in a complex large-scale financial organization as ING, will give insight in how innovation processes are managed in complex large-scale financial organizations most effectively. Next to this, the study will advise the ING and its Customer Experience Center how the current process of managing innovation functions in its environment and how it can be improved in order to increase the innovativeness of the organization.

Shortcomings in this study will be the available time that lacks for implementation of an improved process model and assessing the feasibility of the model in the different environments in which the organization operates. ING is used to illustrate the application of a process model for innovation in a complex large-scale financial organization. Therefore validation tests should be conducted with experts in the organization and in the academic field of innovation to assess feasibility of the outcomes of the single case study for other organizations in the financial industry. Next to this, due to the limited time, the culture and climates of the organization will be taken into account as a fixed parameter in the analysis and only recommendations will be made on these elements.

Main research question

In order to solve the problem statement, a main research question is formulated for which the single case analysis can be executed:

- What are differences between models for innovation in academic literature and implemented models in complex-large scale financial organizations, and what should the design of a process model for innovation include to increase the innovative capacity of those organizations?

A methodology based on the systems engineering perspective will be chosen in section 2.4 to solve this research question in a scientifically sound way.

Sub-research questions

In order to answer the research question, seven sub-research questions are constructed and arranged below. These sub-research questions are subdivided in four distinct phases to structure the research.

An implemented model for innovation: ING

1. Which barriers and enablers for implementing a process model for innovation are present within ING Bank?
2. Which gaps are present between desired and actual levels of performance and what are the organizational requirements for a successful model?

Modeling of innovation in academic literature

3. Which elements affect the successfulness of innovation in complex large-scale financial organizations and which theories are applicable to the case?
4. How should a process model to manage innovation in complex large-scale organizations be designed based on applicable academic literature and what are requirements for a successful model?

Contrasting models in academic literature and the single case

5. Which discrepancies are present between literature and the current implemented process model for innovation?
6. How can the process model for innovation be improved giving the gaps and discrepancies uncovered which affect the effectiveness of the current innovation process?

Application of the study

7. Which elements of the design are representative for other complex large-scale financial organizations and which elements are specific to ING?

2-5 Research methodology and outline

The research that will be conducted has to be structured by means of a suitable research methodology based on the systems engineering perspective on problem solving. In this section first the research method will be introduced, followed by the outline of the research.

Methodology

In order to answer the research questions systematically, a conceptual framework by Hevner et al. (2004) will be applied. This conceptual framework is designed to conduct research in information systems (IS) and the organizations they support as presented in figure 2.2. For the case of the ING it is convenient to use this approach because the emphasis will be on assessing and refining the artifact. Iteratively assessing and refining design choices is essential to build a feasible framework for managing innovation that can be implemented in the organization.

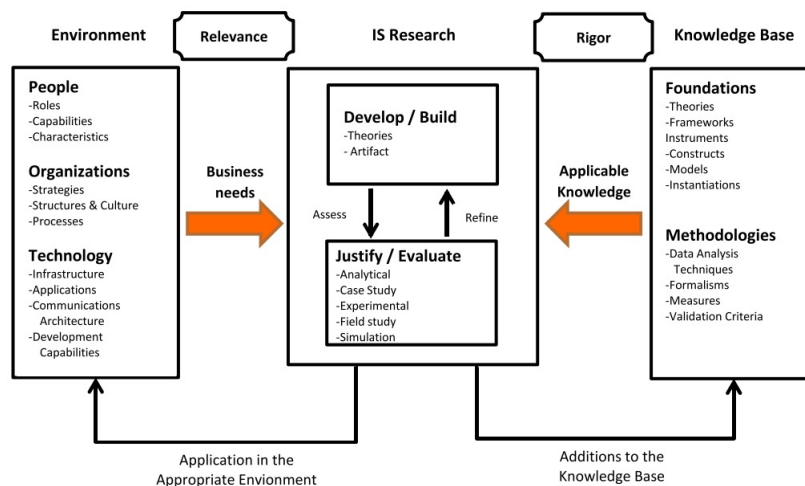


Figure 2-2: Research flow diagram adapted from Hevner et al. (2004)

This framework distinguishes different phases. First, the environment, which allows one to define the problem space. Second, the knowledge base, which provides the raw materials and through which third, IS research can be accomplished. By providing relevance of the environment and rigor by methodologies and foundations, an innovative artifact can be designed (Hevner et al., 2004).

Research outline

The outline of the chapters to conduct this study are based on the framework and are visualized in figure 2.3.

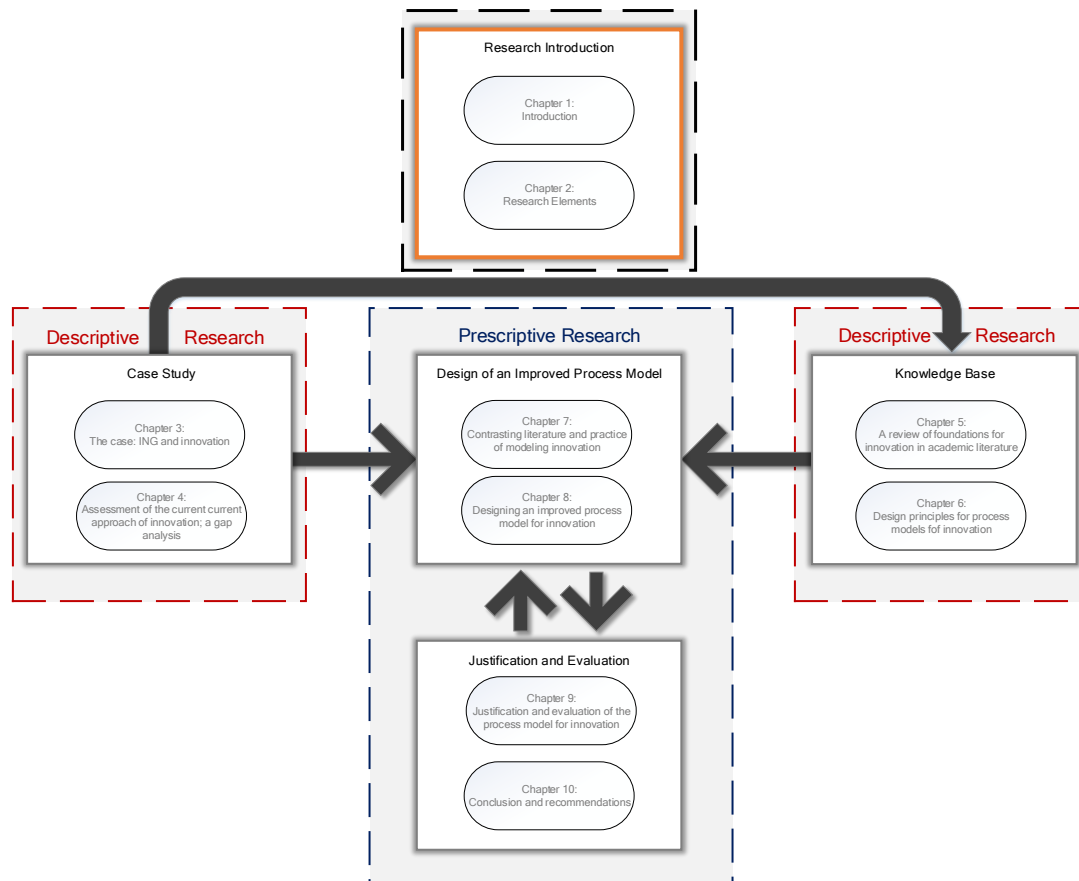


Figure 2-3: Research outline

Descriptive research will be conducted in the first two phases of the research followed by prescriptive research. In the first phase, the case will be explored and a deepening investigation of the perceived problems with the process model for innovation are investigated. This phase will increase understanding in the complexity of managing innovation within a large-scale financial organization. In the second phase the knowledge base will be investigated. Based on the case study applicable literature for innovation models and systems engineering in complex large-scale organizations is explored to investigate discrepancies between literature and practice.

In the second part of the study, prescriptive research will be conducted: In the third phase the current design will be improved based on set design principles to meet requirements adapted from literature and emerged from the case study. Finally, the improved design will be justified and evaluated to assess whether the improved design meets the design principles and requirements. As visualized in figure 2.3, continuous interaction between the design, and justification and evaluation is present. By iteratively designing the model and evaluating it on selected requirements, a model can be designed more efficient and effective considering the time that is present for this study.

Phase I

Case Study

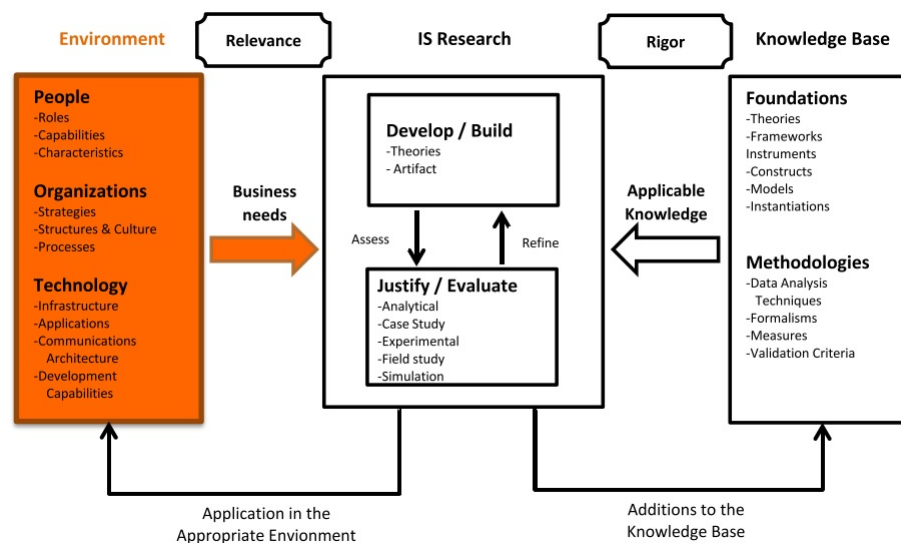


Figure 2-4: Research flow diagram, Environment. Adapted from Hevner et al. (2004)

In the first phase of the study the problem space for the process of innovation will be investigated. This covers the internal and external environment in which stakeholders directly or indirectly have are related to the process for innovation. The goal of this part is to define business needs based on the organizational needs for an improved process design. First, in chapter three ING and its approach to enable for innovation will be presented. Second, in chapter four a gap analysis will be conducted to assess the gap between the desired and actual levels of performance of the process for innovation within the organization.

Chapter 3

A case for a process model for innovation: ING

This chapter first introduces the organization and second innovation within the organization. In order to understand the complexity of the organization an analysis will be conducted on elements that result in this complexity. Next, an assessment of the current approach for innovation facilitated by the innovation hub within the organization, the ING Customer Experience Center, will be conducted.

3-1 ING

The International Nederlanden Group N.V. (ING Group) originates from a merger between Nationale Nederlanden and the NMB Postbank Groep in 1991. ING Group exists of a bank, investment management and insurance (IM) division, it operates on a global scale and has approximately 82,000 employees (ING Group N.V., 2013). This leads to complications such as aligning strategies for products and services, as different markets have different needs and exchange of information between separate entities.

In 2008, as a result of the global financial crisis, ING was given a capital injection by the Dutch State of EUR 10 billion to strengthen its capital (ING Group N.V., 2009). As a result of this state aid arrangement ING determined to restructure and downsize different divisions of the group. This was imposed by the European Commission in order to justify the bailout during the financial crisis. Based on the culture and strategy of ING Group, an operational separation has been realized between the subdivisions in 2010 (ING Group N.V., 2011).

These measures and occurrences created awareness in the organization for innovating products, services and business propositions. Moreover, embedding innovation in the organizational culture. In appendix A, an extended analysis on the internal and external environment is conducted to understand the complexity of the stakeholders operating in this spectrum.

Organizational Structure

The corporate governance model of the organization has a two-tier board structure consisting of an executive board and a supervisory board (ING.com, 2009). In addition shareholders have a saying in decision-making and thereby increase the complexity of decision-making. In appendix A, an extended analysis is provided.

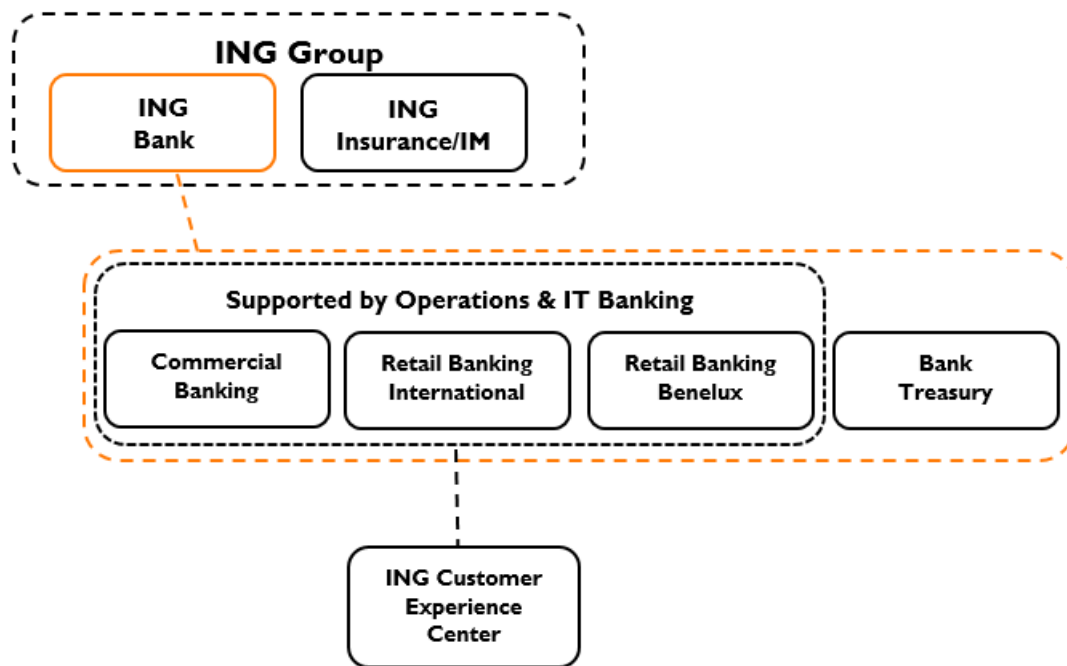


Figure 3-1: ING corporate structure

As presented in figure 3.1, the ICEC is part of ING Operations and IT Banking (OIB) which supports all commercial activities by providing the necessary IT systems and infrastructure to perform this task. OIB supports Commercial Banking, Retail Banking International and Benelux, which are the commercial entities of ING Bank. Because of this hierarchical structure the ICEC's main focus is on ING Bank and therefore the environmental analysis will focus on this entity.

Market Dynamics

The global financial crisis shows that the existence of financial institutions heavily depends on customer confidence and trust. Banks need to improve the customer relationship to become the preferred bank and to avoid that unsatisfied customers will switch. Banks in the current market are very vulnerable to fluctuation and distrust. That is why banks have to be careful in their decision-making and are focused on re-winning trust of customers. Globally, 10 percent of customers of retail banks are likely to switch banks within the next six months, while more than 40 percent are not sure if they will stay at their bank. Main reasons for this are that bank-customer relationships have become more complex and less personal because of remote channels and increasingly complex products (Capgemini & Efma, 2013). Core competences of banks in the 21st century mainly are: trust, administration and data¹. Payment transactions and interactions between the bank and customers are more often achieved digitally. That is why information technology (IT) has become of increasing interest to improve processes and customer service (CIO Magazine, 2008).

In order to adapt to these fundamental changes of perspective, ING Bank updated its strategy and financial ambitions around three pillars to enhance its position in this changing environment. The three pillars are: customer centricity, operational excellence and balance sheet optimization. To achieve these goals, the Dutch State has to be repaid on a short term and ING Bank has to focus on the creation of leading domestic full-service banking positions in attractive stable home markets, as well as a leading commercial bank in the Benelux with a strong position in Central and Eastern

¹Confidential meeting

Europe. Key to making this strategy a success, according to ING, is to have engaged and motivated employees by being a top employer (ING Group N.V., 2013). In addition, ING aims to adapt to the changing environment by meeting its financial ambitions. Meeting demand of customers, shareholders and the market is the main objective of ING for the coming years.

3-2 Innovation in the organization

Initiatives for innovation were already present at former NMB Postbank, some more successful than others, but all showed to have a temporary character. The average time of existence for these initiatives was approximately five years, see appendix B.1. This was due to the fact that set key performance indicators were not met. This resulted in a lack of support within the organization for business continuation of the initiatives (van Engelen, 2007).

At this moment in time, different initiatives and innovation labs are present within the organization with the mission to innovate products and services. Global branches in different environments operate independently when considering innovation, because of the fact that those markets have different needs that cannot be coordinated centrally. A problem that exists, is that exchange of information between the decentralized entities and local innovations is not optimal; there is no proven synergy between these initiatives². As a result Operations & IT Banking (OIB) established the ING Customer Experience Center (ICEC) in 2011 as an initiative within the Netherlands to stimulate and accelerate the innovativeness of the whole organization, kick-started from IT³. The long-term objective of this initiative is to stimulate and facilitate innovation for the whole of ING. By managing the risk of innovation and increasing the pace of innovation, innovativeness of the organization is tried to be stimulated and accelerated. This should support the organization in becoming the preferred bank for customers (ING Group N.V., 2013). The ICEC should be a central entry point for new technologies and managing innovation.

Barriers for innovation

ING as a competitive player in the financial market with its large client base has to focus on sustaining the organizational brand, reduce costs, enable for new sales, reduce the time to market by optimizing operational processes². Operational excellence has been implemented in the organization to optimize cost-income ratios which are the core of business operations. Line managers of different entities are coordinated on KPI's that steer on efficiency, decreasing throughput times and improve customer processes¹.

Governance models are of interest when examining decision-making in the organization. Internal politics, the role of shareholders and organizational strategies are elements that affect decisions and the future path of the organization. Allocation of resources for business units and separate entities in the organization are determined and evaluated on cost-income ratio's. Different business units may not communicate targets and may compete for funding of projects. Limited funds in organizations limits the amount of initiatives that can be pursued and thus commitment and support of senior management is required to allocate funds for a project or initiative. Hence, competition between projects might be present and will block innovation¹.

The size and diversity of the organization results in another problem, the organization operates on a global scale and has various global branches that operate in different environments and markets. It can be characterized as a siloed organization due to this fact and the separate databases, approaches, technologies, infrastructures, legacy systems and coordinating mechanisms for different business units. This increases the difficulty of communication and synergy between different entities within the organization.

²Confidential interview

³Confidential document

Next to these decisions, services and products should comply with strict regulations that are imposed by authorized financial bodies. As a result the organization shows a high level of risk averseness and is believed to operate rather conservative, it has a bureaucratic character (Mintzberg, 1992). When innovation is viewed from a technological perspective, the organization can be characterized as a close-follower. It should always be careful about its branding and follow developments in technology closely⁴. This influences the innovative behavior of the organization as well as legacy systems (i.e. old methodologies, technologies and computer systems) that are present in the organization and with which operations have to be compatible.

Enablers for innovation

At the same time enablers for innovation are present in the organization. The organization and the financial industry are in a transition phase in which the historical closed organization has to transform into an agile, socially engaged and collaborative system⁵. The global financial crisis has resulted in a rapidly changing environment with new parties and changing business propositions, mainly IT driven. Data is more available for analysis and the channels for bank-customer interaction are increasingly shifting towards digital channels (CIO Magazine, 2008).

To respond to these changes, open ecosystems in which open networks are the standard have been introduced in the organization. External technology and business partners are integrated to exchange information, develop new products and process to meet demand of the market and innovate current business propositions and services³. In addition, in the recent years the strategy of the organization focused on re-winning customer trust and enable for repayments of state aid. In recent year, a new CEO was appointed and the urgency for new business propositions and a future for innovative propositions, service and products is envisioned⁶.

Within ING the Netherlands continuous delivery (CD) is implemented as a uniform strategy to improve the process for deployment of software to meet customer demand⁴. The time for delivery can be shortened and improvements reach customers earlier (Humbe & Farley, 2011). Scrum as an agile management tool for developing and sustaining complex products is implemented at ING Bank to support the CD strategy approach. By using milestones and sprints in cross-functional teams projects will operate more efficient (Schwaber & Sutherland, 2011; Takeuchi & Nonaka, 1986). This approach differs from earlier project management practices in the organization such as waterfall models. Using this approach projects would proceed without cross-functional collaboration for weeks before results could be measured. By using agile practices, projects are evaluated in short periods and cross-functionality is improved to increase progress. It is believed that this approach increases flexibility, substance and progress of projects and allows for synergy between global branches⁷.

⁴Confidential interview

⁵Confidential interview

⁶Confidential interviews

⁷Confidential interview

3-3 ING Customer Experience Center

The ICEC was initiated in September 2010 in order to accelerate ideas to be discovered, developed and commercialized via a structured innovation process⁸. It was initiated as a project with internal employees that were connected to earlier innovation initiatives. After a year, in November 2011, the ICEC was officially acknowledged within the organization and opened as a separate business unit. Around July 2012 the ICEC 2.0 was implemented with a newly structured approach based on experiences of employees and in October 2012 a new head was appointed to increase the added value of the platform. A more in-depth analysis can be found in appendix B.2.

The role of the ICEC can be specified as follows:

- Stimulating, accelerating and triggering innovation within the organization
- Integrate new and innovative technologies of knowledge partners in the organization
- Customer centricity; introduce business units within the organization with the needs of the market
- Support business units in the process towards delivery and manage the risk of innovation

Thus, when looking at the specified roles enumerated and in particularly the 'integration of new technologies' and 'customer centricity', the role of the innovation hub has both a technology push and market pull character (Schumpeter, 1950). It integrates different elements of the innovation spectrum and supports the organization in this endeavor.

The Environment

The ICEC is part of ING Bank and the primary focus is on this domain rather than on ING IM. ING Bank, as already described in figure 3.1, has three main entities which are the core of the bank: Commercial Banking (CB), Retail Banking Benelux (RBB) and Retail Banking International (RBI). Those units can make use of the innovation funnel supported by the ICEC to stimulate, facilitate and accelerate innovation and adapt to the changing environment. ING OIB, as the initiator of the ICEC, also is the direct sponsor of the ICEC. It determines the feasibility of the innovation platform and evaluates it on set goals.

The overarching goal of the innovation platform is to increase the innovative capacity of the organization^{2,4,5}. It is believed that innovation is not a goal on itself, it is a management practice that supports the organization in its existence. Not only facilitating business units that develop ideas through the funnel of the innovation platform needs to be core business, but also implementing a process model for innovation that can be embedded in the organizational culture and divisional climates. The innovation platform aims to reduce risk by facilitating different business units in the process for innovation, mainly in the first steps of the innovation process⁹. It is believed that by continuously improving its own process the added value of the innovation platform should be sustainable in time and will continuously improve current business processes.

To increase effectiveness and efficiency the ICEC has created an open environment in which external parties collaborate. It has created a knowledge place where external technologies and expertise are brought together. Knowledge partners are contracted and links with universities are set up to exchange knowledge. In this way external parties can introduce their technologies to solve problems present within ING and external knowledge can be integrated with the organization. In addition a 'global innovation portal' has been initiated to integrate innovative ideas in the organization. This platform connects ING business worldwide to the outside world of start-ups and innovative organizations¹⁰.

⁸Confidential interview

⁹Confidential document

¹⁰Confidential document

The approach of the ICEC

By focusing on creating an ecosystem in which internal and external collaboration is stimulated, the pace of delivering innovative solution is tried to be increased. The physical space of the innovation platform is placed outside of the organizational environment, by inviting employees of the organization into a different environment, creativity and engagement is stimulated⁹.

Each main entity of the bank has its own representative from the ICEC, these representatives are responsible for the coordination and throughput. It is believed that in the long term the approach of the ICEC and innovation should be embedded in the organization¹⁰.

The innovation platform uses an approach based on five phases that can be run through by clients, presented in table 3.1. These phases are hosted by means of events in which clients together with a facilitator undergo the processes that are part of the phase. These process will be described in the next paragraph. A detailed analysis of the people supporting the process for innovation is presented in appendix B.2.2.

Phase	Content
Confidential	Information

Table 3-1: Process phases of the ICEC

The phases are constructed based on five "I's". First, the innovation platform *invites* business units at the ICEC to introduce these parties to the opportunities, possibilities and necessity of innovation. Second, it aims to *inspire* business units by introducing them to detailed customer journeys based on bank-customer interactions. Thirdly, it *investigates* a problem posited by a business unit to come to an innovative solution. In this phase the problem cq. business challenge will be scoped down and structured to clarify the problem statement. Fourth, this problem statement (if present) will be subject of *ideation* sessions in which potential ideas are generated and selected for innovative problem solving. Lastly, this idea will be *incubated*; it will be developed, tested and evaluated towards a Minimal Viable Product (MVP). This MVP is the smallest product with minimal features that can be tested and evaluated on its feasibility. After these five distinct phases development of a business case, a scalability test and implementation of an idea will take place at the clients' workspace without direct facilitation of the ICEC resources.

This framework is used in a multi-actor setting in which different business units of ING operate. By hosting different divisional labs required knowledge and skills for experimentation are brought together within the organization. By operating its own servers and database the platforms enables labs and clients to experiment in a safe and secure environment. This allows employees to work in an environment in which problems with legal and compliance parties are not present and do not decrease the pace for development.

The process model of the ICEC

The innovation process model that is implemented at the ICEC is based on tacit- and explicit knowledge conducted by experience and matches the structural approach for driving innovation in organizations constructed by prof. V. Kumar (2013). The implemented framework consists of seven steps that are integrated in the five phases that form the innovation funnel implemented at the ICEC⁹.

The seven process steps are: an initial problem statement is introduced, a business value proposition (or challenge) is defined, solution ideas are generated, a minimal viable product is developed, a business

case is constructed, a scalability test is performed and implementation of the innovative product or service. In figure 3.2 this is presented.

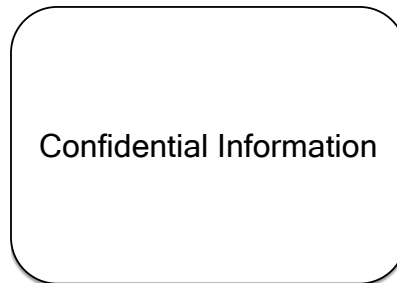


Figure 3-2: ING- ICEC process (LB, 2013)

By using scrum agile project management during the process, a fail-fast mechanisms is implemented to determine in short cycles if an effort is worth proceeding to a next phase or that it lacks trust, commitment and feasibility. By actively integrating business units with innovation, this is achieved. As elaborated on before the innovation platform only facilitates the process for innovation, this means that the business units are responsible for the development and delivery. Final steps of the process; the scalability test and implementation, are run through without support of the innovation platform. In figure 3.3 the integration between the innovation hub and the business unit is visualized.

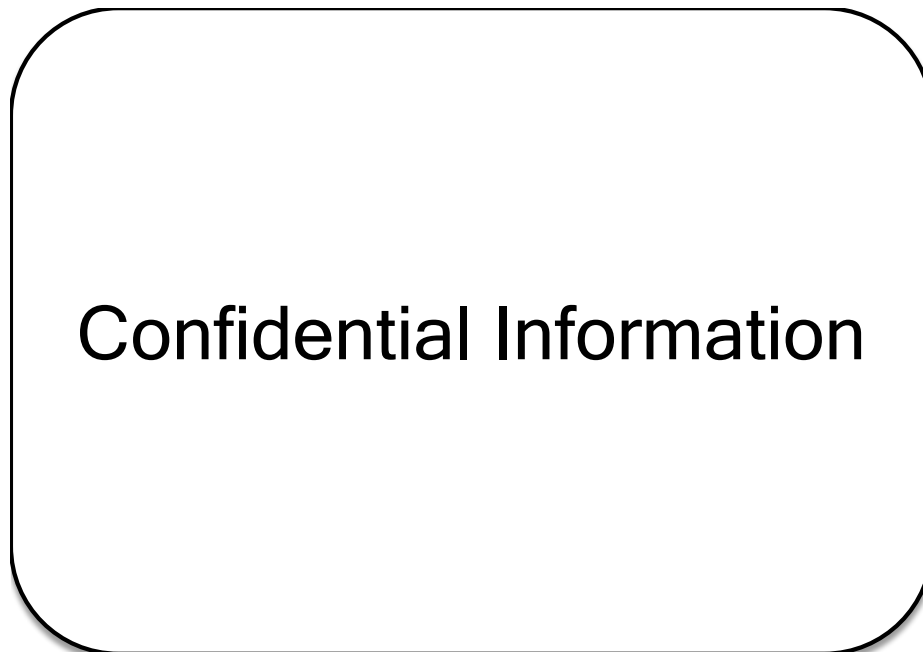


Figure 3-3: ICEC approach, (LB, 2013)

Since the implementation of the process for innovation used by the ICEC, it was revised several times to optimize the way of working⁹. Adaptations to overcome execution problems have led to a model that differs from the original innovation process. During the execution there are still thresholds that emerge; e.g. the ICEC platform has not been fully embedded in the organization and the perceived added value is still unknown for a great part of the organization.

3-4 Conclusion

In this chapter ING and its approach for innovation by ING Bank were introduced. This single case was used to illustrate how innovation is modeled in a complex large-scale financial institution and to identify what enablers and barriers for innovation in this environments are. The enablers and barriers for successful innovation in the organization were analyzed together with the current approach for innovation implemented at the ING Customer Experience Center (ICEC). Moreover the next sub-research question was answered:

Which barriers and enablers for implementing a process model for innovation are present within ING Bank?

First, barriers were identified. It can be concluded that the organization has a dispersed character, mainly due to the global scale on which it operates. The environment in which entities operate differs greatly and so does the need for innovation. It can be concluded that the approach for innovation functions in a complex large-scale organization that has a siloed character. Next, market and organizational dynamics have resulted in a new urgency for innovation as it is key for business continuity in the rapidly changing environment. In addition, internal competing decentralized initiatives for innovation, the risk averseness of the organization, the organizational culture, specific climates in business units, legacy systems and organizational coordination mechanisms weaken the innovative capacity. These barriers need to be overcome or have to be aligned with innovative strategies to enable for innovation within the organization.

Second, enablers for increasing the innovative capacity of the organizations were identified. The organization is in a transition phase, it has to adapt to the rapidly changing environment in which importance of Information Technology (IT) services increases. The static and hierarchical culture of the organization has to shift towards a social, agile and collaborative system that embraces an open ecosystem for collaborative development of products, services and processes. Agile approaches for project management enable cross-functional collaboration between business units and the external environment. A change of leadership within the organization resulted in new strategies and forms a window of opportunity for enabling innovation.

Third, the current process model for innovation was explored. Concluding, it is questionable if the process for innovation functions optimally in the current organization and the different business units giving their different structure, environment and needs. Moreover it is questionable if the approach and uniform process model for innovation adapted from literature fits to the organizational character and organizational need for innovation. In chapter four we will identify what the business needs are for a process model and how the current process model for innovation functions.

Assessment of the current approach for innovation: A gap analysis

The innovation platform and its approach have not been fully embedded in the organization and the approach is not used at its full potential yet as argued in chapter three. The implemented innovation funnel is a uniform structural process that is used for different business units, but it is unclear if the process complements the need of those different business units. Therefore the question is how the process model functions in its environment and what the gaps are between the actual and desired levels of performance. Do models from literature present shortcomings or does the current process need to be improved?

The quality of professional services, in this case a process model for innovation, can be analyzed by means of an in-depth gap analysis (Brown & Swartz, 1989). By means of this analysis the gap between the desired and actual levels of performance of the professional service can be assessed. The identified gaps will in addition reduce applicable literature that has to be explored and reviewed.

The gap can be identified by solving the equation stated in equation 4.1 and 4.2:

$$O_i = X_i - E_i \quad (4-1)$$

$$X_i = f * (E_{<i}) \quad (4-2)$$

O_i = Evaluation on encounter i

X_i = Expectations of encounter i

E_i = Experience of encounter i

$E_{<i}$ = Experience prior to encounter i

In this equation the evaluation of an encounter i (i.e. the added value of the process model for innovation) is the difference between the expectation of encounter i beforehand, and the experience of encounter i by direct stakeholders. If this difference is positive it shows that the service can be improved and the actual levels of performance do not meet the desired levels of performance and vice versa. Hence, the experience is assessed to be equal to, better than, or worse than expectations of the professional service: the process for innovation.

Section 4.1 presents what the desired situation perceived by stakeholders in the organization is for a process for innovation. This will result in desired levels of performance that will be used as a

starting point for analyzing and filling the gap. Next to that, section 4.2 analyzes the actual levels of performance of the current process for innovation. Lastly, section 4.3 presents an overview of gaps that need to be closed in order to achieve the desired situation of managing innovation within ING.

4-1 Managing innovation within ING: the desired levels of performance

In order to measure what the desired levels of performance of the process for innovation are (the expectations of encounter i : X_i); the sum of the experiences of stakeholders prior to the implementation of the process for innovation by the ICEC need to be determined: the expectations of the encounter. By stakeholders in this phrase is meant; the stakeholders that initiated and sponsor the innovation platform, and management that is responsible for the continuity of the organization and the innovativeness of the organization. Thus, it has to be determined what stakeholders expect of an innovation process based on their prior knowledge and short- and long term goals. This is based on the strategies of the organization and the organizational goals and objectives for innovation. The desired levels of performance are based on: internal documents and organizational strategies and futures envisioned by the management team of OIB¹. These interviews are presented in appendix E.

Desired situation

The desired levels of performance of the innovation platform perceived in the organization are analyzed by means of confidential interviews with direct stakeholders. Together with the roles of the innovation platform that are presented in section 3.3, it can be stated that the desired levels of performance for an approach for innovation within the organization are the following:

An innovation hub should:
Confidential Information

Table 4-1: Role of an innovation hub

In addition to these desired levels of performance, quantitative objectives are set by management for coordination of the innovation platform. Management has set the next key performance indicators as a coordination mechanism to evaluate the functionality of the innovation platform:

Quantitative objectives for the innovation platform:
Confidential Information

Table 4-2: Current quantitative objectives of the innovation platform

Next to the desired levels of the innovation platform, the desired features of a process model for innovation can be described as follows¹:

A process model for innovation should:
Confidential Information

Table 4-3: Desired features of a process model for innovation

¹Confidential documents and interviews

4-2 Managing innovation within ING: the actual level of performance

In this section, the actual levels of performance will be identified. In order to measure what the actual levels of performance are, the relevant experiences of direct stakeholders have to be determined (the experience of the encounter: E_i). This will be conducted in threefold, by means of: interviews with direct stakeholders, researching documentation and attaining workshops these experiences will be captured.

By means of interviewing; the management board of OIB (the sponsors of the innovation platform), the head and employees of the ICEC, and clients (business lines) of the innovation platform, the experience of stakeholders with the innovation approach can be identified. From these experiences the actual levels of performance can be deduced.

The management board of OIB experiences the performance of the current approach as presented in table 4.4²:

Actual levels of performance perceived by the management board
Confidential Information

Table 4-4: Actual levels of performance; management board

Next, it is of interest to capture the experiences of employees that perform daily operations at the innovation platform. The management board of the ICEC and its employees have the next experiences with the current implemented approach³:

Actual levels of performance perceived by direct employees
Confidential Information

Table 4-5: Actual levels of performance; direct employees

Lastly, the experience of clients with the innovation platform will give additional insights in the actual performance. In this clients are employees of ING that make, or can make use of the resources of the ICEC to turn ideas into practice. Clients experienced the performance presented in table 4.6

Actual levels of performance perceived by clients
Confidential Information

Table 4-6: Actual levels of performance; clients

A note when enumerating these experiences is that clients mostly participated in early process steps as structured by the ICEC namely: the inspiration, ideation and investigation phase. This is due to the fact that the visibility of the ICEC and support within the organization is still low and the approach has been implemented for a relatively short time; two years. In addition to this, no significant result on the NPS score has been achieved.

²Confidential interviews

³Confidential interviews

By means of a group meeting with (former) employees that have worked in innovation initiatives at ING, perceived problems that are identified have been evaluated. In appendix B.1 the former initiatives are analyzed and employees of these platforms have been asked to reflect on current problems perceived in the organization concerning innovation. The result of this meeting is a list of elements that underlie these perceived problems⁴:

Actual levels of performance perceived by (former) employees of initiatives for innovation within ING
Confidential Information

Table 4-7: Actual levels of performance; (former) employees

4-3 Business needs and the identified gap

Business Needs

It can be stated that the need for a process model for innovation supported by the innovation platform differs per level in the organization. As argued section 3.3, strategies differ per organizational level and have to be in line with strategies higher in hierarchy. The same is applicable for business needs on different organizational levels. The business needs of an approach for innovation are presented in table 4.8.

Level	Business need
Confidential	Information

Table 4-8: Business needs

In addition the assessed gaps have to be filled to attain the desired situation and fulfill the business needs. It results in the need for the organization to improve the professional service to satisfy the needs of the organization. The business needs have to be positioned relative to existing technology infrastructure, applications, communication architectures, and development capabilities of the organization (Hevner et al., 2004). The environment of the organization is analyzed in appendix A.

The Gap

When managing the process for innovation in complex large-scale organizations barriers are present that result in inefficiencies of operations (presented in chapter 3). In order to overcome these barriers and implement a process approach that copes with the complexities of these systems, problems need to be identified and structured. After identifying the desired and actual levels of performance, gaps can be assessed between both levels of performance. This evaluation on the differences between the expectations and experience is base for improving the current design of the process for innovation.

A process model to stimulate, accelerate and improve innovativeness, as is present at ING, can be described as a process that aims to renew and go further than improving the current situation. By exploring and developing new combinations in technologies and collaborate with external knowledge partners, the platform aims to stimulate innovation.

However in practice it is perceived that phases later in the process are not supported and mentored by the innovation platform and its facilities. Clients that enter the process tend to leave the process after

⁴Confidential group meeting

inspiration, investigation and ideation phases. As a result the innovation platform cannot manage the risk of innovation and support the process with its resources and its network of knowledge partners. Thus, the added value of the innovation platform is present in early phases of the process model but tends to decrease in later phases of the process model.

The gaps that are presented between the desired and actual levels of performance are:

Gap No.	Gaps between the desired and actual levels of performance
G ₁	There is no successful output yet; when measured in terms of delivery
G ₂	The process for innovation still needs to be further embedded in the organizational culture and climates to increase its added value
G ₃	The current theoretical process to manage innovation based on literature is not run through from beginning to end in practice. Moreover, the risk of managing innovation cannot be managed at the ICEC completely and resources are not used at its full potential
G ₄	The current process for innovation does not reflect and value all processes that have to be performed for successful innovation in the organization
G ₅	Support in the organization is too low; commitment tends to decrease after sessions and the use of ICEC resources stops
G ₆	There is no standardization of tools
G ₇	There is no fitting channel to exchange information concerning innovation

Table 4-9: Identified gaps

4-4 Organizational requirements

In order to investigate how gaps can be filled and desired levels of performance can be achieved, in the next part of the study models of innovation in literature will be analyzed. By identifying gaps, the case study reduces applicable models in literature that have to be explored and reviewed. By means of organizational requirement the design can be justified and evaluated. These requirements are the translation of the knowledge gaps into validation tools. A feasible process model for innovation meets the selected requirements. The requirements are presented in table 4.10 and every numbered requirement is related to the same knowledge gap.

Org. Req. No.	A process model for innovation should:
O-R ₁	increase the pace for delivery of innovative products and services;
O-R ₂	fit the siloed organization character, culture and climates;
O-R ₃	incorporate the complexity of managing innovation in the organization;
O-R ₄	clarify, contain and value all steps of the innovation process that are run-through;
O-R ₅	increase commitment and support for innovation within the organization;
O-R ₆	be supported by appropriate tools and resources;
O-R ₇	allow for exchange of knowledge.

Table 4-10: Organizational requirements for a process model of innovation

4-5 Conclusion

In this chapter a gap analysis was conducted to identify the gaps between the desired and actual levels of performance of the process model for innovation implemented at ING. By examining the expectations of stakeholders prior to the implementation of the current process model for innovation, and the experiences of the stakeholders at the moment of measuring, the gaps were identified. In addition, based on this analysis organizational requirements for a process model were selected. Moreover, next set sub-research question was answered:

Which gaps are present between desired and actual levels of performance and what are the organizational requirements for a successful model?

First, the gaps that were identified are sevenfold:

No successful output is present yet when measuring in terms of delivery (i.e. resulting products or services from the innovation process). The process for innovation, that is facilitated and hosted by a innovation platform, still needs to be further embedded in the organizational culture and different business units' climates. The theoretical approach that is applied is not run through from beginning to end. Furthermore, the implemented process does not reflect and value all processes that have to be performed for successful innovation. Visibility and the perceived added value of the current process for innovation in the organization has to increase as well as support for the innovation process. And finally, there is no standardization of tools as well as there is no fitting channel to exchange information concerning innovation internally and externally.

When reviewing academic literature these gaps will be base for reducing literature and finding applicable methodologies and foundations and finding differences between literature and practice. In addition these gaps will be base and have to be filled when improving the current process model for innovation present at ING.

Second, to improve the current process model, requirements were selected to evaluate if the improved design fulfills the identified gaps and business needs. The requirements are directly linked to the identified gaps. An improved process model design should;

- Reduce lead-time for delivery of innovative products, services and business propositions
- Fit the siloed organizational character
- Incorporate the complexity of managing innovation in the complex large-scale financial organization
- Clarify, contain and value all steps of the innovation process that are run-through.
- Increase commitment and support for innovation within the organization
- Be supported by appropriate tools and resources
- Allow for exchange of knowledge

Phase II

Knowledge Base

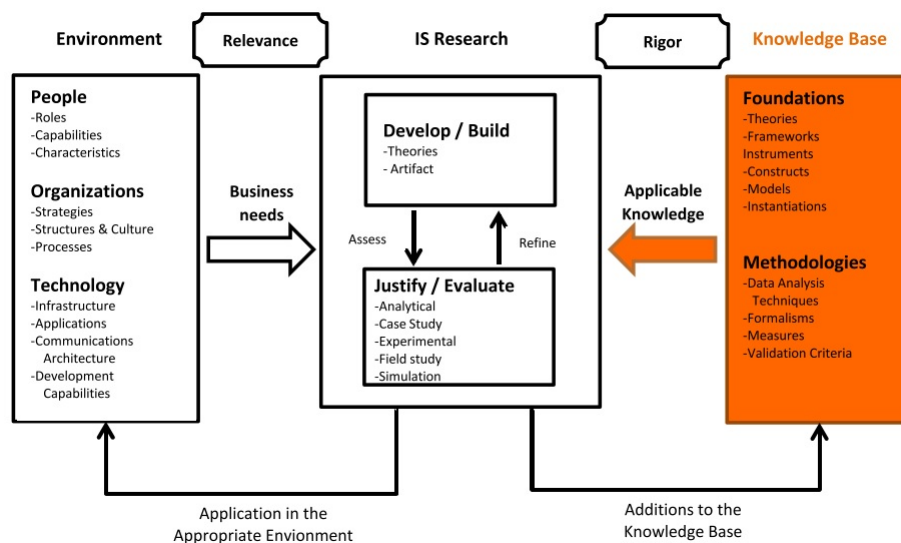


Figure 4-1: Research flow diagram, Literature. Adapted from Hevner et al. (2004)

By analyzing the single case in phase I, perceived symptoms were investigated to discover problems concerning the process of innovation in practice. The identified gaps together with selected requirements form the base for reviewing academic literature which will be conducted in phase II. Foundations and methodologies have to be reviewed to investigate differences between practice of modeling innovation and literature of modeling innovation. First, in chapter five academic literature will be investigated and applicable foundations and methodologies will be selected. Second, in chapter six design principles for process models of innovation will be presented that have to be respected when designing those models in complex large-scale financial organizations.

Literature review on innovation in a complex large-scale organizational environment

This chapter analyzes literature considering the management of processes of innovation in complex large-scale organizations. First, from a holistic perspective the innovation context is analyzed. Moreover, innovation in an organizational context is explored to investigate the different paradigms of innovation literature (section 5.1). Second, elements that prove to face difficulty in the single case study will be linked to foundations and methodologies in literature (section 5.2), followed by a conclusion on the findings (section 5.3).

5-1 Innovation in an organizational context

By exploring applicable models of innovation in academic literature will be investigated what a process model for innovation should include to enable successful implementation.

By means of the uncovered gaps and organizational requirements applicable theories and models are reduced. By interviewing specialists in the field of innovation from the faculty of Industrial Design (ID) and Technology, Policy and Management (TPM) of the Delft University of Technology, literature is explored that proves to be applicable with the analyzed case.

In literature best practices for managing innovation are developed and debated constantly. Models and processes with the emphasis on flexibility, feed-forward and feedback loops, and that focus on internal and external linkages have shown to have more effect on the innovativeness of organizations (Berkhout & van der Duin, 2007). Thus, recent academic research is conducted on models that stress the importance of feed-forward and feedback mechanisms, and that focus on the cyclic process of innovation. By organizing the innovation process through cross-disciplinary networks along an innovation circle, innovation can be managed in teams most effectively. This allows synergy between the large number of highly diverse players that interact in the process (Berkhout, van der Duin, et al., 2007). Moreover, state-of-the-art innovation thinking focuses on integration of systems and extensive collaboration.

The distinction between radical and incremental innovation is an important notion. Established organizations are entrapped to what is familiar to them and are experience path dependency (Teece, Pisano, & Shuen, 1997). Next to this, established organizations are reliant on established routines and core capabilities become core rigidities which negatively affect the capability to implement radical innovations (O'Conner, Ravichandran, & Robeson, 2008). Radical innovation has the tendency not to be linked to organizational strategies and core competences. Therefore radical innovations will not likely flow through models. Incremental innovation has the tendency to find commitment of decision makers easier and therefore has a higher chance of success.

Verganti (2009) introduced a design-driven innovation model (presented in figure 5.1), he believes that radical change only emerges when a combination of technology push and design-driven innovation is presented. 'Meaning' as an important element for radical innovation was introduced; radical innovations based on the introduction of a new meaning for the product or service. In this model is argued that customers are probably not the best sources for radical innovations.

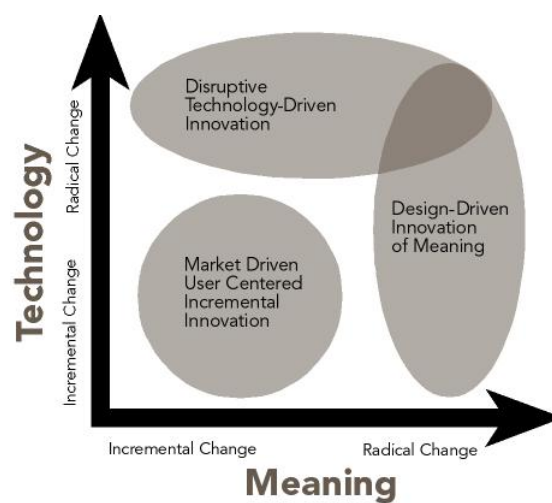


Figure 5-1: Verganti's view on innovations, Verganti (2009)

Concluding, factors that are of interest for the success of an innovation model are the culture of the organization and the attitude of top management. Does the organization strive to be an early adapter, a fast-follower, a conservative-follower, an imitator or does it not value innovativeness within its organization? And is the nature of innovation radical or more incremental? Different applicable elements are highlighted in literature that influence the effectiveness of innovation processes and the innovative capacity of organizations.

Ambidextrous capability

The ambidextrous capability of organizations (i.e. the ability to pursue exploratory and exploitative innovation simultaneously) is crucial for business continuation (Jansen, van der Bosch, & Volberda, 2005a). Thus organizations should not only focus on delivery, but also on research and development. This is what distinguishes an organization from its competitors. Hence, clear consensus on the organizational strategic intent is required. The presence of a compelling strategic intent that justifies the importance of both exploitation and exploration increasing the likelihood of ambidexterity (O' Reilly & Tushman, 2008). Managers should embrace nested paradoxes of innovation: long-term adaptability against short-term survival (Andriopoulos & Lewis, 2008, 2010). Accomplishing this difficult task is primarily a leadership task rather than one of structure and design, thus a skilled leadership team has to be selected to provide a compelling vision and strategic intent (O' Reilly & Tushman, 2004).

Absorptive capacity

Next, the absorptive capacity of organizations (i.e. the ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends) is critical to its innovative capabilities (Robertson, Casali, & Jacobson, 2012). Linking learning and innovation should be incorporated in the organizational culture. In addition, the organizational mechanisms associated with coordination capabilities enhance a unit's potential absorptive capacity (Jansen, van der Bosch, & Volberda, 2005b). Thus coordination mechanisms should be designed that steer on absorptive capacity and value the recognition of external information, using this information and applying it to commercial ends.

Knowledge processes

Another element that influences the innovative capacity of complex large-scale organizations and the success of innovation approaches within organizations are knowledge processes. The ability of an organization to learn from its mistakes is the key of sustainable business continuation (Suak Hau, Kim, Lee, & Kim, 2013). In addition, organizations should have fitting knowledge management tools and organizational facilitating conditions to support knowledge creation processes as a vehicle to improve innovation (Esterhuizen, Schutte, & du Toit, 2012).

Collaborative practices

Lastly internal and external collaboration is of interest. Collaborative practices should be structured within an organization and should be embedded in the organizational culture to enable knowledge sharing (S. Knoll, 2012; Kleinsmann & Valkenburg, 2008). In order to bootstrap the productivity of employees several advanced applications such as search applications, knowledge management, skill management and idea management should be reinforced (Carbone, Contreras, Hernandez, & Gomez-Perez, 2012).

The success of a process model for innovation is highly dependent on the system it operates in. The presented elements that affect the innovative capacity of organizations influence the success of a process model for innovation. In the next section the modeling elements for redesigning a process model for innovation in a complex large-scale organization will be presented.

5-2 Applicable models for innovation

In order to select applicable models for innovation from literature that should be included when contrasting literature with the practice of modeling innovation, a selection mechanism is required.

Based on the gaps between the desired and actual levels of performance of a process model for innovation (identified in chapter four) a selection of models can be made. Literature explored in the previous section provides the context for determining the innovative capacity of organizations. In this context models applicable to process models for innovation should be selected and reviewed.

The case, a risk-averse organization in financial services, is subject to organizational threats and weaknesses: The siloed structure, competing internal programs, fierce regulation and hierarchical structure have proven to be barriers for a successful implementation of a process model for innovation. When analyzing models on innovation in literature to design a structured process for managing innovation within a large-scale organization, the complexities that are present within the organization have to be taken into account.

In literature different approaches for designing different parts of this system are present. Requirements for a process model selected from the case study bound the search area for selecting models. A model for innovation should be capable of fulfilling the requirements that are set in chapter four (section 4.4, figure 4.10). Models should be selected that are able to model on different levels of abstraction. Next, models should be adaptable to the complexity and large-scale character of the organization. Also, models should allow for exchange of knowledge and should focus on openness of the system to enable external collaboration. The models from literature that will be selected, contain specific elements that are believed to be of interest when designing a model respecting the organizational requirements.

O-R₁: No successful output is yet available when measured in terms of delivery

The case of ING represents no successful output. Moreover, no product, service or business proposition has been delivered since implementation of the process model for innovation by the innovation hub. When reviewing literature different process models for innovation show to be of interest. First, the Delft Innovation Model (DIM), by J. Buijs (2012b) emphasizes circularity of process models for innovation. Based on the assumption that selling one product does not say anything about the overall success of the total innovation process, linearity is rejected and a circular view on corporate innovation is included in the model. The innovation process, that originates from the New Product Development (NPD) school, bites itself in the tail and has various feedback loops. In figure 5.2 the DIM is briefly presented.

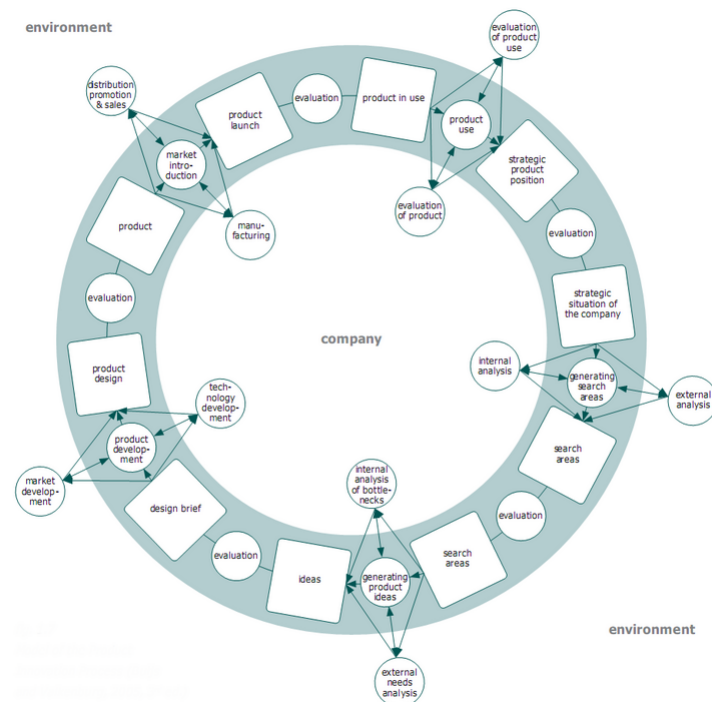


Figure 5-2: Delft Innovation Model, Buijs (2012)

The widely recognized approach of (Cooper, 1990) offers another conceptual framework for innovation models. This framework distinguishes different stages and gates in the model for innovation. After every gate a go/kill decision point emerges where has to be decide on the path forward. The model is based on empirical findings and has evolved over time to increase its feasibility in projects on different scales (Cooper & Edgett, 2007). The product development model starts from an idea and consists of five gates, each followed by a stage. In figure 5.3 the Stage-Gate model is presented. Originally the Stage-Gate model, is a conceptual and operational model for managing the new product development process to improve effectiveness and efficiency. It is a pipeline model that has a beginning and an end.

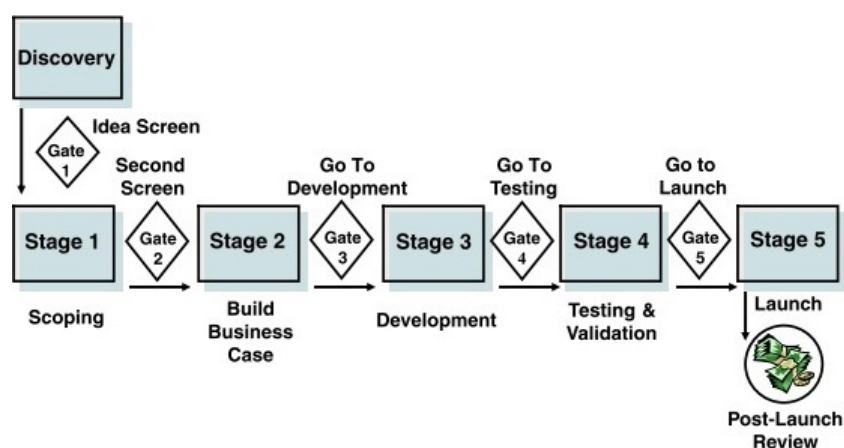


Figure 5-3: Stage-Gate Model, A five-gate system, Cooper (2001)

Based on the requirements of the case and literature by Buijs (2012b) linearity of this process model is

rejected for the design of a process model in complex large-scale financial organizations. The principles in the process model however show to have additional value for designing successful process models.

By making use of the process steps and gates project leaders will be able to better define objectives and tasks, better rank projects and focus on resources (Cooper, 1990). However, misconceptions and challenges were present when using the original Stage-Gate model and next-generation versions were introduced that could be adaptable and flexible in order to cope with projects on different types and sizes (Cooper, 2008). Main insights on the traditional process were that the process is: not a rigid lock-step process, not a linear system, not a project control mechanism and not a back-end or product-delivery process. In addition perceived problems were: too much bureaucracy in the idea-to-launch process (i.e. too much paperwork), too high expectations from a process (i.e. the process will guarantee success) and 'no pain, no gain' (i.e. too much homework).

O-R₂: Fit the siloed organizational character

The organization shows to have a dispersed character with different needs for innovation based on the environment in which business units operate. In order to cope with this feature decentralized innovation should be stimulated. A.J Berkhout (2007) designed the Cyclic Innovation Model (CIM) which exists of different elements. This model is the result of a comparison of the dual nature of scientific exploration and production creation, it emerged from theoretical arguments and case studies in the product and services domain (Berkhout & van der Duin, 2007). The most important features are: the cross-disciplinary component of the model (i.e. processes and interactions between those processes drives innovation), the interconnected cycles with feed forward and feedback connections and the openness of the innovation arena. Hence, corporate entrepreneurship should be enabled by strong leadership to allow for successful innovation¹. In figure 5.4 the CIM is presented.

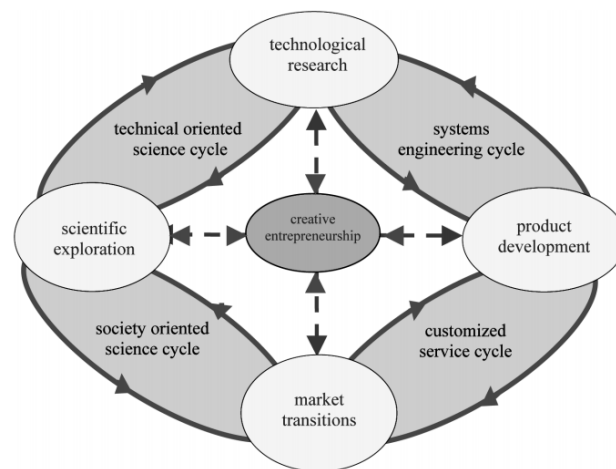


Figure 5-4: Cyclic Innovation Model, Berkhout (2007)

Next management of the process model should include the siloed character of the organization. A process should be designed that reflects the siloed character and protects core values of all stakeholders in the organization (de Bruijn, ten Heuvelhof, & in 't Veld, 2010). Competing programs, limited resources and hierarchy in the organization may lead to strategic behavior that influences decision-making. Theories by de Bruijn and ten Heuvelhoff (2007; 2008; 2010) stress to incorporate the strengths and weaknesses of the organization when managing processes and performance in complex networks.

¹Interview A.J Berkhout

O-R₃: Incorporate the complexity of managing innovation in the organization

In order to cope with the complexity of managing innovation in the organization a holistic view on innovation has to be incorporated. Models from literature that allow for an holistic view on process models are identified. Next to the already presented CIM by A.J Berkhout, that stresses the complexity of innovation and the different nodes that have to be incorporated when allowing for innovation, a systems perspective by Sage and Armstrong (2000) allows to comprehend the multidisciplinary character of systems in large-scale organizations. Moreover, it provides tools to divide systems in sub-systems and structure the system to increase the ability for problem solving and re-engineering (Sage, 1995).

Next to this theory and models designed by Aalbers (Aalbers, Dolfsma, & Koppius, 2013; Aalbers & de Valk, 2013; Aalbers, Dolfsma, & Koppius, 2014) elaborate on connectedness of stakeholders in organizations and the role of identifiers, connectors and sponsors for innovation in networks. Formal, informal and especially multiplex networks (i.e. combining multiple single streams into one stream) explain transfer of innovative knowledge in an organization. Moreover, this theory allows one to examine the stakeholders in an organization that are required for innovation and how these stakeholders should be included in the design for process models. The complexity of the case forms barriers for innovation and by determining how individuals have to be positioned in complex networks in organizations innovation can be enabled.

O-R₄: Clarify, contain and value all steps of the innovation process that are run-through

In order to clarify all process steps of the innovation process that are run-through different theories may be of interest. The updated Stage-Gate Model by Cooper (2008) elaborates on flexible and adaptable process steps that are part of linear innovation processes. The DIM by Buijs (2012b) clarifies steps of the corporate innovation process and literature by Sage and Armstrong (2000) may be used to structure building blocks of the sub-systems of the process model.

O-R₅: Increase commitment and support for innovation within the organization

A lack of commitment for the process of innovation facilitated by the innovation hub is perceived in the organization. To increase commitment and support in the organization the process model has to be professionalized based on the system in which it operates. Next the role of the innovation process in the effort for innovative products and services has to be clarified. By again using theories of de Bruijn et al. (2008; 2010; 2007) managing of networks and processes in complex large-scale organizations can be structured.

In order to model the interdependencies within the organization and increase understanding of the complexity of embedding innovation within an organization the multi-conceptual model by Sun (2012) can be applied. This model allows one to identify different conceptual levels in the organization to assess the innovative performance of an organization supported by an innovation process. In figure 5.5 the multi-level model for assessing innovation competences of an organization is presented.

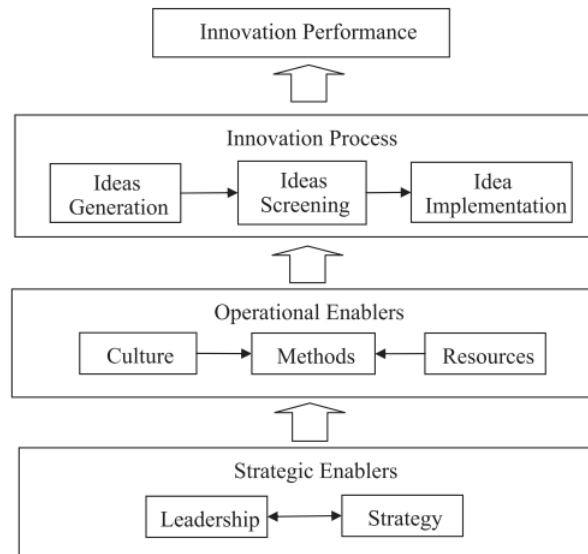


Figure 5-5: A multi-level model for assessing innovation competences, Sun et al. (2012)

O-R₆: Be supported by appropriate tools and resources

Methods, tools, techniques and resources supporting the process model for innovation are poorly standardized and formalized at this moment in time. In order to professionalize the approach for innovation and increase successfulness of the innovative effort the process model needs to be supported by appropriate tools and resources. These tools have to be designed to cope with the characteristics of the organization and improve the effort of stakeholders in the innovation process.

Tools supporting the innovation process will differ per process step in the model. In early steps of the process emphasize should be on creativity facilitation, inspiration and problem solving. By using theories of Tassoul and Buijs (2007; 2009), de Dreu and Baas (2012; 2010) and underlying theories for creativity tools facilitation of creativity sessions can be improved. Next, by using theory by Kolschoten and de Vreede (2008), and Knoll (2010; 2012) collaboration in ideation and project teams can be improved.

Lastly, by using project management practices that are already applied in the organization implementation problems can be overcome. Agile management practices show to improve flexibility and efficiency in the organization and for this reason new project management tools will not be explored (Takeuchi & Nonaka, 1986). Moreover, implementation of new management practices will increase difficulty to embed practices and time for institutionalization (Williamson, 2000).

O-R₇: Allow for exchange of knowledge

A last organizational requirement is the exchange of knowledge internally and externally to allow for open innovation. A feasible tool for knowledge exchange concerning innovation, is not developed or implemented in the organization. Creation of knowledge in the process for innovation is a driver for successful innovation (Esterhuizen et al., 2012) and enabling exchange of knowledge is stressed in different models in literature. Explicit knowledge first need to be captured and second tacit knowledge (i.e. knowledge that is difficult to transfer when writing or verbalizing) need to be exchanged between employees. Intrinsic motivation and intentions for sharing are affecting successful knowledge exchange and have to be taken into account when designing a process model (Hau, Kim, Lee, & Kim, 2013). As elaborated on before, in this study the emphasis will be on improving a process model design and the exchange of knowledge will be a part of this. The creation of a tool for exchange of knowledge is

not part of this study, but the role of a knowledge exchange tool has to be determined and clarified for innovation.

5-3 Conclusion

In this chapter academic literature was explored and reviewed to investigate what a process model for innovation should include. By exploring literature, elements that affect the successfulness of implementation were distinguished. Next, based on this exploration, literature was reviewed on theories and models that prove to be applicable to the single case study. Moreover next sub-research question is answered:

Which elements affect the successfulness of innovation in complex large-scale financial organizations and which theories are applicable to the case?

In academic literature models and processes that focus on external linkages, open networks of innovation with feedback and feed-forward loops are advocated. These features show to have a positive effect on the innovativeness of organizations. A cross-disciplinary network along a circular innovation system in which different nodes have to cooperate for successful innovation needs to be organized. Synergy between the large number of highly diverse players is required in the innovation system and this requires extensive collaboration. In addition it is important to distinguish radical and incremental innovation. Organizations are path dependent and reliant on established routines. This affects the ability for radical innovation but should be taken into account when organizing a process model for innovation. Radical innovations are not likely to be linked to organizational strategies and core competences and thus will not likely flow through models.

Next the effectiveness of innovation processes and the innovative capacity of organization was explored through four indicators stressed in academic literature. The ambidextrous capability of organizations (i.e. the ability to pursue exploratory and exploitative innovation simultaneously) is crucial in organizations and a measure for successfulness and rather a leadership task than one of structure and design in an organization. A compelling vision and strategic intent therefore is required in organizations to allow for sustainable and successful innovation. Second, coordination mechanisms should be designed that steer on the absorptive capacity (i.e. the ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends) and value the recognition of external information, using this information and applying it to commercial ends. Lastly, internal and external collaboration should be structured and should be embedded in the organizational culture to enable knowledge sharing. Fitting tools to capture knowledge, should be implemented for innovation to support the knowledge creation process as a vehicle to improve innovation.

Based on the exploration, theories and models were reviewed that prove to be applicable to the single case. The organizational requirements are boundaries and requirements for a design, and limit the theories and models used. Process models that focus on circular innovation and have stages and gates to assess progress and substance are selected to conceptualize a process model. Next, holistic models that stress cross-functional cyclic innovation and the dual nature of scientific exploration and production creation are selected. In these models, corporate entrepreneurship is stressed for successful innovation and clarify the system in which a process model for innovation should function. Third, systems engineering theories are selected to structure problem solving and comprehend the multidisciplinary character of the system. Together with models that focus on connectedness of stakeholders in the network and decision-making theories, interdependencies in the system can be clarified and handled. Lastly, theories and models that include appropriate tools to support process steps are selected. These tools focus on stimulating creativity, collaboration, exchange of knowledge and progress of the innovative effort.

Chapter 6

Design principles for models of innovation

This chapter presents the structure for improving process models for innovation in complex large-scale financial organizations. Supplemented by applicable models and theories that are identified in chapter five, the structure of determining what a process model for innovation should include will be presented (section 6.1). Second, selected literature will be thoroughly analyzed to investigate how a process model for innovation in complex large-scale organizations should look like and what the design principles are (section 6.2).

6-1 Three level architecture for an improved process design

Systems in large-scale organizations have a multidisciplinary character which make it hard to find a uniform solution to a problem. To enable sound problem solving, the systems can be split up in modules to clarify connectedness, interactions and the underlying structures. Hence, systems exist of subsystems that are the building blocks of systems and divide the system in modules (Sage, 1995; Sage, Armstrong, & James, 2000a; Rolland, 1993).

These subsystems need to be structured in order to solve problems and increase the ability to identify, encapsulate, and manipulate those parts of the system that are relevant to a particular concept, goal, task, or purpose (Tarr & Ossher, 2001). The implementation of models to structure processes in those organizations have to cope with different stakeholders, power relations and dynamic environments. That is why, again, those systems can be entitled as complex systems. In order to structure those processes a systems engineering approach has proven its value.

According to Sage (2000) systems engineering is a human, organizational, and technology-based effort for systems that are large in scale and large in scope. The goal of a systems engineer is to define, develop and deploy systems. By a minimum of three phases: defining, developing and deploying, problems with a multidisciplinary nature i.e. complex systems, can be solved. Thus in order to analyze the process model for innovation different subsystems have to be distinguished for scientifically sound problem solving.

For this study, based on theory of Rolland (1993), the system will be divided in three different subsystems or layers, to enable sound problem solving. A process model is a description of a process and in

this case it will be used for a descriptive purpose; how an approach for innovation should be implemented in organizations. Rolland (1993) proposed three layers of abstractions for process modeling. In this model a process meta-level (i.e. generic concepts), a process model (i.e. the way of working) and development runs (i.e. what happens) are abstracted. These layers will be the backbone for the analysis of designing an improved process model for innovation.

When applying this model, a framework for analyzing the model for innovation can be constructed. This framework is based on the abstraction levels proposed by Rolland (1993) (presented in figure 6.1: Layers for a process design). The first and overarching layer is the systems layer; the systems perspective provides a holistic, gestalt view of large-scale problems and allows one to look further than the specific problem. It recognizes the many components of a problem that affects the potential solution in its environment (Sage, 1995). Second, the different components of the system can be distinguished: the process layer. In this layer the specific processes steps can be distinguished that are required to turn ideas into reality and capturing value from them (Tidd & Bessant, 2009c). Third, the structure of these process steps can be identified to construct a scientifically sound model that meets the needs of systems engineering design principles: the structure layer.

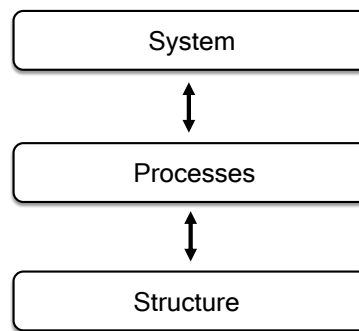


Figure 6-1: Levels of abstraction for a process design

Literature that was explored and selected in chapter five will be used for determining what a process model for innovation should include. For the different levels of abstraction of a process design specific models and fundamental theories will be applied:

- The Cyclic Innovation Model (CIM) by Berkhout (2007), and the multi-level concept model by Sun et al. (2012)
- The Stage-Gate Model Cooper (1990) and the Delft Innovation Model (DIM) by Buijs (2012b)
- Systems engineering approach by Sage and Armstrong (2000)

Different schools of literature are used in the analysis. CIM by A.J. Berkhout is a framework from the systems-based perspective of innovation. It identifies different dynamic processes that are part of the holistic system for innovation. This is extended by literature of Sun et al. (2012), that focuses on required innovation competences. Next, literature by R. Cooper and J. Buijs is selected. This literature is a product from the school of New Product Design (NPD) and is implemented at various organizations in the engineering industry (Cooper, 2008), or is the result of extensive studies on innovation in SME's and multinational corporations (Buijs, 2012b). Lastly, in order to structure processes within a model for problem resolution, fundamental steps for systems engineering activities can be distinguished presented by A.P. Sage and J.E. Armstrong (2000). By integrating these schools of thoughts it is believed that it can be determined what a process model for innovation should include. The design has to fill the gaps assessed in the case and has to be relevant for complex large-scale organizations.

6-2 Foundations of a process model for innovation

In the section the foundations, models and theories for designing a process model for innovation will be presented. First, the systems layer will be analyzed (subsection 6.2.1), second the processes of the system will be analyzed (6.2.2) and third the structure of those processes will be analyzed (6.2.3).

6-2-1 The systems level

When designing a model for managing innovation within a large-scale organization and its complexities, there are different elements in the internal and external environment that are of core interest. In the Cyclic Innovation Model (CIM) designed by A.J. Berkhout, these different elements are incorporated. This model is the result of a comparison of the dual nature of scientific exploration and production creation, it emerged from theoretical arguments and case studies in the product and services domain (Berkhout & van der Duin, 2007). The most important features are: the cross-disciplinary component of the model; processes and interactions between those processes drives innovation. The interconnected cycles with feed forward and feedback connections and the openness of the innovation arena. Next to this the system can be explored by using a multi-level model for assessing innovation competence (Sun et al., 2012). By focusing on the competences that are required at different levels of the organization, an innovation process model can be designed that can be embedded in the organization.

The Cyclic Innovation Model

The base of the model is that science exists of both hard and soft aspects and in innovation it is essential that these aspects are integrated early in the process (Berkhout, van der Duin, et al., 2007). Behavioral sciences, engineering, natural sciences and markets are brought together in a coherent systems of synergetic processes. In section 5.2, figure 5.3 the CIM was presented. This model has a cross-disciplinary view on the system and its interactions and it requires an open society to realize a rapid circulation along the circle, either clockwise or anti-clockwise. In addition, the combination of changes in science, industry, technology and markets creates an abundance of opportunities and it requires entrepreneurship to transform those opportunities into value for society (Berkhout, van der Duin, et al., 2007).

When examining the Cyclic Innovation Model (same figure presented in figure 6.2), innovations are classified in four classes (Berkhout, Hartmann, van der Duin, & Ortt, 2007). Class 1 innovations are the result of new developments in a single node, class 2 innovations emerge from new developments in two nodes and so on. Class five innovations are the most radical innovations that emerge from interaction between all nodes, continuously driven by entrepreneurship it requires the most effort, investments and interaction. These interactions are present between scientific exploration, new technologies, financial market transitions, and new products / services.

Open innovation allows for interaction between science, business and market dynamics. Moreover it is the standard of managing innovation in organizations and sustain business continuity. Connections with universities, knowledge institutes and technology partners are essential to implement a successful innovation model. Therefore in a process model, continuous interactions with knowledge partners are required to integrate external new technologies, information and expertise with internal practices, technologies and expertise to find innovative solutions.

In the end a society can be excellent in science, but still under perform when connecting science with the market. Therefore projects for innovation should always be organized via cross-disciplinary networks along an innovation circle with internal feedback paths. Innovation can start anywhere in the circle; innovations emerge in every domain. But in order to transform ideas into a product-service, a shared mental framework is essential to allow synergy between the large numbers of highly diverse players. Organizational structures differ in the ability to adapt to the interaction and feedback required for modern technology change. Managers should be aware that knowledge of changes in markets is as important as knowledge of changes in technology (Berkhout, van der Duin, et al., 2007).

A multi-level model for innovation

In order to implement a successful approach for innovation, innovation has to be embedded on different organizational levels. In section 5.2, figure 5.5 the conceptual multi-level model on successful innovation is presented to give insight in the complexity of embedding innovation within an organization (Sun et al., 2012).

The management board has to carry out a clear vision regarding innovation. Strong leadership and a fitting strategy are required to enable innovation (Berkhout & van der Duin, 2007). On an operational level the organization should create; the culture, divisional climates and resources to enable innovation. Methods in different organizational climates should enable innovative behavior and based on these methods, fitting innovation processes should be designed for decentralized initiatives. The need for innovation differs per business unit, division and global branch. Processes should be designed to support and facilitate this need. Concluding, the innovative capacity of an organization requires a multi-level institutionalization to enable innovation.

Interim-conclusion

From a holistic point of view innovation can only flourish when entrepreneurship is present in organizations. This means that the board should have a clear vision on embedding innovation within the organizational culture and allow for innovative behavior. If this is not present, innovation as a management practice will not sustain¹.

Innovation is not a goal on itself, it should be institutionalized within the organizational culture and divisional climates. In global branches of the organization different needs for products, services and business propositions are present and that is why a uniform model for innovation should be implemented that allows for decentralized implementation. Local entrepreneurship is essential to meet the needs of the market and increase success of innovation management. Concluding, science is never the starting point and the market is not the ending point of the innovation chain. The innovation process is a dynamic process with no starting or ending point. Opportunities that emerge because of the interconnected open characteristics of the model have to be transformed into value by entrepreneurs, either within present institutions or new enterprises. Early interaction between the nodes in the model is essential for successful innovation and all nodes have to be used actively in the innovation process.

6-2-2 Processes

In the model for innovation in which different elements are cyclically interconnected, the economic, social and technical aspects of innovation are presented. In addition one can design a structured process for innovation to drive new products and services to the market. When designing a process for innovation two models were introduced in chapter five. First, the Stage-gate model by Cooper (2007) elaborates on the different stages and gates in the innovation process. Second, the Delft Innovation Model by Buijs (2012b) elaborates on a general model of the corporate innovation process.

Stage-gate model

In section 5.2 different stages and gates are identified of the Stage-Gate model. In an innovation process each stage costs more than the preceding one: it is an incremental commitment (Cooper & Edgett, 2007). In each step the project costs increase and the unknowns and uncertainties are driven down. This process should yield positive results in terms of getting new products and services to the market quickly, efficiently, and profitable. The Stage-Gate system has been adapted over time to become an open innovation model and identifies three different phases in which external sources are used in every phase to yield the best results: front-end or process, development and commercialization

¹Interview A.J. Berkhout

(Cooper, 2008). Depending on the size and type of the project the stages can be adapted. In figure 6.3, the adapted Stage-Gate model is presented.

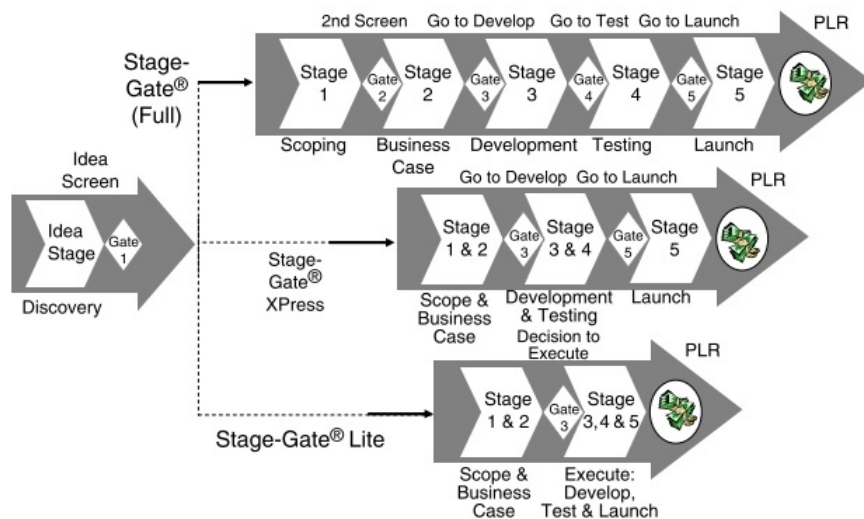


Figure 6-2: Adapted Stage-Gate model to become an open innovation mode, Cooper (2008)

Based on the findings Cooper identified requirements that have to be taken into account when implementing Stage-Gate Models for innovation processes (Cooper, 2008):

- Scaled to Suit Different Risk-Level Projects
- Flexible Processes
- Adaptable Processes
- An Efficient, Lean, and Rapid System
- Use of Scorecards to Make Better Go/Kill Decisions
- Use of In-Process Metrics at Gates
- Effective and Timely Gatekeeping
- Post Launch Reviews to Instil Accountability
- An Open System
- Early and Sharp Product Definition
- Emphasizing the Importance of the Fuzzy Front End of Innovation
- Each Stage should be Cross-Functional

The Delft Innovation Model

In order to deal with the process that lead to innovations Buijs constructed a general model of the corporate innovation process (Buijs, 2012b). This model can only be implemented if managers fit the goals of innovation: they have to give up control and let innovation blossom and they have to shape the right climate in their business unit (Buijs, 2008). In addition top management should implement procedures that allow for innovativeness; if procedures do not allow for innovativeness it will be impossible to create an innovative culture and climate (Buijs, 2012b).

By analyzing different studies on innovation in time some general insights were conducted (Buijs, 2012a):

- Innovation process are temporary: they allow competitive advantage for a short time.
- Innovation processes can be organized in a number of varying separate stages.
- Knowledge of the external competitive world plays an important role.
- Listening to and understanding customers is crucial; a customer panel, list findings.
- Management can only facilitate innovation, people and team processes affect the result.
- Getting new ideas is the core kernel of innovating.
- Innovations differ in amount of change, effort and time for each organization.
- Each Stage should be cross-functional.

Based on these findings the starting point for a model is that a product or service, in its broadest meaning, is part of a Product-Market-Technology-combination as an offering of a particular company for a specific market. The model inhabits these three elements for every stage of the innovation process and can be characterized by five different elements identified by Buijs (2012a):

- The model is a circular process view; there is no start and beginning, the process bites itself in the tail.
- The model has five distinct stages; product use, strategy formulation, design brief formulation, development, market introduction
- All stages have the same uniform structure; the interim-result of the preceding step (squares) are followed by sub-processes either executed within the organization or externally, the result again is an interim-result
- The company is the starting point as it is the main stakeholder
- The processes is connected to the external contexts; an open innovation model

In this circular process there evidently is no beginning or end, it does not matter in which stage clients initiate or end their process. The basic module for all stages is the same; it starts with interim-results of previous stages and is diverged into three processes: the analysis part. The last step of the basic module is an interim result that is evaluated.

This model is intended to be useful for all types of industrial or service industries and the model has to be translated to the innovation process in the problem owners' real world. From a theoretical point of view it would be impossible that companies are skipping stages of the product innovation process). Cooper (1990) studied this in practice and a minimum of only two steps was present: product design & development and market launch. This means that it depends on the innovation how the process should be run through in practice. This is based on two parameters: the complexity of the New Product Development project (NPD) and the familiarity with the NPD-project of the client (Buijs, 2008).

Interim-conclusion

Innovation exists of different stages and basic modules can be distinguished in the process model. Different processes are emphasized in the Stage-Gate model and the Delft Innovation Model (DIM). Overlap in both models that aim to structure product innovation processes is present, but a structural discrepancy between the models can be identified. In the DIM the circular process view is advocated in which there is no absolute start or end in the process model, the Stage-Gate model emphasizes a pipeline model. This model is a project management tool, rather than a conceptual process model for innovation.

One can argue that the DIM extends on the Stage-Gate model; both models stress the use of gates for decision-making. Both models are the result of experience with small and medium size enterprises (SME's) and multinationals, and exists of different stages scaled to suit different risk-level projects. Lastly, stages should be cross-functional to enable collaboration between different entities within the organization.

6-2-3 Structure of processes

As elaborated on in this section, systems exist of subsystems that are the building block of systems and divide systems in models (Sage, Armstrong, & James, 2000b). Structuring these subsystems is essential for problem solving and increasing the ability to identify and develop parts of the system that are relevant for the particular goal. Sage and Armstrong (2000) provide the elements for problem solving from a systems perspective. By a minimum of three life cycle phases: defining, developing and deploying, problems with a multidisciplinary nature i.e. complex systems, can be structurally solved. In the framework for problem resolution, three fundamental steps are identified that have to be conducted in each of the life-cycle phases: *Formulation*, *Analysis* and *Interpretation*.

Fundamental steps

These three fundamental steps can be performed on different levels in the process model. From a holistic point of view the needs and objectives for the system have to be identified and design alternatives have to be identified and generated before deploying the process model. But the three fundamental steps also have to be performed for distinct process steps in the process model to ensure a structured system (Sage, Armstrong, & James, 2000a).

The *Formulation* is the step in which first the needs and objectives of the (sub)system are identified. Second, the design alternatives are identified or generated.

The *Analysis* of alternatives is the step in which the impacts of the identified design options are identified and evaluated. It can be subdivided in two parts; a system analysis and refinement of the alternatives present.

The last step is the *Interpretation* in which the options, or alternative courses of action are compared by means of evaluation of the impacts valued by the client group or problem owner. In this phase the needs and objectives identified in the formulation phase are used as a basis for evaluation. The evaluation results in decision making and a second step before leaving the system and proceeding to a next (sub)system is planning for action.

Generally, the three phases and steps are combined to form a matrix structure as represented in figure 6.4. Together this represents the conceptual framework to solve complex problems in large-scale systems. In large systems, this framework is considered essential to enable the various phases to be better understood, communicated and controlled in order to support trustworthy systems engineering efforts (Sage, 1995).

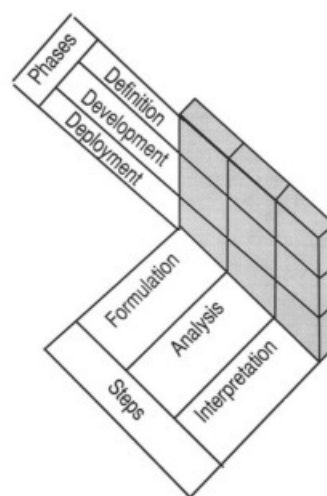


Figure 6-3: Systems composition of life-cycles; Sage, Armstrong and James (2000)

Additional models to structure an ideation process

Lastly, in a process model for innovation specific tooling for process steps is required. As identified in chapter five, appropriate tools and resources have an important role to enable successful innovation. Tools for creativity are selected and in appendix C-3, theories are applied to construct a toolbox to improve progress and substance of the creativity process as a part of the innovation process. Knoll (2010; 2012) argued that an ideation process should in all cases should be:

- Adaptable
- Reliable
- Predictable
- Efficient
- Measurable
- Transparent
- Well-founded

Next, Kolfshoten and de Vreede (2008) identified social and process modifiers to enhance social progress of the collaboration process. As a result Thinklets are constructed as building blocks to help groups to achieve their collaborative goals. An extended application of this theory can be found in appendix C-3.

Interim-conclusion

Concluding, when solving problems from a systems engineering perspective the components of the system have to be distinguished and clearly structured. Three fundamental steps in solving problems with a multidisciplinary character are: formulation, analysis and interpretation. When structuring process steps in a process model by following these guidelines, needs and objectives can be identified in an early stage and evaluated upon in a later stage to ensure progress and substance of the process.

6-3 Literature requirements

When designing a scientifically sound process model for innovation, requirements have to be respected to evaluate of the process design is consist to selected literature. Based on the literature that is reviewed and selected, the next requirements are identified to validate an improved process design on and evaluate its feasibility. In table 6.1, requirements for a process model are presented.

Lit. Req. No.	A process model for innovation should:
L-R₁	be scaled to suit different risk-level projects;
L-R₂	contain scorecard to make better Go or Kill decisions;
L-R₃	be a flexible and adaptable process;
L-R₄	be connected to the external environment: an open system;
L-R₅	include in-process metrics at gates;
L-R₆	contain post-launch reviews to instill accountability;
L-R₇	emphasize the fuzzy front end of innovation;
L-R₈	include cross-functionality of stages and allow for synergy between stakeholders;
L-R₉	contain a circular process view;
L-R₁₀	include an early and sharp definition of the problem
L-R₁₁	be an efficient, lean and rapid system;
L-R₁₂	have effective and timely gate-keeping;
L-R₁₃	be uniformly structured, as well as process steps.

Table 6-1: Requirements from literature for a process model of innovation

These requirements are selected from reviewed literature. Requirements from Cooper (1990) for the implementation of Stage-Gate models are combined with the identified elements for process models by Buijs (Buijs, 2012a). Together with requirements from theory by Berkhout (Berkhout, van der Duin, et al., 2007) and systems engineering theory by Sage and Armstrong (Sage, Armstrong, & James, 2000) a set of requirements from literature is composed.

6-4 Conclusion

In this chapter design principles for models of innovation applicable to the analyzed single case study were reviewed and selected. Rigor for constructing the artifact was achieved through exploring and reviewing applicable foundations and methodologies. Moreover next sub-research question was answered.

How should a process model to manage innovation in complex large-scale organizations be designed based on applicable academic literature and what are requirements for a successful model?

For the design of a process model for innovation three different layers were distinguished to systematically solve the problem. This approach allows one to subdivide the system in separate parts to increase understanding of the complex system. By distinguishing 'a systems level' - for a holistic analysis, 'the process level' - to design the process steps in the model, and 'the structure' - to systematically design elements of the process model, this analysis was performed.

Models from literature were selected complying with requirements that were selected in the case study. This literature was scoped down to acknowledged academic literature that is applicable for the case: process models for innovation in complex large-scale organizations facing the enablers and barriers uncovered.

From a holistic point of view, innovation in complex large-scale organization requires leadership, vision and strategy. By integrating different nodes of innovation; i.e. scientific exploration, technological research, product development and market transitions with entrepreneurship within the organization, successful innovation can be achieved. A culture, climates and resources have to be created that enable innovation on an operational level. And in this environment a process model for innovation can be implemented and will be successful.

Different process steps can be designed for a process model for innovation. A circular process view is advocated in literature in which no beginning or end is present. Gates for decision-making are required in a process model to evaluate progress and substance of the endeavor. In addition, stages in a process model should be cross-functional to enable collaboration between different entities within the organization.

Lastly, the system and its subsystems should be clearly structured for clear problem solving. By distinguishing three fundamental steps for problem solving; formulation, analysis and interpretation, progress and substance of the process can be guaranteed. In addition objective measures should be determined based on organizational strategies and potential futures. In this way innovative efforts can be evaluated on feasibility with the business needs and efficiency and effectiveness of the innovation effort will increase.

Based on these design principles, requirements were selected from applicable literature. A process model for innovation should: be scaled to suit different risk-level projects, contain scorecards to make better go or kill decisions, be a flexible and adaptable process, be an open system (i.e. connected to the external environment), include in-process metrics at gates, contain post-launch reviews to instill accountability, emphasize the fuzzy front end of innovation, include cross-functionality of stages and allow for synergy between stakeholders, contain a circular process view, include an early and sharp definition of the problem, be an efficient, lean and rapid system, have effective and timely gate-keeping, include post launch reviews to instill accountability, be uniformly structured, as well as process steps.

When determining what a design for a process model should include, next to the organizational requirements the selected requirements from literature should be respected.

Phase III

Design

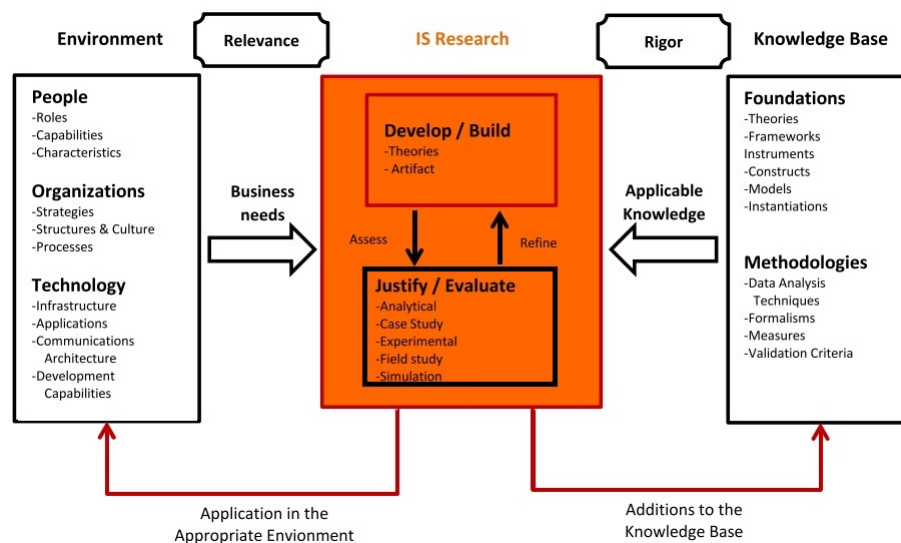


Figure 6-4: Research flow diagram, Improvement. Adapted from Hevner et al. (2004)

By applying existing foundations and methodologies rigor can be achieved for the design phase of the research study (Hevner et al., 2004). Based on the foundational theories, models and instruments the gap between the actual and desired levels of performance will be filled. In phase III an improved model will be designed. First, literature will be contrasted with the practice of modeling innovation to determine how literature and practice can strengthen each other when designing process models for innovation. Second, the strategy for the design will be presented followed by the elements which a process model for innovation should include.

Contrasting literature and practice of modeling innovation

This chapter contrasts literature and practice of modeling innovation. First, by presenting differences between literature and practice (section 7.1). Second, by presenting differences between schools of thoughts in literature concerning models for innovation that are applicable to the case (section 7.2). Lastly, a conclusion will be presented on how literature and practice can strengthen each other (section 7.3).

7-1 Contrasting literature and practice

A first step for improving the current process model for innovation, is to identify the differences between literature and the case. This section consists of four elements for which a discrepancy is present between literature and practice.

Operational excellence, innovation and coordination mechanisms

Operational excellence as an objective within an organization is implemented as a management practice to improve processes in the organization. It aims at reducing throughput times, the time for delivery and reducing costs of operations (van Assen, 2013). In order to coordinate operational excellence, coordination mechanisms are implemented may be inefficient regarding innovation. Those mechanisms focus on efficiency and innovation can be characterized as an unstructured, fuzzy and often unknown effort (Jansen et al., 2005a). A successful implementation often requires multiple failures and when coordination mechanisms implemented for professional excellence, this process might fail beforehand¹. In practice on the other hand, is advocated that operational excellence might even be an enabler for innovation. By coordinating on improving the customer experience, by improving processes and interactions with the customer, innovation will be achieved². Thus, operational excellence enables for customer centricity and has a market pull character.

Concluding, not a difference in definition is present, but rather a different perspective on operational excellence. In a process model for innovation both perspectives should be incorporated and it depends on the phase in the process model which perspective should be embraced.

¹Interview A.J Berkhout

²Confidential interview

A cyclic model for innovation

In the analyzed case, a pipeline model for innovation is implemented (Section 3.3). This model is implemented in an organization that has the characteristics of a complex large-scale organization. In addition, this financial organization has proven to be risk-averse, siloed and has a tight hierarchic structure (Section 3.2). Coordination mechanisms are implemented that steer on the cost-income ratio and in order to assess the feasibility of business units, KPI's are implemented based on this ratio. For the business unit that implemented the current model for innovation this KPI is translated in measuring on output: the output of the process is measured on success (Section 4.1). Implicitly the innovation hub is also evaluated on other performance indicators, but the process model is not subject to these implicit performance indicators. This will inevitably result in perverse behavior. The key of a successful process model for innovation should be that failures are part of the process as well as successes to find innovative solutions (Buijs, 2012b; Berkhout, Hartmann, et al., 2007). Failures thus can be argued as successes if killed in an early stage of the process in the innovation funnel. By coordinating on output; products and services might be developed to meet the set targets rather than finding innovative products and services.

Concluding a model for innovation should have a cyclic character, containing separate stages, where no end or beginning is present. In this way the continuous effort that is required to enable for successful innovation is incorporated in the process model. By coordinating on throughput and capturing information before and after separate stages, lessons can be learned from innovation. Moreover to enable for institutionalization throughput can be measured to evaluate if the process model performance as desired and if parts have to be adjusted. The need for innovation in various business units differs; one units may have all technologies present, but does not has the problem to link this technologies to. Another unit may have a problem and does not have the technology to solve this. Hence, cross-functional cyclic innovation should be present to overcome barriers of innovation and allow for synergy in the organization.

Dynamics in time and governance models

An organization is subject to the environment in which it operates and this has proven to influence the network of stakeholders. The global financial crisi has resulted in a lack of trust in the financial services industry and banks are subject to sharpened regulations. The chance of customers switching banks has increased rapidly (Capgemini & Efma, 2013) and new parties in the financial industry have entered the sector. Innovative efforts in the organization have proven to last for a short time, approximately five years (section 3.2) and the necessity for continuous effort within the organization was not perceived in last years because of the global financial crisis that have led to restructuring of the organization and focusing on a sustainable cost-income ratio (section 3.1). The urgency for continuing business operations and not failing operations have proven to compete with continuous vision and programs for innovation³. Thus, governance and decision-making is an essential element that highly depends the successfulness of innovation within an organization.

In literature the necessity for continuous innovation in organization is stressed, when implementing a long-term vision for innovation and creating strategic and operational enablers for innovation, innovation proves to be more successful (Berkhout, van der Duin, et al., 2007; Sun et al., 2012). The presence of governance models that influence the successfulness of innovation models is not thoroughly investigated in literature. Decision-making authorities are essential in determining continuation of innovative efforts and by enabling for a transparent process model insight can be given in the reasoning for decision-making (de Bruijn et al., 2010).

Concluding, managing innovation in literature stresses the need for continuous innovation. In practice the reality of the environment in which organizations function is very dynamic and occurrence of

³Confidential interview

thresholds result in shifts of scope and abandoning the urgency for innovation. Organizational governance models are essential for successful innovation and by enabling for transparent decision-making, stakeholders can learn and adapt to these dynamics.

Tacit and explicit knowledge

The ability of an organization to learn from its mistakes and adapt operations to not make these mistakes again is core of business continuity and competitiveness (Suak Hau et al., 2013). Thus knowledge creation process and management should be implemented in organizations as a vehicle to improve innovation (Esterhuizen et al., 2012). In practice, however the value of tacit knowledge proves to be larger than presented in literature. Tacit knowledge of stakeholders is hard to capture and is key for strategic decision-making in complex networks (de Bruijn & ten Heuvelhof, 2008). Managing knowledge, and managing knowledge for innovation, is a hard task and exchange of knowledge in networks of employees can to some extent, not be captured. Knowledge and expertise are the key asset of employee's in organizations and these tools allow one to distinguish one from another. In addition Not-Invented-Here (NIH) behavior has proven to be a barrier for successful collaboration in organizations (Lieberman, 1990).

Concluding, implementation of knowledge management systems to store explicit and tacit knowledge is subject to organizational and intrinsic motivated barriers. To enable for knowledge exchange as a vehicle for innovation, tacit and explicit knowledge should be captured in a novel, and innovative way.

7-2 Discrepancies between schools of thought in literature

The second step in this chapter is to investigate the differences between schools of literature based on the literature study that is performed in phase two. This section consists of three elements for which differences are uncovered.

Radical innovation

According to Berkhout, and advocated in his conceptual model for innovation, the more nodes of a society are present in innovation the more radical the character of innovation. This can be translated in the effort required for making innovation possible; single node innovations can be developed in a relatively short time, multiple nodes will require respectably more time. Thus, when combining science, the market, technologies and the organization with an entrepreneurial strategy radical innovation will emerge. It is not necessary to combine all nodes, but the less nodes are part of the innovation, the more incremental an innovation will be (Berkhout & van der Duin, 2007; Berkhout, van der Duin, et al., 2007; Berkhout, Hartmann, et al., 2007). Contradicting this theory, Verganti argues that market-driven change will not lead to radical innovation, advocated in his design-driven model for innovation. This is based on the assumption that customers are most probable not the best sources for radical innovation, they are not aware of their future needs. Including customers in the innovation process is important, but the added value is limited (Verganti, 2009).

Concluding, both conceptual models for innovation are broadly accepted in innovation thinking but have a discrepancy. Verganti believes that customers are important in the process for innovation, but are not required for radical innovation. Berkhout et al. stress the integration off all parts of society to enable for radical innovation. For the study this discrepancy will not affect the process model for innovation. As argued in chapter five, radical innovation is not likely to be captured in process models for innovation and thus this element is not of core interest when identifying what a process model design should include.

A pipeline versus a cyclic process model

As already presented in section 6.1, a cyclic shaped model is presented in literature to enable for continuous innovation. This continuous and cyclic shape is stressed by Berkhout and Buijs (2007; 2012b). Cooper (1990, 2008) presents a pipeline model. This model is designed for driving new products to the market by using a robust idea-to-launch system. Hence, it is a model that can be implemented for managing projects that aim for delivery of a product.

Concluding, the difference between the presented models is the time variable that is included in the process model by Buijs and in his Delft Innovation Model. The stages and gates that are the core of the Stage-Gate model are present in the DIM and the only adaption is that the model bites itself in the tail. This notion proves to be of interest when considering innovation on a meta-level and coordinating the process model. When a continuous process model is designed decision-makers and stakeholders in the problem-space are aware of the chaotic, fuzzy elements of a process and the long-term vision it requires for success.

7-3 Conclusion

In this chapter discrepancies were uncovered between modeling innovation in practice and in literature. Next to this differences between models for innovation in academic literature were contrasted. Next sub-research question was answered in this chapter:

Which discrepancies are present between literature and the current implemented process model for innovation?

Modeling of innovation in practice is highly dependent on the environment in which it functions. That is why practical implementations of academic models for innovation cannot be implemented in a 1-on-1 relation. In this analyzed case, a pipeline process model is implemented by means of an innovation hub that has to manage the process model and is being evaluated on the successfulness of the approach. In literature is argued that a process model for innovation can only be successful if the board of directors envisions a clear strategy for innovation. By creating a culture, climate and resources for innovation, innovation will be enabled in operations. Only then, a process model for innovation can be implemented and this process model needs to be safeguarded on a strategic level.

The model should contain a cyclic shape in order to translate the continuous effort that is required for successful innovation. An innovation hub will add most value in the fuzzy front end of innovation. Using knowledge as a tool for coordination can be a solution for coordination of the process, but a novel and innovative way of capturing knowledge should be implemented to cope with the organizational barriers. In addition, knowledge creation as a vehicle for innovation is required that copes with not-invented-here problems and stimulating sharing of tacit and explicit knowledge. A novel and innovative tool has to be created that copes with these complexities and can be institutionalized within the organization.

Operational excellence as a management practice steers on efficiency, and results in decreasing throughput times and improving customer-interaction processes as an enabler for innovation. In innovation literature steering on efficiency is highly inefficient when aiming to increase the innovative capacity of organizations; innovation is a fuzzy process with unknown results. We believe that not a difference in definition is present, but rather a different perspective on the process for innovation. When integrating both perspectives in different phases of the process model for innovation, both notions will strengthen each other and increase the innovative capacity of the organization.

Next, models for innovation in academic literature were contrasted. It covers the notion of radical innovation and how to enable for radical innovation within complex large-scale organizations. A discrepancy is present in literature presented by Verganti and Berkhout. Verganti believes that customers are important in the process for innovation, but are not required for radical innovation. Berkhout stresses that integration of all parts of society is required to enable for radical innovation. Radical innovation is not likely to be captured in process models for innovation and thus this element is not of core interest when identifying what a process model design should include.

In addition, pipeline and cyclic models for innovation were contrasted. The main difference between the models is the variable of time. Stage-Gate models are project management tools to structure projects. Models that stress the cyclic character of innovation emphasize the continuous effort of innovation and clarify the complexity of innovation. That is why the cyclic element is taken into account in this study for innovation processes.

What can be concluded is that the models highlighted in literature all treat essential parts of modeling innovation. Conceptual models are implemented in different environments and the implementation of those models will evidently differ from conceptual models. The level of abstraction of models and the degrees of freedom that are present in these models will affect the implementation and the adoptions that have to be made. Moreover, analyzed models for innovation in literature strengthen each other and all contain elements that come back in the different schools of innovation science. Specific enumerated elements in the single case study are not properly highlighted in models from academic literature. Therefore, the highlighted elements that prove to be of interest will be used to extend current innovation models in literature.

Chapter 8

Strategy and design

This chapter presents the strategy for the design of process models for innovation and what elements a design should include for successful innovation. First, the strategy for design (section 8.1) will be presented, second, is elaborated upon institutionalizing a process model for innovation within the organization (section 8.2). Third, is elaborated upon what a process model for innovation should include (section 8.3), followed by the structure of processes (section 8.4). Lastly, governance of the process model for innovation will be discussed (section 8.5).

8-1 Strategy

For designing the artifact a structured approach is chosen to clearly model the complexity of the design, and to enable for successful institutionalization of the design. The strategy that is chosen to achieve this will be presented in this section.

8-1-1 An open innovation model

Implicit linearity in innovation models have to be overcome into open innovation models to increase successfulness of innovation (Trott & Hartmann, 2009). Innovations can be divided in incremental or radical innovations. When looking at the model in figure 8.1, which is an application of the CIM for the financial and IT sector, innovations are classified in four classes (Berkhout, Hartmann, et al., 2007). Class 1 innovations are the result of new developments in a single node, class 2 innovations emerge from new developments in two nodes and so on. Class five innovations are the most radical innovations that emerge from interaction between all nodes, continuously driven by entrepreneurship; it requires the most effort, investments and interaction. These interactions are present between scientific exploration, new technologies, financial market transitions, and new products / services (Berkhout, van der Duin, et al., 2007). This model is based on the assumption that Information Technology (IT) will be the main driver for new business propositions and services in financial services.

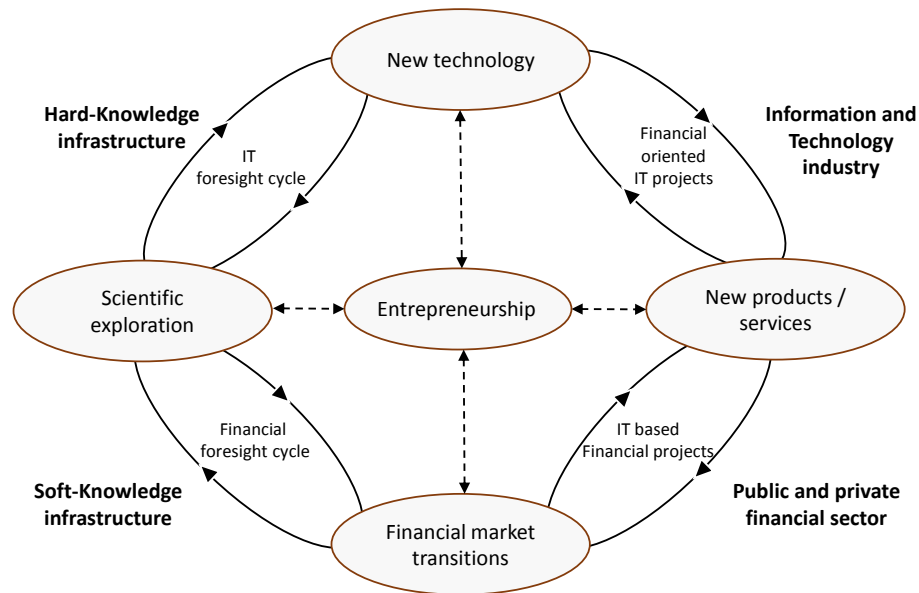


Figure 8-1: Cyclic Innovation Model (Berkhout and van der Duin, 2007), applied for the financial and IT sector

Open innovation allows for interaction between science, business and market dynamics. Moreover it is the standard of managing innovation in organizations and sustain business continuity. Connections with universities, knowledge institutes and technology partners are essential to implement a successful innovation model. Therefore in a process model, continuous interactions with knowledge partners are required to integrate external new technologies, information and expertise with internal practices, technologies and expertise to find innovative solutions.

8.1.2 Requirements

Based on literature and practice, requirements are selected on which an improved process design should comply with. When a designed model meets these requirements, the proposed process model can be institutionalized in the organization. In figure 8.2 the organizational requirements and the requirements selected from literature are presented.

When analyzing the similarities and differences between the organizational requirements and the requirements from literature the following can be concluded:

- In literature cross-functionality and openness is stressed.
- In literature, cyclic and continuity of innovation models is stressed.
- In the case a tendency towards clarification and valuing of the complexity of models is present.
- A similarity in the presence of tools to determine progress and increase substance is stressed.
- A similarity in designing flexible, adaptable models that can be adapted in different environments is stressed.

Org. Req. No.	A process model for innovation should:
O-R ₁	increase the pace for delivery of innovative products and services;
O-R ₂	fit the siloed organization character, culture and climates;
O-R ₃	incorporate the complexity of managing innovation in the organization;
O-R ₄	clarify, contain and value all steps of the innovation process that are run-through;
O-R ₅	increase commitment and support for innovation within the organization;
O-R ₆	be supported by appropriate tools and resources;
O-R ₇	allow for exchange of knowledge.
Lit. Req. No.	A process model for innovation should:
L-R ₁	be scaled to suit different risk-level projects;
L-R ₂	contain scorecard to make better Go or Kill decisions;
L-R ₃	be a flexible and adaptable process;
L-R ₄	be connected to the external environment: an open system;
L-R ₅	include in-process metrics at gates;
L-R ₆	contain post-launch reviews to instill accountability;
L-R ₇	emphasize the fuzzy front end of innovation;
L-R ₈	include cross-functionality of stages and allow for synergy between stakeholders;
L-R ₉	contain a circular process view;
L-R ₁₀	include an early and sharp definition of the problem
L-R ₁₁	be an efficient, lean and rapid system;
L-R ₁₂	have effective and timely gate-keeping;
L-R ₁₃	be uniformly structured, as well as process steps.

Table 8-1: Set of requirements for a process model of innovation in complex large-scale financial organizations

Concluding, when designing an improved process model requirements can be aligned and respected without harming each other. Organizational requirements emphasize more on the complexity of the environment and literature emphasizes more on objective measurements; measuring for decision-making.

The requirements are taken into account when improving the process design. In the justification and evaluation phase the improved design will be evaluated on the selected requirements to determine the feasibility of the model.

8.1.3 Structure of design

A process model for innovation that structures the effort of developing an idea into a practice is the objective of the design. In order to increase efficiency of this process model, different phases and process elements can be distinguished. Early phases should be preferably facilitated and monitored by separate entities, let us call it innovation hubs. These hubs should have the resources and expertise to facilitate local branches, business units and innovation labs to explore different innovative initiatives and successfully exploit them (Jansen et al., 2005a). By implementing a structured approach for managing innovation, problems that require an innovative solution can be solved efficiently and effectively. Complex large-organizations as in the analyzed case, have a dispersed organizational character and the need for support in the process for innovation differs per entity. That is why a process for innovation should be supported by local entities that can facilitate process steps when required to increase the successfulness of delivery and stimulate local entrepreneurship. Moreover, the risk of innovation can be managed and decreased by institutionalizing a structured approach for innovation. It will increase the

successfulness of developing an idea into a practice by using a 'fail-fast' mechanism that selects viable initiatives. This requires a clear vision of the board of directors on the futures of the organization and shaping a strategy that allows for innovation. Essential elements for achieving this are: perform technological research, perform scientific exploration, be aware of applicable market transitions and have a structured process for managing innovation: an innovation management approach¹.

In figure 8.2 the design principles for an innovation model within an organization are presented, this is the backbone of designing a process model for innovation. First, from a holistic perspective the system in which an innovation process model functions can be determined. By clearly identifying the system, what includes the process model and the environment in which it functions, one can understand and appreciate the human, organizational and behavioral concerns, as well as concerns involving technology (Sage, Amstrong, & James, 2000b). Second, the process model exists of process elements that are the foundations of structured model. Lastly, the process model has to be structured to enable for successful process management. In addition, literature that was explored and proven to be of interest for re-designing the process model is included in the presented figure based on figure 6.1 in section 6.1.

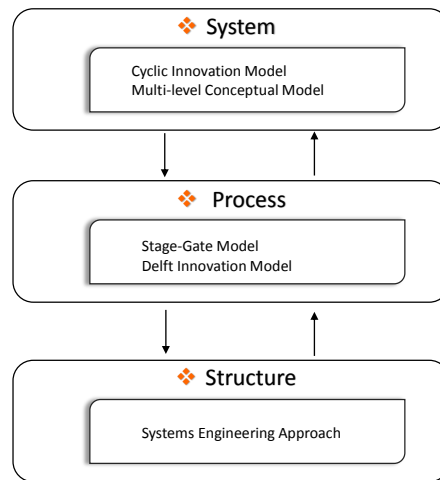


Figure 8-2: Three layer architecture and applicable literature

8-2 Institutionalizing the design

In order to increase the innovativeness of an organization a structured approach for managing innovation should be institutionalized in the organization. A process model for innovation can only function and be successful if the organizational culture, climates and resources enable for innovation. This requires leadership and strategy from the board of directors of an organization that envision innovation and practice it.

Enablers and Barriers

As investigated in literature, a process model for innovation can only be successful if barriers for innovation within the organization will be overcome (Berkhout, Hartmann, et al., 2007; van der Panne, van

¹Interview A.J. Berkhout

Beers, & Kleinknecht, 2003), Hence, enablers for innovation in the organization have to be embraced and used as the base for implementation of a process model for innovation. Next, identified barriers in the organization that are presented form thresholds for successful implementation. By applying insights and applicable models from literature, combined with the conducted knowledge from the case study successful institutionalization can be achieved.

8.2.1 Organizational institutionalization

To allow for continuous innovation, as elaborated before, the board of directors should have a clear vision regarding the organizational futures and innovation. Stimulating bottom-up innovation requires top down measures to enable institutionalizing an innovative culture.

From a holistic point of view innovation can only flourish when entrepreneurship is present in organizations. This means that the board should have a clear vision on embedding innovation within the organizational culture and allow for innovative behavior. If this is not present, innovation as a management practice will not sustain.

Innovation is not a goal on itself, it should be institutionalized within the organizational culture and divisional climates. In global branches different needs for products, services and business propositions are present and that is why a uniform model for innovation should be implemented that allows for decentralized implementation². Local entrepreneurship is essential to meet the needs of the market and increase success of innovation management.

In order to implement a successful approach for innovation, it has to be embedded on different organizational levels. By adapting a multi-level conceptual model for innovation, in figure 8.3 an adapted conceptual multi-level model on successful innovation is presented to give insight in the complexity of embedding innovation within an organization (Sun et al., 2012).

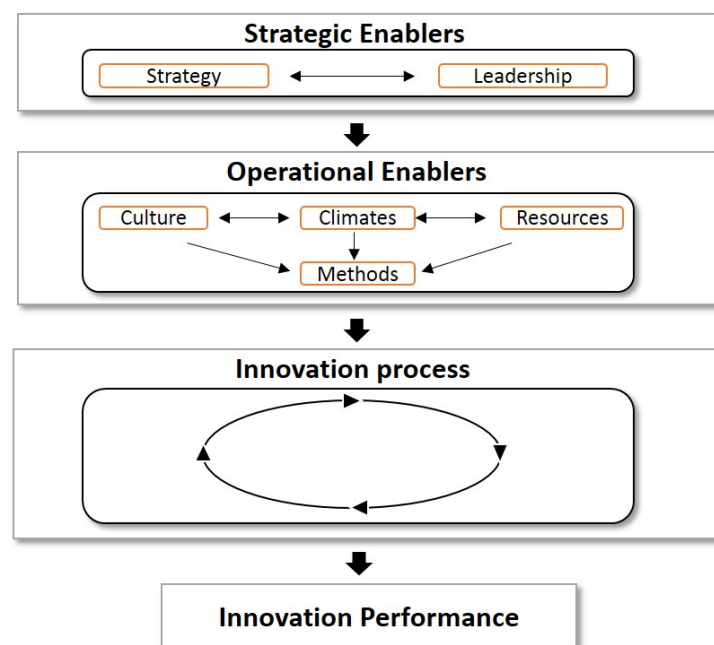


Figure 8-3: Applied Conceptual multi-level model, Sun et al. (2012)

²Interview A.J. Berkhout

On a board level a clear vision has to be carried out regarding innovation. Strong leadership and a fitting strategy are required to enable for innovation. On an operational level; the culture, divisional climates and resources in the organization with its dispersed character should enable for innovation. Methods and resources in different organizational climates should enable for innovative behavior and based on this methods fitting innovation processes should be designed for decentralized initiatives. The need for innovation will differ per business unit, division and global branch. Processes should be designed to support and facilitate this need. Concluding, the innovative capacity of an organization requires a multi-level institutionalization to enable for innovation.

Coordination mechanisms should rather focus on the success of incorporating the process model than on results of the process model. An innovation hub will not support the whole process model. Instead it can facilitate, stimulate and monitor early fuzzy process steps if there is a perceived need experienced by business units. Outputs of process steps will have to be evaluated by applicable BMT's in order to decide whether to continue or kill the effort. Thus, BMT's are essential stakeholders that directly determine the successfulness of initiatives and innovation hubs will only have to support the process towards a decision-making moment. Underlying governance models to make a decision are influencing the successfulness of the innovation process and should therefore be taken into consideration when determining a set of coordination mechanisms for the innovation process.

As a result, documenting proceedings of initiatives and ideas should be key for coordinating processes of innovation. Evaluation of the process rather than the result will increase the innovativeness of the organization on a long-term and discourage perverse behavior. Perverse behavior will be present if 'own gains' and misaligned targets for business units and innovation hubs are incorporated in the organizational culture and climates. Therefore, innovation should have a permanent and continuous character in organizations to sustain business continuity and avoid perverse effects (de Bruijn, 2007). Steering on efficiency of line managers does not stroke with developing innovative initiatives from an academic point of view. When defining efficiency as the value of output relative to the costs of inputs used, related to productivity and resources, this does not allow for an innovative culture. A process for innovation has a fuzzy character, the output is unclear and one success may emerge from multiple failures. Thus, resources should be allocated for innovation and allowing failure to achieve success should be embedded in the culture and climates to enable for innovation.

Facilitating a safe and secure environment where ideas can be developed without interfering entities that block innovation therefore is core to increase innovativeness. Allowing this entities only in setting objective measures to evaluated the process, identifying and applying organizational strategies and futures, will increase efficiency and effectiveness of the process. Next, these entities should be included later on in the process model when developing a concept into a practice to increase successfulness and assess the feasibility of the concept design in the organizational context.

8.2.2 Individual institutionalization

When implementing a uniform model for innovation and an adaptable and flexible process model for decentralized business units and global branches, continuous effort is required to institutionalize innovation in the culture and different climates. People in the organization have to be actively stimulated for creativity and intrinsic motivation is required to enable for successful innovation (Amabile, 1988).

It is perceived that commitment and support in the case study is lacking for the adaption of a process model for innovation³. That is why an approach have to be chosen to create awareness, clarify the innovation model and engage line managers within business units. This can be done by means of the next options:

1. **Bottom-up**; ambassadors of innovation can be appointed that engage, invite and inspire employees in business units to stimulate their creativity and stimulate an innovative culture. Re-

³Confidential meeting ING

lationship management with business line managers to encourage innovativeness and stimulate creativity by recurring meetings is a fulfilling tool to actively engage business units.

2. **Top-down;** business line managers should be stimulated by the applicable BMT with the strategic vision on innovation and the process model to enable innovation facilitated by innovation hubs; coordination mechanisms should be aligned with these vision.

In addition, documentation of process proceedings for innovation have to be the base for recurring meetings on innovative efforts and coordination. In order to increase the innovativeness of the organization on all levels, active participation has to be stimulated and by documenting proceedings engagement can be increased. Agile project management allows to quickly evaluate on progress and supports cross-functional collaboration (Takeuchi & Nonaka, 1986). When using the approach for innovation in organizations, an adaptable documentation tool has to be appointed for knowledge sharing.

Knowledge creation processes are vehicles to improve innovation within organizations (Esterhuizen et al., 2012). As already stressed before, coordinating the approach for innovation on the process, rather than on the results can take place by capturing knowledge and evaluating on this knowledge. By identifying goals of process steps beforehand and evaluating on the fulfillment of these goals afterwards, progress will be documented and can be evaluated. By means of a unique tagged database in which knowledge of innovative initiatives is captured:

1. BMT can scan where business lines identify problems, investigate idea areas and evaluate if the approach is successful.
2. Managers on various levels have a tool to monitor progress of business lines, increase commitment and support business units' effort on innovative initiatives.

It is important to design a knowledge process that supports knowledge sharing of innovation internally in the organisation and with external knowledge partners. Current practices lack support within the organization and an improved design that meets specific criteria of knowledge systems and firm's innovation performance (Lopez-Nicolas & Merono-Cerdan, 2011; Choy, Yew, & Lin, 2006).

Rules of the Game

In order to increase the effectiveness of the innovation process, it is important to increase commitment of employees that participate in innovative initiatives. When participants make use of the resources of an innovation hub, they commit themselves to the process. This process in essence should be free and failure should be allowed, but in order to achieve progress rules of the game have to be present (de Bruijn et al., 2010), presented in table 8.2.

Rules of the innovation game
<ul style="list-style-type: none"> • Commit to the process rather than to the result • Entry and exit rules have to be present; one can leave the process by evaluation if the added value is still present • Transparency of the process for all parties involved; clear objectives and measures • Open decision making; go or kill decisions have to be properly communicated and documented • Ensure that the process is properly staffed • Ensure substance; participants have to be mental and physical, actively involved • Documentation of progress; to enhance and evaluate progress of the effort

Table 8-2: Rules of the innovation game, based on de Bruijn et al. (2010)

Thus, by entering the process participants commit to the process and are allowed to exit the process. Failure is allowed, but lessons should be learned from all activities conducted and these lessons should be documented in order to evaluate the effectiveness of the process. When it is assumed that coordination mechanisms are implemented that do not evaluate the innovation hubs on the result, but on the process, these proceedings and process results will be the indicators of success.

8-3 A process model for innovation

The process design is constructed by using the layered framework as was introduced in section 8.1 figure 8.2. In order to construct a process design that copes with problems perceived in complex large-scale financial organizations and academic literature, three levels of the process model for innovation are proposed.

First, will be elaborated upon the structure of the process design (section 8.3.1). Second, the specific elements of the process will be described (section 8.3.2).

8.3.1 Systems level

By combining the academic schools of NPD and systems engineering, as elaborated upon in phase II, requirements of an improved process design can be met and the perceived gap can be filled. Literature from Berkhout (2007) and Sun et al. (2012) is used to integrate the dual nature of scientific exploration and production creation. In this model the internal and external environment is incorporated by interconnected cross-disciplinary components. In chapter seven is elaborated upon the system and the effort it requires for successful implementation of the process model. The underlying processes are based on models in academic literature by Cooper (2008) and Buijs (2012b). Together with barriers and enablers that were uncovered in the case study on the approach for managing innovation in a complex-large scale organization. For structuring of the processes and to increase efficiency and effectiveness of the processes, sub-processes are designed from a systems engineering perspective. The widely adopted systems engineering approach by Sage and Armstrong (2000) is key for achieving reliable, efficient, cost-effective products and services in a various level of fields.

The proposed model distinguishes both the internal organization and the environment. In order to increase the effectiveness of the approach for innovation in the organization, an open innovation model has proven its value (Carbone et al., 2012; Chesbrough, 2003). By maintaining a close connecting

between the external environment and the internal organization, an integration between hard and soft sciences, market trends, technology and industry can be enhanced (Berkhout, van der Duin, et al., 2007).

Next to this the proposed model has a spiral, more than a cyclic character which is presented by (Buijs, 2012b). It is perceived that a cyclic model implicitly shows that the process for innovation does not show the evolutionary character of innovation. The product or service that is the output of one iteration indeed is the start of a new iteration. But the product or service rather evolves based on earlier iterations, prior objectives and needs than that the process starts over again.

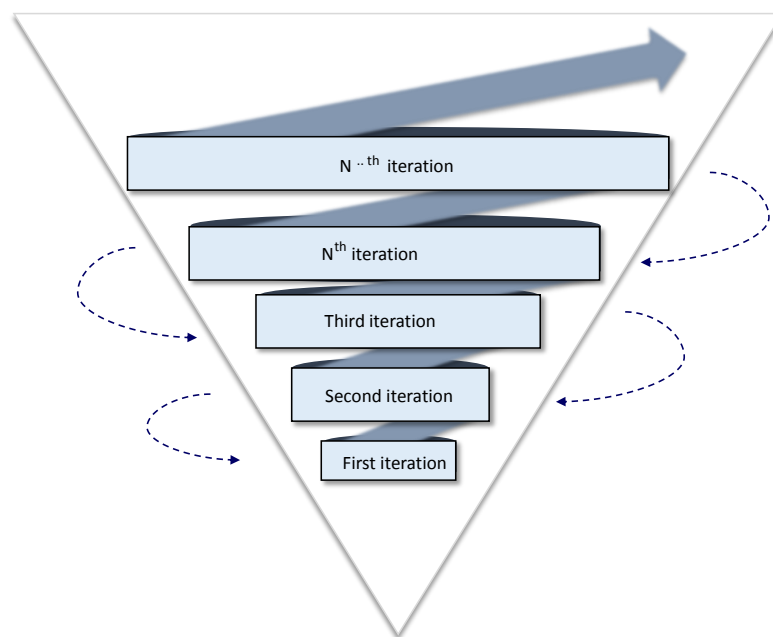


Figure 8-4: Process model design - Spiral

Thus, the proposed process model for innovation exists of different iterations that can be combined in a spiral (figure 8.4), which emphasizes the evolutionary character of innovation. Innovation is a continuous effort without a beginning or an end and the effort can start in all phases of the proposed process design. The output of an iteration is the input of the next iteration, and feedback loops to align products and services with organizational strategies and futures identify the need for innovation. A delivered product or service from an innovation iteration might suit the organizational strategies at a certain moment in time, in future this service might not serve the organizational strategy or vice versa. Hence, feedback loops with strategies and organizational futures of earlier iterations will increase understanding in the purpose of a service and are evaluation tools to determine the feasibility of a product or service.

Every iteration exists of six phases that form the structured process for managing innovation (figure 8.5). The specific content of the phases will be illustrated in the next section. The 'discovery' phase is the absolute starting point if a service is initiated. In this phase an insight on one, or more of the nodes distinguished in the CIM by Berkhout (figure 8.1, section 8.1.1) will initiate the innovation process. This phase is followed by the 'investigation' phase, in which the specific problem space for delivering an innovative product or service is identified to increase the ability for successfully finding an innovative solution. This phase is required because it overcomes problems with unclear, ill-structured problems. In addition in this phase objective measures are determined based on organizational strategies and

futures for products and services. The determined objective measures have to be used during the process to evaluate progress and determine to kill or proceed an effort. When the problem space is identified and the coordination mechanisms (objective measures) are identified, ideas can be generated and selected in the 'ideation' phase. This phase is followed by an 'incubation' phase in which an idea can be pre-developed. Next, the pre-developed product or service can be 'developed' into a final design and can be 'implemented' in practice.

In addition, what is important in the design are the degrees of freedom in the process model. The process phases are set, but the process elements can be edited to the specific environment (i.e. the need for innovation, the radicalness of innovation, the time for delivery and the organizational strategy). Iterations may therefore differ in throughput times, resources allocated and stakeholders that are involved in the process.

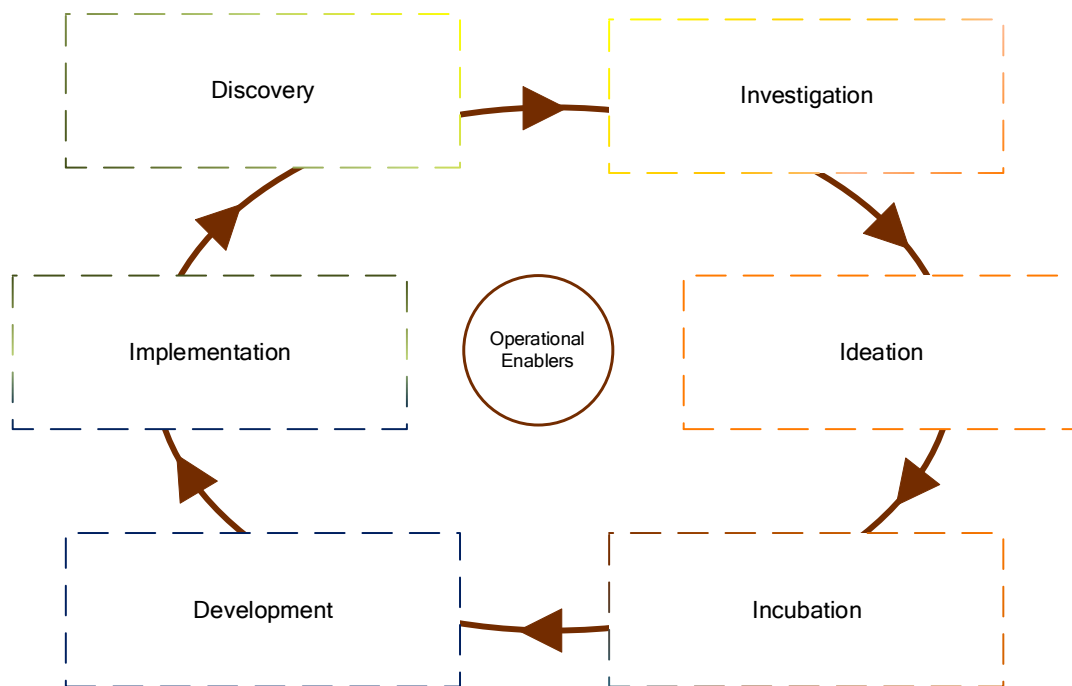


Figure 8-5: Process Model design - Phases

Different colors are used in the model to express the emotion it requires in every phase of the process model. Nijdam (2006) argued that yellow relates to awareness; aware of transitions in the environment. Orange relates to happiness and the desire; for the effort of finding innovative ideas to be developed. Brown relates to trust and security; pre-developing an idea into a concept in a safe and secure environment. Blue relates to understanding and trust; developing and understanding what the product or service will have to look like. And lastly green, for wealth and growth of a product or service. This is used for visualizing the process model for innovation.

8.3.2 Process level and structure

The designed process, exists of different process elements that form the structural process for innovation. The proposed cross-functional cyclic model with its feedback and forward loops exists of six different phases and eleven separate process steps. The model is presented in figure 8.6.

Every phase consists of one or more process steps. Process steps (rectangles) are followed by internal or external interim-results. The difference between both interim-results will be discussed in section 8.5. Each interim-result of a preceding step is the input for the next process step and is also a go or kill moment. Support for every process step either comes from the internal organization or the external environment. In addition the process is a uniform model that requires flexible use and has to be adaptable to different scales. There is no starting point and no end point; it is a continuous effort in which the innovation hub has to facilitate and support the process to decrease the risk of innovation.

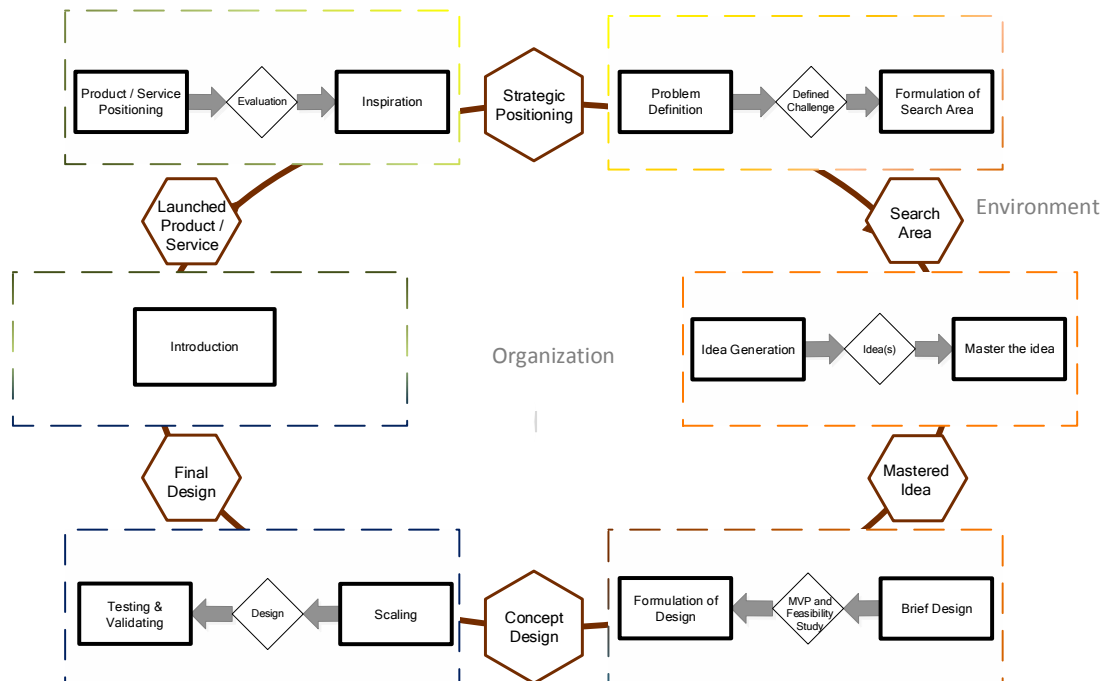


Figure 8-6: Process Model design - Processes

The risk of innovation within a complex large-organization can be described as the total cost of the process to create new products or services and the chance of failure which may negatively affect business continuity of the organization. Every process step requires commitment by stakeholders involved in the process. Every interim-result requires documentation so that lessons-learned in the process towards the interim-result can be shared and other stakeholders within the organization can use the output as input for their perceived problems and potential solutions.

Every process element differs in content, toolbox, total cost and effort required to go through the process. In table 8.3 the content of the different phases of the process model is discussed. Every dot in the table represents a process step. Next to this the stakeholders that are required for finding commitment to allocate resources and / or continuing the effort are presented for every process step or phase. As is presented, finding commitment is increasingly important for process steps and phases closer to delivery. This is because total costs of the process increase towards delivery. In addition, in appendix C the process steps and tools for every process step are described in detail.

Phases	Processes
Discovery	<ul style="list-style-type: none"> • Product / Service positioning (recognition of a gap between actual and desired levels of performance) • Inspiration (external environment and internal organization) <i>Commitment finding (communicate to problem owner)</i>
Investigation	<ul style="list-style-type: none"> • Problem analysis (definition of the perceived symptoms underlying the problem) • Formulation of search area (defining a clearly structured problem statement, objectives, objective measures and requirements) <i>Commitment finding (communicate to problem owner)</i>
Ideation	<ul style="list-style-type: none"> • Finding Ideas (generating ideas, clustering ideas, selecting ideas) <i>Commitment finding (communicate to problem owner)</i> <ul style="list-style-type: none"> • A brief design of an idea <i>Commitment finding (communicate to the applicable business management team (BMT))</i>
Incubation	<ul style="list-style-type: none"> • Constructing a Minimum Viable Product in a safe and secure environment (Sprints to design, develop, test and evaluate and deliver a concept design) <i>Finding of acceptance (Sprints to design, develop, test and evaluate and deliver a MVP)</i> <ul style="list-style-type: none"> • Constructing a Feasibility Study (cross-functional environment) <i>Commitment finding (communicate to the problem owner)</i> <ul style="list-style-type: none"> • Formulation of design (formulating design requirements and a concept) <i>Commitment finding (communicate to applicable BMT)</i>
Development	<ul style="list-style-type: none"> • Scaling the concept Design (developing the concept into a final design) <i>Commitment finding (communicate to problem owner)</i> <ul style="list-style-type: none"> • Testing and Validating (testing and validating by pilots) <i>Commitment finding (communicate to the applicable BMT)</i>
Implementation	<ul style="list-style-type: none"> • Introduction of the service <i>Evaluate and improve (communicate to problem owner)</i>

Table 8-3: Process steps of a process model for innovation

8-4 Governance

As elaborated upon in chapter seven, decision-making and aligning stakeholders in their innovative effort is required for successful management. That is why the problem owners and decision-makers should be aware of the process interactions and the complexity of the process model. In this section the interactions with problem owners and the business management team, as decision-making entities, will be presented to increase understanding in stakeholder dependency and governance of innovation in organizations. Lastly, the role of an innovation hub and the added value of an innovation hub will be argued.

Transparent decision-making

Decision-making tends to be chaotic if many parties are present, many procedures and issues (de Bruijn et al., 2010). Complex-large scale organizations show this characteristic. In addition a lack of understanding why decisions are taken will affect continuity of processes. That is why transparency of decision-making is essential for innovation.

A decision made by a decision-making entity has underlying fundamental reasons; the strategy and future of the organization, or organizational entity. When all stakeholders in the innovation process are aware what the reason for ending or continuing an effort is, those stakeholders can anticipate on this and improve the product or service in line with the strategy and futures. Or can store the innovative idea till a moment in time when the strategy and futures are changed: a window of opportunity (Heinonen & Hiltunen, 2012).

As argued before, coordination mechanisms that steer on output rather than the process for innovation might oversee irrational reasons for failures. It has proven that the role of middle-management and the dilemma between security and development affect progress and innovation processes cannot be understood as a rationally soluble task (Kasper, 1987). When decisions are made transparent and stakeholders are aware of the fundamentals for decision-making the innovation dilemma for decision-makers, can be better understood.

Problem Owners

The problem owner represents the internal stakeholder of the organization that enters the innovation process, independent in which state of innovation the problem owner is. It has the power to allocate resources for innovation and has perceived a problem for which innovation is required (either by means of an innovation hub, or independently). This stakeholder should be integrated in the process continuously in order to align the business needs with the process towards delivery. By being aware of the process steps, the support and commitment required progress should be ensured. Thus by complying to the rules of the game, mutual understanding by both the innovation hub, the problem owner and the participants that commit to the innovation effort can be enhanced. Next substance of the process will be enhanced and information can be captured, exchanged and used for evaluation of the process.

As is presented in figure 8.7, the problem owner is involved in every phase and process in the process model for innovation. By communicating the results of every process step, progress and substance can be guaranteed. Information resulting from process steps should be captured: the interim-results. By capturing this knowledge the BMT can be informed on innovative endeavors and can perform transparent decision-making on killing or continuing innovation efforts. Between phases a communication point with BMT's is present, on this will be elaborated in the next paragraph.

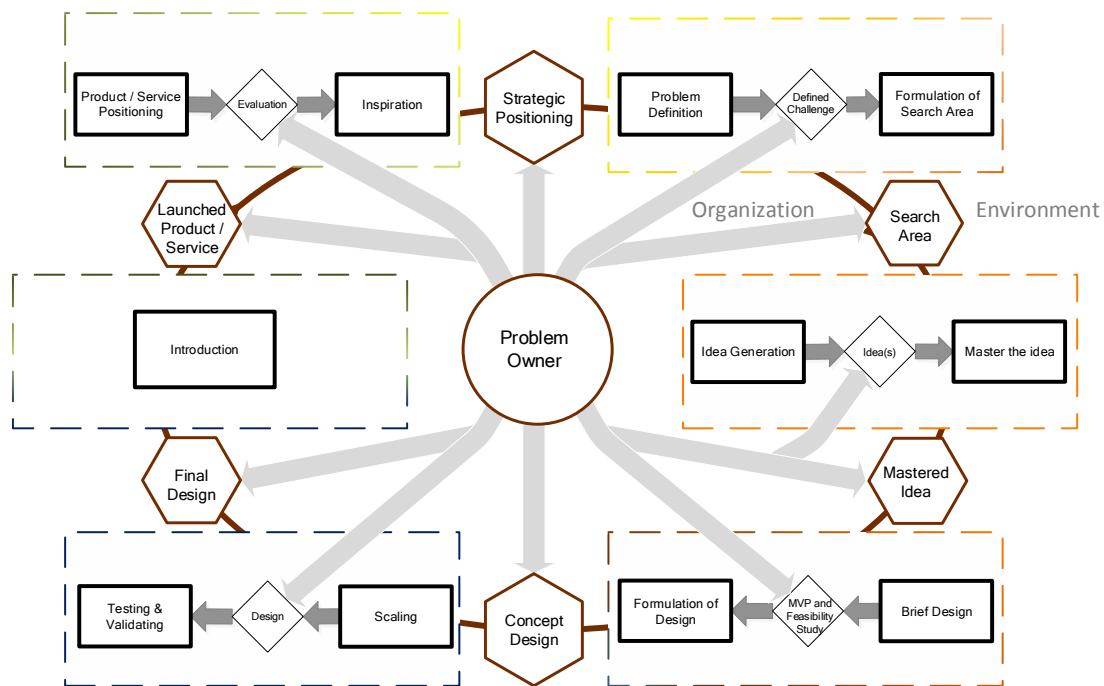


Figure 8-7: Process model design - Problem owners

Business Management Team

In order to transform ideas into successful output, support and commitment by senior management has proven to be essential in the case study (Part I). By performing continuous evaluations on interim-results of process steps, one can make sure the development is in line with the organizational strategy, and commitment and support can be enhanced. This evaluation has to be based on pre-determined objective measures resulting from organizational product or service objectives and needs, which have to be in line with the organizational strategy and futures. In figure 8.8 the direct involvement of BMT's after phases of the process model is stressed; by making transparent decisions and being aware of decisions successfulness of the innovation model can be enhanced.

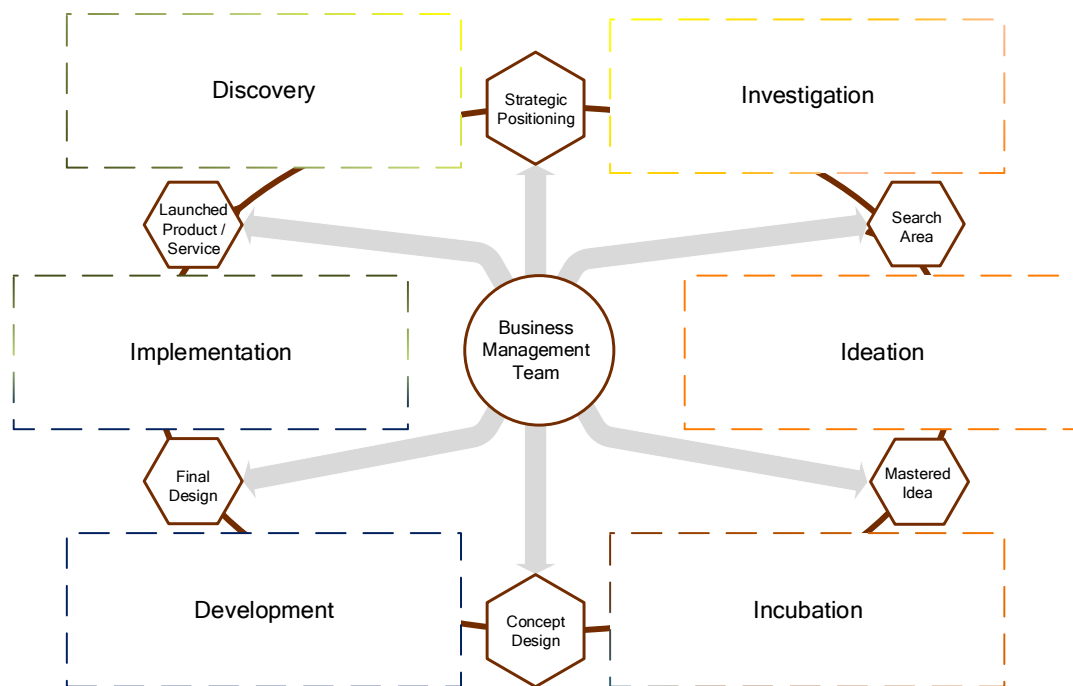


Figure 8-8: Process Model design - Business Management Team

Innovation hub

The problem of innovation processes oftentimes is to get ideas (the fuzzy front-end) into the innovation funnel and achieving commitment of a sponsor (i.e. the decision maker that has to allow for continuing the pursuit)⁴. In order to cope with these barriers an innovation hub needs to support early process steps of the structural process for innovation with its resources and expertise. It should not be the place from which innovations emerge, but a hub that enables for knowledge sharing. Hence, it should allow for collaboration between: different internal business lines and innovation labs, the market and external knowledge parties to create knowledge processes as an enabler for innovation (Carbone et al., 2012).

The added value of an innovation hub may therefore be the largest in the 'discovery', 'investigation', 'ideation' and front end of the 'incubation' phase. Processes described in proceeding phases of the model can, and will be executed mostly in separate business lines in which specific knowledge is available and resources and fte are assigned for development and implementation. In figure 8.9, the role of innovation hubs in the process model is visualized.

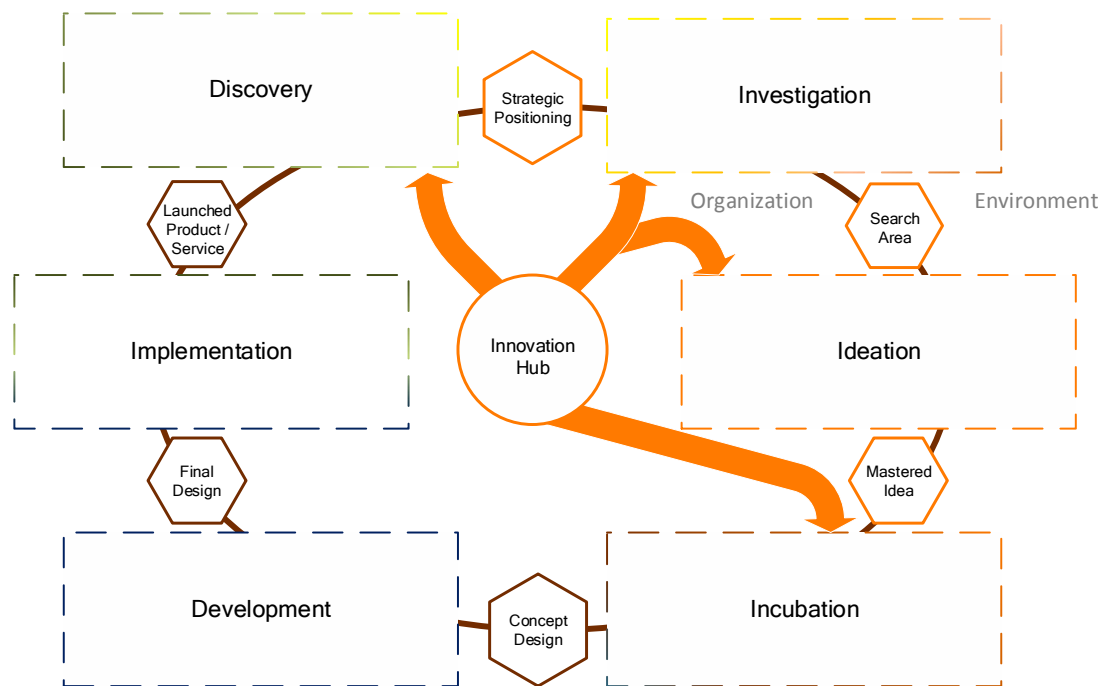


Figure 8-9: Process Model design - Innovation Hub

⁴Confidential interviews

Moreover, based on the model for innovation networks founded by Aalbers and Valk (2013), an innovation hub in an organization should play the role of a connector and explorer for innovation. As visualized in figure 8.10 the spectrum of innovation exists of multiple stakeholders. The external knowledge partners (i.e. universities, technology partners, the markets and so on) have to be linked to internal stakeholders (employee) that have or not yet have a need to innovate. By exploring problems within the organization, opportunities in the environment and connecting these parties innovative products and services are believed to be delivered more efficient and effective. Sponsors (i.e. parties that are responsible for allocation of resources and decision-making) have proven to be indispensable for successful innovation and should allow for this corporate entrepreneurship. That is why the innovation hub in addition should connect the external environment with the internal stakeholder and the sponsor to stimulate innovation and facilitate the innovative effort by its resources and knowledge.

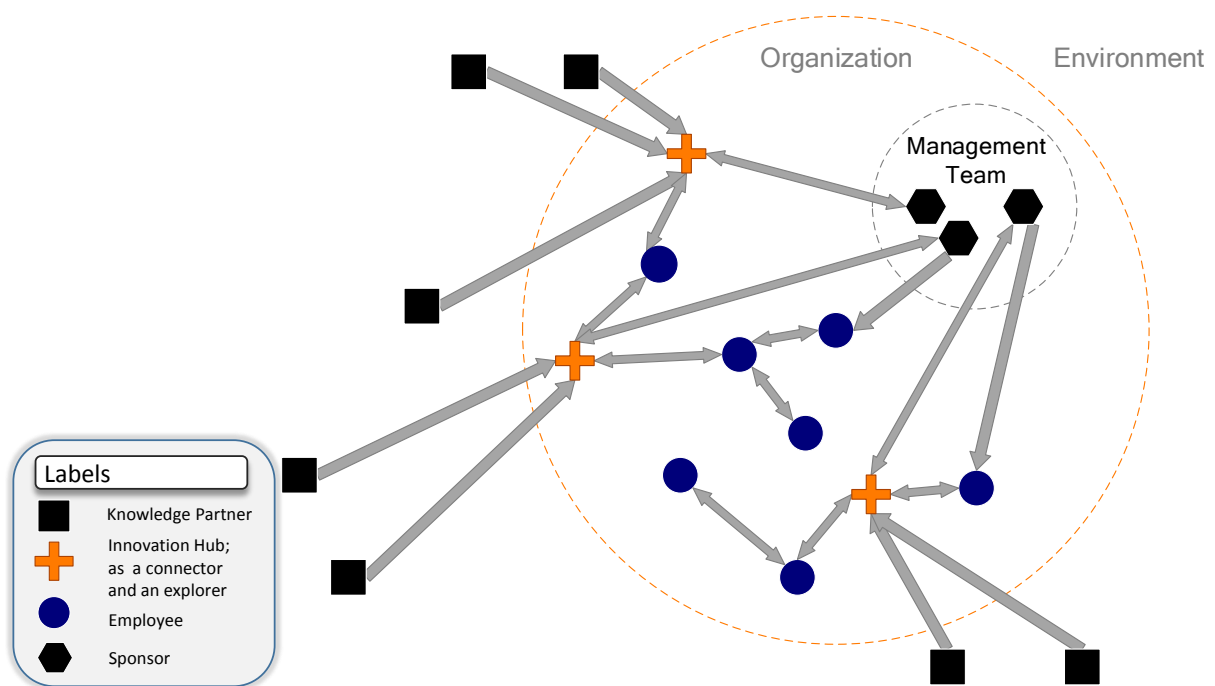


Figure 8-10: The role of an innovation hub based on Aalbers and Valk (2012)

Hence, a hub should:

- facilitate the connection with external knowledge partners;
- enable cross-functional internal and external knowledge sharing and collaboration;
- explore internal and external opportunities;
- provide a safe and secure environment to host early phases of a the innovation process;
- facilitate innovation management tools for inspiration, ideation, analysis, formulation and evaluation;
- host innovation initiatives and room for decentralized entrepreneurship.

8-5 Conclusion

In this chapter the strategy for designing and the elements that should be included in a process model for innovation were presented. It requires an open innovation model for successful innovation. Cross-functional collaboration of the organization with external knowledge partners and the market is key to achieve this. Moreover, next sub-research question was answered:

How can the process model for innovation be improved giving the gaps and discrepancies uncovered, which affect the effectiveness of the current innovation process?

In order to institutionalize the design, identified enablers have to be embraced and barriers have to be overcome by both organizational and individual institutionalizing innovation within the organization. To achieve this, an innovation hub should be present in early phases of the process model and a clear vision and strategy has to be carried out by strong leadership. To ensure progress of the process, rules of the game are identified that have to be respected for successful implementation. Transparent decision-making is required to understand the fundamentals of decision-making and overcome the innovation dilemma.

In scientific literature and corporate environments, management of innovation has emerged throughout recent history to enable for exploring and exploiting new products and services. The notion of open innovation models, cyclic models and feedback and forward loops are adapted in attempts to structure process in corporate environments. The elements that have to be included when designing process models for innovation in complex large-scale financial organizations are presented, based on requirements from literature and the single case.

For designing a model, a systems engineering approach was applied for structuring a system for innovation. Subsystems were distinguished and three layers of abstraction were proposed for an improved process design: a systems level, a process level and a process structure level.

The proposed model has a spiral character which emphasizes the evolutionary character and the continuous effort that is required for successful innovation in complex large-scale financial organizations. This model exists of iterations that are subdivided in different phases which in return are subdivided in different process steps. Every ending iteration is the start of a new iteration and by capturing knowledge, information of different iterations can be used in other iteration. Hence, failures in a prior iteration can lead to a success in a proceeding iteration if organizational strategies, technologies, science or the market changes.

In addition, communication and evaluation of process steps and phases are essential for ensuring progress and substance. Governance of the process model is part of the successfulness of innovation and transparent decision-making contributes to this. Problem owners, Business Management Teams and Innovation Hubs are key stakeholders in the process model for innovation and in this chapter the influence and roles of these stakeholders is stressed. An innovation hub can be the party that explores opportunities in the environment and problems that require innovative solutions within the organization. Next, it can connect knowledge partners with internal stakeholders (i.e. the business management team and employees) and facilitates innovation within the organization at the fuzzy front end of innovation.

It can be concluded that a process model for innovation can only be successful if operational and strategic enablers are present for innovation, and innovation is institutionalized in the genes of the organization. If room for corporate entrepreneurship is created by top management, a process model can be implemented that should be adapted to specific environments given their needs, resources and strategies.

Phase IV

Evaluation and Recommendation

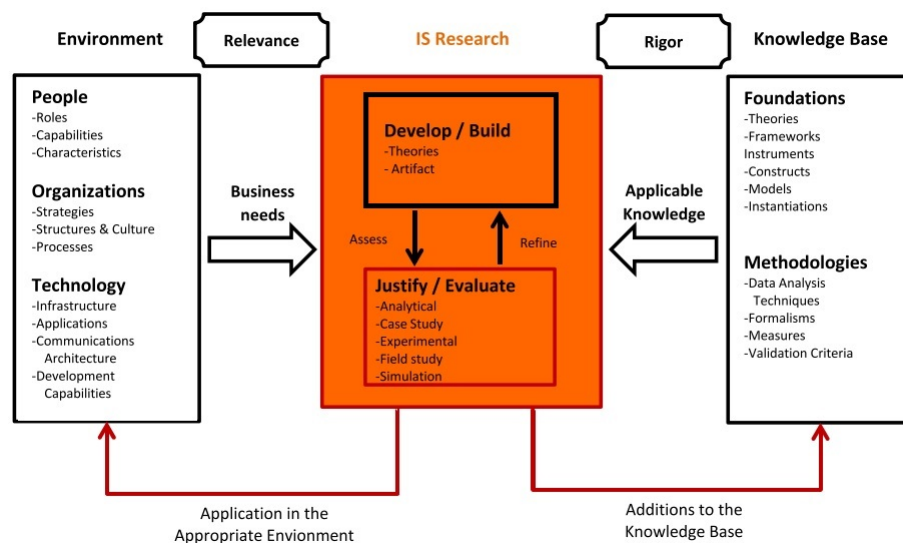


Figure 8-11: Research flow diagram, Justification and Evaluation

The designed artifact, elements that should be included in a process model for innovation, is constructed in an iterative way. As elaborated upon in the applied design method for conducting this research, continuous interaction was present between the design phase and the justification and evaluation phase. By means of continuously evaluating the design, feasibility of the process model was enhanced. In this phase first in chapter nine, the process model will be justified and validated based on the selected requirements. Second, in chapter ten conclusions and recommendations of the conducted research will be presented.

Justification and Evaluation of the improved process model

In order to assess if the designed process model meets the requirements that are selected, this chapter presents justification and evaluation of the design. By evaluating if the model meets the requirements from literature, it can be assessed if the model is designed respecting models from literature. In addition, will be evaluated if the design meets the requirements selected from the single-case study to assess if the model meets business needs. Thus, it will be assessed if the model improves the current situation and is applicable in complex large-scale financial organization given the enablers and barriers that are identified. Section 9.1 presents the validation with experts in the field of innovation, section 9.2 presents the validation with direct stakeholders in the organization. In section 9.3 discusses system errors of the results and section 9.4 presents a brief roadmap for implementation. Lastly, section 9.5 presents a conclusion.

9-1 Evaluation on models in literature

In this section will be evaluated if the process model includes all elements that are required, considering the requirements selected in literature and in the single-case (presented in section 8.1.2, table 8.1). By interviewing experts in the field of innovation models, it is investigated if the improved model is designed correctly.

Expert interviews

Parallel to designing the process model, interviews were conducted with experts in the field of innovation from Delft University of Technology¹.

Professor A.J. Berkhout, who constructed the Cyclic Innovation Model (2007), is interviewed to investigate if the proposed model from a holistic perspective, integrates the conceptual models in an appropriate and scientifically sound way. Moreover, requirement: O-R₂, O-R₃, L-R₄, L-R₇, L-R₈ and L-R₉ were investigated. In appendix D-1, the interview results are presented.

¹Interviews with A.J. Berkhout, J. Buijs

It can be concluded that all selected requirements are met in the conceptual model, but it has to be noted that this is till a certain extend. A process model for innovation functions in an organizational environment that should have a clear vision and strategy for innovation (O-R₃). Innovation should be institutionalized in the organization and leadership is required envisioning innovation for enabling decentralized entrepreneurship (O-R₂), the proposed model emphasizes the fuzzy front end of innovation by introducing an innovation hub that kick starts innovation (L-R_{7,8}). If this is present, sustainable external connections with knowledge partners and the market have to be made together with top-down directions for innovation. A process model for innovation should be facilitated directly by top management otherwise it will not succeed. An addition to the conceptual model is the spiral form of innovation models; this is acknowledged, it is an addition to the current conceptual model by adding a time variable which implicitly is present in the CIM (L-R₉). It shows the continuous effort that is required for sustainable innovation in organizations.

Next, Professor J. Buijs, who constructed the Delft Innovation Model (2012b), is interviewed to discuss the feasibility of the process elements and if the proposed model integrates literature by Cooper (2008), the Delft Innovation Model and the case based on literature by V. Kumar (2013). Moreover, requirements: O-R₄, O-R₆, O-R₇, L-R₁₋₁₂ were investigated. In appendix D-2, the interview results are presented.

All applicable requirements from literature are believed to be met and suggested tools and resources are feasible for supporting an innovation process in organizations (L-R₁₋₁₂)². The process steps are in line with the DIM, but it should be taken into account that the 'discovery' phase of the model cannot be managed internally. This is the fuzzy front-end of innovation and includes the external environment and the clients. It is important that an organization understands that this is the most important phase of innovation and cannot be modeled; it should be monitored closely to adapt to transitions. Metrics, scorecards and post-launch reviews: 'fail-fast mechanisms' should be communicated with BMT's; those actors have to cooperate in the process model and should ideally undergo the process to increase awareness of the governance and difficulties of innovation. Management and exchange of knowledge have proven to be a difficult task in organizations, active exchange of knowledge is required in which people directly play a role. Otherwise information is useless: an active learning organization has to be created (O-R₇). Lastly, coordination mechanisms should be adjusted to evaluate on innovation; if operational enablers are present for innovative behavior, the business units should be evaluated on their innovative capacity continuously.

Again, the spiral characteristic of the process model is acknowledged, implicitly this features is present in the DIM, but not in the Stage-gate models that rather are project management tools.

9-2 Evaluation considering the business needs for innovation

For the case study interviews were carried out to identify business needs of a process model for innovation within the organization. In these interviews enablers and barriers were investigated as well as requirements of a feasible design. Next, validation interviews were conducted to evaluate the improved process model. Top management that supports and initiated the process model for innovation within the organization were interviewed to assess the feasibility³. In addition, workshops were facilitated in which recommendations were applied to investigate the feasibility. In appendix E, the results of the interviews are presented.

Expert interviews

In the early interviews that were conducted to explore the business needs, the necessity for exchange of knowledge was partly acknowledged. Tacit knowledge is a key asset of an individual and sharing your

²Interview J. Buijs

³Confidential interviews

most valuable asset might bring harm to the individuals' position in the organization; one can become superfluous. Next, the Not-Invented-Here principle is a threshold for successful knowledge sharing; exchanging knowledge will only be successful if the culture and climates within the organization enable knowledge sharing (appendix E-1,2).

In the validation interviews conducted in the organization, all organizational requirements were assessed (appendix E-4,5,6,7). In addition it is assessed if the model and the requirements that resulted from literature study were feasible for the case study. The continuity of the process model is acknowledged and a spiral, rather than a cyclic process, clarifies the effort of innovation. It is indeed important that a process model fits the dispersed character of the organization and an innovation hub will add most value at the front-end. It should support first phases of an innovation process and should kick-start it.

In order to fit the siloed character and match the complexity of the organization, long-term goals have to be implemented for innovation and this requires a continuous process for innovation. This is acknowledged and therefore it is important to embed innovation in the organizational culture and climates by clear leadership.

Next, evaluating the process on successfulness, rather than steering on output of the process is acknowledged. It will overcome perverse behavior and will increase the innovativeness of the organization. But reality of the organization is that business lines are coordinated on KPI's that focus on performance and efficiency. Thus, next to evaluating on embedding the process model in the organization, evaluating on delivery of products or services will still be present. Proper tooling should be implemented to capture information and increase time for delivery, but this tooling is not implemented yet. This makes evaluating the design difficult.

Workshops

In workshops applicable recommendations are applied and tested on its feasibility (appendix E-3). These recommendations focused on tools and resources for ideation sessions (presented in appendix C-3). It is perceived that structuring the ideation sessions by divergence, clustering and convergence and applying techniques to perform this add value to the current process. Next documenting knowledge and information concerning innovation is not yet captured properly in the organization and in the sessions for innovation. It is perceived that this still should be improved and by stressing this in the new process model stakeholders will become aware of this. In addition by implementing rules of the game for participants of events at the innovation hub, progress and substance is acknowledged to be improved. Lastly, facilitators should have the competences to facilitate inspiration and ideation sessions (appendix C-3, figure C.5). They should be aware of group and cognitive influencing factors and should anticipate on this to overcome barriers for synergy in groups.

9-3 System Errors

A validation test of the improved process model is not performed in practice yet, due to limiting resources and time of the research. That is why it cannot be assessed if the proposed process model can be implemented for all different entities of the organization. The conceptual model is designed in a flexible and adaptable way and it is believed that decentralized implementation can be successfully achieved, assuming that strategic and operational enablers will be present in the organization for innovation.

O-R₅: Increase commitment and support for innovation within the organization can only be achieved if a culture and climate for innovation is created. By interviewing experts it can only be assessed if there is room for this, but not if this room will be created in practice. This requires significant implementation time and cannot be assessed in current study. Next, suggested tools (O-R₆ are included in the design,

but only implementation in of these tools on a longer term and different environments will show feasibility. In the conducted workshops, some of the tooling is applied and resulted in improvements but broad adaptation requires commitment and support on different levels in the organization.

9-4 Roadmap for institutionalizing the improved process model

The process model that is justified and evaluated in previous sections can only be successful implemented when operational and strategic enablers are present (discussed in section 8.2). Intrinsic motivation of stakeholders in the organization is required for successful innovation and coordinating mechanisms should be designed to stimulate this. In this section a brief roadmap will be presented for embedding the process model for innovation within the organization. A strategy for implementation is presented, on a short- and a long-term to successfully institutionalize the process model and increase the innovative capacity of the organization.

9.4.1 Strategy for implementation

When the process model for innovation is acknowledged in the organization it is important that it gets embedded on a short term. The temporal duration of change increases significant if it concerns governance models in institutions (Williamson, 2000). When changes in governance models are made it will require one till ten years to institutionalize changes depending on organizational dynamics. Hence, short term implementations have to be executed and a long-term vision have to be carried out to enable for successful innovation (Berkhout, Hartmann, et al., 2007).

Allow for decentralized innovation hubs

The process model for innovation should be supported by BMT's of all entities in different environments of the organization. By supporting cross-functional innovation successful innovation can be achieved and best-practices can be exchanged. Different environments have different business needs and by allowing for decentralized innovation the network of knowledge partners can be grown and opportunities in different environments can be explored and connected.

9.4.2 Short-term implementation

Top-down awareness should be created on the vision regarding innovation from the board of directors. This board should also support the process model and be directly integrated in the decision-making process. By documenting: ideas, decisions, initiatives, failures and successes, transparency of the process can be enhanced. Strategies and business needs underlying these occurrences will differ and change over time. By structurally documenting occurrences (i.e ideas, decisions, initiatives, failures and successes) initiatives can be developed in other business environments. Dependent on the dynamics that heavily fluctuate over time, initiatives in a different environment may book success and turn into successful delivery. It is important that complex large-scale financial organizations are agile to allow for strategic shifts in business propositions and adapt to transforming environments.

Next stakeholders (i.e. problem owners, business line managers and business management teams) in the organization should be aware of the governance and complexity of innovation in the organization. That is why those stakeholders should undergo the process model at a certain time to understand the complexity of the innovation effort.

9.4.3 Long-term implementation

Long-term implementation of innovation models and processes has proven to be hard in the single case. Support and strategy for innovation sustained for a time-span of five years on average and dynamics in the market can be both barriers and enablers for success. That is why a short-term implementation, as elaborated upon, should have a clear strategy for both the short and the long term to allow for sustainable institutionalization. In this way innovation, as a continuous effort and not a goal on itself, can be institutionalized in the organization. It should ideally be a fundamental element in the short and long-term strategy of the organization.

9-5 Representative elements of the design

It can be concluded that the process model for innovation has elements that are specific to the case and elements that are representative for a wider context.

First, the spiral element of the design which implies the continuous and evolutionary character of innovation is representative for complex large-scale organizations based on evaluation of experts in the field of innovation (see appendix D). Next it is believed that the six phases of the process model are uniform and can be applied in different contexts. The feedback, feed forward and linkages with objectives and strategies show added value; connecting strategies and objectives to the innovation effort will increase progress and substance. Time for delivery of products and services can be reduced, but radical innovation is not likely to be captured in a process model for innovation. Thus, the process model for innovation and its tools are not designed for radical innovation within organizations.

Next, it is questionable if specific elements of the process model are applicable in other contexts. As elaborated upon; operational excellence within the organization has been embraced and cost-income ratio's determine process and performance. Path dependency shows to influence used tools in the organization and in this design specific tools are included that were already acknowledged to overcome institutionalization problems (f.e. Scrum Agile and Continuous Delivery). For different contexts it has to be determined if these tools are feasible and if it will lead to implementation thresholds.

Next, the role of innovation hubs in organizations differ. The single case represents a siloed organization that operates on a global scale. This results in communication and knowledge exchange problems. Thus decentralized innovation is required to facilitate and stimulate innovation. A single hub cannot focus on all global entities and thus corporate entrepreneurship has to be stimulated by applicable business management teams. This results in the fact that coordination mechanisms should be on the one hand in line with current coordination mechanisms and on the other hand should allow for continuous innovation.

Lastly, the organization in the case depends on customer trust and is risk averse in innovating new products and services. This will evidently differ for other financial organizations and innovation might be institutionalized further in other organizations. That is why those organizations might not require an innovation hub that stimulates and facilitates innovation within the organization. Resources have to be allocated for innovation and managing these resources primarily is a leadership task.

9-6 Conclusion

In this chapter was assessed if the proposed process model for innovation meets the requirements that are set based on the business needs and the applicable models for innovation in literature. By conducting interviews with innovation experts the model was contrasted to models in literature. The designed model showed to meet set requirements. Next workshops were conducted to determine if recommendations improve sessions for inspiration and creativity. Moreover, next sub-research question was answered:

Which elements of the design are representative for other complex large-scale financial organizations and which elements are specific to ING?

The elements which a process model for innovation should include are subject to some uncertainties. Due to limiting resources and time of the research it could not be assessed if the proposed model could be implemented for all different entities in the organization. The conceptual model is believed to be flexible and adaptable to allow for decentralized implementation. This requires strategic and operational enablers within the organization that create a culture for innovation. Moreover, commitment and support for innovation within the organization is required for successful implementation of the model.

In order to institutionalize this approach a brief roadmap was constructed in which short- and long term strategies are included. The most essential element of institutionalization is support and commitment by both the board of directors and the business management teams. It requires a clear vision, strategy and leadership to successfully institutionalize innovation within a complex large-scale organization. Decentralized room for innovation is required on a short term to allow for long term implementation of innovation within the organizational culture. Short term implementation should focus on creating awareness top down and institutionalizing a mindset for innovation. Stakeholders on all levels of the organization should be aware of the governance and complexity of innovation and should undergo the process for innovation to increase understanding of this highly uncertain endeavor. Long-term implementation shows to be hard in the single case, but a long-term strategy for innovation is required and a process model is an essential part of this.

Practical recommendations are adapted in inspiration and ideation sessions and features of the designed model were acknowledged till a certain extent; the reality of the organization has to be taken into account and organizational changes in culture and climates will take a significant amount of time before an organization can change.

Representative elements of the design are the spiral character of the process model which emphasizes the continuous and evolutionary effort of innovation. The six phases that were identified are uniform for innovation processes and are flexible and adaptable to specific environments. The feedback, feed forward and linkages with objectives and strategies show added value; connecting strategies and objectives to the innovation effort will increase progress and substance. Time for delivery of products and services can be increased, but it has to be noted that radical innovation is not likely to be captured in a process model for innovation.

Specific elements of the process model might not be applicable in other contexts. Operational excellence within the organization has been embraced and cost-income ratio's determine process and performance. Organizations show to be subject to path dependency. Tools that are used in organizations are institutionalized and are part of the culture and climates in the organization. For this reason specific tools are included in this design that were already acknowledged to overcome institutionalization problems (f.e. Scrum Agile and Continuous Delivery). For different contexts it has to be determined if these tools are feasible and if it will lead to implementation thresholds.

Lastly, the level of institutionalization of innovation within different complex large-scale financial organizations will evidently differ. That is why those organizations might not require an innovation hub that stimulates and facilitates innovation within the organization. Resources have to be allocated for innovation and managing these resources primarily is a leadership task. Hence, the environment in which the process for innovation functions affects successfulness of the model.

Conclusions and Recommendations

Innovation within complex large-scale organizations in financial services are subject to different barriers and enablers for innovation. Financial institutions can be classified as information-intensive organizations. A core competence of especially large premium banks is trust and for this reason those organizations are risk averse in delivering new products, services and business propositions. By recent market dynamics such as the global financial crisis the urgency for innovation has been increased. Therefore this study was initiated to report on innovation within those organizations, and more specifically process models for innovation in complex large-scale financial organizations.

Moreover, it is investigated what a process model for innovation should include by contrasting academic literature and a model of innovation implemented at ING, as an illustration of a complex large-scale financial organization. More specifically, the implemented process model to manage the risk of innovation within the organization by the ING Customer Experience Center (ICEC) is analyzed.

This chapter will first present conclusions of the study by answering the main research question (section 11.1), and second will present recommendations following from the presented conclusions.

Concluding, this study was initiated to solve next stated problem:

- **It is unclear what the differences are between process models for innovation developed in literature and models implemented in complex large-scale financial organizations; those organizations are subject to specific organizational complexities and uncertainties that influence successful innovation.**

10-1 Conclusions

By means of a systems engineering approach this problem was divided in sub-systems to understand the complexity of the system in which a process model for innovation functions. To structure this research, a main research question was formulated:

- **What are differences between models for innovation in academic literature and implemented models in complex-large scale financial organizations, and what should the design of a process model for innovation include to increase the innovative capacity of those organizations?**

To answer the research question the design-science conceptual framework is used. This allows one to identify relevance of what a process model for innovation should include based on business needs of the organization. ING is used as a single case to illustrate the implementation of a process model in a complex large-scale financial organization. By defining business needs for the organization, gaps between the desired and actual levels of performance of a process model for innovation were identified. Based on these gaps organizational requirements were selected to set boundaries for exploring and reviewing the knowledge base. From the knowledge base foundations and methodologies were selected to provide guidelines for designing what a process model should include. These guidelines were requirements from literature on which the design could be iteratively justified and evaluated. Rigor was achieved by applying these existing foundations and methodologies.

Next, to form an answer to the main research question, sub-research questions were formulated that subdivide the research question in distinct elements.

10.1.1 Case Study

In the case study the ING Customer Experience Center (ICEC), part of ING Operations and IT Banking is used. The result of the first part of this research, is that organizational and market dynamics are key drivers for innovation and influence the perceived urgency for innovation. Enablers and barriers for innovation were identified that affect the implementation of innovation and process models for innovation within the organization.

The organization has a siloed character, operates in different markets and entities have different needs for innovation. Internal competing decentralized initiatives for innovation, risk averseness of the organization, the organizational culture, business units' climates, legacy systems and implemented coordination mechanisms weaken the innovative capacity of the organization and have proven to be barriers for successful innovation. Initiatives for innovation were initiated through time with an average lifetime of approximately five years. This reflects the temporary character of innovation, more than that it is perceived as a continuous effort. In order to overcome these barriers for innovation organizational enablers have to be embraced. The organization is in a transition phase and it has to adapt to the rapidly changing environment in which IT has become of increasing importance. Hence, agile and collaborative systems that focus on collaborative open ecosystems for development of business propositions are implemented. Those systems enable cross-functional collaboration between business units and the external environment.

Business needs and gaps

Next, business needs as they are perceived by people within the organization were captured. By means of a gap analysis was identified what the difference between the desired levels of performance and the actual levels of performance of the process model for innovation is. The identified gaps are sevenfold:

- No successful output has resulted from the process model for innovation when measured in terms of delivery.
- The process model still needs to be further embedded in the organization.
- The current process model is not run through from beginning to end in practice and implemented KPI's are based on the result of the process.
- The current process model does not reflect and value all process that have to be performed for successful innovation.
- Support and awareness in the organization increased, but is too low; commitment tends to decrease after the use of ICEC resources.
- There is a lack of standardization of tools.
- A fitting channel to exchange information concerning innovation is not present.

Moreover, the approach and the process model for innovation have to professionalize further to attain the desired goals: increase the innovative capacity of the organization and reduce time for delivery of innovative business propositions, products and services.

Based on these gaps organizational requirements were selected to construct boundaries to find applicable foundations and methodologies in literature. These requirements are sevenfold and directly linked to the identified gaps. The elements that should be included for the design of a process model for innovation have to respect the organizational requirements to meet business needs of the organization.

10.1.2 Literature

After conducting the case study elements that affect the successfulness of innovation in complex large-scale financial organizations from literature were identified and based on the organizational requirements applicable foundations were selected.

Applicable foundations

It is important to distinguish radical and incremental innovation. Organizations are path dependent and reliant on established routines. This affects the ability for radical innovation, but should be taken into account when organizing a process model for innovation. Radical innovations are not likely to be linked to organizational strategies and core competences and thus will not likely flow through models.

In academic literature models and processes that focus on external linkages, open networks of innovation with feedback and feed-forward loops are advocated. These features show to have a positive effect on the innovativeness of organizations. A cross-disciplinary network along a circular innovation system in which different nodes have to cooperate for successful innovation needs to be organized. Synergy between the large number of highly diverse players is required in the innovation system and this requires extensive collaboration. Next the effectiveness of innovation processes and the innovative capacity of organization was explored through four indicators stressed in academic literature. The ambidextrous capability of organizations (i.e. the ability to pursue exploratory and exploitative innovation simultaneously) is crucial in organizations and a measure for successfulness and rather a leadership task than one of structure and design in an organization. A compelling vision and strategic intent therefore is required in organizations to allow for sustainable and successful innovation. Second, coordination mechanisms should be designed that steer on the absorptive capacity (i.e. the ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends) and value the recognition of external information, using this information and applying it to commercial ends. Lastly, internal and external collaboration should be structured and should be embedded in the organizational culture to enable for knowledge sharing. A fitting knowledge management tools should be implemented for innovation to support the knowledge creation process as a vehicle to improve innovation.

Design principles

Based on the applicable foundations, design principles were identified on what a process model for innovation should include. This resulted in requirements from literature that together with the organizational requirements can be used for justifying and evaluating the design.

For designing a process model for innovation, three layers of abstraction were distinguished to structurally map elements that should be included in the design. The systems level, the process level and the structure of processes were identified, which all interact and have degrees of freedom for implementation. From a holistic point of view, innovation in complex large-scale organizations requires leadership, vision and strategy. By integrating different nodes of innovation (i.e. scientific exploration, technological research, product development and market transitions) with room for corporate entrepreneurship, successful innovation can be achieved. Culture, climates and resources have to be

created that enable for innovation on an operational level to allow for innovative behavior in the genes of the organization and successful implementation of a process model for innovation. In the process model, different process steps can be distinguished and a circular process view is advocated in literature that stresses the continuity of the innovation effort. Communication and decision-making in this process model should be transparent and stages should be cross-functional to enable for collaboration between different entities within the organization and the external environment. Different phases and process steps in process models should be uniformly, flexible and clearly structured to fit different environments, contexts and sizes of projects. Objective measures should be identified continuously, that align organizational strategies and futures with innovative efforts. By evaluating innovative efforts on the organizational positioning regarding strategies and futures, the risk of innovation can be managed and the pace for delivery can be increased.

Requirements

Based on these design principles, requirements were selected from applicable literature. A process model for innovation should: be scaled to suit different risk-level projects, contain scorecards to make better go or kill decisions, be a flexible and adaptable process, be an open system (i.e. connected to the external environment), include in-process metrics at gates, contain post-launch reviews to instill accountability, emphasize the fuzzy front end of innovation, include cross-functionality of stages and allow for synergy between stakeholders, contain a circular process view, include an early and sharp definition of the problem, be an efficient, lean and rapid system, have effective and timely gate-keeping, include post launch reviews to instill accountability and be uniformly structured, as well as process steps.

10.1.3 Design

By exploring the single case study, relevance was established and by exploring the knowledge base rigor was achieved. This allows one to accomplish research and design an innovative artifact. First discrepancies between literature and practice were investigated before the strategy of the design could be presented and the design could be initiated.

Discrepancies between models in literature

First, in broadly accepted model for innovation constructed a discrepancy is uncovered between literature provided by A.J. Berkhout and R. Verganti. Both authors argue that radical innovation requires significant more effort than incremental innovation and to allow for this both technology push and scientific exploration are required. Of interest is that Verganti stresses that market driven innovation will probably not be the best source for radical innovation and therefore should not be included in conceptual models. In contrast to Berkhout, who argues that the more nodes of innovation (scientific exploration, technological research, product development and market transitions) are present, the more radical innovation becomes. Thus, the market (i.e. market driven innovation) is required for radical innovation. In this study we believed that customers have to be integrated for successful innovation and co-creation with the customer is essential to discover the needs of the market.

Second, pipeline and cyclic models for innovation were contrasted. The main difference between the models is the variable of time. Stage-Gate models are project management tools to structure projects. Models that stress the cyclic character of innovation emphasize the continuous effort of innovation and clarify the complexity of innovation. That is why the cyclic element is taken into account in this study for innovation process models.

Discrepancies between practice and literature

Next, discrepancies were uncovered between the management of innovation in practice and applicable model for innovation in literature. It is investigated that organizations are subject to market dynamics and have to cope with the reality of the environment in which it operates which is not properly included in model from literature. The siloed, risk averse and financial character results in key performance indicators that coordinate on cost-income ratios and steer on efficiency. Operational excellence as a management practice focuses on efficiency and results in decreasing throughput times and improving customer-bank interaction as an enabler for innovation. In innovation literature, steering on efficiency is impossible when coordinating innovation; it is a fuzzy process with unknown results. We believe that not a difference in definition is present, but rather a different perspective on the process for innovation. When integrating both perspectives in different phases of the process model for innovation, both notions will strengthen each other and increase the innovative capacity of the organization.

Next, not a pipeline process model should be implemented facilitated by a separate innovation hub, but a circular process view on innovation supported and facilitated by senior management to emphasize the continuous innovation effort. Early steps should be facilitated and monitored by innovation hubs and this entity should focus on integrating knowledge partners, the dynamic market and the organization in its innovative endeavor. Knowledge exchange as a vehicle for innovation in the organization should be enabled and a novel and innovative application for enabling knowledge management should be designed. Current methods prove to be incompatible with the organizational culture, climates and business needs. Tacit and explicit is the most valuable asset of employees in organizations and intrinsic motivation have to be created to allow for knowledge sharing.

Strategy and design

By means of the identified layers of abstraction a process model is designed that can be institutionalized in the organization. By organizational and individual institutionalization it is believed that the model can be embedded in the genes of the organization. Coordination mechanisms should focus on the success of incorporating the process model, rather than on output of the process to enable successful innovation. Decentralized innovation hubs are proposed that stimulate early steps of the innovation process. Next by documenting information (ideas, decisions, failures and successes) progress and substance of the process can be enhanced and monitored. This will allow for transparent decision-making which increases understanding of the complexity of innovation and overcome the innovation dilemma. Senior management should facilitate a safe and secure environment where ideas can be developed without interfering blocking parties to allow for stimulating creativity and innovative problem solving. Those entities should be included when setting objective measures, based on strategies and futures and in later developing phases to increase successfulness and assessing the feasibility of the concept design in the organizational context. Individual institutionalization can be attained by actively stimulating for creativity and intrinsic motivation of employees. By means of top-down; senior management should incentivize business line managers to make room for innovation, and bottom-up stimulation; ambassadors of innovation part of innovation hubs should inspire business units with innovative solutions to perceived problem giving the strategies of the organization.

In addition, rules have to be set for gaming. To professionalize the approach for innovation actors that participate in the innovative effort and make use of the resources of innovation hubs, should commit to the process and should be aware of exit rules. When coordination mechanisms are implemented that do not evaluate the process on its output but on progress and substance, the proceedings and process step result will be the indicators of success.

What a design should include

A spiral model for innovation that emphasizes the continuous and evolutionary character of innovation was designed (see figure 10.1). The process model exists of multiple iterations that are subdivided in different phases which in return are subdivided in different process steps. When feedback loops are present that evaluate organizational strategies, futures, products and services in the organization, an organization can learn from its mistakes and anticipate to the changing environment. Failures in a specific environment in one iteration may lead to a success in a different environment in another iteration; by capturing knowledge, information may be exchanged and a transition in the market, organization or technology may trigger successful innovation.

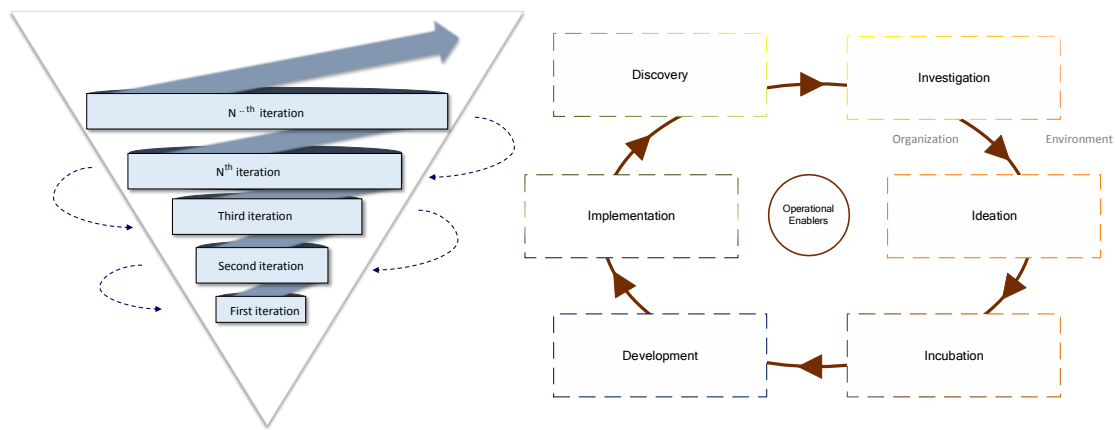


Figure 10-1: Spiral process model design

Problem owners, business management teams and senior management should be directly integrated in the innovation model. Communication and evaluation of process proceedings is essential for ensuring progress and substance of the endeavor. Transparent decision-making increases understanding of the complexities of innovation within the organization. Hence, governance of the process model is part of the successfulness and innovation hubs are key stakeholders in the early steps of the process model. In the process standardized toolboxes, techniques and methodologies, have to be present to: integrate knowledge partners, find creative solutions to problems, be aware of market transitions and science, exchange knowledge and stimulate collaboration.

In addition an innovation hub can be the party that explores opportunities in the environment and problems that require innovative solutions within the organization (see figure 10.2). Next, it connects knowledge partners with internal stakeholders (i.e. the business management team, as a sponsor and employees) and facilitates innovation within the organization at the fuzzy front end of innovation by providing proper resources and tooling.

It can be concluded that a process model for innovation can only be successful if operational and strategic enablers are present for innovation, and innovation is institutionalized in the genes of the organization. If room for corporate entrepreneurship is created by top management, a process model can be implemented that should be adapted to specific environments given their needs, resources and strategies.

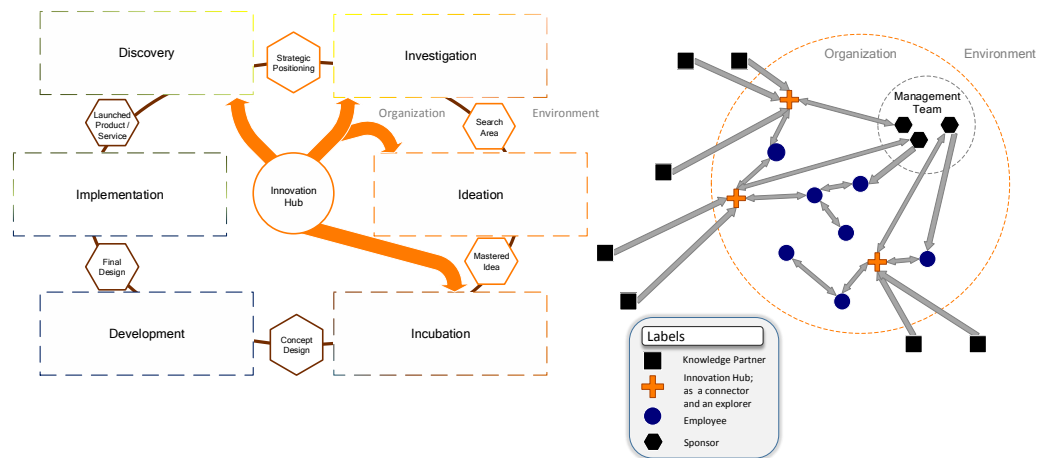


Figure 10-2: Process model design - Role of an innovation hub

10.1.4 Justification

Finally, was assessed if the proposed process model meets the set of requirements that are based on business needs and applicable models for innovation in literature. By means of experts interviews and performing workshops justification and evaluation is conducted. By means of the iterative way of designing, problems were overcome and recommendations were continuously implemented.

The elements which a process model for innovation should include are subject to some uncertainties. Due to limiting resources and time of the research it could not be assessed if the proposed model could be implemented for all different entities in the organization. The conceptual model is believed to be flexible and adaptable to allow for decentralized implementation. This requires strategic and operational enablers within the organization that create a culture for innovation. Moreover, commitment and support for innovation within the organization is required for successful implementation of the model.

Representative elements

In addition was assessed which elements of the design are representative for other complex large-scale financial organizations and which elements are specific to ING

Representative elements of the design are the spiral character of the process model which emphasizes the continuous and evolutionary effort of innovation. The six phases that were identified are uniform for innovation processes and are flexible and adaptable to specific environments. The feedback, feed forward and linkages with objectives and strategies show added value; connecting strategies and objectives to the innovation effort will increase progress and substance.

Specific elements of the process model might not be applicable in other contexts. Operational excellence within the organization has been embraced and cost-income ratio's determine process and performance. Organizations show to be subject to path dependency. Tools that are used in organizations are institutionalized and are part of the culture and climates in the organization. For this reason specific tools are included in this design that were already acknowledged to overcome institutionalization problems (f.e. Scrum Agile and Continuous Delivery). For different contexts it has to be determined what amount of resources may and should be allocated for the innovation process, if tools are feasible and if it will lead to implementation thresholds.

Lastly, the level of institutionalization of innovation within different complex large-scale financial organizations will evidently differ. That is why those organizations might not require an innovation hub that stimulates and facilitates innovation within the organization. Resources have to be allocated for innovation and managing these resources primarily is a leadership task. Hence, the environment in which the process for innovation functions affects successfulness of the model.

10-2 Answering the research question

The question that was formulated for this research is: What are differences between models for innovation in academic literature and implemented models in complex large-scale financial organizations, and what should the design of a process model for innovation include to increase the innovative capacity of organizations? The sub research-questions partly formed an answer to this question and it can be concluded that models implemented in complex large-scale financial organizations have to cope with the reality of those organizations; specific barriers and enablers of innovation.

The main difference between models for innovation implemented in practice is the fact that those models are subject to organizational and environmental uncertainties. Dynamics of the organization and the market in which the organization operates are capricious and affect the innovative capacity of the organization. That is why a long term strategy for innovation should be envisioned and the emphasize in process models for innovation should be on the continuous and evolutionary character of innovation. Coordination mechanisms that evaluate on output prove to be perverse tools for innovation and operational excellence within organizations should be integrated thoughtfully with innovation to reduce the lead-time for delivery. By evaluating the process of innovation on throughput rather than output, the innovative capacity of the organization will be positively influenced. A process model can only be successful if a culture, divisional climates and resources are created that allow for innovation. Leadership in the organization has to envision innovation and create room for corporate entrepreneurship, only then will a process model for innovation function and can the innovative capacity of an organization increase. By clarifying the complex and fuzzy process of innovation to its stakeholders, understanding of the uncertain endeavor for innovating products, services and business propositions will increase.

Innovation should be embedded in the genes of the organization and a process model can only support in increasing the innovative capacity. The process model should be adaptable to different environments and project scales to cope with the capriciousness and uncertainties that are present. Transparent decision-making in the process for innovation will increase understanding of involved stakeholders and will create mutual understanding of the complexity and elements underlying decision-making. By means of early definition of the problem, objectives, organizational strategies and potential futures, feedback and feed forward loops can be used to evaluate progress and substance of the innovative endeavor. Lastly, clear governance of the process model and the role of knowledge partners, decision-making entities, innovation hubs and employees have to be clear for all stakeholders involved to increase urgency and the necessity of innovation.

10-3 Discussion and recommendation

As premium brand financial institutions are risk averse and have limited space for failure, it is questionable if innovation can be a core competence for these large-scale organizations. Continuous innovation requires leadership and a long term vision. The question is if a long term vision for innovation should be carried out or that innovation should be initiated when there is a direct need and be killed when there is no direct need. In literature is stressed that a long-term vision for innovation is essential for business continuity. But innovation is a costly process and it is highly dependent on senior management if resources are allocated to innovation initiatives. In addition, institutionalizing a structured process for innovation takes considerable effort and time. Organizations are path dependent and current coordination mechanisms are based on KPI's that steer on cost-income ratio's and output. These coordination mechanisms have to adapt to continuous innovation in order to enable success.

Knowledge sharing and collaboration

A key driver for managing innovation and implementing a process model for innovation within organizations, is sharing of knowledge.

As concluded a process model should be evaluated on throughput rather than on output. To achieve this, knowledge in the process needs to be captured and standardized to allow for evaluation. Current tools for sharing knowledge and collaboration for innovation are not compatible with the business needs and are not sufficient for monitoring a process for innovation. In addition, connecting stakeholders and exploring the innovation spectrum is essential for successful innovation. Tools to allow exchange of knowledge and increase collaboration have to be compatible with the organization.

That is why it is important it is researched how proper tools for enabling collaboration and exchange of information should be designed. To first, allow for collaboration with external knowledge partners for sharing best-practices and technologies, and second allow for internal knowledge sharing and monitoring the process of innovation.

Business management teams can only assess feasibility of innovation if an overview of endeavors is created. An innovation hub might be the entity that monitors this tool and facilitates collaboration for innovation. Moreover, knowledge creation and exchange within organization, has proven to be a catalyst for innovation.

This study believes that next requirements have to be met when designing a proper tool for knowledge capturing:

- Easy-in-use
- Uniform for the entire organization
- Visible in the entire organization
- Allow for transparent decision making
- Easily accessible

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Appendix A

CONFIDENTIAL: Complex large-scale organisation: ING

First, the organization will be analysed on strategies, structures, cultures, climates and processes (Hevner et al., 2004). Second, the "people" i.e. the stakeholders within the environment will be specified with their roles, capabilities and characteristics. Third, initiatives of innovation platforms will be analysed to investigate the attitude and trends within ING towards Innovation processes.

A-1 Confidential

A-2 Confidential

Appendix B

CONFIDENTIAL: ING - Innovation

In this appendix the organizational environment in which the process for innovation is functioning will be analysed. First, in section B-1 initiatives on innovation processes at ING throughout recent history will be presented to increase understanding in innovation practices at ING. Second, in section B-2 the organizational features of ING will be analysed to investigate the complexity of this large-scale organization. Third, in section B-3 the current approach for innovation within ING the Netherlands will be presented and analysed.

B-1 Confidential

B-2 Confidential

Appendix C

Process Model structure

In this appendix the structure of the process steps is presented. This structuring is based on the systems engineering approach by Sage and Armstrong (2000) and is complemented with literature that has proven to be applicable to needs of the case.

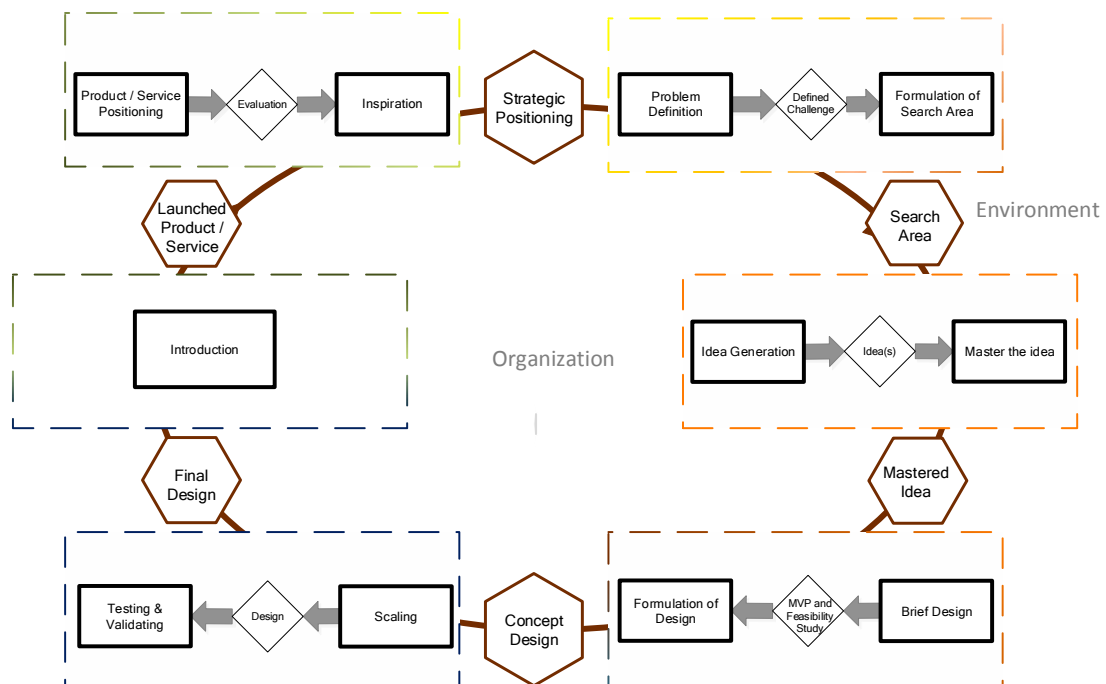


Figure C-1: Process Model design - Processes

C-1 Discovery

When designing a system for a systems engineering perspective, starting point is a perceived problem. The discovery phase is not necessarily the physical starting point, as innovation can start in all phases and has no end or beginning.

C-1-1 Product / Service Positioning

The product positioning step in the process, is the step in which the prior launched product/service is scanned on the objective measures that are set for the specific product / service before implementing it in practice (Buijs, 2012b). Hence, it should be assessed if it meets the product or service- and organizational set strategies based on core competences. Next, it has to be assessed if the product/service fulfills the (latent) needs of the market or that there is a gap between demand and supply.

The process can be structured by first *formulating*, the objective measures of the product or service in use, in light of the organizational strategies and potential futures. Second, *analysing*, the performance of the product / service on the formulated objective measures in light of the current organizational strategies. Lastly, *interpretation* of results of the process and an evaluation of the product or service in use.

Thus, the result of this process is an evaluation of the positioning of the product or service. It is determined if it still fits the set objectives and needs of the organization, product or service, and / or market. The result may be that the objectives and needs, need to be reassessed and changed. Moreover the result will be a defined challenge that can be used to improve the current product or service.

The cost of this step is low because this evaluation of a current product or service is an internal process which can, but not necessarily, be hosted and executed by an innovation hub or other party. The effort that is required to perform this process is very low because it is a continuous process on evaluating current products or services by employees within the organization possibly supported by facilitators of an innovation hub.

How to identify performance of a product or service in use:

1. Identifying the gap between actual and desired levels of performance of the product or service in use
2. Scanning and reassessment of prior set objectives and strategies of the product or services in use
3. Evaluation of products or services in light of the current organizational strategies

Table C-1: Product / Service Positioning - Identifying performance

C-1-2 Inspiration

In the inspiration step the specific problem space in which the product/service functions is identified. The interim-result of the product position step (the evaluated product or service) is input for this step. In order to find innovative solutions to a problem in this step it is important that the organizational strategy and potential organizational futures are set to discover the opportunities for the product / service. By combining this with: trends in market futures, (latent) customer needs, hard and soft science, and technologies, the future paths of the organization can be determined (Berkhout,

van der Duin, et al., 2007). It creates an environment for innovative problem solving and encourages participants to be innovative.

By first *formulating* the organizational needs and core competences it can be assessed how well the product / service fits in the organizational activities. Secondly *analyzing* the problem space by means of an inspirational session will give insight in the strategic positioning of the product / service and the organization. The problem owner(s) and actors involved in the process are supported to discover the problem space. By introducing actors to: available hard and soft science, market trends, technology and industry change, and future paths of the organization, the strategic positioning of the product / strategy can be determined. The facilitator of the inspirational session is required to have knowledge about market trends, and the organizational strategy and futures to set the positioning of the product/service. By using the support of knowledge partners and databases with external and internal sources of knowledge, opportunities can be shared and used to inspire involved actors. Lastly, *interpretation* of the result by evaluating the outcomes is required to make sure that the defined strategic positioning of the product / service and organization is in line with the view of the applicable BMT and problem owner(s).

The relative cost and effort of this process step is low. Commitment by a sponsor/manager is required in order to make resources and time available. Actors that commit themselves to the processes have to be willing to further develop the problem into a solution. This process can and needs to be hosted by a facilitating party, preferably an innovation hub, which needs to have the resources and expertise concerning the internal and external environment. Moreover, sponsors and managers do not yet have to allocate full resources for the project.

In order to have knowledge about trends, hard and soft science and organizational strategy and futures, different tools can be distinguished:

Tools
<ol style="list-style-type: none"> 1. Trends (Customer Journeys, Inspirational video's, mock-ups, Inspirational speakers, Trend watchers) 2. Demos of knowledge partners, (internal) innovation labs, branches and business lines 3. Resources of universities and knowledge institutions (patents, knowledge, research) 4. Overview of organizational strategies, potential futures and initiatives (strategic documents, alignment with applicable BMT, business lines) 5. Environmental influencing tools (mental and physical activating elements to trigger the cognitive capacity of people)

Table C-2: Inspiration - Tools

These tools help to create an inspiring environment in which people are stimulated to think out of their daily working environment and think out of the box. Active participation thereby is required to increase the effectiveness of the tools and the tools need to be mastered by the facilitators of the innovation hub.

C-2 Investigation

After discovering the problem and inspiration of the opportunities and weaknesses in the internal and external environment, a strategic positioning of the product / service was the interim-result of the

discovery phase. The next phase is to investigate the specific problem space to increase the ability to successfully find an innovative solution.

C-2-1 Problem Definition

The strategic positioning of the product / service based on market trends, (latent) customer needs, and organizational strategies and futures is the interim-result of the preceding step and input for the investigation phase and process. In this process step the specific problem is identified by scoping and bounding the problem based on the external and internal environment. This is essential because it affects the ability of actors to find a sound solution and manage the further process in reducing costs, time and energy.

Formulation of the specific problem and problem space is necessary to define the problem space in which a solution can be found. Next an *analysis* of the needs, constraints, alterables and societal factors of the problem is required. It allows one to define the organizational objectives, needs and requirements concerning the product / service. Lastly, *interpretation* of the defined challenge from different perspectives allows for objective reasoning. By evaluating if the defined challenge describes the problem it can be assessed if in the next process a crisp and clear search area and objective measures can be identified.

The overall cost of this process is low-medium and the required effort is medium, a dedicated team that commits themselves to solving the problem should be accompanied by a facilitator from the innovation facility that has the capability to integrate both the external and internal environment to determine the search area for alternative courses of action. The resources and fte required thereby remain low.

C-2-2 Formulation of Search Area

When the problem is properly defined, search areas have to be defined together with objective measures. Search areas are bounded areas in which the organizational strategies and potential futures are aligned. Moreover it is the area in which potential solutions for the problem ought to be *formulated*.

By *analyzing* the organizational strategies, futures and needs for innovative solutions within the organization and the separate business units, the objectives for innovation can be identified. Thus, the objectives of the organization for the product / service have to be defined. Based on these findings, objective measures can be set for the solution space to make sure the solution is in line with the organizational needs and objectives. This results in a set of objective measures of the product / service which have to be used to reflect and evaluate interim-results on in all proceeding phases. Failures or deviations can be coped with in order to reduce the risk of innovation. The output of this process step is a bounded search area in which a solution can be discovered. The boundaries are set by the organizational strategies and potential futures in combination with technology, market needs and core competences of the organization. Lastly, *interpretation* of the results has to be performed. The search area has to be evaluated based on the strategic positioning of the product / service and the organization. Next, commitment has to be found by a problem owner or sponsor to allocate resources for finding a solution to the problem.

Elements for Objective Measures
<ol style="list-style-type: none"> 1. Does it fit with the strategic positioning? 2. Does it fit with organizational futures? 3. Is there a perceived benefit for the organization? 4. Is there a market, a client group? 5. Can it achieve commitment of the problem owner? 6. Does it solve a problem or does it add value to an existing service? 7. Is it not offending common moral, and social values? 8. Is it compliant with regulations?

Table C-3: Formulation of Search Area - Elements for objective measures

The objective measures have to be determined based on the elements presented. The determined objective measures have to be used during the process to evaluate progress and determine to kill or proceed an effort.

C-3 Ideation

After identifying the problem space and narrowing down the search area, ideas have to be generated and selected. An important note is that in the chaotic system of innovation an idea can also be the starting point. If this is the case a direct feedback loop is essential into the investigation phase to determine the problem space and define the search area to increase success of delivery.

C-3-1 Idea Generation

Creativity can be seen as a means to find solutions to a proposed problem, in this case an innovative solution. The process from a problem towards a solution requires to be a structured approach to increase efficiency and effectiveness (Mumford, 2012). This process should be guided by a facilitator that is aware of the tools and techniques that can be used to facilitate the process.

First, *formulating* the tasks, decomposing the task, choosing a toolbox for ideation and evaluation is required to structure the process. Divergence by generating ideas is necessary. Second, by clustering and converging the ideas an *analysis* can be performed. Clustering of ideas adds quality to the collection of ideas by making connections, exploring and building an understanding of a solution space. Some types of clustering are: object, morphological, functional and gestalt clustering (Tassoul & Buijs, 2007). After clustering, convergence of clustered ideas is required to find a(n) idea(s) to be developed and find consensus on the path of solution finding. Lastly, *interpretation* of results by evaluating on set objective measures is needed to enhance progress of the process. By presenting the idea(s) to the problem owner it can be assessed if there is room for incubating the idea further.

The effort required for the creative facilitation process is medium and the cost is low-medium; attendees that commit themselves to the process are required to actively commit to the process and stop their day-to-day operations.

Setting the perfect scene for stimulating creativity

When stimulating creativity in group processes one can distinguish: the group and the individual cognitive process.

- In order to activate knowledge in the Long Term Memory (LTM), one needs to assemble a search cue in the Working Memory (WM) by external stimuli (Nijstad, Stroebe, & Lodwijkx, 2002).
- Creativity requires new connections between parts of the memory and the memory should be cleared of useless information that blocks connections, in this way ideas can be assessed more easily (de Dreu, 2012).

Moreover, people can only absorb a limited amount of information and stimuli. Therefore the WM should be emptied and fully focused on the creativity task by suiting activities in a stimulating environment. People in groups need an intrinsic motivation, knowhow about the subject and have to be activated to be creative (Baas, 2010). In addition commitment to the process and problem involvement by participants is required to increase the successfulness.

The composition of groups ideally is 5-8 per group (Steiner, 1966). Involvement of multiple actors increases interdependency and barriers to success have been identified (Kolfshoten & de Vreede, 2008). That is why rules have to be set for the creativity game (de Bruijn et al., 2010):

1. Ownership of Ideas; one needs to find agreement on collaboration of ideas
2. Postpone judgments; do not kill any idea during the game
3. Dare to freewheel; go into the nonsensical to follow strange and surprising hunches
4. Quality through Quantity; generate lots of ideas to find some interesting and surprising ideas

In addition, to achieve progress of the collaboration social modifiers can be used to increase social progress in groups and process modifiers can be used to improve time efficiency and improve the process (S. Knoll, 2012). Lastly, ThinkLets can be used to collect, create, document and test collaborative activities of a group. The content is presented in table C.4.

Social Modifiers	Process Modifiers	ThinkLets
Anonymity (no association)	Limited Input (limit of each participant)	One Page (single public storage)
Identification (tagging)	Comparative (new must be better)	Free Brainstorm (own private storage)
Nominal (private list)	Commenting (new is a response)	Leafhopper (swapping of storage)
Osborn (large number)	Qualitative Evaluation (response by criteria)	Branchbuilder (topics and swapping)

Table C-4: Idea Generation - Social, process modifiers and ThinkLets

A facilitator of a group is responsible for the group and individual progress of the process. Ideally the facilitator should be accompanied by an assistant that supports the facilitator and processes knowledge (de Bruijn et al., 2010).

Facilitator Competences
<ol style="list-style-type: none"> 1. Authority 2. Substance (Knows about the content of the problem, external and internal environment) 3. No conflicting interest (No input may be delivered or judgments may be made) 4. Aware of group and cognitive processes (In order to apply social, process modifiers and ThinkLets)

Table C-5: Idea Generation - the facilitator

Tools and process

When a solution to a problem is needed, the solution space for idea generation can be categorized in five elements presented in table C.6: 'Inventory', 'Associative', 'Provocative' (Osborn, 1993; Gordon, 1961), 'Confrontative' (de Bono, 1970) and 'Intuitive' (Tassoul, 2009).

Category	Techniques and procedures	Thinking mechanism
Inventory	Shedding the known, Mindmap	Analysis of the current knowledge, Clustering / categorization
Associative	Classic Brainstorming, Classic Brain writing, Mindmap	Association - opposition, commonalities, Part - whole, causality, closeness in time and space
Provocative	Presumptions / assumptions, Provocative questioning, Synectics	Identifying presumptions / what else? E.g. what if we were to make 1000% more turnover? Inside out / upside down etc., Metaphorical process to make the familiar strange (e.g. How would Donald Duck do this)
Confrontative by Analogy	Dynamic brainstorm, Lateral thinking, Random stimulation	Classic brainstorming subjected to stimuli, Analogy (personal, direct, symbolic, fantastic, paradoxical)
Intuitive	Qualitative Evaluation (response by criteria)	Persona's and situations, Go for a walk and focus on senses)

Table C-6: Idea Generation - Tools for creativity

When converging into a(n) (selection of) idea(s). It is necessary to evaluate ideas on set evaluation standards (Tassoul, 2009). These standards have to be communicated beforehand to secure the transparency of the process and increase the successfulness.

Evaluation and Selection of ideas
<ol style="list-style-type: none"> 1. Criteria; specification, requirements or wishes 2. Intuitive techniques; interesting, innovative, inspiring, elegance 3. Inventorying techniques; itemized response (+/-/interesting/concerns), advantage / limitations and uniqueness 4. Confrontative techniques; devils' advocate 5. Sorting techniques; dots, clustering, c-box (axes with innovativeness and feasibility) 6. Selective confrontation; make criteria on the spot based on participants

Table C-7: Idea Generation - Evaluation and selection

C-3-2 Mastering the Idea

After a selection has been made on a(n) idea(s) that will solve the set problem which are (is) in line with the objectives and goals of the organization the idea will be consulted to knowledge partners and internal interested entities. These parties are allowed to have a look at the output of prior steps in the process to investigate if they might have ideas and solutions. Based on the search area knowledge partners can give input and are encouraged to share technologies and best-practices for solving the problem. In addition these parties can give feedback on ideas that are developed during the creative facilitation process by participants of the sessions hosted by the innovation hubs. By pitching their solutions and technologies to the problem owner, successfulness of finding an innovative solution to an idea can be increased. It is chosen to invite the knowledge partners after idea generation process. In this way idea generation is not subconsciously influenced by the ideas and technologies that are presented by the knowledge partners, which can limit the creative capacity of participants.

By first, *formulating* the goals for mastering the idea it can be assessed if technologies and potential ideas suggested by knowledge partners and internal entities have added value regarding the objective measures that are set to solve the problem. Second, an *analysis* needs to be performed in which is assessed if alternatives pitched by other parties have added value. Lastly, *interpreting* results by evaluating on set objective measures is needed to enhance progress of the process. Before entering the next phase it is required to communicate the idea to the applicable BMT and sponsor, because in the next phase effort and costs will rapidly increase. Thereby it is important that is emphasized on presentation of the final idea that meets the goals of the organization and find commitment for development. The presentation should be a pitch that incorporates the next elements:

Elements of a successful pitch
<ol style="list-style-type: none"> 1. Engage, Inspire and Convince the audience 2. Know what the audience is searching for 3. Introduce a clear Problem, Business challenge 4. Show the Need for Innovating (what does it add to the current portfolio) 5. Stress the Organizational Benefits (aligning with organizational strategies and potential futures), Objectives and Needs 6. Introduce the Idea, hard data and facts to back it up 7. Visualize the idea 8. Have a Proof Toolbox to prove your idea (revenue, technology, added value, cost efficiency) 9. Focus on the Objective: get to the next step

Table C-8: Idea Generation - Elements of a successful pitch

C-4 Incubation

Incubation of a mastered idea into a concept design is the core of this phase. In order to increase the successfulness of delivering innovative ideas, it is important that ideas can be designed, developed, tested and released in a safe and secure environment, before testing its compliance with legal and risk requirements. These separate entities in the organization are therefore not included in the first incubating process step, but are included after finalizing a minimal viable product (MVP) to conduct a feasibility study and formulate a concept design. After this process, lean six sigma teams for achieving

operational excellence can be integrated to optimize efficiency of the process for delivery and initiate the development.

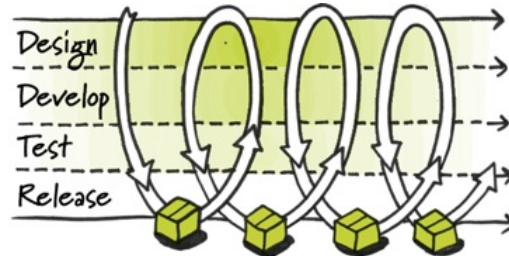


Figure C-2: Incubation - Scrum Agile Project Management, Thoughtworks (2013)

Developing and testing in a secure and safe environment provides the information necessary to build a solid and realistic design. In this phase first a MVP has to be delivered. Second, specific formulation of the design have to take place to deliver a concept design that can be further tested.

C-4-1 Brief Design

Based on the mastered idea that has been agreed upon by the applicable BMT a MVP will be designed. In this process no interference of entities that limit the creative boundaries are integrated. A landscape in which no legal, risk and compliance parties are present allows for creativity to transfer the idea into a MVP.

By using Scrum agile project management continuous delivery is made possible (Schwaber & Sutherland, 2011). Through short sprints and milestones many releases and evaluations can take place in a low risk environment. By reviewing early and often it is aimed to remove major objections that would otherwise impede adoption¹. Sprints of two or three weeks in which is designed, developed, tested and evaluated will result into a MVP. By evaluating on objective measures, progress of the endeavor can be assured and the pace of delivering can be maintained

Innovation hubs can facilitate this by using the next tools:

Tools for Incubation

1. Secure servers to try out with test-data
2. No interference of compliance, risk and legal that restricts the problem space
3. Scrum agile project management for innovation management: short sprints with design, develop, test and evaluate cycles to fail fast or succeed quickly
4. Feasibility study: based on the brief design a feasibility study can be performed integrating legal, risk and compliance parties
5. Knowledge partners with new technologies, tools and expertise

Table C-9: Incubation - Tools

¹Internal document - Way of Working

Feasibility study

After developing and finalizing the MVP integration with parties from legal, compliance and risk is required to conduct a feasibility study. In this study the question needs to be answered till what extent the design can be delivered giving the restrictions that are imposed by authorized bodies. In this way it can be assessed if the design can be further formulated into a concept design. These authorized bodies are legal, finance and compliance entities of the organization that will verify if the MVP is aligned with regulations and organizational boundaries. When performing this cross-functional effort, the feasibility can be assessed and the minimal viable product will be exposed to organizational limitations to assess if the pre-developed idea can be further developed into a practice or that it has to be killed.

When the MVP and feasibility study have been communicated to the problem owner and agreed upon, it is necessary to formulate the design into a concept that can be further developed. In addition, operational excellence teams should be included to increase quality of the process. In this way operational excellence and managing innovation can be combined and strengthen each other.

C-4-2 Formulation of Design

When the feasibility has been conducted a design can be formulated. The goal of the formulation of design is to formulate a concept design that can be communicated to the applicable BMT. Consensus has to be found on the added value and feasibility of the idea to be implemented in practice before developing the idea and testing it. Hence, a business case has to be developed. Elements that have to be incorporated in the formulation of the concept design are (Buijs, 2012c):

Elements for Formulation a Design
<ol style="list-style-type: none"> 1. A prototype, the concept design 2. Targeted clients 3. Delivery date 4. Competitive offerings 5. Estimated costs and profits 6. Detailed features and technology required

Table C-10: Formulation of Design - Elements

By using sprints and milestones to develop a concept design quickly, the risk of development will be decreased. This will result in a concept design that is ready for testing by the applicable business unit(s) on a larger scale. In the separate business unit the incubated idea can be developed further to deliver the product / service to the market. Hence, the added value of the innovation hub ends after this process step. Development and implementation should be conducted in business units based on their management practices, preferably by using scrum agile or in future an innovation management practice.

C-5 Development

The core of the development phase is scaling up of the concept design and validating by testing. By testing the design internally, performing pilots in practice and validating the concept, the design can be finalized.

In the business unit the concept design will be further developed into a fulfilling product that meet the needs of the targeted clients and the organization. The function of the innovation hub reduces after the incubation phase. Cross-functional integration has been performed and the different entities that have to be aligned for successful delivery are connected. The way of working within the business unit depends on the project management tools that have been embedded in the business unit. What is important is that the separate entities still have to follow the process for innovation; by reflecting and evaluating on objective measures successful delivery can be achieved more efficient and effective.

Testing and validating the design by means of pilots or other means will result in a final check on the functionality and improving the design. By iteratively adjusting the design on user experiences the design have to be set for meeting the demands of the targeted clients.

After completion, the final design has to be communicated to the applicable BMT before implementing it in practice. This is the last strategic moment when communication with the BMT has to take place.

C-6 Implementation

When agreed upon the final design the way of introducing the product / service to the market have to be determined. At this point in time the product / service has full visibility, it is either possible to introduce it under the wings of the organizational brand or introduction by means of a separate entity that has no direct linkage with the organization. This decision has to be made based on the organizational strategy. It is a strategic decision that may heavily affect the successfulness and will have to be made for innovations with a more radical character because it will change the brand image.

After implementation a next iteration will take place in time. A launched product / service may, and will, in time not meet objectives, goals and requirements of the organization and the demand of the market. Introduction will lead to strategic behaviour of competitors and an adapting environment, thus the next innovation cycle will insuperable restart as a result.

Appendix D

Interviews

In this appendix interviews with experts in the field of innovation are presented.

D-1 A.J. Berkhout

In this interview (which is conducted in Dutch) the holistic system is validated in which the process for innovation functions. The next requirements are validated: O-R_{2,3}. L-R_{4,7,8,9}.

Wat is het Cyclic Innovation Model (CIM)?

'CIM is een manier van formaliseren van innovatie binnen organisaties. Hierbij gaat het om een pad voor innovatie, geen proces. Innovatie moet plaatsvinden in een systeem, het gaat om de toekomstvisie van de raad van bestuur, de richting die ze willen geven. Alleen dan kan een innovatie proces functioneren. De interactie tussen de verschillende onderdelen in het model is vereist om innovatie mogelijk te maken en kruisbestuiving zorgt hier voor.'

Hoe beoordeelt u de innovatieve capaciteit van banken?

'Banken zijn teveel product-push georganiseerd. Het moet naar een visie gaan naar wat klanten willen in de toekomst, en vaak weten klanten dit niet en moet een visie aanwezig zijn.'

Hoe kan innovatie plaatsvinden?

1. Visie; een visionair met leiderschap die de rol van de bank in de toekomst aangeeft. Alleen dan kan een proces bestaan dat geïnstitutionaliseerd is.
2. Top-down moet er richting gegeven worden aan de visie voor innovatie. Daarnaast moet het, het proces voor innovatie faciliteren.

Operational excellence binnen organisaties vs. innovatie?

'Efficiency gaat niet samen met innovation. Operational excellence kan verwoord worden als het hebben van voldoende resources voor het funden van innovatie, echter gaat het om het institutionaliseren van innovatie in de grondvesten van de organisatie.'

Tijdelijk vs. Continue innovatie

'Tijdelijke initiatieven zijn een ramp, organisaties moeten continue voorbereid zijn op de toekomst, nogmaals de visie moet helder zijn en initiatieven moeten daarin stevast aanwezig zijn. Phillips en AMSI doen dit goed en hebben decentrale innovatie systemen opgericht omdat ze op deze manier aan de regionale vraag kunnen voldoen. Er is een visie voor innovatie en die wordt uitgevoerd met decentrale initiatieven.'

Cyclisch process model voor innovatie vs. evolutionair / spiraal ontwerp voor innovatie?

'Slechts tijd is een variable, indien je deze toevoegt ontstaat er een spiraal vorm. Dit is de basis van het CIM. Het model is chaotisch in plaats van linear en de structuur van een process dient om; ten eerste het bereik aan te geven, ten tweede om mensen op de hoogte te stellen van een process en ten derde om het process te structureren.'

D-2 J. Buijs

In this interview (which is conducted in Dutch) the process model for innovation is validated. The next requirements are validated: O-R_{4,6,7}. L-R_{1 - 12}.

Wat is het Delft Innovation Model (DIM)?

DIM is een simplistisch model. Het zijn de stapjes in het model om the process te begrijpen en alle onderdelen in dit model hangen samen. In dit model is de 'product use' stap toegevoegd. Het betreft de veranderderlijke wereld waar een manager geen invloed op heeft. Dit is een verschil met het stage-gate model samen met het cyclische aspect.'

Hoe kan innovatie plaatsvinden binnen een organisatie?

Innoveren op lead-time is een eindig proces. Innovatie kost energie en het standaard patroon moet onderbroken worden met energie om innovatie mogelijk te maken. Daarvoor is nieuwe kennis nodig, de status quo blokeert innovatie binnen organisaties.

Daarnaast is een innovatie tijdelijk, een organisatie tracht een monopolie te bereiken met een product wat vervolgens beconcurreerd zal worden.

Cyclisch process model voor innovatie vs. evolutionair / spiraal ontwerp voor innovatie?

Het spiraal model ondersteun ik, in mijn colleges benadruk ik ook het evolutionaire karakter van het innovatie proces. Het model heeft gates en in-process metrics, zo kan innovatie gestructureerd worden.

Worden de requirements, overeenkomstig met de requirements gesteld door Cooper nageleefd in het model en zijn deze requirements de juiste?

Het model van Cooper, (het Stage-Gate model) is een juiste benadering voor het managen van innovatie projecten. De requirements zijn prima om een project te managen en als ik het model in de studie zie, kan ik dit duidelijk uitleggen en zie ik dat het in grote lijnen het DIM en Stage-gate Model respecteert. Het belangrijkste verschil wat ik zie is het spirale element, dat ik zoals gezegd ondersteun.

Is de rol van documenteren en kennis overdracht in het model overeenkomstig de theorie geïmplementeerd?

Documenteren "as such" is onzinnig, er moet iets mee gedaan worden. Een actief lerende organisatie moet ontworpen worden waarin kennis wordt gebruikt. Bij gates moeten keuzes gemaakt worden op basis van bekende waarden.

Daarom ook moeten managers meespelen in de processen en meedoen met innovatie om zo kennis te maken met het krachten spel en de obstakels van innovatie.

Hoe moet het process model gecoördineerd worden?

Objectives moeten gesteld worden die niet coördineren op cijfers, dat zorgt voor perverse effecten. Het coördineren moet gebeuren op basis van de inhoud en of het process goed doorlopen wordt.

Zijn de fasen en de process van het ontworpen model in lijn met het DIM?

'Als ik het model zo zie kan ik het goed uitleggen en de essentie komt overeen met het DIM. Wat belangrijk is, is dat de "discovery" fase buiten de scope van managers valt. Het gaat om de potentiële klant en ING heeft hier geen invloed op, het zal hier achter moeten komen en het vertrouwen van de klant moeten winnen.'

Hoe zou kennis overgedragen moeten worden?

Een database met kennis heeft alleen nut als managers bij elkaar zitten en persoonlijke kennisoverdracht plaats vindt. Kennis in een database "an sich" heeft geen toegevoegde waarde en helpt niet voor innovatie.

Appendix E

CONFIDENTIAL: Interviews

In this appendix, confidential interviews and workshops with stakeholders that are connected to ING are presented.

E-1 Confidential

E-2 Confidential

E-3 Confidential

E-4 Confidential

E-5 Confidential

E-6 Confidential