

# Chapter 8

## Open Innovation in Practice: The Development of the IT Capability Maturity Framework

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**Abstract** This chapter describes the IT Capability Maturity Model (IT-CMF), a high-level process capability maturity framework for managing the IT function within an organisation. The framework identifies a number of critical IT processes and describes an approach to improving maturity for each process. The design environment of the IT-CMF is challenging as the processes are based on “open innovation” principles. An example of the application of the IT-CMF to the Intel Corporation Information Technology organisation is outlined. The practical usefulness of the framework lies in its potential to organise and structure a complex portfolio of IT innovation activities in a manner that enabled continuous improvement.

### 8.1 Introduction

The case study reported in this chapter has been developed in the context of the IT Capability Maturity Model (IT-CMF), a high-level process capability maturity framework for managing the IT function within an organisation (Curley 2004; Curley 2006a, b, c). The framework identifies a number of critical IT processes and describes an approach to improving maturity for each process. We find the design environment with the IT-CMF in particular challenging and interesting as the design and review processes are based on “open innovation” principles. “Open innovation” as presented by Chesbrough (2003) offers an innovation model where organisations leverage both external and internal resources to generate value. This concept challenges the view of

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closed innovation where innovation processes are restricted to experts within the organisation. By leveraging the collective intelligence of experienced practitioners in the Innovation Value Institute community, the information quality of the design artefacts in the IT-CMF is established and enhanced.

The objective of this chapter is to provide insights into how the open innovation community has successfully implemented open innovation principles to develop a new IT Management framework.

## 8.2 The Evolution of Open Innovation: Changing Innovation Paradigms

Chesbrough (2003) argues that in many industries the centralised approach to R&D which he terms “closed innovation” has become obsolete. This paradigm, he contends, must be replaced by “open innovation” which adopts external ideas and knowledge in conjunction with the internal process. A number of factors are influencing this change such as the mobility of skilled people, the increasing presence of venture capital, emergent high-tech start-ups and the significant role of university research. Companies such as Cisco and Intel have adopted the new paradigm in contrast to Xerox which has lost many innovations due to its closed systems. One of his principles is that “not all the smart people work for us” and he advocates that the smart people within an organisation connect with the smart people outside. Embracing the ideas and inspiration in these external links, he contends, will actually multiply the advantage of internal efforts. However, connecting external innovation to internal innovation requires a new business model.

The growing significance of the open innovation paradigm has prompted West, Vanhaverbeke and Cloudt (2006) to propose a research framework with the following classifications: individual, organisational, value network, industry/sector and national institution (p. 288). In a related work, Vanhaverbeke and Cloudt (2006) suggest that emerging forms of value networks must be examined at the level of different nested layers. These diverse layers span the spectrum from the individual to firms–organisations; through Dyads; onto inter-organisational networks and ultimately reaching to national/regional innovation systems. von Hippel (2005) speaks about the democratisation of innovation where products and services users increasingly have the ability to innovate for themselves with the resulting move from manufacturer-centric to user-centric innovation processes.

## 8.3 Open Innovation and the IT-CMF

Open innovation is central to the development of the IT-CMF for two reasons. Firstly, the IT-CMF is being developed under the aegis of the Innovation Value Institute which is a consortium designed and operated under the guidance of open

innovation principles. The consortium is made up of over 60 organisations drawn from Industry, Academia and Government institutions. These organisations have been successfully collaborating for a number of years in the development of the IT-CMF. A noteworthy feature of the consortium is that its memberships include companies which are in direct competition in industry, yet work very productively together in the open innovation environment in the IVI. Secondly, a key characteristic of the Innovation Management maturity model is that at higher levels of maturity, companies exhibit innovative behaviours that extend beyond their own organisational boundaries to include innovative activities with customers, suppliers, external agencies, etc. This dimension of innovative behaviour is captured under the parameter “reach” in the IT-CMF.

## 8.4 Open Innovation and IT Innovation

A so-called resource-based view of IT innovation has been popular in the literature (Feeney and Wilcocks 1998). This view sees the ability to leverage IT in new ways as being a core competence of an organisation and a source of sustainable competitive advantage. Resources that might lead to competitive advantage may include proprietary IT technology, unique IT technical and/or management skills. This stream of research has shifted its focus towards “open innovation” (Chesbrough 2003). Today’s economic landscape has been characterised as having many features associated with open innovation, e.g. mobile knowledge workers, globally distributed development teams, greater linkages between academia and industry, the emergence of new locations for innovation and a propensity to go beyond organisational boundaries to identify and collaborate with innovators. There has been a growing awareness of the importance of combining internal and external sources of innovative capacity to create a “portfolio approach” to the development of intellectual capital. In the academic context, more attention is being paid to the potential for technology transfer, innovation incubators and entrepreneurial spin-offs.

## 8.5 The Focus of the Problem: Realising the Value of IT Investments

A particular challenge facing IT managers is how to evaluate the value of IT investments. Bannister’s (2005) review of approaches to IT evaluation identifies three strands in the literature:

- Studies that focus on the long-term historical economic impact of investments in IS. Examples include Brynjolfsson and Hitt (2003) who explored the so-called productivity paradox and the cumulative effect of investments in IT on

- organisations, and Strassmann (1985) who has argued that such effects are only really assessable over long periods, maybe as long as half a century.
- Studies of whether specific investments made over shorter periods have yielded value. These vary from the application of innovative methods to measure value realised to use well-established methodologies, such as return on investment, comparison of how different metrics report or combinations of measures, such as the balanced scorecard (Kaplan and Norton 1992) or the Prudential Appraisal Method (Coleman and Jamieson 1994).
  - Studies assessing whether or not a potential investment in IT is worthwhile. The time horizon here is typically fairly short, usually 5–10 years, though from time to time studies will contemplate a more distant time horizon. Almost all such studies are at the level of the organisation, be it a firm or a public sector body.

A novel approach to IT Innovation Effectiveness realisation has been proposed by Peppard et al. (2007). The “IS benefits management” approach advocated by the authors is defined as “the process of organising and managing so that the potential benefits from using IT are actually realised” where “benefits management” emphasises that benefits arise only from changes made by individual users or groups of users, and these changes must be identified and managed successfully. “Benefits realisation” and “change management” are therefore inextricably linked. This is the case when the project is explicitly an IS-enabled or “techno-change” program. A noteworthy aspect of the Benefits Management approach is the application of a Benefits Dependency Network (BDN). The BDN provides the framework for explicitly linking the overall investment objectives and required benefits with the business changes necessary to deliver these benefits and the essential IT capabilities that enable these changes. This approach is an example of a general trend towards a “capability”-oriented view of IT as opposed to the “resourced” based view described in Peppard et al. (2000).

## 8.6 The IT Capability Maturity Framework

The Innovation Value Institute has developed a framework for managing IT for business value—the IT-CMF and this framework is being tested with leading organisations around the world. IVI’s approach leverages existing frameworks and complements them with a comprehensive value-based model for organising, evaluating, planning and managing IT capabilities. An example of the application of the framework in a real-world context is provided in Donnellan et al. (2011).

The IT-CMF proposes a high-level process capability maturity framework for managing the IT function within an organisation. The framework identifies a number of critical IT processes and describes an approach to designing maturity frameworks for each process. By comparison, other IT process frameworks including COBIT, ITIL and CMMI do not explicitly provide a mechanism to address the topic of IT innovation. A sub-group of Innovation Value Institute has been concerned with building and testing the CMF for the IT innovation critical process.

The IT-CMF accepts that innovations arising from both linear sequential processes and complex social processes co-exist within the same firm. The framework unifies a single approach to address the manageability of both classifications of IT innovation. For linear sequential processes, the innovation capability describes the ability or capacity to execute in a manner that increases the probability of a positive outcome in an IT innovation. For complex social processes, and non-sequential activities, the innovation capability describes the pre-conditions required to increase the probability of innovation outcomes.

The IT innovation Capability Maturity Framework describes the IT innovation capability through a five-level capability maturity framework. The maturity approach has been used successfully in the IT industry to describe specific stages of progression to an optimal mode of operation.

Potential advantages of the capability maturity approach include its ability to present a structured, sequential stepwise function. Due to the simplicity of the model, maturity frameworks have seen wide adoption in the IT industry by large organisations (e.g. CMM) and have strong uptake amongst the community of practitioners. The approach is useful in describing a manageable approach to improvement, and therefore preserves the simplicity and direct-acting approaches presented by the linear sequential process innovation frameworks. Each level of the capability maturity framework also describes a set of contextual descriptions, and therefore preserves the approach presented by the non-linear school of frameworks.

Potential disadvantages of the capability maturity approach include its tendency to adopt a somewhat instrumental, doctrinaire and mechanical approach to problems that may be quite complex. The IT Innovation CMF addresses this shortcoming in two ways. Firstly, the maturity framework is augmented with additional dimensions for each of the five levels. The maturity approach chosen introduces a set of innovation capabilities at each level. Each capability is assigned characteristics, attributes and descriptions of representative outcomes on an organisation. Secondly, the IT Innovation CMF is augmented by linking the maturity levels to a supplementary overarching IT capability maturity framework (IT-CMF). Therefore, the IT innovation CMF is divided into four strategies, mirroring directly the strategies of the IT-CMF. Strategies describe the four primary activities associated with managing innovation, funding innovation activities, executing the innovation capability and assessing the value of innovations.

Broadly defined, the innovation capability is a set of actions undertaken to prepare an organisation to be more innovative. This is achieved by increasing the organisation's ability to enact defined innovation processes and by increasing the effectiveness and relevance of non-linear activities on innovative outcomes. Preparation in the linear sequential sense involves the creation of tools and artefacts within the firm. Artefacts may be tangible, such as systems, devices and templates, or intangible, such as activities, roles, processes and methodologies. Preparation in the complex social sense involves affecting change on the environmental context of the firm to increase the probability of an organisation to innovate.

**Table 8.1** The IT innovation critical process in the IT CMF

|                                       | <b>Managing IT innovation</b>       | <b>Funding the innovation portfolio</b> | <b>Executing the IT innovation capability</b>                   | <b>Assessing the value of IT innovation</b> |
|---------------------------------------|-------------------------------------|-----------------------------------------|-----------------------------------------------------------------|---------------------------------------------|
| <b>5. Systemic innovation</b>         | Business transformation and agility | Self-sustaining                         | Culture drives continuous business innovation                   | Confidence in value return                  |
| <b>4. Managed innovation</b>          | Aligned to strategic business needs | Co-funded with business                 | Routinely delivers innovative operational improvements          | Reliable, consistent measurement            |
| <b>3. Defined innovation</b>          | Defined IT innovation strategy      | Justified business spend                | Tools, processes, organisation supports value-chain innovations | Defined value assessment                    |
| <b>2. Sporadic innovation</b>         | Emerging innovation strategy        | One-time spend                          | Occasional product improvements                                 | Informal value measurement                  |
| <b>1. Initial / ad hoc innovation</b> | Undefined innovation strategy       | Not explicitly budgeted                 | Limited impact and scope of innovations                         | No recognised value                         |

Specifically defined, the innovation capability consists of a description of the core capability and its primary characteristics. Each characteristic is described by observable attributes exhibited by the firm, measurable metrics of attribute existence and performance and expected impact on the firm's ability to increase the probability of innovative outcomes.

The IT Innovation Management Critical Process, the first maturity level describes the IT innovation capability in its most immature form. The capability is initial, linear processes are unmanaged and there is a poor understanding of the nonlinear capabilities and social processes. In practice, there will be a limited adoption of new technologies, and IT managers are in general unaware of the potential or existing benefits of IT innovations.

The second maturity level describes a sporadically managed innovation capability. An emerging capability is characterised by a small group of IT managers who recognise the value of IT innovation and act in an uncoordinated manner to increase IT innovations.

The third maturity level describes a defined innovation capability with a high degree of coordination. Linear processes are defined and are executed upon to increase levels of innovation. Non-linear activities are encouraged through contextual investments.

The fourth maturity level describes an actively managed innovation capability. IT and executive managers promote and coordinate innovation across the enterprise.

The fifth maturity level describes a systemic innovation capability. IT innovations are recognised by the firm to contribute value to the enterprise, and the organisation is active in encouraging innovation (Table 8.1).

**Table 8.2** Application of the IT CMF in Intel

| <b>Managing IT innovation</b>                                                                                                                                                                                                                                                                            | <b>Funding the innovation portfolio</b>                                                                                                                                                                                                  | <b>Executing the IT innovation capability</b>                                                                                                                                                                     | <b>Assessing the value of IT innovation</b>                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Prior to the initiative, innovation activities were defined as isolated, specific projects. The initiative was an attempt to contextualise and coordinate the projects under a single strategic initiative. If successfully executed, this initiative would represent a move from maturity level 3 to 4. | Prior to the initiative, projects were funded on a sporadic basis. This initiative attempted to provide a coordination mechanism to justify innovation spend. Consequently, this initiative reflected a move from maturity level 2 to 3. | A major component of the initiative included the standardisation of an innovation toolkit, website, and guidelines to formalise the innovation process. This reflected a sustained level 3 innovation capability. | The initiative involved the measurement of 9 innovation metrics across the processes, inputs, and outputs of the innovation activities. These metrics were to inform management in setting new project priorities. This reflected a maturity level of 4. |

## 8.7 The Application of the IT-CMF in Intel Corp

In this section, we present an example of the IT Innovation Capability Maturity Framework applied to the Intel Corporation Information Technology organisation. We demonstrate the innovation framework as a mechanism to structure the set of innovation activities pursued by the Intel IT managers in their attempts to improve efficiency and performance of IT operations through innovation.

Curley has described in some detail the transformation of IT in Intel (Curley 2006a, b, c). In 2005, the Intel Information Technology organisation formalised an initiative to foster and encourage innovation throughout the firm. The focus of the new initiative was to supplement and encompass existing innovation activities with a perspective on the direct financial value generated by each activity. The approach was novel to Intel at the time, who had previously regarded innovation activities as unmanageable and unquantifiable. Existing IT innovation activities included dedicated innovation hiring programs, projects to increase recognition of innovation, innovation rewards and incentives and a set of activities to deploy IT innovations in the organisation. Innovation in IT was recognised as imperative to maintain Intel's competitive edge, through investment in programs to foster long-term systemic innovation.

The IT Innovation CMF describes the set of specific initiatives as a coordinated attempt to improve the maturity of the innovation capability. The maturity framework serves both to structure the set of activities in a mutually exclusive, collectively exhaustive perspective on innovation management, and to assess the performance and potential of the activities. In Table 8.2, the set of Intel IT

Innovation-related activities is summarised and structured into the four strategies of managing innovation, funding innovation activities, executing the innovation capability and assessing the value of innovations. Each set of activities is compared in principle with the description of each maturity level.

## 8.8 Summary and Conclusions

This chapter reviewed the trends in open innovation and focussed on one particular new development in this area—the IT Capability Maturity Framework (CMF). Among its 60+ members, the Innovation Value Institute has many leading exemplars of IT Innovation practice, including Intel, Microsoft, SAP, etc. This collaborative community of like-minded peers is committed to investigating and advancing tools and best practices associated with IT-enabled innovation. The consortium provides an ideal opportunity to examine the practice of open innovation across a range of innovative organisations. We found the IT innovation critical process to be a novel and practical mechanism for structuring the set of IT innovation activities within a firm. The practical usefulness of the framework lies in its potential to organise and structure a complex portfolio of IT innovation activities in a manner that enabled continuous improvement.

### Practical Tip

The application of “open innovation” principles are usually concerned with products and services. The IT-CMF demonstrates that the “open innovation” approach can be successfully applied to business processes in the IT sector.

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