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DESIGNING AND IMPLEMENTING A METHOD TO BUILD INNOVATION CAPABILITY IN PRODUCT DEVELOPMENT TEAMS

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ABSTRACT
This paper presents a framework and process (MINT) to support product development teams that have an ambition to improve their capability to manage both radical and incremental innovation. The driving force for the method was a clearly expressed need from teams to be able to measure and direct and change their own innovation work practice. The paper encompasses a longitudinal collaboration between academia and industry and aims to contribute to the development of a deeper understanding of how to successfully implement design research results in practice as called for by the design research community. The MINT method which is outlined in the paper has been developed and successfully adopted to the need of different teams in several companies. The learning outcome from the research project is analysed and three categories of critical factors which relates to the design, content and implementation process of the method are discussed and compared to relevant innovation and change management literature.

Keywords: collaborative design, innovation, product development, team work, design methods

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1 INTRODUCTION

Product development is continuously faced with grand challenges. Megatrends such as globalization, the pursuit of sustainability and low-cost manufacturing are constantly affecting teams with new and increased requirements. As a consequence, the development of products needs to be both efficient – delivering on time with high quality and low cost, and innovative – delivering new values to customers that supersede formerly delivered values as well as those delivered by competitors. This requires that established companies develop the capability to refine and further improve their existing knowledge base in order to manage incremental innovation, *and* to simultaneously search for new areas of knowledge and identify opportunities for radical innovation (Tushman and O´Reilly, 1996). In other words, companies need to develop their innovation capability. With innovation capability, we mean the capability to manage and effectuate the creation and realization of both incremental and radical products that become successful in the marketplace. This becomes a true challenge in practice, since the ways of organizing and working to support incremental and radical products often stand in direct conflict with each other. Understanding how to implement and manage such a "dual" strategy harmoniously is, therefore, a lesson companies are looking to learn (Magnusson and Martini, 2008). These days, companies can, to a large extent, be considered to be composed of teams; the challenge for companies is to facilitate a team environment conducive to both types of innovation. Making use of product development teams as a means of building new capabilities has previously been suggested in extant literature as these teams often work autonomously, and are a key in customer value delivery (Leonard-Barton, 1992). It can be argued that increasing companies' understanding of how to develop support and tools that simultaneously enable teamwork and team learning will provide a viable path for companies experimenting with building innovation capability. Teams can thus be considered to be a proper and productive unit of analysis for research and for intervention in developing such support.

How to increase innovation capability in practice is the very core of this paper. We focus on teams in product development, as these are the operating unit. The driving force for the method that will be presented was a clearly expressed need of teams to be able to measure and direct their own work in order to increase their innovation capability. The paper will encompass a longitudinal work of a collaborative effort between academia and industry that strived to develop concrete and actionable support for teams in order to induce change for an increased innovation capability. The paper thus contributes to the development of a deeper understanding of how to successfully implement design research results in practice, as called for by the design research community (Blessing and Chakrabarti, 2009; Cantamessa, 2003). Empirical investigations will be presented, setting the base for the focus of the paper: the development of a team support method for increasing innovation capability.

2 THEORETICAL FRAMEWORK

The literature on innovation management is rich in models and frameworks on how to successfully manage innovation. The general innovation models by Tidd and Bessant (2009), Goffin and Mitchell (2005) and Davila et al. (2006), the technical innovation audit (Chiesa et al., 1996), the new product development process proposed by Clark and Fujimoto (1991) and the holistic model of innovation capability within the firm developed by Lawson and Samson (2001) constitute some examples. These frameworks differ in their design and content, but a common attribute is their focus on the organizational level rather than the team level, making the need to understand how to translate them into a useful means of support for teams a critical task. There is no consensus of what the most critical dimensions of innovation capability might be, but it can be argued that some commonality exists around key enablers based on studies in highly innovative companies. The need to have an innovation strategy, an innovation process, and a culture that supports innovation can be considered such key elements. Some approaches and practices emerge as more important than others: educating about the nature and importance of innovation and change; generating capabilities to manage multidisciplinary teams for creative group-problem solving, communicating a clear image of the organization's strategy, goals, and core values, and emphasizing values such as meeting users' needs, risk taking, and tolerance of failure (Tushman and Nadler, 1986). Furthermore, research results from companies known for being successful in repeatedly generating both incremental and radical innovation over long periods show that these organizations have highly effective learning systems: they are characterized by a self-critical attitude and a capability to learn to improve existing ways of working, as well as having developed preparedness for the future. The mechanisms underlying successful management of both incremental

and radical ideas are not well-understood, and that is why companies at present are experimenting with trying to learn how to deal with this duality by searching for new ways to manage work and processes (O'Connor and DeMartino, 2006; Bessant, 2008). In the context of a team-based organization, having shared mental models is fundamental to team learning, as the foundation of collaboration is to build a mutual conception of the tasks that the team is to fulfill on (Van den Bossche et al., 2011). Druskat and Pescosolido (2002) describe a shared mental model as a situation where the mental models of the individual team members are similar, which leads to a shared approach to the tasks and processes of the team.

Using innovation measurement is one mechanism that can support the development of a shared mental model as the use of measurement has shown to affect intrinsic motivation and empowerment through creating meaning by increasing understanding on how a particular action fits within the broader scope of the organization (Hall, 2008). Further, using measurement can motivate and inspire new behaviors (Simons, 1990; Kaplan and Norton, 1982) as well as support team-autonomy (Meyer, 1994). Innovation measurement literature stresses the importance of measuring a wide variety of areas, such as innovation strategy, ideas and ideation, customer and market, organizational learning and knowledge management tools, and organizational culture and leadership (Adams et al., 2006; Crossan and Apaydin, 2010; Chiesa et al., 1996), but is less clear on how these dimensions are connected and how they can be translated into measures and indicators that are useful in practice (Smith, 2005). Practitioners thus currently lack the requisite metrics to make informed decisions about their innovation processes or programs. For companies that do measure their innovativeness, the most common use is R&D and product-development metrics only, such as number of patents filed, percentage of sales from products introduced in the past year, and number of ideas submitted by employees; metrics that offer a limited view of a company's innovativeness (Muller et al., 2005). Further, these metrics are less helpful in supporting teams' understanding on how to develop their innovation capability.

In order to develop a tool that supports teams to continuously learn how to become more innovative, change management and organizational learning research also need to be consulted. Organizational learning has been shown to play a key role in achieving speed and flexibility in the innovation process (Jiménez-Jiménez and Sanz-Valle 2011; Brown and Duguid, 1991). According to Kolb (1984) the learning process for individuals needs to include both active experimentation and reflective observation. Individual learning and knowledge sharing is a key for organizational learning, though not the only criteria. Porras and Robertson (1992) define a model for organizational development, highlighting that it is the actual behavior of individuals that needs to be changed in order to develop the organization. Birkinshaw et al. (2006) refer to organizational development as organizational innovation and state that organizational innovation needs to be incremental and conducted in steps in order to create a lasting change. A prescriptive and known pragmatic approach to change management is the eight-step procedure for transformational change by Kotter (2007). He defines a need to reveal a state of urgency in order for a change process to start, as well as actually produce an initial perceivable change among the people involved in the change work. Building innovation capability can be argued to have this type of transformational character, as it has been shown that these capabilities cannot be achieved simply by implementing the systematic management of innovations. Rather, a fundamental rebuilding of the social structure and values is necessary to create an innovation enhancing culture (Amabile et al., 1996).

Based on existing theory, the following research questions emerge:

1) How can teams be supported to develop their innovation capability?
2) What are the critical factors to consider when implementing support for teams that strive to develop their innovation capability?

3 RESEARCH DESIGN

The method this paper will present is one of several results from a longitudinal study comprising multiple steps and repeated data collections. The five-year study is typical of an action-research approach; the research has been conducted concurrently with action, and researchers have participated in actions within the organizations (Coughlan and Coghlan, 2002). The purpose has been to benefit from the great potential of creating new knowledge through collaboration between practitioners and researchers that, without the collaboration, would have been hard to discover (Fendt and Kaminska-Labbé, 2011). Coghlan and Coughlan (2010) define four quality dimensions of action learning:

engagement with real life, collaborative nature, reflective character, and workable outcomes/actionable knowledge. The research presented here is well aligned with all of these dimensions, with the critical events in the study, method for data collection, and data analysis described below.

The initial part of the research project was a pilot investigation performed by a group of senior researchers aimed at identifying critical issues for increasing innovation capability in these companies (Olsson et al., 2008). Ten industrial organizations were part of the study which all had knowledge-intensive development work within their organization, and delivered a range of highly complex technical products with value from goods and services. The companies varied in size, from large global organizations, to small privately owned firms. This pilot investigation revealed needs for support of teams, and importantly, the need for measuring innovation and innovation capability. These needs were critical for the following parts in the study.

The second part in the research study was a close collaboration with five organizations that agreed with the need to develop support for teams, and stated an ambition to engage in developing support for them, implementing changes in ways of working with innovation. At this time, the organizations were different in size, structure, and business area, though they shared a commonality in the development of complex and knowledge-intensive products. Interviews were conducted in a two-step procedure. First, interviews in two organizations were deeply analyzed and categorized into a *measurement framework*; second, this framework was validated from the interviews in three additional organizations. All interviews contributed to identifying needs for support when working with innovation and change for increased innovation capability. A *procedure* for applying the framework in a team setting was then designed and tested in the five organizations. The framework and the procedure were named MINT (Measuring Innovation in Teams), and have previously been reported in Regnell et al. (2009). In total, 24 interviews were conducted (6+6 related to the first step, and 3+3+7 related to the second step).

In the third and fourth part, MINT was tested and applied within the contexts of these organizations, then revised and further developed. In the fourth part, it was designed specifically to be used as a company-specific tool. During these parts, numerous conversations and reflective meetings were held with researchers and representatives of the organizations in parallel to the active interventions where different versions of MINT had been applied to teams with different functions and levels in their respective organizations. Observations were made during these organized MINT workshops, with evaluations and feedback on the methods gathered during and after. Part three lasted for a period of six months with three workshops held, and part four lasted around twelve months, with five workshops held. Thereafter, company specific tools based on MINT were designed and put into use. Parts three and four were indeed crucial to the application and verification of MINT, in addition to also revealing important findings concerning prerequisites for support for increasing innovation capability, thus contributing to the research society with input on how to apply and package research results.

The single most important data collection method has been interviews. Semi-structured research interviews were conducted according to the methodology described by Kvale (1996). Interview guides have been used, and the interviews transcribed and categorized. These categories have been analyzed in two ways: identifying concrete factors for innovation in teams as defined by practitioners, where little further analysis has been conducted, and a deeper, more thorough analysis concerning the sometimes hidden needs and perceived prerequisites for support in daily practice when conducting changes for increased innovation capability.

4 RESULTS

The first part in the study revealed the need to focus on teams and on measuring innovation and innovation capability. This part also illustrated a challenge within firms for allocating resources to develop new ways of working that has been interpreted as a need to develop support that are using as little resources as possible within a company. The second part laid the foundation for a framework that describes issues and factors that are crucial for innovation in teams; the *framework* represents the content in a change activity, where the *procedure* represents the form for initiating change. The framework and the procedure – the latter developed based on change management literature and the prerequisites identified in the two first parts of the study – constitute the method MINT that will be described below. The needs that the part studies have revealed could be summarized in the following requirement list for the method:

- Include an overview of what innovation is about
- Spur reflection on what innovation is, and how it is performed in the company at present

- Provide information on critical factors known to facilitate innovation
- Provide a structure on how to improve the team's present way of working and organizing

Based on theory, the method needs to make room for reflection that engages many individuals, because this facilitates innovation, and because it is a key driver for sustainable change. It also needs to inform the team about what is important to improve, in order to act as an initiator of change. The method needs to support changes in behaviors, not simply direct towards required results. These principles have formed the basis of the development of MINT.

In part three, MINT was implemented by one researcher in collaboration with a practitioner leading an effort to increase innovation capability in an R&D development unit. Attracted by measurement as a principle, the company was highly interested in developing means for increasing innovation capability, with a high ambition to develop long term interventions for continuously improving ways of working – that is, by using a learning approach. The framework and the procedure were applied in a workshop setting which gathered about 20 engineers from the unit, and with a few iterations in a smaller team, the method resulted in new metrics in the R&D development unit that had undertaken the procedure. Later it was also applied on management level, again resulting in complementary metrics for the whole R&D organization. The defined metrics were an important result for the organization; also in addition, the fact that the method allowed teams and individuals to engage in the aim of the company to increase their innovation capability was also identified as crucial, and clearly illustrated the potential for the method to support change for increasing innovation capability both in terms of change content, and structure for change.

The interventions with a second company in the fourth part brought an even higher ambition from the company's side: to develop a method requiring little resources in its application, allowing teams to take a first step in a self-managerial approach to increase their innovation capability. The rhetoric of measuring innovation capability was attractive, however a systematic procedure which teams could be guided through was even more important. The head of innovation management initiated an expansion of the support material to strengthen is as guidance in a self-deployment of the method in teams. Examples from practice and statements from researchers were included. The effort to induce action within teams was further strengthened by tailoring the method to the company´s innovation vocabulary, which made it even stronger for them as all their change initiatives were aligned with each other. Today, the method is applied globally by this large industrial company.

3.1 The framework and process

The interviews in part two lead to an identification of critical factors for innovation work. In total, 150 factors were compiled that were then categorized into four major areas: Idea Management, Project Selection, Organization of Actors and Activities, and Results and Effects, see Figure 1. Within each key area, subareas were found, and factors were translated into innovation indicators.

A basic idea with MINT is the involvement of team members in defining an action plan for the team itself. This action plan is constituted by identified challenges to the team concerning their innovation capability, defined actions for meeting these challenges, targets for actions, and indicators for following-up on actions. The involvement of team members, defining their own action plans as well as the systematic approaches to defining actions is a key factor of the method being an actual support of change. This work is facilitated by the framework having key areas that support in the reflection of current team work activities, their innovation capability, and what the innovative work is constituted by. Table 1 exemplifies the underlying challenges related to each key area.

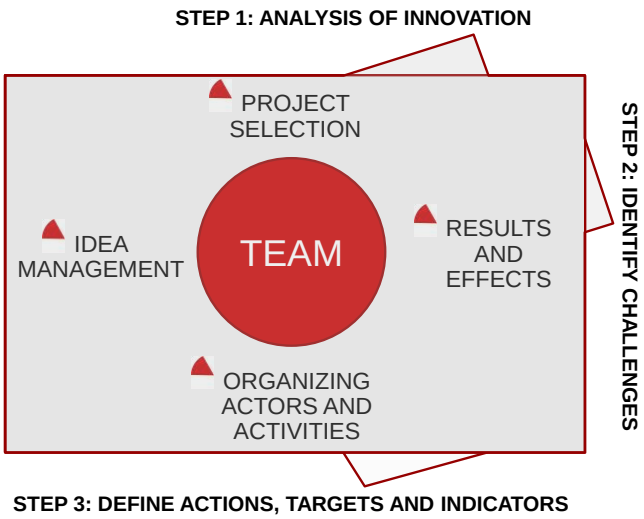

Figure 1. Key areas in the framework representing the core in MINT. The framework is facilitating each step in the method.

Table 1. For each key area, possible challenges are exemplified in order to facilitate the analysis and reflection step in the MINT procedure. A narrowed selection of these challenges is presented in the table.

Idea Management	**Project Selection**	**Organizing Actors and Activities**	**Results and Effects**
We need to: • Increase no. of ideas • Increase quality of ideas • Use systematic idea generation methods • Ideas from different areas and competencies • Involve users • Observe users	We need to: • Create a systematic decision process for project selection • Consider different aspects of innovation (Product/Service/ Market/Business Model) • Find balance in the project portfolio regarding time, size, and risk.	We need to: • Define an innovation process • Consider roles and authorities for innovation • Increase collaboration between functions in the company • Consider team diversity	We need to: • Develop our Service offer • Secure IPR • Develop our Business Model • Improve the communication of our results internally

MINT includes a fairly easy flow of activities. The framework, procedure, and supporting material are designed to be used in a workshop with three major steps, also represented in Figure 1:

- Analysis of Innovation: Discussion/Dialogue on innovation, what it is for the team and how the team works today to be innovative. This step is a reflective observation of innovation as a phenomenon, and the current work for the team – this part is crucial for the ability to change to working in new ways.
- Identify Challenges: Facilitated by the support material, the team is encouraged to identify the challenges they see for their increased innovation capability. For identifying challenges, inspiration is found in the key areas of the framework and in the more detailed exemplification as described in Table 1. Through the identification of challenges, the team sees a clearer picture of their need to change, and consequently finds motivation for change.
- Define Actions, Targets, and Indicators: For each challenge, one or several actions are then defined by the team. The actions can be defined, which is often perfectly feasible, based on the collected experience of the team, and also inspired by the support material. For this matter, the support material contains an innovation guide that describes possible actions and indicators for challenges. For each action, a target is set and an indicator defined. Through this final step, a systematic action plan for change is created.

This flow of activities has a certain logic where each step has a distinct purpose and each purpose is critical to actually support the change that is strived for when deploying the method. Analysis has the purpose to support reflection; identifying challenges support reflections and also creates motivation; defining action is a sort of conceptualization which gives rise to new ways of working, defining targets is a goal setting procedure and finally defining indicators has the purpose to allow follow-up and create a management support for change.

5 ANALYSIS AND DISCUSSION

The longitudinal research approach used in this study has been driven by a major principle: to integrate research and practice, and develop actionable knowledge for product development teams in practice. The first step in the research project established a foundation for conducting need-driven research, whereas the second developed support for teams based on empirical data. Evaluation of the design support as reported in this paper is performed in two companies through an action-learning approach.
The MINT framework and method can be described as having been successful in the sense of having been adopted in practice by teams in companies. The analysis reveals several learning outcomes on how to successfully implement support for teams aiming to build capability to manage both radical and incremental innovation. The analysis identified three critical categories of factors which are further discussed below. These factors are related to the design, content, and implementation process of the framework.

5.1 Designing a framework and process for learning in teams

The MINT framework is firmly based in teams' everyday work; its systematic process has been seen to initiate and make explicit the different views of what innovation means to different individuals within a team, which then helps develop a shared understanding among team members – a prerequisite for learning in teams (Van den Bossche et al 2011). The framework supported reflection in the teams and knowledge sharing through the use of simple, semi-structured formal interventions. This is found to be an effective way of integrating knowledge in teams, as it provides opportunities for a richer discussion of how the team will apply their combined knowledge to both change and improving existing ways of working in and managing ambiguous and new situations (Okhuysen and Eisenhardt, 2001). The results from the workshops seemed to create a sense of urgency and act as a kick starter for the changing of work practices in the teams. The simple and semi-structured design of the workshops together with their emphasis on actions and goals can be argued to encourage active experimentation, as it is easy for the team to set-up and perform itself on a regular basis. However, it can also be argued that to support more than incremental innovation, the framework would benefit from being more clearly developed to support second loop learning (Argyris and Schöön, 1996); a means of challenging the status quo has been found to be an important capability in generating radical innovation (Bessant, 2008).

5.2 Identifying a content that guides the building of innovation capability in teams

Chiesa et al. (1996) define the need to measure innovation from two critical perspectives: innovation as a process and innovation as a result; this has also been stressed by Crossan and Apaydin (2010). The comparison to the MINT framework is relevant as the starting point for developing a method, since it was the desire of the team members to measure their innovation actions as a way of understanding whether they were being innovative or not. The development of innovation indicators was thus critical in meeting this need from the teams. Despite its potential to facilitate management, measuring innovation is considered particularly challenging (Adams et al., 2006). The content in the MINT method is based on practical needs, and has included suggestions for indicators (150 indicators which takes innovation both as a process and as a result in consideration are included in the workshop material as an inspiration) instead of only appointing critical areas to measure as a way to increase an understanding of how to build innovation capability in practice. By this, the teams are able to select indicators that provide guidance suiting their own ambitions and needs, in alignment with literature on how measurement needs to be designed in order to support teams, rather than only act as controlling device (Meyer, 1994). Moreover, the indicators within the key areas Project selection, Result, and Effects, are taking into consideration the different needs inherent to radical and incremental innovation by encouraging the team to reflect on different types of innovation (services, business models) while striving to balance the project portfolio in terms of risks and time. The general innovation models

described in extant literature (e.g., Tidd and Bessant, 2009; Goffin and Mitchell 2005) take the organizations as the starting point, and have been helpful although the areas and their related indicators in the MINT framework are instead based on the need to support the daily work of teams.

5.3 Implementing to trigger change in innovation work practices in different settings

The tool is based on empirical needs, and its simple and intuitive framework allows adoption to specific company and team settings. In the development of the tool, different types of collaborations between researchers and practitioners have been used to inform the design of MINT support that have been considered to have contributed to its successful implementation. This includes distant collaboration where researchers interviewed company representatives, to more intense collaborations and dialogues between researchers and the practitioners responsible for improving innovation capability in the companies. A collective inquiry process can itself generate data that can radically change practice (Coughlan and Coghlan, 2002). Building trust between partners has been identified as a key issue affecting effectiveness and success of industry and academia why the long term relationship as developed between the researchers and practitioners in the two companies described in this study can be considered an important factor in a successful implementation of the support. It is worth noting that the presence of a researcher for the initial implementation of the framework via facilitation of workshops in the companies is in alignment with the ideas of Birkinshaw et al. (2006) that address the need to find knowledge outside the organization and apply external change agents in order to realize organizational innovation.

Adopting the terminology within the framework of the company's existing vocabulary is considered highly beneficial for the implementation of research-based design support. By this, the framework and its contents are more easily understood by the team members, and it minimizes the risk of the support to being viewed as "just another tool," but rather a more coherent support for the overall strategy implementation within the company and its focus on innovation. Further, the management in the companies found the vocabulary adoption vocabulary to be an effective way to create a common language among its teams in order to facilitate the overall change work. Thus, researchers need to be open to changing terminology to facilitate the implementation of design support in different settings. This is also required for it to become the flexible and dynamic cognitive supportive frame that is required to support teams working in uncertain environments such as innovation (Davila et al., 2006). Instead of striving to develop an overly structured method before implementation, researchers may consider the value in making them more open to adoption in each setting.

This study has contributed to a deeper understanding of factors critical to consider if successfully implementing research-based support for teams with an ambition to build capability to manage both radical and incremental innovation. It is yet too early to fully evaluate how effective the method is in supporting team´s innovation capability development, however, the interest of other companies demonstrates a need for further application, development, and evaluation of the framework and methods described in this paper.

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REFERENCES

Adams, R., Bessant, J. and Phelps, R. (2006) Innovation management measurement: A review. *International Journal of Management Reviews*, Vol. 8, No.1, pp. 21-47.

Amabile, T. M., Conti, R., Coon, H., Lazenby, J., and Herron, M. (1996) Assessing the work environment for creativity. *Academy of Management Journal* , Vol. 39, No. 5, pp.1154-1184.

Argyris, C. and Schön, C.A. (1996) *Organizational Learning II – Theory, Method and Practice*, Reading, Addision Wesley Publishing Company.

Blessing L.T.M. and Chakrabarti, A. (2009) *DRM, a Design Research Methodology*, London: Springer.

Bessant, J. (2008) Dealing with discontinuous innovation: the European experience. *International. Journal of Technology Management,* Vol. 42, No. 1, pp.14.

Birkinshaw, J., Hamel, G., Mol, M.J. (2008) Management innovation. *Academy of Management Review*, Vol. 33, No. 4, pp. 825–845.
Brown, S. J., Duguid, P. (1991) Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation, *Organization Science*, Vol. 2, No. 1, pp. 40-57.
Cantamessa M. (2003) An empirical perspective upon design research. *Journal of Engineering Design*, Vol.14, No.1, pp.1-15.
Chiesa, V., Coughlan, P. and Voss, C. A. (1996) Development of a technical innovation audit. *Journal of Product Innovation Management*, Vol.13**,** pp.105-136.
Clark, K.B. and Fujimoto, T. (1991) *Product Development Performance : Strategy, Organization and Management in the Auto Industry*. Boston: Harvard Business Press.
Coghlan, D., Coughlan P. (2010) Notes toward a philosophy of action learning research. *Action Learning: Research and Practice*, Vol. 7, No.2, pp.193-20
Coughlan, P. and Coghlan, D. (2002) Action research for operations management. *International Journal of Operations & Production Management*, Vol. 22, No.2, pp. 220-240
Cooper, R. G. and E. J. Kleinschmidt (1986) An investigation into the new product process - steps, deficiencies, and impact. *Journal of Product Innovation Management*, Vol.3, No.2, pp. 71-85.
Crossan, M. M. and Apaydin, M. (2010) A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature. *Journal of Management Studies,* Vol. 47, No. 6, pp. 1154-1191.
Davila, T., Epstein, M.J. and Shelton, R. (2006) *Making Innovation Work: How to Manage It, Measure It, and Profit from It*. Upper Saddle River, Wharton School Publishing.
Druskat, V., Pescosolido, A. (2002) The content of effective teamwork mental models in selfmanaging teams: Ownership, learning and heedful interrelating. *Human Relations*, Vol. 55, No.3, pp. 283–314.
Fendt, J. and Kaminska-Labbé, R. (2011) Relevance and creativity through design-driven action research: Introducing pragmatic adequacy. *European Management Journal*, Vol. 29, No. 3, pp. 217-233.
Goffin, K. and Mitchell, R. (2005) *Innovation Management – Strategy and Implementation Using the Pentathlon Framework.* UK: Palgrave MacMillan.
Hall, M. (2008) The effect of comprehensive performance measurement systems on role clarity, psychological empowerment and managerial performance. *Accounting, Organizations and Society*, Vol. 33**,** 141-163.
Jiménez-Jiménez, D., Sanz-Valle, R. (2011) Innovation, organizational learning, and performance. *Journal of Business Research*, Vol. 64, No. 4, pp. 408-17.
Kaplan, R. S. & Norton, D. P. (1992) The balanced scorecard - measures that drive performance. *Harvard Business Review*, Vol. 70**,** pp. 71-79.
Kolb, D.A. (1984) *Experiential Learning*. New Jersey: Prentice-Hall.
Kotter, J.P. (2007) Leading Change; Why Transformation Efforts Fail. *Harvard Business Review.* pp 92-107.
Kvale, S. (1996) *Interviews: An introduction to qualitative research interviewing*. Thousand Oaks, CA, Sage.
Lawson, B. and Samson, D. (2001) Developing Innovation Capability in Organizations: A Dynamic Capabilities Approach. *International Journal of Innovation Management*, Vol. 5, No.3, pp. 377-400.
Leonard-Barton, D. (1992) Core capabilities and core rigidities: A paradox in managing new product development. ', *Strategic Management Journal*, Vol.13, No.1, pp. 111-125.
Magnusson, M. and Martini, A. (2008) Dual organizational capabilities: from theory to practice - the next challenge for continuous innovation. *International Journal of Technology Management*, Vol. 42, No.1/2, pp. 1-19.
Meyer, C. (1994). How the Right Measures Help Teams Excel. *Harvard Business Review*, Vol. 72, No.3, pp. 95-103.
Muller, A., Välikangas, L., Merlyn, P. (2005) Metrics for innovation: guidelines for developing a customized suite of innovation metrics. *Strategy & Leadership,*Vol. 33**,** pp. 37-45.
O'Connor, G. C. and DeMartino, R. (2006) Organizing for Radical Innovation: An Exploratory Study of the Structural Aspects of RI Management Systems in Large Established Firms. *Journal of Product Innovation Management*, Vol. 23, No.6, pp. 475-497.
Olsson A. Ed. (2008) *Innovationsförmåga*, Department of Machine Design, KTH.

Porras, J.I., Robertson, P.J. (1992) *Handbook of industrial and organizational psychology*. Psychologists Press Dunnette, Marvin D. (Ed), pp. 719-822.
Regnell, B., Höst, M., Nilsson, F. and Bengtsson, H. (2009) A Measurement Framework for Team Level Assessment of Innovation Capability in Early Requirements Engineering, *10th International Conference on Product Focused Software Development and Process Improvement*, Oulu, Finland, June 15-17, 2009, Heidelberg Berlin, Springer, pp 71-86.
Simons, R. (1990) The role of management control systems in creating competitive advantage: New perspectives. *Accounting, Organizations and Society*, Vol. 15**,** pp. 127-143.
Smith, KM. (2005), Measuring Innovation, *The Oxford Handbook of Innovation*, New York, US, Oxford University Press, pp. 148-177.
Tidd, J. & Bessant, J. (2009) *Managing Innovation: Integrating Technological, Market and Organizational Change, 4th edition*, John Wiley & Sons.
Tushman, M.L. and O'Reilly, C.A. (1996) Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change. *California Management Review*, Vol. 38, pp.8–30.
Tushman, M & Nadler, D. (1986) Organising for innovation, *California Management Review*, Vol 28, No 3, pp. 74–88.
Van Den Bossche, P., Gijselaers, W., Segers, M., Woltjer, G., Kirschner, P. (2011) Team learning: building shared mental models. *Instructional Science*, Vol. 39, No. 3, pp. 283-301.