Chapter 8
Research, Development, and Innovation Capability Maturity Model Reference for European Projects

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ABSTRACT

Capability maturity and capability readiness models are designated management tools in scholarly literature. One of their applications is in shaping roadmaps, projects, and programs. Typically, individual articles tackle the two topics separately and the way the two management tools are intertwined. Scholarly literature shows the need to link the two tools. These tools tend to refer to digital transformation or include digitalization in their construction. A specific example is the TRL1-TRL9 capability maturity model used by NASA and by the European Union. This is the reference for conducting research, development, and innovation activities at the European Union. It models roadmaps and all project management techniques. A specific case study is considered in this chapter. Findings show the reference to manage research, development, and innovation activities at the European Union and NASA is a capability maturity model, a project management tool, and includes digitalization business information systems as the tools for business activity and business process management.

INTRODUCTION

Capability Maturity Models CMM have been used since 1986, in a wide variety of forms. In 2006, the Software Engineering Institute at Carnegie Mellon University developed the Capability Maturity Model Integration CMMI, which has largely superseded the CMM and addresses some of its drawbacks. A maturity model can be viewed as a set of structured levels that describe how well the behaviors, practices and processes of an organization can reliably and sustainably produce required outcomes. The basic constituents of capability maturity models are capability maturity levels and organizational dimensions. Organizational dimensions achieve the capability maturity levels. Business processes are one such organizational dimension. On capability maturity model is the TRL 1 to TRL 9 model, which is used for research, development and innovation activities. The TRL model is used to describe the activities and results or deliverables. An activity or process is completed when certain deliverables have been attained as outcome of the activities. The TRL1-9 capability maturity model is used by Nasa and European Union as the benchmark for research, development and innovation activities. The model assumes digital simulation technologies, such as Computer Aided Technologies or Product Lifecycle Management software, underpin these activities and their deliverables. The model is, by now, harmonized with digital simulation technologies and will be analyzed as such. Typically scientific literature review alots individual articles to capability maturity models. Another topic that is designed individual articles is roadmaps. Literature review shows articles tie roadmaps to maturity indices and show them as the next management tool to be used after the roadmap. Roadmaps thereby overarch programs and projects. The goal of this article is to describe the TRL 1-9 capability maturity model and the way it is used to derive roadmaps, programs and projects. The topic as such is prevalent in scholarly articles focused on maturity indices and roadmaps. The methodology is a descriptive case study. The subject of the case study is the use of the TRL 1 to 9 model in European project calls for funding on a specific European project case. The case study illustrates how the capability maturity model becomes a requirement for the project activities and deliverables and how this can easily be organized in milestones. Findings are that the TRL 1-9 model is a simple capability maturity model and that its deliverables and milestones are recommended to be used to schedule projects. These deliverables include proof of concept which may be realized via digital means, Computer Aided Technologies or Product Lifecycle Management Software. Findings from the empirical data analysis are that the Technological Readiness Model is easy to apply in technologically advanced agriculture. A reference example in classic theory is thereby confirmed. The case study is a useful example for practitioners.

LITERATURE REVIEW

The Definition and Role of Capability Maturity Models and Readiness Models

In 1986, the capability maturity model was created by the US Department of Defense. In the capability maturity model, maturity levels are given by progressive capabilities that describe how the behaviors, practices and processes of an organization can reliably and sustainably produce required outcomes (Nayab, 2010). The maturity levels are: initial; repeatable; defined; capable; efficient. In digital transformation, maturity indexes refer to processes and other organizational dimensions and have several capability maturity levels. The goal tends to be value. According to Porter and Heppellmann (2014),

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