The Project Management Body of Knowledge

Dr. Mark C. Paulk

SE 4381, Software Project Planning and Management

Jonsson School of Engineering and Computer Science

Management Topics

1. Modern project management

→ PMBOK

2. Organization strategy and project selection

3. Organization: structure and culture

4. Defining the project

5. Estimating times and costs

6. Developing a project plan

7. Managing risk

8. Scheduling resources and cost

9. Reducing project duration

10. Leadership

11. Teams

12. Outsourcing

13. Monitoring progress

14. Project closure

15. International projects

16. Oversight

17. Agile PM

Critical chain project management

PMI

The Project Management Institute has formalized the body of knowledge for project management in the Project Management Body of Knowledge (PMBOK).

The PMBOK is for project management in general.

- **software projects are one example of where it can be applied**

Many companies require that their managers be PMI certified project management professionals.

- **http://www.pmi.org/en/Certification/What-are-PMI-Certifications.aspx**

What Is a Project?

A temporary endeavor undertaken to create a unique product, service, or result.

- **has a definite beginning and end**

The end is reached

- **when the project's objectives have been achieved**
- **terminated because its objectives will not or cannot be met**
- **terminated at the customer's (sponsor's) choice**

Major Characteristics of a Project

An established objective

A defined life span, with a beginning and end

Usually, the involvement of several departments and professionals

Typically, doing something that has not been done before

Specific time, cost, and performance requirements

Projects, Programs, and Portfolios

Portfolio

- **a collection of projects, programs, subportfolios, and operations managed as a group to achieve strategic objectives**

Program

- **a group of related projects, subprograms, and program activities managed in a coordinated way to obtain benefits not available from managing them individually**
  - **comprised of subprograms, projects, or other work that are managed in a coordinated fashion in support of the portfolio**

Portfolio Management

A project portfolio balances the total risk for the organization.

Only the most valuable projects are approved and managed across the organization.

Major Functions of Portfolio Management

Balance projects in the portfolio in order to present a risk level appropriate to the organization

Create a total organization perspective that goes beyond silo thinking

Oversee project selection

Monitor aggregate resource levels and skills

Encourage use of best practices

Improve communication among all stakeholders

Improve the overall management of projects over time

Project Management Office (PMO)

A management structure that

- **standardizes the project-related governance processes**
- **facilitates the sharing of resources, methodologies, tools, and techniques**

Supportive PMOs

- provide a consultative role by supplying templates, best practices, training, access to information, and lessons learned from other projects
- a project repository
- low degree of control

Controlling PMOs

- provide support and require compliance
- compliance may involve adopting project management frameworks or methodologies, using specific templates, forms and tools, or conformance to governance
- moderate degree of control

Directive PMOs

- directly manage projects
- high degree of control

Organizational Structures

Functional

Projectized

Matrix

- **weak**
- **strong**
- **balanced**

Functional Organization

A hierarchy where each employee has one superior

Staff members are grouped by specialty at the top level

Each department will do its project work independently of the other departments

Projectized Organizations

Project-based structure

Team members are often co-located

Most of organizational resources are involved in project work

- **if over 75% of the organization's work involves projects, consider the projectized structure**

Project managers have a great deal of independence and authority

Matrix Management

Matrix organizations are a blend of functional and projectized

A hybrid organizational form where a horizontal project management structure is "overlaid" on the normal functional hierarchy

Two chains of command: functional and project

A dual focus between functional / technical expertise and project requirements

Takes 3-5 years for matrix system to fully mature

Weak, Strong, and Balanced Matrix

Weak matrix organizations

- **many of the characteristics of a functional organization**
- **project manager is a coordinator or expediter**
- **expediters cannot make or enforce decisions**

Strong matrix organizations

- **full-time project managers have considerable authority**

Balanced matrix organizations

- **project manager does not have full authority over the project or project funding**

Influence of Organizational Structure on Projects

	Functional	Weak Matrix	Balanced Matrix	Strong Matrix	Projectized
Project Manager's Authority	Little or none	Low	Low to moderate	Moderate to high	High to almost total
Resource Availability	Little or none	Low	Low to moderate	Moderate to high	High to almost total
Who Manages the Project Budget	Functional manager	Functional manager	Mixed	Project manager	Project manager
Project Manager's Role	Part-time	Part-time	Full-time	Full-time	Full-time
Project Management Administrative Staff	Part-time	Part-time	Part-time	Full-time	Full-time

Project Life Cycle

A series of phases that a project passes through from its initiation to its closure.

Phases are generally time bounded, with a starting and ending or control point.

Range from predictive (plan-driven) to adaptive (change-driven) approaches.

- **Predictive: product and deliverables are defined at the beginning of the project and any changes to scope are carefully managed.**
- **Adaptive: product is developed over multiple iterations and detailed scope is defined for each iteration only as the iteration begins.**

Generic Project Life Cycle Structure with Outputs

Starting the project
- **project charter**

Organizing and preparing
- **project management plan**

Carrying out the project work
- **accepted deliverables**

Closing the project
- **archived project documents**

Uncertainty vs Cost of Change

Risk and uncertainty are greatest at the start of the project

- **decrease as decisions are reached and deliverables are accepted**

Ability to influence the final characteristics of the product is highest at the start of the project

- **cost of making changes and correcting errors increases substantially as the project approaches completion**

Competing Project Constraints

Scope

Quality

Schedule

Budget

Resources

Risks

If any one factor changes, at least one other factor is likely to be affected. See the Iron Triangle.

PMBOK® Guide 2013

A Guide to the Project Management Body of Knowledge, Fifth Edition, (PMBOK® Guide), Project Management Institute, Newtown Square, PA, 2013.

Knowledge Areas in PMBOK Guide

- **project integration management**
- **project scope management**
- **project time management**
- **project cost management**
- **project quality management**
- **project human resource management**
- **project communications management**
- **project risk management**
- **project procurement management**
- **project stakeholder management**

Project Integration Management *(PMBOK)*

Includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups.

- **develop project charter**
- **develop project management plan**
- **direct and manage project work**
- **monitor and control project work**
- **perform integrated change control**
- **close project or phase**

Project Scope Management (PMBOK)

Includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.

- **plan scope management**
- **collect requirements**
- **define scope**
- **create WBS**
- **validate scope**
- **control scope**

Project Time Management (PMBOK)

Includes the processes required to manage the timely completion of the project.

- **plan schedule management**
- **define activities**
- **sequence activities**
- **estimate activity resources**
- **estimate activity durations**
- **develop schedule**
- **control schedule**

Project Cost Management (PMBOK)

Includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget.

- **plan cost management**
- **estimate costs**
- **determine budget**
- **control costs**

Life-cycle costing ⇒ consider the effect of project decisions on the cost of using the product, e.g., software maintenance.

Project Quality Management (PMBOK)

Includes the processes and activities of the performing organization that determine quality policies, objectives and responsibilities so that the project will satisfy the needs for which it was undertaken.

- **plan quality management**
- **perform quality assurance**
- **control quality**

Quality – the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs.

Grade – a category or rank given to entities having the same functional use but different technical characteristics.

Good enough software???

Project Human Resource Management (PMBOK)

Includes the processes that organize, manage, and lead the project team.

- **plan human resource management**
- **acquire project team**
- **develop project team**
- **manage project team**

Project Communications Management *(PMBOK)*

Includes the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information.

- **plan communications management**
- **manage communications**
- **control communications**

Project Risk Management (PMBOK)

Includes the processes of conducting risk management planning, identification, analysis, response planning, and controlling risk on a project.

- **plan risk management**
- **identify risks**
- **perform qualitative risk analysis**
- **perform quantitative risk analysis**
- **plan risk responses**
- **control risks**

Project Procurement Management *(PMBOK)*

Includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.

- **plan procurement management**
- **conduct procurements**
- **control procurements**
- **close procurements**

Project Stakeholder Management
(PMBOK)

Includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution.

- **identify stakeholders**
- **plan stakeholder management**
- **manage stakeholder engagement**
- **control stakeholder engagement**

Questions and Answers