Project portfolio management maturity model for dynamic environments

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Abstract. Project portfolio management (PPM) capabilities provide a holistic decision-making framework to align projects with strategy and to ensure resource sufficiency for the project portfolio. PPM capabilities are shown to evolve in response to dynamic environments in six case studies. Capability Maturity Models (CMMs) are often used to outline the maturity paths for the establishment and evolution of PPM capabilities. This paper presents a PPM CMM that improves upon existing CMMs by incorporating organisational learning capabilities, by recognising antecedents for maturity stages that build upon other capabilities and by paying explicit attention to capabilities that assist in balancing exploration and exploitation projects.

Keywords. Project Portfolio Management (PPM), Capability Maturity Model (CMM), Organisational Learning, Exploration and Exploitation.

Introduction

As many organisations shift to ‘management by projects’, projects are often the main vehicle for delivering organisational strategy. Project portfolio management (PPM) has gained attention as a way to enable organisations to align projects with strategy and to ensure adequate resourcing for projects [1, 2]. PPM is a high-level capability that involves a range of tools and processes along with supporting organisational structures such as a portfolio review board or a portfolio management office. PPM capabilities can improve organisational flexibility and performance by providing a holistic and responsive decision-making environment.

While PPM capabilities often have common elements, they cannot be easily transferred or acquired. There is an order of implementation to many aspects of a PPM capability, and the capability must be developed over time [3, 4]. For example, establishing a foundational capability such as a gated project management (PM) process is an antecedent to the development of an effective PPM capability; and data gathering capabilities must be developed before the capability to evaluate and adjust the portfolio mix can be established [5, 6]. Therefore PPM capabilities are thought to be developed along maturity paths that can be identified in ‘capability maturity models’ (CMMs). Capability maturity models include both process measures and other elements such as organisational structure, training and communication [7, 8].

CMMs have become a popular way for organisations to build capabilities ever since the Software Engineering Institute (SEI) CMM was developed in 1991 [9]. Organisations can use CMMs to compare their capabilities with a standard and identify areas for improvement and development [10]. CMMs are applied to a range of capabilities from risk management and knowledge management to PM and PPM [7, 11]. CMMs are often derived from 'best practice' studies and are designed to reflect the practices that are in use, with practices at the higher levels of maturity generally thought of as the 'best practices' that successful organisations use. The proposition behind most maturity models is that organisations develop capabilities by achieving each level of capability in sequence across a range of capability dimensions [7, 8, 12]. At each level most maturity models include a list of criteria or activities that are undertaken by organisations operating at that maturity level. The SEI CMM contains five maturity levels: Level 1: Initial (ad hoc); Level 2: Repeatable; Level 3: Refined; Level 4: Managed; and Level 5: Optimised (adaptive and sustained) [9].

CMMs for PM and PPM identify levels of use, proficiency of various practices and the characteristics of the organisational environment that are associated with corresponding levels of improved outcomes. PPM CMMs have been proposed for a variety of environments [6-8, 13-15] and follow a similar four- or five-level approach. Some CMMs have been challenged because the rigid hierarchies presented do not cater for the established need for portfolio management processes to be customised and tailored to the individual environment [16], and because interactions between elements are not adequately considered [17]. These criticisms highlight the challenge in representing complex organisational PPM capabilities in a structured hierarchical form. Similarly, many of the available PM CMMs have shortcomings. One claim is that they are too simple, focusing only on a portion of the capability and ignoring the organisational environment and the development and management of the people in a PM environment [18]. In addition, maturity models usually focus on explicit codified practices and don't extend to cover the more intangible and knowledge-based elements of the capability [10], and therefore do not help organisations manage unique environments and challenges of change [18]. Finally, although the research underpinning many maturity models identifies practices that are linked with successful outcomes, they do not establish a causal relationship between the practices and the outcomes. Based on these criticisms, CMMs may need to be developed to include more of the intangible aspects of the capabilities, including organisational learning capabilities [10].

This paper presents a maturity model to assist organisations with the staged development and implementation of an effective and dynamic PPM capability. It is based on in-depth research into the development and evolution of PPM capabilities in a variety of new product and service development environments as part of a recent doctoral research project [19], and addresses some of the shortcomings of existing maturity models.

Method

The outcomes and learning-based maturity model (OLMM) presented in this paper is based on findings from a two-stage empirical study. The first stage, a survey of 60 service and manufacturing organisations involved in product innovation, established a benchmark of best practices for PPM. The survey was sent to professionals with portfolio-level perspective or responsibility at 166 organisations and the 60 returned surveys represented a 36 percent return rate. The second stage, an in-depth multiple case study of six successful innovators, investigated the development of PPM capabilities and how PPM contributes to competitive advantage. The six case study organisations were chosen based on their sustained new product success and leadership. Although PPM originated in manufacturing-based industries,

it is a growing endeavour in the increasingly important service industries. Therefore both industries were included in the research. Three of the case study organisations were from the service sector (professional services, finance/banking and telecommunications) and three were from the manufacturing sector (building materials, medical devices, and heavy industrial products). The case study analysis was based on public and private documents and a series of four or five semi-structured interviews with a diverse set of managers at each organisation. The interviews explored the current PPM capabilities as well as the past trends and future plans in this area.

Findings

The PPM capabilities at the case organisations were found to encompass three main dimensions; 'process' dimensions, 'structure' dimensions and 'people' dimensions as illustrated in the model of a PPM capability proposed in Figure 1.

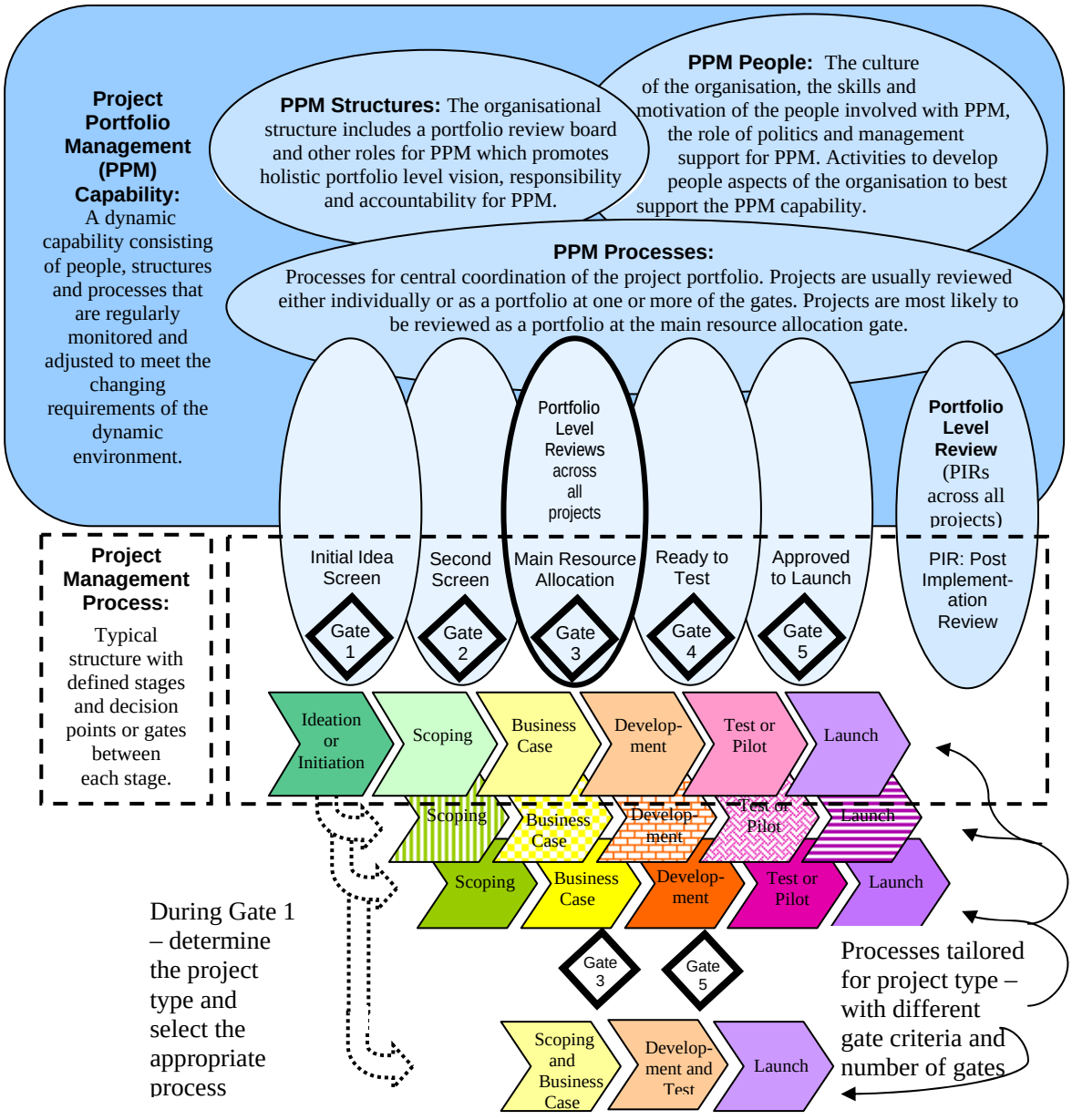

Figure 1: Three dimensions of PPM integrated with tailored gated PM processes.

As shown in Figure 1, the PPM capabilities generally include a gated PM process integrated with a portfolio-level review process at one or more of the gates or decision points. In addition the figure also reflects the fact that each of the case organisations has developed more than one version of the PM process to cater for different project types. The main differences between versions of the gated project management processes are in the number of stages and gates and in the types of criteria used to evaluate projects at the gates.

Figure 1 also includes a stage for the post implementation review (PIR). The PIR is an important stage of the process because the feedback enables the review, evaluation and improvement of the PPM processes. However, this is a weak area in most of the organisations studied. Although the managers at the case organisations believe that PIRs are important, they find it hard to get the resources or the time for such tasks.

Change and dynamism

One of the most notable aspects of the PPM capabilities at the six case organisations is the level of change. The findings at all of the organisations provide evidence of ongoing evaluation and change of the PPM capability, and each case organisation has made changes within the past year. All of the organisations are also currently planning for further changes and adjustments in the near future as they strive to increase the maturity and effectiveness of their PPM capability in dynamic environments. These changes are shown to be path dependent, with antecedent capabilities being developed to prepare for higher capabilities. Some of the changes were introduced to help tailor the PPM capability to cater for the organisations' individual environments and project types, and to enhance the ability of the PPM capability to address the balance between the short-term 'exploitation' projects and long-term 'exploration' projects.

The in-depth case findings indicate that both intentional and unintentional learning processes influence the evolution of the PPM capability. Organisations intentionally invest in learning activities that enhance both tacit and explicit learning mechanisms in order to establish and improve their PPM capabilities [20]. The research also indicates that PPM capabilities evolve organically and unintentionally through accumulated decision-making experiences. This unintentional evolution of PPM capabilities can result in undesirable changes to the PPM capability such as the 'success trap', prompting additional purposeful efforts to counteract these changes.

The 'success trap' (also referred to as the 'exploitation trap') is a phenomenon where organisational decision-making evolves to favour short-term, incremental or low-risk 'exploitation' projects, at the expense of the more radical, breakthrough longer-term 'exploration' projects that organisations believe are essential for long-term success [21]. The PPM capability provides a locus for the decision-making processes that enhances ability of experiences to accumulate and the learning to be captured. The 'success trap' is an unintentional result of this learning where it becomes easier and easier to justify safe and short-term projects due to reinforcement from the frequent, timely and largely positive outcomes from these decisions. As one interviewee explained, "Short versus long-term is most difficult to balance, especially with pressure to turn around in a shorter term. Longer term no one gives you any credit for and it is harder to get justification".

While the PPM capability is in part to blame for creating an imbalance in the portfolio, it also provides the case organisations with the capability to recognise and address the 'success trap' phenomenon. Each of the organisations aims to be ambidextrous and to exploit and explore at

the same time. Each of the case organisations has adjusted, or is planning to adjust, their PPM capability to enhance their ability to balance exploitation and exploration projects. Some have introduced measures such as targeted idea generation activities to generate more radical ideas and tailored processes and evaluation criteria for evaluating longer-term explorative projects. As one manager states, "It is not fair to require people to paint a picture three years out when they just have an idea at an early stage. We don't put a lot of weight on the early stage projections – otherwise it will knock out good ideas".

Overview of the Outcomes and Learning-based Maturity Model (OLMM)

Existing CMMs were reviewed and evaluated and were found to be limited in scope and not adequate for representing the maturity and development of the PPM capability at the case organisations [6-8, 13, 14]. Therefore a new capability maturity model, the 'PPM Outcomes and Learning-based Maturity Model' (OLMM), was developed to include all the elements of a PPM capability and to address the weaknesses of the existing CMMs. The five main benefits of the OLMM model, compared with other PPM Maturity Models are:

- the inclusion of a wide range of human and organisational aspects to represent the full breadth of the PPM capability,
- the focus on outcomes rather than activities with a rating system that recognises the flexibility in capability development and progression,
- the inclusion of organisational learning capabilities through review and feedback capabilities linked with capabilities for adjustment of elements of the PPM capability,
- the recognition and linking of antecedents for maturity stages that build upon other capabilities, and
- explicit attention to the aspects of PPM capabilities that will assist in balancing exploration and exploitation projects.

The OLMM is designed to guide organisations in the customisation of their PPM capability through the tailoring of processes and criteria to their environment, and to assist organisations to ensure that the capability is responsive to changes in the environment.

The OLMM was developed through evaluation and analysis of existing CMMs for PPM, a review of the literature on PPM, analysis of the findings from the survey and the in-depth case studies, feedback and advice from PPM experts, and finally, feedback from the case organisations. The OLMM is implemented in a spreadsheet, with three 'pages' or worksheets. The 'main page' evaluates organisations on their overall progress from the initial foundations for a PPM capability through to their performance on the main goals for a PPM capability: high portfolio value, alignment with strategy, balance and effective pipeline management so that projects receive adequate resources [3]. The other two pages outline capabilities that support the capabilities on the main page: the new product development (NPD) page outlines the NPD-related capabilities that support a PPM capability, and the PPM page details the components of the PPM capability in more detail. All capability elements are rated on a 0-5 scale to represent the fact that capabilities are not always achieved at the same depth or level. In addition, although the OLMM presents the capabilities along common maturity paths, it does not require or assume that capabilities are each fully developed in a prescribed order and therefore enables a true picture of the situation to emerge.

A simplified version of the main page is presented in Figure 2. Coloured bars above each outcome box show the ratings for the 6SI Benchmark – the average rating from the 'six successful innovators' (6SI) that are the six case study organisations. The use of both colour and numerical ratings is designed to provide 'feedback-at-a-glance'. For example, the areas where the 6SI Benchmark shows strong performance (pink and orange) and medium performance (yellow) can be quickly observed. Similarly, when individual organisations' numerical rating data are entered into the allocated cell (below the 6SI benchmark cell), the corresponding colour is also displayed, enabling quick comparison with the 6SI benchmark and revealing the areas of strength and weakness.

Each item on the main page of the OLMM (Figure 2) has a customised key for capability rating. Supporting (usually antecedent) capabilities are identified where relevant – these are identified by codes starting with 'N' for capabilities on the NPD-focused page, and codes starting with 'P' for capabilities on the PPM-focused page.

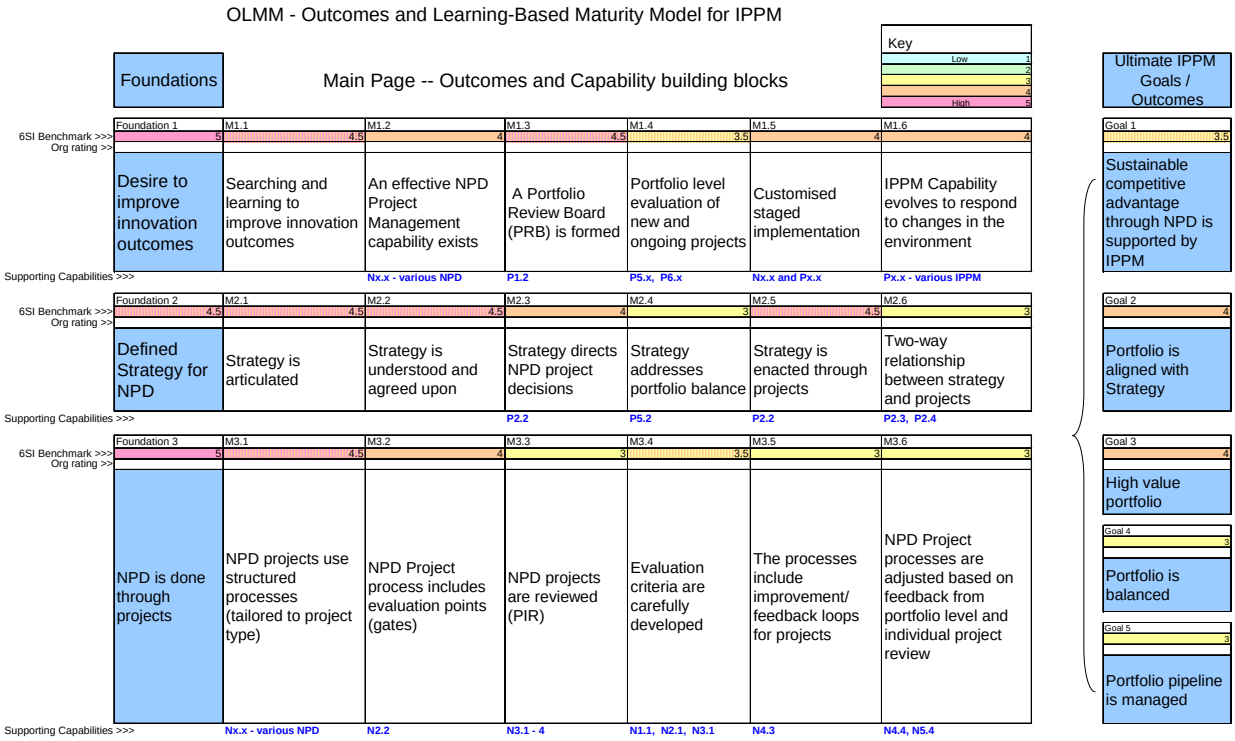

Figure 2: Overview of the Outcomes and Learning-based Maturity Model for PPM

The NPD-focused page of the OLMM identifies NPD capabilities that support PPM in four sections: (1) The front-end product development stage, (2) the implementation stage, (3) the review stage, and (4) Improvement/Feedback loops for product development project processes. Throughout the NPD-focused page, the OLMM includes specific capabilities for the establishment, evaluation and improvement to the criteria used for evaluation and measurement during the NPD and PPM processes.

The PPM-focused page identifies PPM capabilities and organisational capabilities that support PPM in eight sections: (1) organisational structure and responsibility, (2) support for PPM, (3) communication capabilities, (4) front end capabilities such as idea generation, idea management and project proposal capabilities, (5) capabilities to manage PPM Criteria, (6)

PPM process and portfolio level analysis capabilities, (7) pipeline management capabilities to manage the timing and resourcing of projects, and (8) culture, people and team issues. The NPD- and PPM-focused pages of the OLMM are not illustrated in this paper.

A sample of the rating keys for the capabilities M1.3 - M1.6 are presented in Table 1. Specific descriptions are used in the capability keys to improve the reliability of the responses. Table 2 provides an example of some of the supporting capabilities for M1.4, the capability to perform a portfolio level evaluation of new and ongoing projects.

Table 1: Sample of Capability Rating Keys for the OLMM

Capability code	M1.3	M1.4	M1.5	M1.6
Brief Description	A Portfolio Review Board (PRB) is formed.	Portfolio level evaluation of new and ongoing projects	Customised staged implementation	PPM Capability evolves to respond to changes in the environment
Key for Rating	O = Individual decisions only 1 = No identified review board or team, but multiple people make decisions. 2 = Some type of team or group is used - quite informal 3 = A PRB or decision-making team is identified and given some PPM decision-making responsibility 4 = the PRB is formal and is given full PPM decision-making responsibility 5 = (as in rating 4) with the PRB membership selected carefully through an established and transparent process. The PRB contains experienced cross disciplinary professionals.	0 = no PPM process evident 1 = Process developed to rank project proposals projects 2 = Process developed and used to select new projects 3 = PPM process developed to evaluate new and ongoing projects when making resource allocation decisions for new projects 4 = (as in rating 3) along with resource adjustment decisions for existing projects 5 = PPM process developed (as in rating 4) with a clear charter to kill poor projects and re-claim resources for other projects.	0 = not implemented 1 = ad hoc attempts and partial implementation of the developed process 2 = There is/was some order to the implementation process 3 = A standardised Implementation process is/was used (following prescribed models or maturity paths). 4 = A customised implementation process is being developed/or is evolving - taking into account organisational contingencies, current maturity as well as the maturity paths 5 = A customised implementation process is planned/has occurred/or has evolved - taking into account items as per rating 4	0 = No PPM capability 1 = Minimum and static PPM capability 2 = Some evaluation of the PPM capability 3 = Some evaluation and adjustment/improvement evident 4 = Periodic evaluation and adjustment/improvement 5 = Continual evaluation and adjustment/improvement

Table 2: Sample of Supporting Capabilities for Capability M1.4 (Portfolio level evaluation of new and ongoing projects)

P5.1	P5.2	P5.3
Project Proposal Criteria and PPM Criteria for project resource allocation are defined and documented.	PPM Criteria for project resource allocation include portfolio level strategic and balancing (risk, pipeline, resource, timeframe, exploitation/exploration) criteria as well as individual Project Proposal Criteria	Project Proposal and PPM Criteria are reviewed and adjusted based on analysis of project level and portfolio level data. Documentation is kept up-to-date.
P6.2	**P6.3**	**P6.4**
New Projects are selected using PPM Criteria as part of a portfolio of new projects	New Projects are selected using PPM Criteria as part of a portfolio of new projects and ongoing projects	Ongoing projects are continually evaluated using PPM Criteria as part of a portfolio of new projects and ongoing projects - Ongoing projects may be killed or de-prioritised if other projects are a better fit with PPM Criteria.

Tables 1 and 2 provide an illustration of the types of rating criteria used throughout the OLMM and the way that supporting capabilities cascade through the OLMM pages and are representative of the rest of the OLMM. The capabilities listed in Table 2 are included in the PPM focused page of the OLMM.

Feedback from initial application of the OLMM indicates that it can be a useful tool for organisations to better understand and improve their PPM capabilities. Although the OLMM has evolved and improved through several stages of iteration and feedback, continued use and analysis of the OLMM is recommended for further improvements to the model.

Conclusion

PPM capabilities provide a holistic decision-making framework to align projects with strategy and to ensure resource sufficiency for the project portfolio. Empirical research shows how PPM capabilities evolve in response to dynamic environments. A CMM has been presented that is designed to represent the staged development and implementation of an effective and dynamic PPM capability. The CMM addresses some of the shortcomings of existing maturity models. It incorporates organisational learning capabilities, highlights capabilities for change and renewal of the PPM capability, and includes specific capabilities to assist organisations achieve ambidexterity through a balance of exploitation and exploration projects.

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