Innovation Process Design: A Change Management and Innovation Dimension Perspective

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Abstract. The authors propose an innovative approach to the management of innovation integrating business, process, and maturity dimensions. Core element of the concept is the adaptation of ISO/IEC 15504 to the innovation process including 14 innovation drivers. Two managerial models are applied to conceptualize and visualize the respective innovation strategies, the Balanced Scorecard and a Barriers in Change Processes Model. An illustrative case study shows a practical implementation process.

Keywords: Innovation management, Innovation Processes, Change Management, Maturity Models, Organizational Maturity, CMMI, ICE, ISO/IEC 15504.

1 Introduction

Most organizations face an inherent structural conflict between holistic strategy and functional organizational design. A successfully linked strategic planning and budgeting process depends not only on integrating all the entities of an enterprise, but also on reconciling long-term goals with short-term realities. A potential solution is using strategic themes to identify a portfolio of strategic innovation initiatives and, based on a dynamic quantitative and qualitative process analysis, creating a separate new class of innovation centred initiatives. Immelt (2006) launched a GE corporate initiative to drive growth through innovation called 'imagination breakthroughs'. Davenport (2007) argues that "the frontier for using data to make decisions has shifted dramatically". High-performing organizations are starting to build their competitive strategies around data-driven insights that will in turn generate impressive business results. They identified analytics as key for superior performance through sophisticated quantitative and statistical analysis as well as predictive modelling. Sawhney, Wolcott & Arroniz (2006, p.76) propose a holistic definition of business innovation as "the creation of substantial new value for customers and the firm [and, implicitly, the stakeholders] by creatively changing one or more dimensions of the business system". The quest for new value is confirmed by Kim & Mauborgne (2005, p. 17): "Value innovation requires companies to orient the whole system toward achieving a leap in value for both buyers and themselves." In this context, value innovation is about driving costs down while creating surplus on value for customers and stakeholders.

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The concept of connecting innovation and process capability combines both, the challenge of developing competitive strategies by introducing innovative value propositions as well as innovation process measurements by visualizing innovation capability. The objective of this research is to illuminate how to leverage the power of analytics in measuring capability in innovation processes.

In general, improvements in innovation processes have been sought through either increasing the budget for R&D or the implementation of best practices. Dooley, Subra & Anderson (2001, p. 25) define a "best practice as a tactic or method [chosen to perform a particular task, and/or to meet a particular objective] that has been shown through real life implementation to be successful". Booz Allen Hamilton confirmed in their 2006 study on Global Innovation 1000 that "higher investments in R&D do not automatically lead to an increase in corporate performance, and a high number of patents do not necessarily lead to higher profits". Research studies and management thinkers have developed a large number of best practices, either via description or prescription that could be used in organizations to improve the innovation process. The recognized challenge in importing best practices for any organization is the fact that in order to successfully implement an innovation strategy it is not only the practice but also the issues of capability and diffusion. The authors hypothesize that well performed practices and processes that are widely and continuously applied in the organization lead to a higher rate of successful innovations.

It is the objective of this research paper to propose a holistic Innovation Capability dEtermination Model based on the ISO/IEC 15504 that integrates the change management dimension.

This paper includes:

- Extension of ISO/IEC 15504 to innovation
- Application of a model of barriers in change management processes
- Design of an integrated design of a process reference model to determine the innovation capability of organization.
- Introduction to and an overview of the Innovation Capability dEtermination (ICE) model for improvements in innovation.
- Adaptation of the Balanced Scorecard Approach of Connected Innovation Driver Processes.
- Proposal of an Applied Research Framework.

2 Concept

2.1 Idea to Extend ISO/IEC 15504 to Innovation

The ISO/IEC 15504 capability construct has proven to have good validity in predicting process performance in various industries, like Automotive Spice, Coso Spice, etc. The authors argue that it is reasonable to use the capability dimension and propose a new process reference model for innovation. The application of a new reference model to the existing capability construct can be used to facilitate the latent conflict of interest between technical innovation and controlling by proposing a joint communication platform. The ISO framework is a widely used and accepted method in the software engineering domain (one of the drivers for technological innovation), whereas the methods and tools of strategic management (the base practices to assess

process capability) are usually the domain of business strategists. The result of our research about applying the concept of ISO/IEC 15504 to innovation management was first published in Peisl, Schmied (2007 and 2008) and is further detailed in this paper (see figure 1).

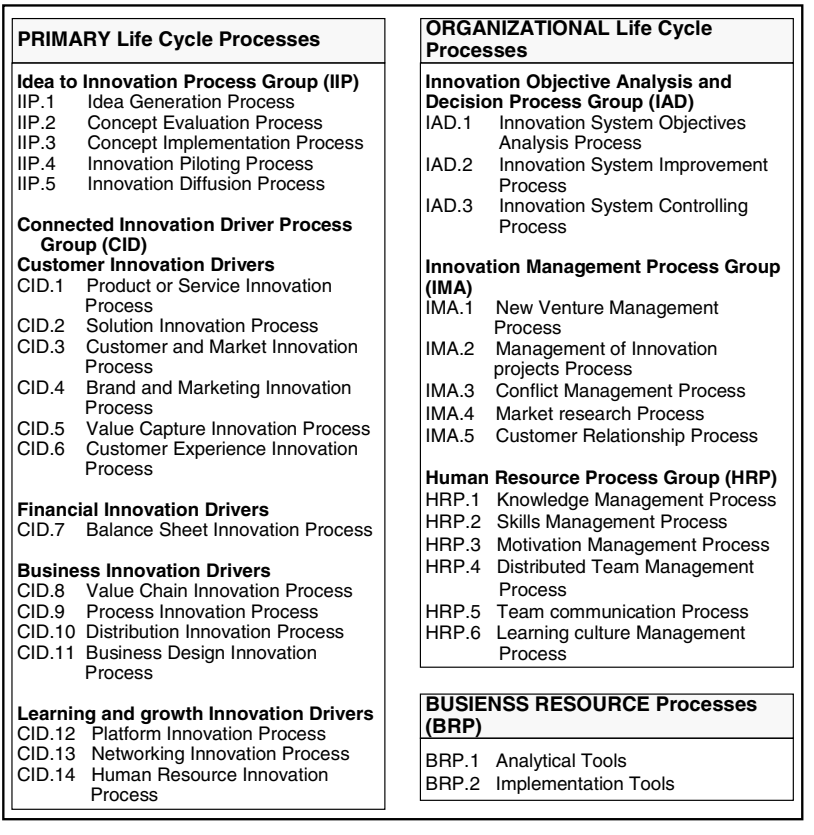

Fig. 1. ICE Process Reference Model

2.2 Application of a Model of Barriers in Change Management Processes

Any change process creates barriers because of the human behavior to resist change. Any innovation process results in organizational change and, therefore, creates barriers. The understanding of successful innovation process design requires a holistic approach to change management, i.e. the proposed model of barriers in transformation processes, as well as an integrated view on innovation dimensions. More than ever before, organizations need to innovate to sustain growth. Despite a long history of extensive discussions in academia and business innovation is all too often accidental rather than intentional. Research shows that organizations do not lack ideas to drive new product or service introductions but structured ways to allocate resources on the right innovation initiative.

The authors build their concept on a model defining three dimensions of barriers, i.e. structural, performance, and value perspectives explaining why change processes

within organizations may fail (Peisl, 1995; Hopfenbeck, Peisl, Müller, 2001). Key findings of this model include (see also figure 2):

- Structured processes and well defined metrics are essential to create an innovative organizational culture.
- Successful implementation of innovation processes requires two perspectives: An organizational and an individual perspective.
- The individual dimension includes human resource capability and motivation leading to creativity.
- The organizational dimension includes processes, metrics and value systems leading to an open innovation organizational culture.

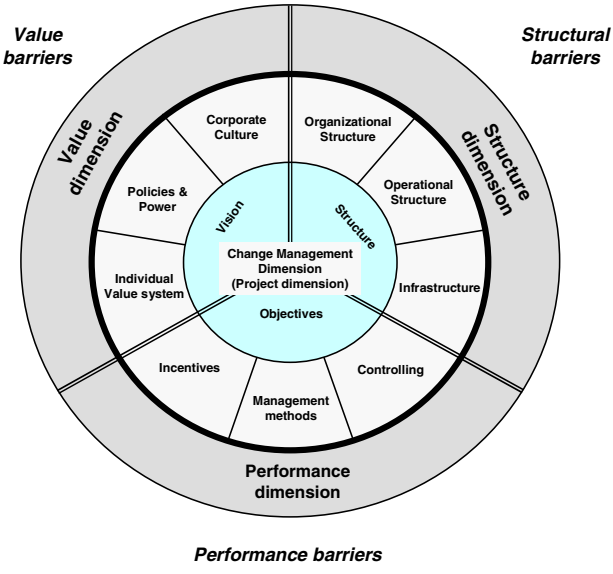

Fig. 2. Three dimensions of barriers in change processes

The purpose of this paper is to link the change management (i.e. business) challenge to reduce or eliminate barriers in transformation processes with the innovation capability perspective to create an effective innovation process design. In order to achieve the objectives the authors generalize the concept of capability in SPICE beyond the software and systems engineering domain and propose a process reference model for evaluating the innovation capability of organizations. The authors define the concept of capability as the degree to which a process is performed, managed, established, predicted, and continuously optimized (ISO/IEC 15504-2). In a second stage the Innovation Capability dEtermination (ICE) model provides an organizational innovation maturity concept based on ISO/IEC 15504-7. It provides a framework to identify, prioritize, and describe the status quo as well as necessary changes to develop an organization's innovation capabilities and to develop better products and services and so to achieve the best market position and business success.

The generic innovation process from idea generation to innovation diffusion (IIP), i.e. the successful – and profitable – positioning of new products and services in the market, includes five steps:

1. idea generation,
2. concept evaluation,
3. concept implementation,
4. innovation piloting, and
5. innovation diffusion

The Analysis of organizational objectives generates the initial input for IIP, combined with a consequent process improvement across all steps and a system controlling (IAD). The authors integrate a filter, including 14 innovation dimensions (CIDs), previous to the idea generation process, to match the organizational objectives with the innovation dimensions and therefore to focus the idea generation process on selected areas (for a complete overview of the process reference model see figure 1).

The CIDs are based on the dimensions of the model of barriers in transformation processes and further literature research, and are structured according to the perspectives of the balanced scorecard (see figure 4):

- financial,
- customer,
- business process, and
- learning and growth perspective.

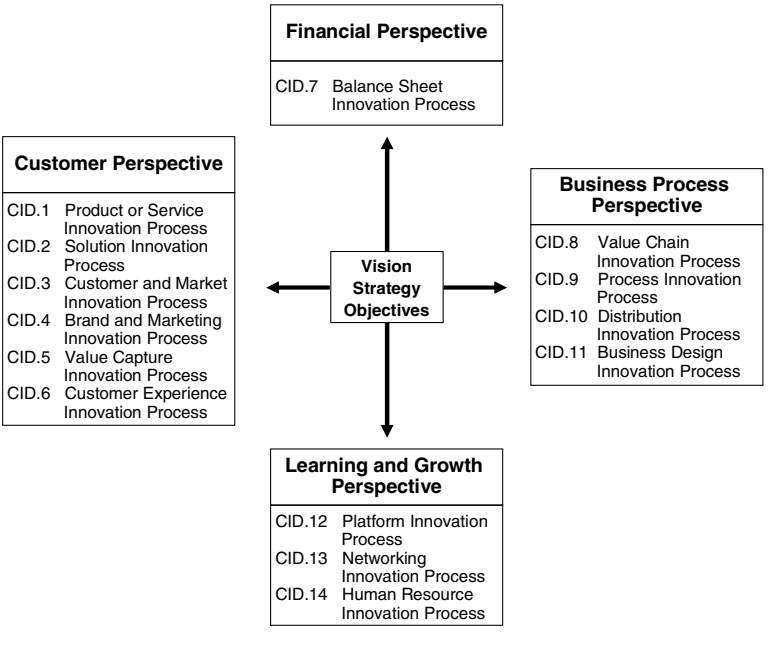

Fig. 3. Balanced Scorecard Approach for Connected Innovation Driver Processes

In conjunction with innovation management, human resource processes, and analytical and implementation tools from the business area a holistic innovation process design is established.

The ICE Model can support organizations to prioritize innovation possibilities by the use of an Innovation opportunity matrix which illustrates the strategic attractiveness of the innovation and the ROCE (return on capital employed). Thus an ideal allocation of scarce resources to the most promising innovation opportunities can be facilitated (see figure 4).

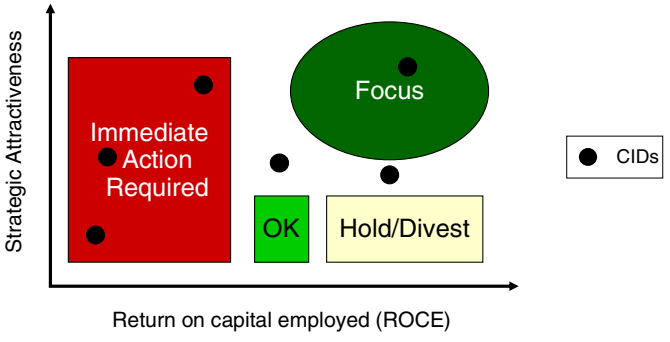

Fig. 4. Innovation Opportunity Matrix

In the following chapter we will demonstrate the benefit of the ICE model exemplified with the virtual organization FindYourWay AG taken from Schmied, Wentzel, Gerdom, Hehn, 2008.

In further research projects the ICE model will be implemented in various industries with representative small and medium-sized enterprises.

3 Applied Research Framework

3.1 The FindYourWay AG

The FindYourWay AG is a medium-sized organization founded in the 50s. At the beginning the organization was focused on electronic developments, the most important products were radios and televisions. Today the software development became an important part of the product development portfolio. The organization is focused on radios and navigation systems in the automotive industry and therefore generates the main turnover with these products. Worldwide FindYourWay AG employs more than 1000 people at various locations globally.

Core product development takes place in Germany. However, manufacturing locations exist in Portugal and China. In the main target markets like the USA, France, and Japan Sales and Service locations have been established.

Recently FindYourWay AG relocated parts of the applied research and development to Eastern Europe and set-up a location in Estonia. This new unit is focusing on the development of software tools and tests. Furthermore the relocation of development of

reusable software libraries is planed for the near future. For the development additional services of external employees and partners are needed.

In the past FindYourWay AG had some major difficulties with the accurate implementation of projects. For example, an important customer, the Alemannischer Lastwagen Verbund (ALV), canceled an order for the development of a new generation of navigation systems. The key reasons were among others:

- customer requirements were partly not or partly too late considered
- the effort to realize important functions was underestimated
- the performance of the system was insufficient
- the stability of the navigation was insufficient.

The cancelation of this project caused a financial loss for FindYourWay AG and especially a massive loss of confidence on the part of ALV. In order to sustain the collaboration with FindYourWay AG ALV requires a process improvement project and medium-term a companywide CMMI Capability Level 2 for all process areas with CMMI Maturity Level 2 and some selected processes on CMMI Maturity Level 3. In particular ALV challenged FindYourWay management with the concept of Open Innovation and demanded a clear innovation concept.

The following organizations, projects, persons, and tools are involved in the project improvement project:

Organizations:

- Alemannischer Lastwagen Verbund (ALV)
  (Key customer of FindYourWay AG)
- FindYourWay AG
  (In the organization the process improvement project is conducted)
- process!park (external consulting organization)

Tools:

- Capability Maturity Model Integration for Development (CMMI-Dev)
- Innovation Capability dEtermination model
- Balanced Scorecard

In the meanwhile the initial assessment, the CMMI based improvement project and the final CMMI Scampi Appraisal was conducted by the external consulting company process!park (for further information please see: Schmied et. al. 2008).

Faced with the prospects of slow growth, commoditization and global competition, FindYourWay AG has now emphasized innovation as critical to their future success. Therefore the ICE model is applied in addition to CMMI for Development for innovation process improvement. In the following chapters the authors describe the implementation of the Idea to Innovation processes (IIP) (see figure 3).

3.2 Innovation Capability dEtermination

3.2.1 Vision, Mission and Objectives

First of all FindYourWay AG needs to define their organizational vision, mission and objectives. A clear and consequent definition of the objectives is the prerequisite of any innovation process.

Vision of FindYourWay AG:

- Advantage through integrated intelligent communication

Mission of the FindYourWay AG:

- Providing essential solutions for mobility

Objectives of the FindYourWay AG:

- The organizational objectives are allocated to the four dimensions of the balanced scorecard; financial, customer, process, and leaning and growth dimension (Figure 5 shows an excerpt of the organizational objectives).

Based on the organization objectives (see figure 6) FindYourWay AG has to derive innovation objectives. The Connected Innovation Driver Process Group includes 14 drivers of innovation and can be used for prioritization of innovation objectives (Remark: The prioritization of the innovation objectives will be done in the Concept Evaluation process).

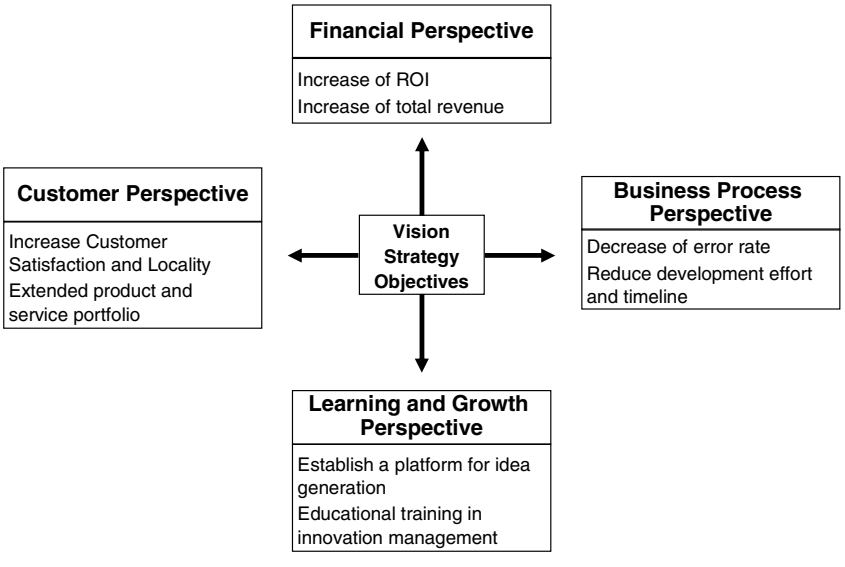

Fig. 5. Excerpt of the organizational objectives

Within a brainstorming session of the strategic business team (CEO, Head of product management, head of product development, head of sales management) the following four Connected Innovation Driver Processes were identified:

1. CID.1 Product and Service Innovation Process (→ Extended product and service portfolio)
2. CID.3 Customer and Market Innovation Process (→ Extended product and service portfolio)
3. CID.9 Process Innovation Process (→ Decrease of error rate, → Reduce development effort and timeline)
4. CID.14 Human Resource Innovation Process (→ Educational training in innovation management)

3.2.2 Idea Generation

The Idea Generation process (see figure 6) can only be efficient if you use the CID processes as a strategic filter to focus the idea generation process on selected areas.

FindYourWay AG: A brainstorming session together with the CEO, Head of product management, Head of product development, Head of sales management and representatives of the main customer ALV is carried out to generate ideas within the defined innovation dimensions (CID.1, CID.3, CID.9, CID.14).

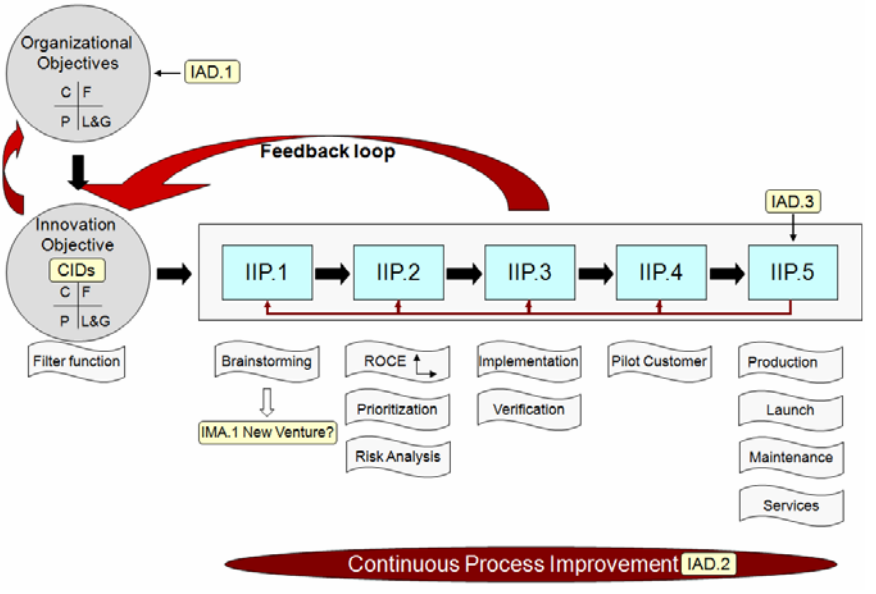

Fig. 6. Innovation Process (FindYourWay AG)

As an example the main results for CID.1 Product and Service Innovation Process are:

- Next generation of navigation system:
  - Geo Business Intelligence: Connection between meta data about geographical objects (e.g. sights) and the navigation system
- Enhancement of navigation system to a holistic logistic solution:
  - E.g. localization of commercial vehicles, optimization of routing (e.g. distance) and capacity and availability management

If ideas don't fit into the current innovation objectives the organization should consider about a new venture (see IMA.1 New Venture Management).

3.2.3 Concept Evaluation

The main focus of Concept Evaluation (see figure 6) is a prioritization of the ideas. Criteria for prioritization could be e.g.

- a detailed analysis of the Return-On-Capital-Employed
- technical feasibility
- risk analysis in legal and administrative aspects

According to the Concept Evaluation FindYourWay AG will currently focus their innovation processes on the development of a holistic logistic solution.

3.2.4 Concept Implementation

FindYourWay AG realizes the holistic logistic solution according to the system life-cycle model (requirements analysis, design, implementation, verification activities), which was defined formerly within the CMMI for Development based improvement project.

3.2.5 Innovation Piloting

Within the Innovation Piloting Process e.g. a prototype of the idea is evaluated together with the piloting customer. It is important to ensure the profitability of the innovation at an early stage to avoid investments in ideas that are not needed by any customer.

An intensive cooperation between FindYourWay AG and the pilot customer ALV is the basis for an early piloting and objective oriented investments.

3.2.6 Innovation Diffusion

For the Innovation Diffusion a detailed market introduction plan including marketing and sales strategy has to be formulated.

Therefore FindYourWay AG needs to allocate resources (e.g. financial and human resources) to launch the holistic logistic solution.

4 Summary

In this research paper the authors propose an integrated view on innovation based on business tools, change management, and process maturity and capability. The brief case study provides an initial understanding on how to implement and visualize innovation initiatives in an open innovation context. The need to innovation and continuously create value to customers and stakeholders is based on the understanding that processes and process measurements shape culture and innovative behavior in all organizational dimensions. In applying change management models, the balanced scorecard, and ISO/IEC 15504 the authors integrate well-known instruments and design a new concept that still needs verification across industries. This paper is a work in process documentation and we would like to invite interested organizations to join in our applied research project.

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