

# A Short Paper on Innovation Capability Maturity within Collaborations

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**Abstract.** Innovation Management generally combines high costs with a high rate of failure. The resulting risk can be approached with an assessment of the organizational innovation capability. For this purpose, Innovation Capability Maturity Models (ICMMs) have been developed by recent research. This paper strives to make these models applicable for networks, by considering the differing requirements of a collaborative environment. The resulting level of network conformity adds another dimension to the assessment of maturity in innovation management and NPD processes.

**Keywords.** New Product Development, innovation management, innovation capability maturity, network conformity, collaborative innovation.

## 1 Introduction

The importance to do important things well can be considered a general principle that hides behind many management tools, such as the Eisenhower Method, or the Pareto principle. This approach however necessitates the recognition and differentiation of important things from those that are less important. A typical domain to apply these principles is research and development. According to R.G. Cooper, only one out of seven new-products becomes a successful product [1]. At the same time, R&D is a major cost factor for many enterprises; in 2011 the 1000 companies with the biggest R&D budget spend a cumulative sum of \$603 billion on R&D [2]. The low rate of success in combination with the high spending on R&D shows the importance of a successful innovation management.

One approach to rate and improve the organizational capability to innovate is the application of Innovation Capability Maturity Models (ICMM). The idea behind an ICMM is to check how well an organization develops new ideas. The achieved level of maturity determines this organization's ability to achieve impact with its ideas, and thus creating innovations. While ICMMs have already been the subject of previous research, none of them considers the differing requirements of a collaborative environment.

With previous research in mind, this paper is not aiming to create yet another ICMM, but instead strives to refine existing models towards an application in enter-

prise collaborations. To achieve this task, the following section examines related work.

## 2 Related Work

The idea of rating the maturity of ideas is inspired by research around the Capability Maturity Model (CMM), which is described in the following sub-section.

### 2.1 The Capability Maturity Model (CMM)

The Capability Maturity Model (CMM) is a development model to support the software-development processes. The CMM is the outcome of research that has been conducted by the Software Engineering Institute (SEI) and funded by the U.S. Department of Defense (DoD). The first version was published in 1991. To broaden the field of application and to improve the integration of the model, it has been advanced to the Capability Maturity Model Integration (CMMI) that has been released in 2002 [3]. To assess the maturity of a process area, the CMMI defines five maturity levels:

- **Initial:** Process unpredictable, poorly controlled and reactive
- **Managed:** Processes characterized for projects and is often reactive
- **Defined:** Processes characterized for the organization and is proactive
- **Quantitative Managed:** Processes measured and controlled
- **Optimizing:** Focus on process improvement

These levels differentiate between reactive and proactive process areas, and rate their alignment with aims derived from certain instances, such as a single project, the organization, management requirements, and quality management. As described in the following, this approach has been picked up by several authors to create Innovation Capability Maturity Models (ICMM) for application in innovation management.

### 2.2 The Innovation Capability Maturity Model (ICMM v2) of Essmann

The ICMM v2 of Essmann is the most cited transfer of the capability maturity approach to innovation management [4]. It has been researched as part of a PhD thesis and defines a structure of five maturity levels [5]:

- **Ad hoc innovation:** consumed with day-to-day operations, outputs are inconsistent and unpredictable
- **Defined innovation:** need to innovate identified and defined, outputs are inconsistent, but traceable
- **Supported innovation:** practices, procedures and tools implemented, consistent outputs maintain market share
- **Aligned innovation:** integrated and aligned activities and resources, outputs are a source of consistent differentiation

- **Synergized innovation:** synchronization of activities and resources, outputs provide sustained competitive advantage

A questionnaire has been developed to determine the current level of maturity of the organization. Similar to those of the CMM, these levels rate an organization's ability to develop new ideas from a business perspective according to how well elaborated and aligned they are. Additionally, the impact of the research division's outputs is considered.

### 2.3 ICMMs by other Authors

Apart from the previously described ICMM v2, the attempt to rate the innovation capability maturity has been made by other authors:

- The model of Darell Mann differentiates between the five levels of: seeding, championing, managing, strategizing, and venturing [6].
- Another ICMM, which is based on Apple case studies, also refers to the CMM and consists of five levels: discrete, established, strategic, optimized, and adaptive [7].

These models however share a similar structure and are explained in a comprehensive manner, but show less scientific elaboration. The structure of the CMM and the ICMM v2 is therefore the key input for the approach towards the collaborative ICMM, as described in the following section.

## 3 ICMM for Collaborative Innovation Governance

The maturity of a network's innovation management can be rated in similar dimensions to those of a single organization. The shared dimensions are (i) **Change Management**, (ii) **Communication**, (iii) **Human Resources**, and (iv) **Technology**. An additional dimension of (v) **Cooperation** has to be added in order to reflect the requirements towards successful cooperation management to develop ideas by collaboration. Currently, these dimensions represent a first approach towards a structured model and may be altered during progress of the model's development. They have been selected due to their proven relevance to innovation management [8]. This relation however, causes dependencies between them, which have to be considered. E.g., the acceptance of new ideas on inter-organizational level is part of successful communication level, but also a key issue for satisfying collaboration [9].

The first version of the collaborative ICMM has been constructed by extension of the CMM's five level structure with an additional dimension to determine the degree to which the network acts as a homogenous organization. These four levels of network conformity are defined as:

- **Single organization:** The highest level of innovation capability maturity that has been gained by the best performing single organization within the network

- **Network awareness:** The highest level of innovation capability maturity within the network that all its relevant innovators are aware of
- **Network consent:** The level of innovation capability maturity within the network that all its relevant innovators have agreed to operate on
- **Network dedication:** The lowest level of innovation capability maturity that has been gained by all relevant innovators within the network

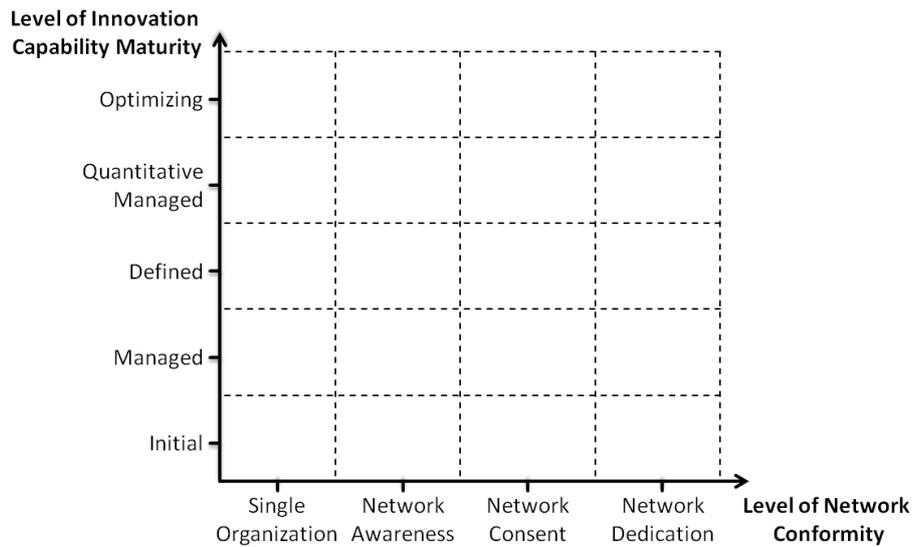


Fig. 1. Innovation and Network Capability Maturity

In combination with the five levels of the CMM, a graph can be created, as shown in Fig. 1. A maximal degree of network conformity will result in a horizontal line; a low degree will result in a step chart.

#### 4 Limitation and Outlook

The level of network conformity resembles a simple, but effective extension to assess the maturity of a network's capabilities in collaborative innovation management. Though, this short paper only resembles an initial approach to the topic. Further research will be based on a case study and elaborate on the two-dimensional model. The future aim is to refine a questionnaire to assess a networks current state and to provide guiding instructions for improvement, which are based on this state.

The challenges of collaborative innovation management stem from the diversities in business objectives and policies within the network. Also inter-organizational barriers that hinder communication between organizations and the options to cross these, require additional research. A similar problem has been examined by the author concerning the improvement of collaborative manufacturing process chains [10]. This research will be continued and will consider the application of intelligent products to

transfer data about the current manufacturing states between organizations. An application of intelligent prototypes could contribute to share data concerning the current state of a NPD on an artificial level within the network.

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