

Managing an Engineering Project

An Online Continuing Education Course for Engineers

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Managing an Engineering Project

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Introduction

Project management principles and processes apply to all projects. However, there are unique approaches, tools, and techniques that work better with specific kinds of projects. Such is the case with engineering design projects, which have these unique challenges:

- Stage-gate/phased approach (study, preliminary design, final design)
- Leading a multi-disciplined design team
- Percent complete milestones
- Permitting and code compliance
- Lengthy technical specifications
- Complex systems with performance risks
- Difficult construction cost estimating
- Often no direct return on investment or payback period
- Risks of impact on the health and safety of the public

Project managers (PMs), design managers, and engineering leads are expected to achieve the project goals while tackling these challenges. High-quality designs are expected in a short time period and at low cost. There is a saying that you can only pick two of three: quality, speed, or cost. But on most projects, all three are expected with specific goals defined for each! Project management is the key to achieving the trifecta: high quality, on schedule, and within budget.

This course focuses on addressing the unique demands of being a PM for an engineering design project.

Design Management

For engineering design projects (or the design phase of a project), the term “design management” is often utilized for project management activities. Design management refers to managing design activities for both the overall team (by the PM) and design activities within a discipline (PM or discipline lead). So, design management and project management overlap when referring to the management of the team or multiple disciplines. Design management differs from project management for design tasks such as performing quality reviews, collaborating with other discipline staff, and coordinating with drafters on accurately depicting design details. See Figure 1 for a depiction.

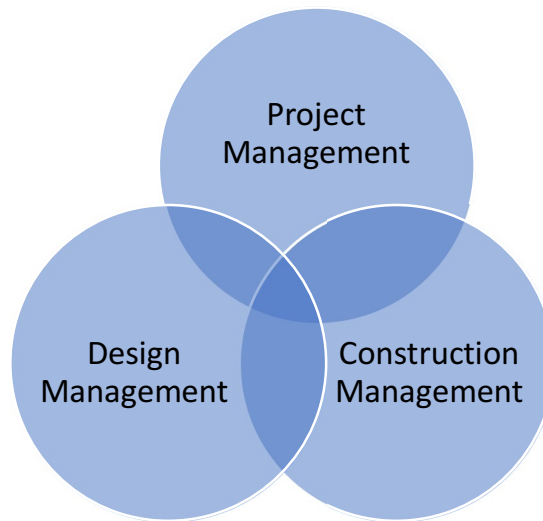


Figure 1: Overlap of Project Management with Design Management and Construction Management

On some engineering projects, depending on the leadership skills of the design leads, the PM may take on a more active role in design management tasks. The PM and design leads should identify who will perform certainly overlapping tasks when planning the work.

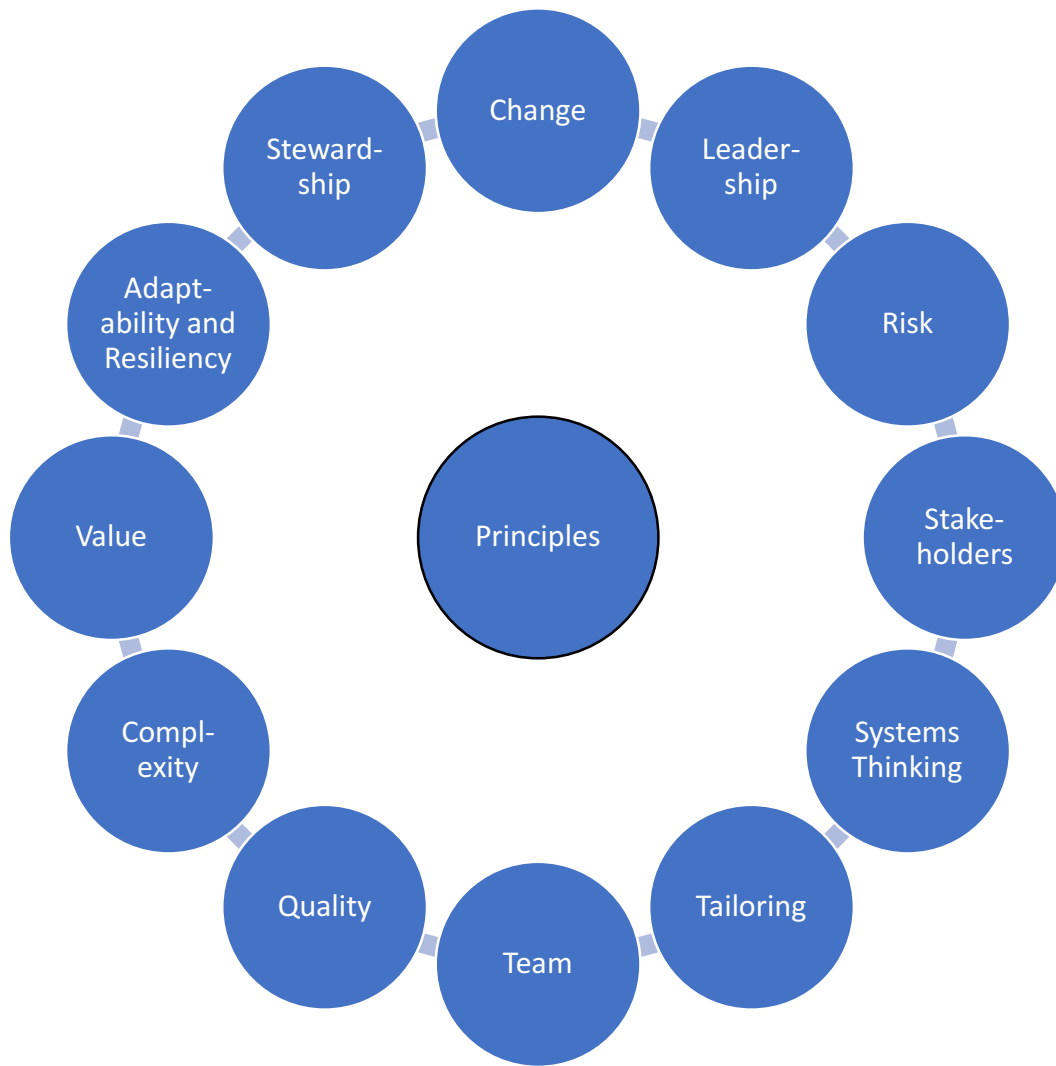
The majority of project management work is done in planning activities.

PMBOK® Guide

The most widely accepted standard for project management principles is the *Guide to the Project Management Body of Knowledge* (PMBOK® Guide) issued by the Project Management Institute, Inc. (PMI). Fundamental recommendations are provided, which are widely accepted across a variety of project types and delivery types. This course makes reference to and is guided by this document.

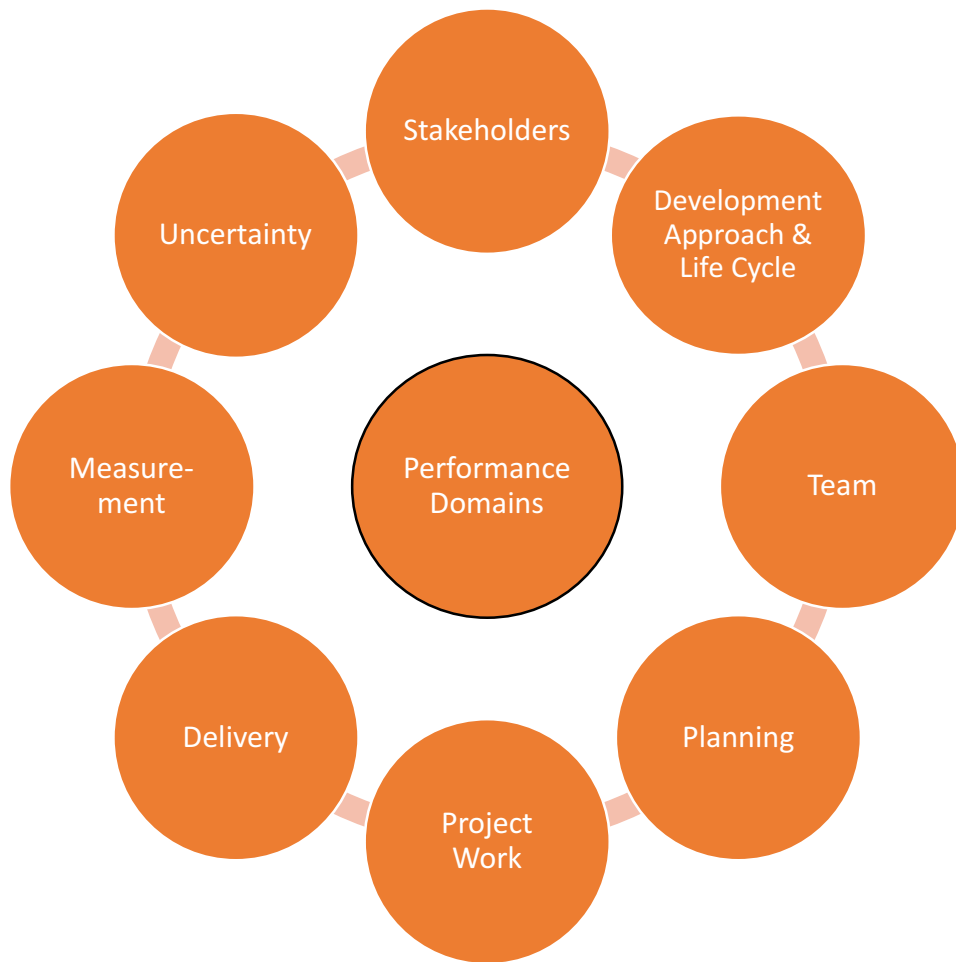
Five process groups are defined: Initiation, Planning, Execution, Monitoring and Controlling, and Closing. All five apply to each phase/stage of a project, including the design phase.

There are twelve “Principles” for project management, as shown in Figure 2. These principles are foundational attitudes and approaches that guide all aspects of a project. The project manager should embody these principles and live them out each day.



*Figure 2: Twelve project management “principles” per the PMBOK® Guide.
Source: Author*

There are eight “Performance Domains” for project management, as shown in Figure 3. Performance domains are the areas of activity that help achieve project goals. The domains are ways to put principles into action.



*Figure 3: Eight project management “performance domains” per the PMBOK® Guide.
Source: Author*

Engineering Projects

Engineering projects, often called capital improvement projects, typically involve the construction of physical improvements to real property or infrastructure. This includes both public property (municipal, special districts, utilities, state, federal, military) and private property (residential, commercial, industrial). Private capital improvement projects are often called capital expenditure projects or CapEx projects.

Engineering projects aim to install or modify physical components as opposed to software development or product development projects. However, control features and associated programming are often a part of engineering projects. The term engineering project can refer to just the design phase, or both the

design and construction phases, with the engineering team providing support during construction. For this course, just the design phase is covered.

Examples of engineering projects in construction are provided in the following figures.



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