

CHAPTER 10: MANAGEMENT, LEADERSHIP, AND ETHICS

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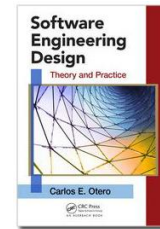
SESSION I: DESIGN MANAGEMENT FRAMEWORK

Software Engineering Design: Theory and Practice

by Carlos E. Otero

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SESSION'S AGENDA

- Software Design Management
 - ✓ What is software design management?
 - ✓ Why study software design management?

- A Design Management Framework
 - ✓ Quality in software design
 - ✓ Typical project lifecycle
 - ✓ Typical performance measures in project phases
 - ✓ Components of the design management framework

- What's next...

SOFTWARE DESIGN MANAGEMENT

- What is software design management?
 - ✓ Software design is the process of transforming functional and non-functional requirements into models that describe a technical solution.
 - Can be viewed as a complex decision problem since
 - there are many ways to design a software system, and
 - software engineers must make design decisions to achieve the required goals of the software system in the most effective manner
 - ✓ Management is a *set of activities* directed at an organization's *resources* to achieve organizational goals in an efficient and effective manner.
 - Activities: planning and decision making, organizing, leading, and controlling
 - Resources: human, financial, physical, and information
 - ✓ In the design phase, management refers to activities required to efficiently create *quality* design artifacts, within schedule and budget constraints.

SOFTWARE DESIGN MANAGEMENT

- Why study software design management?
 - ✓ In large-scale software projects, software design management is essential to plan, organize, staff, track, and lead the activities required to carry out successfully the software architecture and detailed design steps.

 - ✓ To understand relevant managerial techniques and concepts
 - This will help to effectively use resources to achieve the various goals for each main component in the design phase (i.e., software architecture, detailed design, and documentation).
 - Effective use of resources is key to the success of software design management.

 - ✓ In the general sense, software design management is needed to:
 - Control/monitor design processes
 - Manage the resources necessary for completing quality design artifacts according to organizational goals

THE CONCEPT OF QUALITY

- Quality is a performance measure for a service provided or a product produced
- Quality is *relative* to a particular stakeholder. For example:
 - ✓ A **personal website** can be classified as high-quality by the programmer that developed it, and as low quality by user clients. Why?

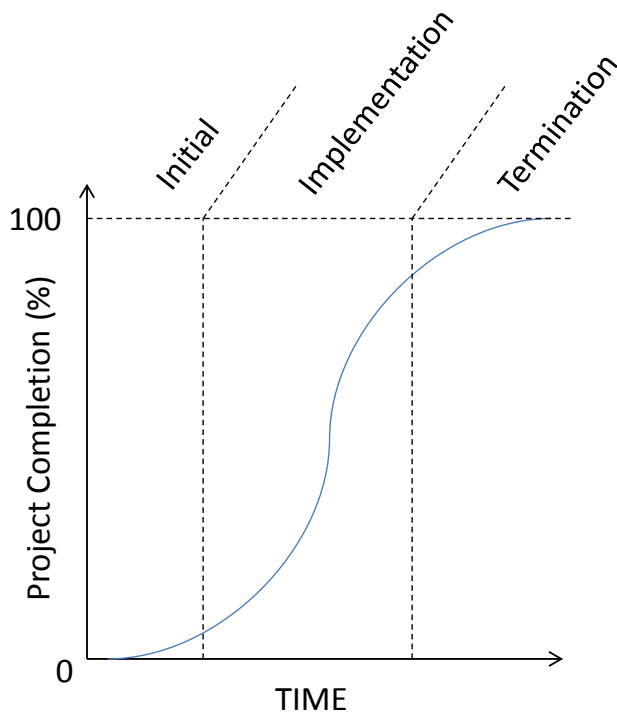


- Because both stakeholders have different parameters by which they measure quality
 - The programmer may perceive quality in terms of being able to use appropriate colors and organize the website to run on a particular web browser.
 - A client using a different web browser may not see the website's organization and colors as intended; thus perceiving the website's quality as poor.

- Although the **quality** of a software design can be assessed in various ways, from a management's perspective, quality of software design tends to be evaluated in terms of **cost** and **scheduling**.
 - ✓ Thus, it is important to understand project management techniques that can be used to keep design artifacts within cost and schedule thresholds.

DESIGN MANAGEMENT FRAMEWORK

- It is beneficial to view the design phase as a project. Why?
 - ✓ Project management techniques can be directly applied to the design phase
 - This will help to efficiently and effectively manage the software design activities
 - E.g., the life cycle of the design phase can be represented with three stages as in:



- This life cycle represents a typical project pattern
 - ✓ Contributions to a project's completion are:
 - Relatively small during the initial and termination phases
 - Significantly high during the implementation phase
- When defining a life cycle structure for a project, we can **decompose** a project into its appropriate stages, and **manage each stage individually**.

LIFECYCLE STAGES

- In the **initial stage**, there are two main objectives:
 - ✓ Achieve a clear understanding of the tasks to be accomplished and the resources that are necessary to successfully complete the tasks.
 - ✓ Develop a plan to complete the project's tasks within schedule and budget constraints.

- The initial phase is characterized by planning activities.
 - ✓ Although some of the artifacts resulting from this phase (e.g., schedule) may be deliverables to clients, this phase is not viewed as contributing significantly to the percentage project completion.

- The **implementation stage** is where:
 - ✓ Most of the effort is employed
 - ✓ Most of the design project deliverables are achieved, including completed design documents
 - ✓ The percent project completion is the highest

OBJECTIVES IN THE LIFECYCLE STAGES

- In the **termination stage**,
 - ✓ Key activities involve verification that everything is in place for a smooth transition into the code construction phase. Examples of activities are:
 - Making sure that the latest versions of the design documents are securely stored according to configuration management procedures
 - Updating schedule and cost current values
 - Re-evaluating schedule and budget plans based on the resulting performance measures of the design phase
 - Communicating results to upper management.

- The design documents generated in this stage are critical for the robustness and maintainability of the software designed.
 - ✓ However, the relative impact of this stage to project completion is not viewed as significant as that of the implementation phase.

MANAGING LIFECYCLE STAGES

- The lifecycle stages of a design project must be *individually managed* to ensure acceptable levels of quality and performance measures.
 - ✓ What does this mean?
 - For example, an important outcome of the *planning stage* is a clear understanding of the tasks to be accomplished and the resources that are necessary to successfully complete the tasks.
 - Various project management techniques exist to help achieve this outcome.

- It is important to know how to apply appropriate project management techniques to each of the design project stages
 - ✓ Afterwards, *peer reviews* will help ensure that the objectives of the planning stage are achieved.
 - Peer reviews must be conducted throughout these stages to minimize the propagation of errors to subsequent stages and apply corrective actions.



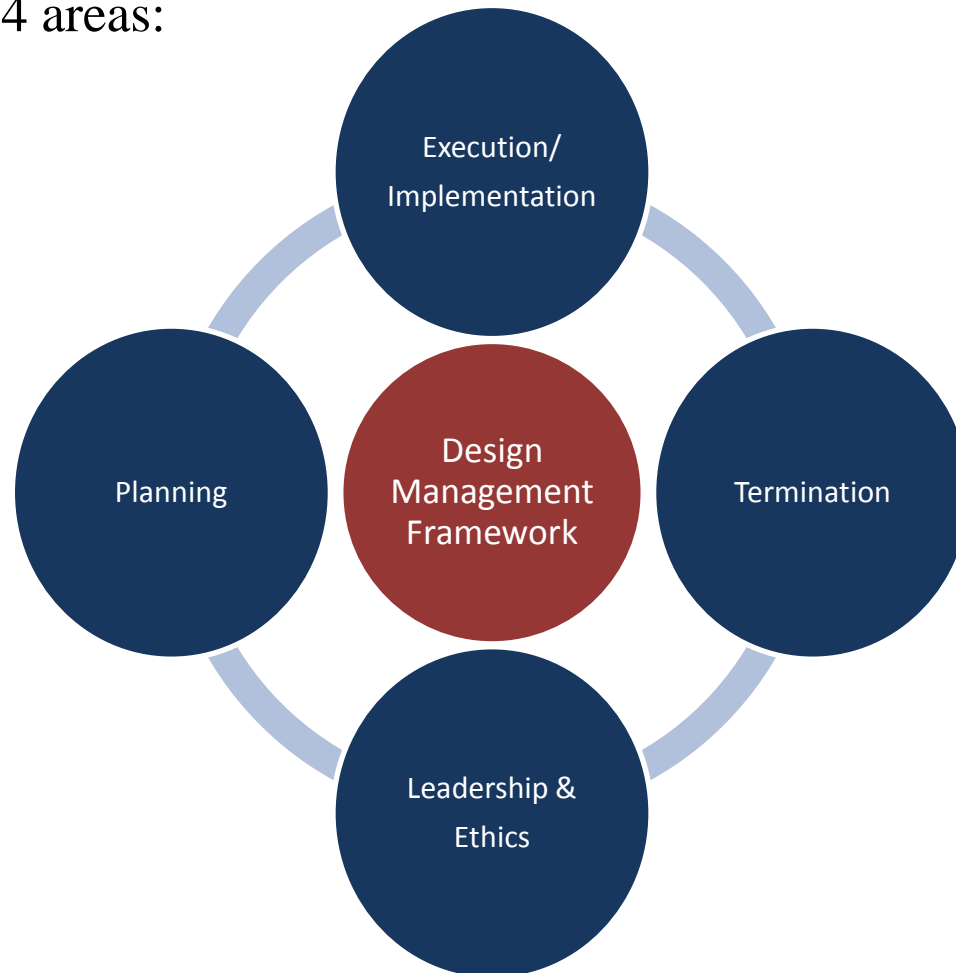
DESIGN MANAGEMENT FRAMEWORK

- Each of the **design project lifecycle stages** are associated with different performance measures. For example:
 - ✓ In the planning stage, performance measures such as the following are relevant:
 - Thoroughness (everything is considered),
 - Completeness (complete definition of plans),
 - Accuracy of estimates.
 - ✓ In the execution/implementation stage,
 - Quality is a function of a series of technical attributes of software designs.
 - Managing during this stage is mainly a monitoring approach to make sure that the plan is been followed, and take corrective actions if necessary.

- **Leadership** and **good ethical conduct** are important factors that affect the effectiveness of managing each lifecycle stage.

DESIGN MANAGEMENT FRAMEWORK

- Thus, an appropriate design management framework is one that considers the following 4 areas:



WHAT'S NEXT...

- This session accomplished the following:
 - ✓ Defined software design management
 - ✓ Understood the importance of studying software design management
 - ✓ Discussed the concept of quality in software design management
 - ✓ Described the stages of a typical project lifecycle
 - ✓ Described typical performance measures in project phases
 - ✓ Defined a design management framework composed of four components:
 - Planning
 - Implementation/Execution
 - Termination
 - Leadership & Ethics

- Next session will focus on the planning component of the design management framework,
 - ✓ This session will focus on managerial concepts and techniques that are relevant to the planning phase.

QUESTIONS?

