

Portfolio Management

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Systems engineers need to be aware of and understand the role of systems engineering in project, program, and portfolio management (PfM) processes to achieve maximum stakeholder value. In general, program and project management practices help ensure that organizations execute programs and projects the “right” way. Portfolio management can help to ensure they select the “right” programs and projects, and systems engineering ensures they use the “right” systems thinking (Specking et al. 2020). Not using portfolio management practices increases organizational risk and could decrease stakeholder value.

This article provides:

- a description of the ISO/IEC/IEEE 15288 activities and tasks with regards to portfolio management;
- a description of the Project Management Institute's (PMI's) portfolio life cycle process based on PMI's Guide to the Project Management Body of Knowledge (PMI 2017a);
- the connection of the PMI's portfolio life cycle process to ISO/IEC/IEEE 15288;
- a reference to the principles of portfolio management from the PfM Standard;
- a realignment of the SE Handbook's common approaches/tips with the PfM Standard's six domains;
- a discussion to better clarify systems engineering's relationship to portfolio management, as well as systems engineering's relationship to other topics, such as project management and program

management; and

- a description of the systems engineer's role to support portfolio managers that explicitly states how a systems engineer (a) helps evaluate the value of projects to authorize, continue, or terminate enterprise projects and (b) manages their portfolio of systems engineering activities to support portfolio managers and to support enterprise processes, products, and services.

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Contents

Portfolio Management Overview

Portfolio Management Process Implementation

Portfolio Management Process Best Practices

Relationships Between Systems Engineering, Portfolio Management, and Project Management

References

Works Cited

Primary References

Additional References

Portfolio Management Overview

ISO/IEC/IEEE 15288 (ISO/IEC/IEEE 2015) establishes portfolio management's importance to systems engineering by including it as an organizational project-enabling process. This organizational project-enabling process uses an organization's strategic plan, portfolio direction and constraints, supply strategy, and project status report as inputs, while a portfolio management plan, organization infrastructure needs, project direction, project portfolio, organization lessons learned, portfolio management report, and portfolio management records are outputs (INCOSE 2015). Portfolio management uses these inputs to perform processes that help enterprises define and authorize projects; evaluate the portfolio of projects and programs; and terminate projects to develop the portfolio management outputs. These activities take place throughout the portfolio life cycle, which includes optimization, initiation, planning, and execution (PMI 2017b).

Portfolio Management Process Implementation

The proper implementation of portfolio management processes results in seven major portfolio management outcomes: 1) qualification and prioritization of business venture opportunities, investments, or necessities; 2) identification of projects; 3) allocation of project resources and budgets; 4) description of project management responsibilities, accountability, and authorities; 5) sustainment of project meeting agreement and stakeholder requirements; 6) redirection or termination of unsatisfactory projects; and 7) closure of successfully completed projects (ISO/IEC/IEEE, 2015). A project should continue if it contributes to organizational strategy; makes progress on achieving its pre-established goals; obeys organizational project directives; is executed according to its pre-approved plan; and continues to add value to the organization with acceptable returns (INCOSE 2015).

Organizations can increase portfolio value by successfully implementing portfolio management processes through six performance management domains throughout the portfolio life cycle (PMI 2017b). These domains, described in Table 1, include portfolio strategic management, portfolio governance, portfolio capacity and capability management, portfolio stakeholder engagement, portfolio value management, and portfolio risk management.

Table 1. Performance Management Domain Descriptions for Portfolio Management (Specking et al. 2020)

Domain	Description
Portfolio Strategic Management	Align portfolio components to one or more strategic objectives and monitor impact
Portfolio Governance	“Through open and transparent governance, including processes for categorizing, prioritizing, selecting, and approving portfolio components, key stakeholders are more likely to accept the decisions and agree with the process, even when they may not fully endorse the decisions made” (PMI 2017b).
Portfolio Capacity and Capability Management	“The selection of portfolio components and the roadmap for their implementation is balanced against the organization’s current capacity and capability with the potential of bringing in additional resources” (PMI 2017b).

Portfolio Stakeholder Engagement	“Key portfolio stakeholders require active expectation management” (PMI 2017b).
Portfolio Value Management	Use the organizational strategy to enable investment in a portfolio with the expectation of a pre-determined return
Portfolio Risk Management	Evaluate risk (positive/opportunities, negative/threats) and consider how those risks might impact accomplishing the portfolio strategic plan and objectives

These domains use some or all of the seven PMI fundamental principles for portfolio management (PMI 2017b). The seven PMI fundamental principles for portfolio management include:

- *Strive to achieve excellence in strategic execution;*
- *Enhance transparency, responsibility, accountability, sustainability, and fairness;*
- *Balance portfolio value against overall risks;*
- *Ensure that investments in portfolio components are aligned with the organization’s strategy;*
- *Obtain and maintain the sponsorship and engagement of senior management and key stakeholders;*
- *Exercise active and decisive leadership for the optimization of resource utilization;*
- *Foster a culture that embraces change and risk; and*
- *Navigate complexity to enable successful outcomes.*

Portfolio Management Process Best Practices

INCOSE's Systems Engineering Handbook (INCOSE 2015) provides several best practices for performing portfolio management processes. These best practices connect to one or more of the six performance management domains seen in Table 2.

Table 2. SE Handbook Best Practices for Portfolio Management (Modified from (Specking et al. 2020))

Performance Management Domain for Portfolio Management	Key Word for Best Practice	Description of Best Practices
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<ul style="list-style-type: none"> • Portfolio Strategic Management • Portfolio Strategic Engagement • Portfolio Value Management 	Right Stakeholders	Include relevant stakeholders when developing the organization's business area plan to enable the organization to determine present and future strategic objectives for focusing resources
<ul style="list-style-type: none"> • Portfolio Value Management • Portfolio Governance 	Measurable Criteria	Prioritize opportunities based upon measurable criteria that contains a stated threshold of acceptable performance
<ul style="list-style-type: none"> • Portfolio Value Management • Portfolio Governance • Portfolio Capacity and Capability Management 	Progress Assessment	Base expected project outcomes on defined, measurable criteria with specific investment assessment information to enable an impartial progress assessment
<ul style="list-style-type: none"> • Portfolio Governance 	Coordinate Interactions	Use some type of coordination organization, such as a program office, to manage the interactions among active projects
<ul style="list-style-type: none"> • Portfolio Governance 	Consider Products and Systems	Use a product line approach for scenarios where multiple customers need the same/similar system but customize the system as necessary
<ul style="list-style-type: none"> • Portfolio Risk Management 	Assess Risk	Assess risk during current project evaluation and cancel/suspend projects with risks that outweigh the investment
<ul style="list-style-type: none"> • Portfolio Strategic Management • Portfolio Capacity and Capability Management 	Align with Strategy	Perform opportunity assessments of ongoing projects and avoid opportunities that contain unacceptable levels of risks, resource demands, or uncertainties or does not aligned with organization capabilities, strategic goals, or strategic objectives
<ul style="list-style-type: none"> • Portfolio Value Management • Portfolio Governance 	Allocate Resources	Allocate resources based upon project requirements

• Portfolio Governance	Effective Governance	Use effective governance processes, which support investment decision making and project management communications
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Relationships Between Systems Engineering, Portfolio Management, and Project Management

It is often difficult for systems engineers to understand the relationships between systems engineering, portfolio management, and project management because of their overlapping processes and the use of similar tools. Figure 1 shows the role of project management, systems engineering, and portfolio management for developing and improving an enterprise architecture to provide products or services to many stakeholders. Project and program managers and systems engineers all interact with stakeholders and the enterprise architecture, which consists of products or services and the systems that make them. Systems engineers use the enterprise architecture to develop user and system functional hierarchies, which enable capability development. These capabilities help systems engineers evaluate the enterprise's current and future states. From this evaluation, the Project Management Office (portfolio managers) can develop a potential list of projects or programs to fund. Portfolio managers use best practices in decision analysis (Parnell et al. 2013) to develop a project prioritization value model (e.g. single or multiple objective decision analysis model). Portfolio managers then use optimization techniques to determine which projects or programs to fund based upon the prioritization value model. Project managers then execute the funded projects to ensure that the projects stay on schedule and within budget constraints while meeting desired performance metrics. Information impacting systems engineering documentation discovered from the funded projects updates the functional hierarchies and system architecture. Throughout the project, portfolio managers receive updates from project managers on project progress. Portfolio managers use progress information to evaluate the project for continuation or termination. If the project is terminated upon successful completion of the project, the project's outcomes update the enterprises'

architecture. Otherwise (i.e. terminated early or upon an unsuccessful completion), portfolio managers update their list of potential projects and/or programs for reprioritization. This cycle continues and evolves with time based upon the enterprise's strategy.

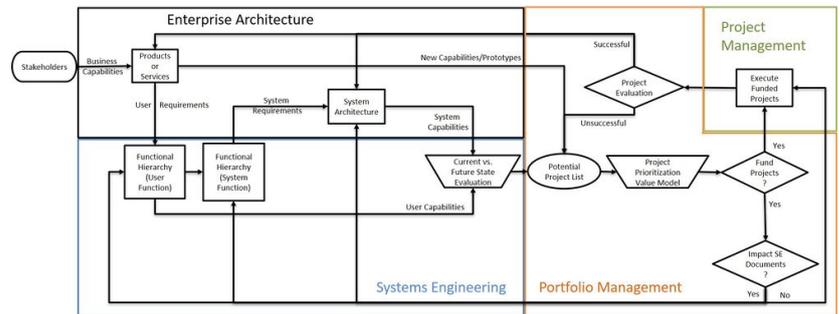


Figure 1: Role of Systems Engineering, Project Management, and Portfolio Management in a DevOps Environment

In addition to helping systems engineers understand the roles of systems engineering, portfolio management, and project management, Figure 1 provides insights into the relationships between the processes from an enterprise DevOps environment perspective.

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Additional References

None.

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