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Methodology Matters: IT-CMF is built on Rigour and Relevance

Abstract

The *maturity model in Information Systems (IS) research* continues to grow in popularity, as an approach to evaluating and improving an organization's capabilities. In recent years, numerous maturity model contributions have been made; for example, in the areas of IT/business alignment, project management, and information life cycle management. However, concerns are expressed in the literature regarding the development process and foundations upon which some maturity models are developed. This white paper presents a high-level overview of the issues outlined in existing research regarding maturity model development. The paper further highlights how the development approach adopted for IT-CMF overcomes those concerns by building upon existing theories and methodologies, by following a rigorous development process that is based on a design science approach, and through externally validating the framework within numerous organizations.

Maturity Models in IS Research

Maturity is defined as *"a measure to evaluate the capabilities of an organization in regards to a certain discipline"* (Rosemann and de Bruin, 2005). Maturity models outline characteristics associated with the various levels of maturity, thereby serving as the basis for an organization's capability maturity assessment. In essence, these maturity models serve to help organizations to understand their "as is" situation and enable them to transition to the desired "to be" maturity, through deriving and implementing specific practices or improvement roadmaps. Such improvement roadmaps support a stepped progression with respect to organizations' capabilities, enabling them to fulfill the characteristics required to meet specific maturity levels.

The *maturity model approach in IS research* has received growing interest in recent years (Becker et al, 2010; Mettler, 2009), in order to inform organizational continuous improvements and support either self- or third party maturity assessments. While the Software Engineering Institute's (SEI) Capability Maturity Model (CMM) for software development and the successor Capability Maturity Model Integration (CMMI) are most prevalent in studies of maturity (Becker et al, 2010); nonetheless, several new maturity models have been developed in recent years. These focus on improving maturity in, for example, IT/business alignment (Khaiata and Zualkernan, 2009); business process management (Rosemann and de Bruin, 2005); business intelligence (Hewlett Packard, 2007); project management (Crawford, 2006); inter-organizational systems adoption (Ali et al, 2011) and enterprise resource planning systems use (Holland and Light, 2001).

Criticisms of the Maturity Model Approach

Despite the growing popularity of maturity assessments, there is some criticism regarding the methodological approaches adopted in their development. According to Becker et al (2010), IS research has *"rarely endeavored into reflecting and developing theoretically sound maturity models"* and as such there is a lack of evidence of scientifically rigorous methods in their development processes, with some models based on poor theoretical foundations (Mettler, 2009). Furthermore, Becker et al (2010) suggest that there is a lack of evidence of validity testing of newly developed models; however, to ensure their relevance for practitioners, the proposed models need to be piloted and "applicability checks" conducted with practitioners. Closing the gap between current and desired maturity is also problematic, with Mettler (2009) suggesting that many models do not describe how to carry out improvement actions.

Addressing the Methodological Criticisms of Maturity Model Development – the Case of IT-CMF

Methods, such as Design Science (DS) (Hevner et al, 2004) are proposed as a useful means to develop new maturity models in a rigorous manner, using both prior studies and empirical evidence as the basis for the model's content development and stages of maturity. IT-CMF addresses the concerns outlined above through following a rigorous development process based on design science and open innovation principles; empirical piloting, testing and validation of the model; and development of a series of improvement practices, outcomes and metrics to drive maturity level progression.

Content development for IT-CMF is undertaken by dedicated workgroups for each of IT-CMF's 33 Critical Capabilities (CCs); these workgroups include a mix of Subject Matter Experts (SMEs) and Key Opinion Leaders (KOLs), including academic researchers, industry-based practitioners, and consultants. Work group development output evolves through a series of four stages, and is reviewed at the end of each stage by a Technical Committee (TC). As development work progresses through the various stages, more in-depth content is required and the CC material is subject to more rigorous reviews and validation processes.

This content development across the four stages follows the Design Science (DS) research approach. DS is a problem-solving approach that involves building and evaluating innovative artefacts in a rigorous manner to solve complex, real world, relevant problems; make research contributions that extend the boundaries of what is already known; and communicate the results to appropriate audiences (Hevner et al, 2004; March and Smith, 1995; Pries-Heje and Baskerville, 2008). Knowledge and understanding of the problem domain is achieved through building and evaluating the artefact (Hevner et al, 2004). The DS approach adopted in the development of IT-CMF (see Table 1) is closely aligned with the three DS research cycles outlined in Figure 1.

Table 1: Design Science (DS) Cycles of IT-CMF Development

DS Cycle	IT CMF
DS Relevance Cycle	Relevance of the IT CMF artefact is driven by the problems organizations experience in optimizing how they currently manage and measure the business value of their IT investments. Field testing of IT-CMF in the application environment helps determine if further development work is required to ensure its relevance in addressing the business problem.
DS Rigour Cycle	Development is grounded in existing artefacts, methodologies, foundational theories and expertise; and draws from an extensive base of industry and academic literature and existing IT standards and frameworks. Contributions to the knowledge base include a detailed framework and set of practices that help drive innovation and change in how organizations manage and use their IT investments to optimize business value.
DS Design Cycle	Development focuses on iterative build and evaluate activities by the CC workgroup in order to address the identified problem, while drawing on existing theoretical foundations and methodologies in the knowledge base. The build process is evolved and refined through evaluation feedback, including technical committee stage gate reviews to identify further development refinements and field testing of the artefact within contextually diverse organizations.
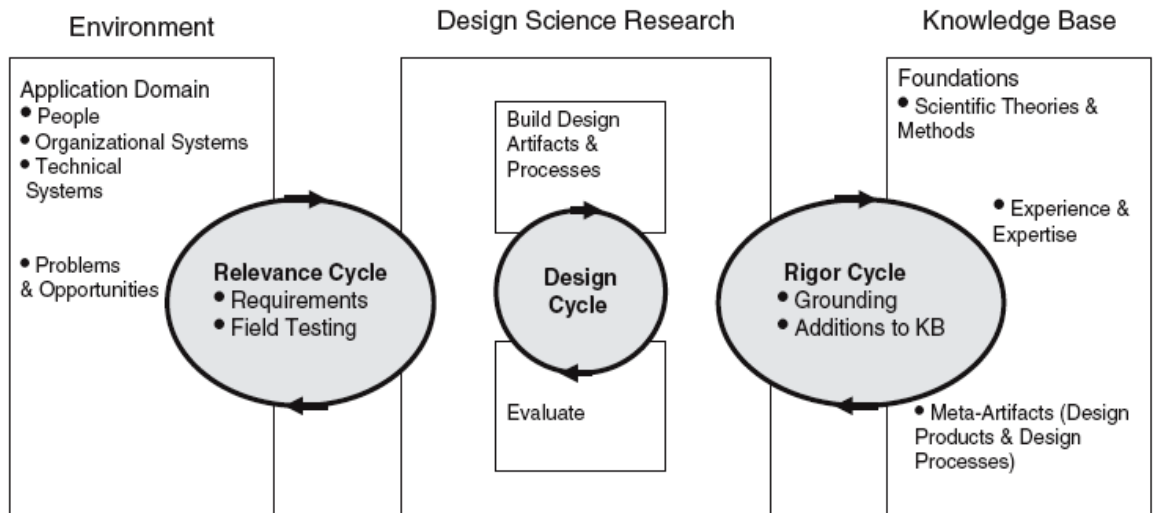
Discussion and Conclusions

Growth in the development and use of maturity models provides strong support for the relevance of the maturity assessment approach in practice. As stated by Mettler (2009), *"as organizations constantly face the pressures to obtain and retain competitive advantage, invent and reinvent new products and services, reduce cost and time to market, and enhance quality at the same time, the need for and the development of new maturity models will certainly not diminish given that they assist decision makers to balance these sometimes divergent objectives on a more or less comprehensive manner"*. Based on the literature, the greatest concern regarding this assessment approach is the processes involved in maturity model development – rather than building on a theoretical basis, many models are simply based on practices drawn from organization- or industry-specific projects that demonstrated favourable results. For many models there is a lack of model testing in terms of validity, reliability and generalizability, and little documentation on how the model was designed and developed (Mettler, 2009).

However, given the relevance of maturity models to organizations in informing and supporting prioritized stepped improvements in capabilities, a maturity model that addresses the concerns in the literature pertaining to their theoretical foundations and rigorous development and testing approaches should be a useful contribution. Therefore, IT-CMF reflects an important contribution from the perspective of organizations seeking to optimize their IT capabilities and the value they derive from IT. Based on the methodological approach adopted in its development, IT-CMF presents a rigorous and relevant approach to enabling CEOs and CIOs to understand and improve their organization's maturity across five levels of maturity in order to derive business value from IT investments.

References

About the Author

Dr Marian Carcary is a research fellow at the Innovation Value Institute, based in the National University of Ireland, Maynooth. She is lead researcher on three IT-CMF Critical Capabilities (CCs), and she also works on other IVI and EU-funded projects. Prior to taking up this position, Marian taught in the Kemmy Business School in the University of Limerick and worked as a part-time member of Faculty in the Limerick Institute of Technology for six years. She has completed MSc and PhD research, both of which were funded by scholarships from the Irish Research Council for Science, Engineering and Technology (IRCSET). Marian can be contacted at marian.carcary@nuim.ie.

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The Innovation Value Institute (IVI) is a multi-disciplinary research and education establishment co-founded by the National University of Ireland Maynooth and Intel Corporation. IVI develops frameworks to assist IT and business executives to manage IT for Business Value and to deliver IT-enabled business innovation. IVI is supported by a global consortium of like-minded peers drawn from a community of public and private sector organisations, academia, analysts, professional associations, independent software vendors, and professional services organisations.

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ivi@nuim.ie or +353 (0)1 708 6931