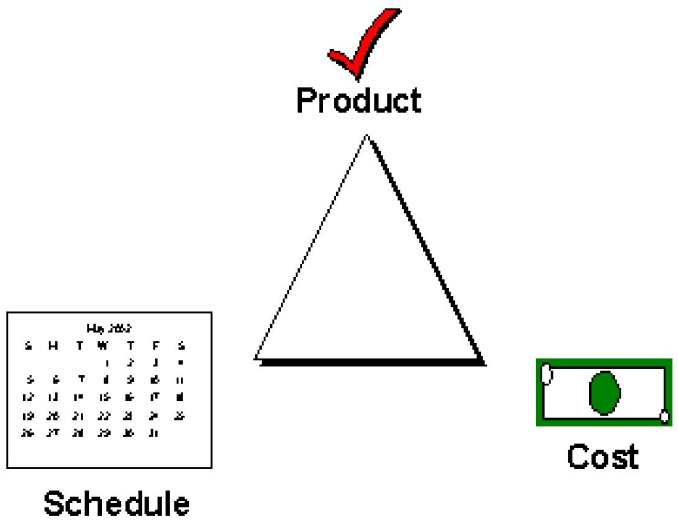
Project Management Fundamentals

Four Project Dimensions

- People
- Process
- Product
- Technology

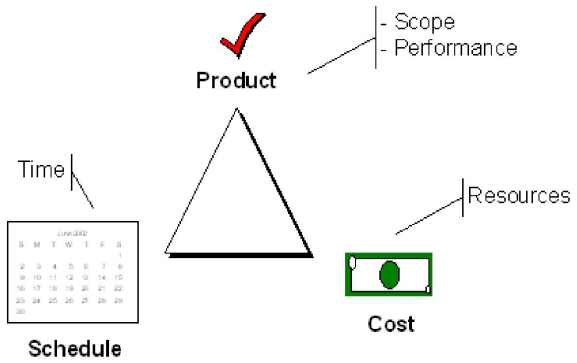
Trade- off Triangle

- Fast, cheap, good. Choose two



Trade off Triangle Trade-

- Know which of these are fixed & variable for every project



People

- “It’s always a people problem.”
- Gerald Weinberg, The Secrets of Consulting

Developer productivity: 10-to-1 range

- -Improvements:
  - -Team selection
  - -Team organization
- –Motivation

- Other success factors
- –Matching people to tasks
- –Career development
- –Balance: individual and team
- –Clear communication

Process

- Two Types: Management & Technical
- Development fundamentals
- Quality assurance
- Risk management
- Lifecycle planning

- Customer orientation
- Process maturity improvement
- Rework avoidance
- Avoid abuse by neglect

Product

- The “tangible” dimension
- Product size management
- Product characteristics and requirements
- Feature creep management

Technology

- Often the least important dimension
- Language and tool selection
- Value and cost of reuse

Classic Mistakes

36 Classic Mistakes

- Types
  - –People-Related
  - –Process-Related
  - –Product-Related
- –Technology-Related

People- Related Mistakes

- Undermined motivation
- Weak personnel
  - –Weak vs. Junior
- Uncontrolled problem employees
- Heroics
- Adding people to a late project

People-Related Mistakes …2

- Noisy, crowded offices
- Customer-Developer friction
- Unrealistic expectations
- Politics over substance
- Wishful thinking

People-Related Mistakes …3

- Lack of effective project sponsorship
- Lack of stakeholder buy-in
- Lack of user input

Process-Related Mistakes

- Optimistic schedules
- Insufficient risk management
- Contractor failure
- Insufficient planning
- Abandonment of plan under pressure

Process-Related Mistakes …2

- Wasted time during fuzzy front end
- Shortchanged upstream activities
- Inadequate design
- Shortchanged quality assurance

Process-Related Mistakes …3

- Insufficient management control
- Frequent convergence
- Omitting necessary tasks from estimates
- Planning to catch-up later
- Code-like-hell programming

Product-Related Mistakes

- Requirements gold-plating
- –Gilding the lily
- Feature creep
- Developer gold-plating
- –Beware the pet project
- Push-me, pull-me negotiation
- Research-oriented development

Technology-Related Mistakes

- Silver-bullet syndrome
- Overestimated savings from new tools and methods
- –Fad warning
- Switching tools in mid-project
- Lack of automated source-code control

Project Management Institute Overview

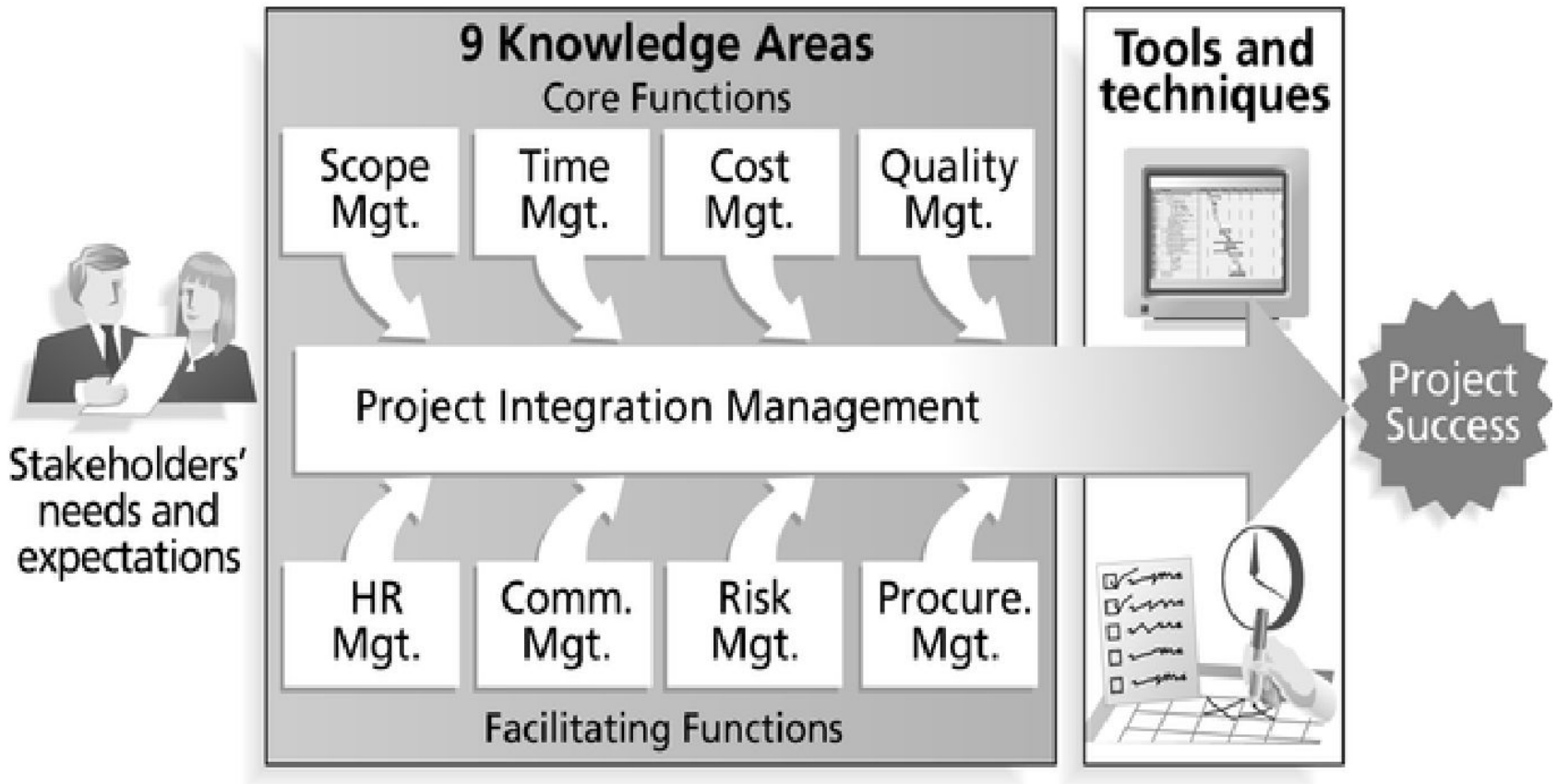
- Five volunteers founded the Project Management Institute (PMI) in 1969. Their initial goal was to establish an organization where members could share their experiences in project management and discuss issues.
- Today, PMI is a non-profit project management professional association and the most widely recognized organization in terms of promoting project management best practices.
- PMI was formed to serve the interests of the project management industry. The premise of PMI is that the tools and techniques of project management are common even among the widespread application of projects from the software to the construction industry.
- PMI first began offering the Project Management Professional (PMP) certification exam in 1984.
- Although it took a while for people to take notice, now more than 590,000 individuals around the world hold the PMP designation.

- To help keep project management terms and concepts clear and consistent, PMI introduced the book *A Guide to the Project Management Body of Knowledge (PMBOK Guide)* in 1987.
- The highly regarded Institute of Electrical and Electronics Engineers (IEEE) has adopted it as their project management standard.
- In 1999 PMI was accredited as an American National Standards Institute (ANSI) standards developer and also has the distinction of being the first organization to have its certification program attain International Organization for Standardization (ISO) 9001 recognition.

PMBOK

- Structures PM by
  - A) Processes
  - B) Knowledge Areas
- Processes. 2 types
  - 1. PM processes: describing and organizing the work of the project
  - 2. Product-oriented processes: specifying and building the project's product

PMI Framework



PMBOK is the fundamental knowledge you need for managing a project, categorized into knowledge areas:

1. **Managing integration**: Projects have all types of activities going on and there is a need to keep the "whole" thing moving collectively – integrating all of the dynamics that take place. Managing integration is about developing the project charter, scope statement, and plan to direct, manage, monitor, and control project change.

2. **Managing scope**: Projects need to have a defined parameter or scope, and this must be broken down and managed through a work breakdown structure or WBS. Managing scope is about planning, definition, WBS creation, verification, and control.

3. **Managing time/schedule**: Projects have a definite beginning and a definite ending date. Therefore, there is a need to manage the budgeted time according to a project schedule. Managing time/schedule is about definition, sequencing, resource and duration estimating, schedule development, and schedule control.

4. **Managing costs**: Projects consume resources, and therefore, there is a need to manage the investment with the realization of creating value (i.e., the benefits derived exceed the amount spent). Managing costs is about resource planning, cost estimating, budgeting, and control.

5. **Managing quality**: Projects involve specific deliverables or work products. These deliverables need to meet project objectives and performance standards. Managing quality is about quality planning, quality assurance, and quality control.

6. **Managing human resources**: Projects consist of teams and you need to manage project team(s) during the life cycle of the project. Finding the right people, managing their outputs, and keeping them on schedule is a big part of managing a project. Managing human resources is about human resources planning, hiring, and developing and managing a project team.

7. **Managing communication**: Projects invariably touch lots of people, not just the end users (customers) who benefit directly from the project outcomes. This can include project participants, managers who oversee the project, and external stakeholders who have an interest in the success of the project. Managing communication is about communications planning, information distribution, performance reporting, and stakeholder management.

8. **Managing risk**: Projects are a discovery-driven process, often uncovering new customer needs and identifying critical issues not previously disclosed. Projects also encounter unexpected events, such as project team members resigning, budgeted resources suddenly changing, the organization becoming unstable, and newer technologies being introduced. There is a real need to properly identify various risks and manage these risks. Managing risk is about risk planning and identification, risk analysis (qualitative and quantitative), risk response (action) planning, and risk monitoring and control.

9**. Managing procurement**: Projects procure the services of outside vendors and contractors, including the purchase of equipment. There is a need to manage how vendors are selected and managed within the project life cycle. Managing procurement is about acquisition and contracting plans, sellers' responses and selections, contract administration, and contract closure.

10. **Managing stakeholders:** Every project impacts people and organizations and is impacted by people and organizations. Identifying these stakeholders early, and as they arise and change throughout the project, is a key success factor. Managing stakeholders is about identifying stakeholders, their interest level, and their potential to influence the project; and managing and controlling the relationships and communications between stakeholders and the project.

The 5 PMI Process Groups

1. Initiating
2. Planning
3. Executing
4. Controlling
5. Closing

Note: these can be repeated for each phase

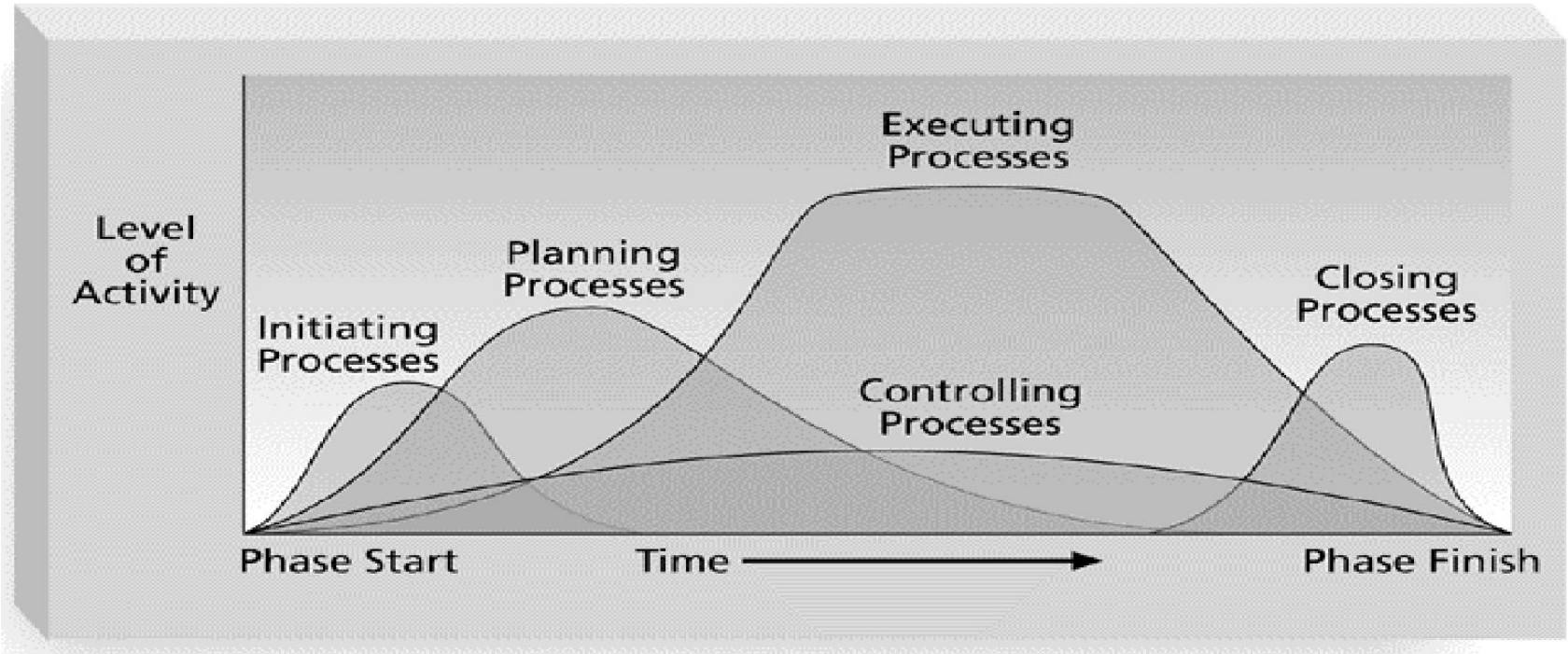
Each process is described by:

Inputs

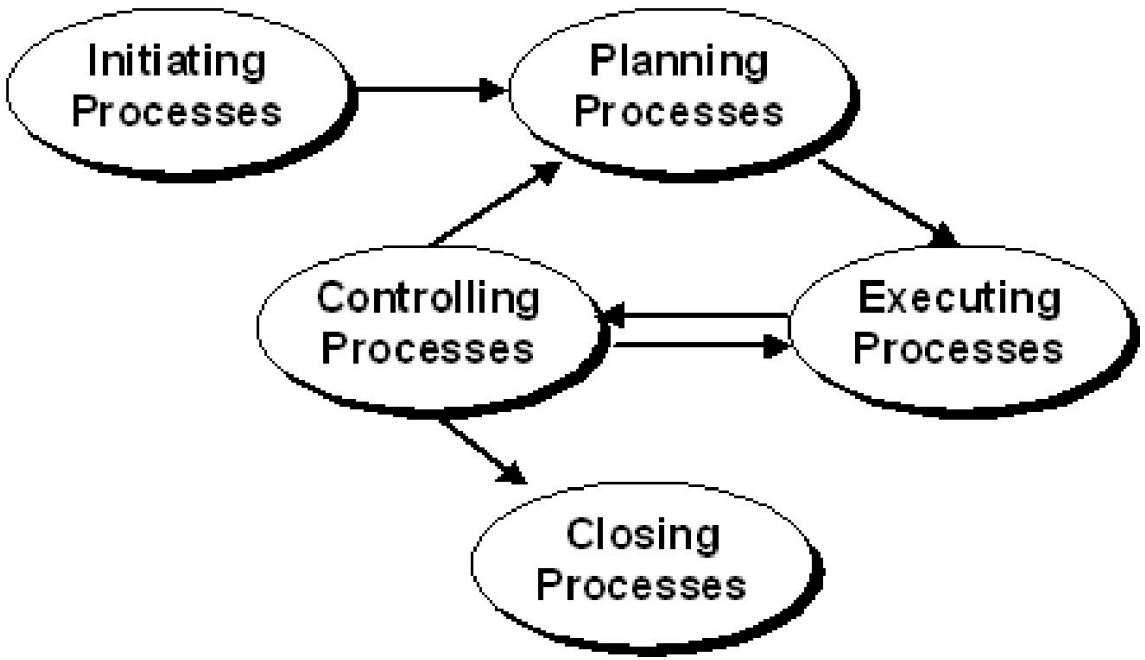
Tools & Techniques

Outputs

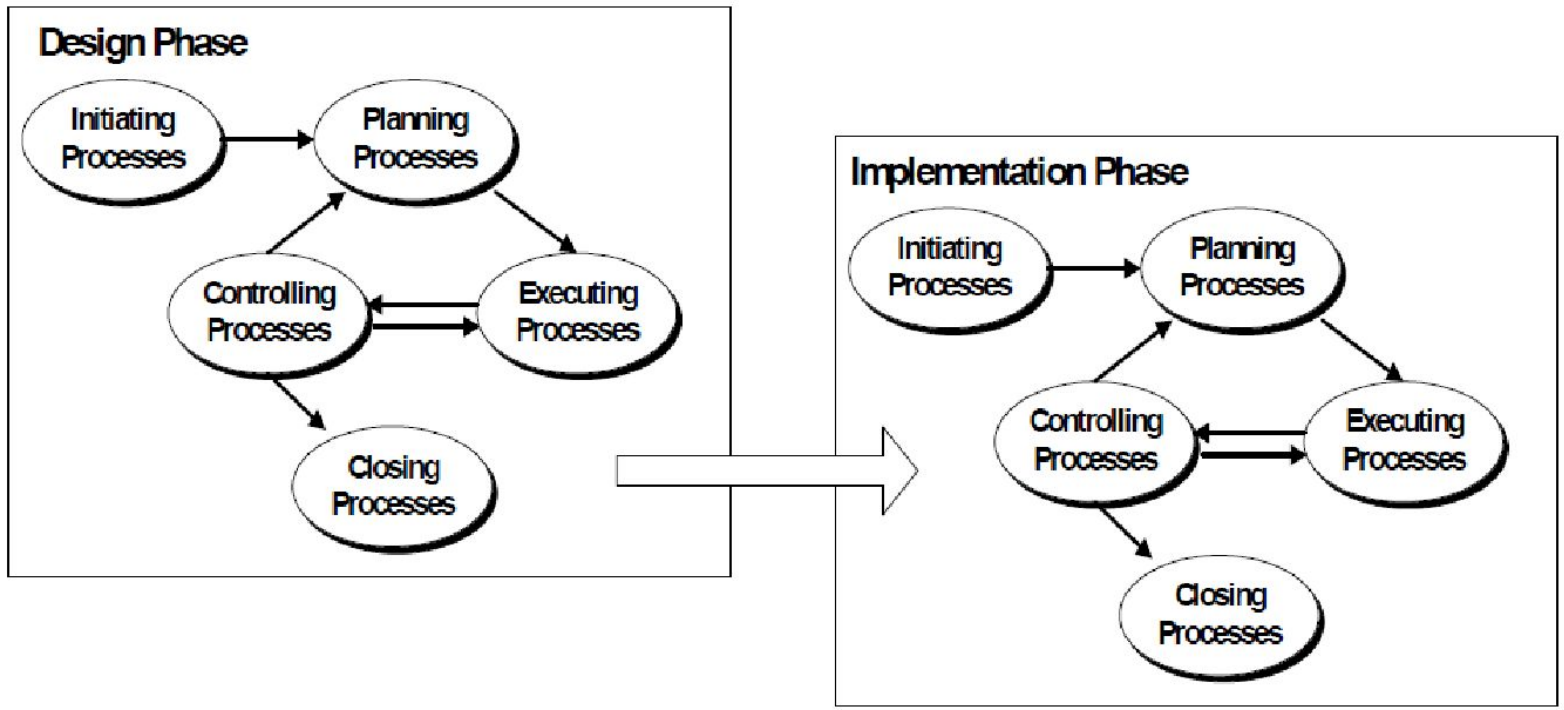
PMI Process


Executing
Processes
Level
of
Activity
Planning
Processes
Closing
Processes
Initiating
Processes
Controlling
Processes
Phase Start
Time
Phase Finish

PMI : Process Links



PMI: Phase Interaction



PMI: Initiating Process

- Inputs
  - Product Description
  - Strategic plan
  - Project Selection Criteria
  - Historical Information
- Outputs
  - Project charter
  - Project Manager assigned
  - Constraints
  - Assumptions

PMI: Planning Process

Devising and maintaining a workable scheme to accomplish the business need that the project was undertaken to address

- Scope Planning
- Scope Definition
- Activity Definition
- Activity Sequencing
- Activity Duration Estimating
- Resource Planning
- Cost Estimating
- Cost Budgeting
- Risk Planning
- Schedule Development
- Quality Planning
- Communications Planning
- Organization Planning
- Staff Acquisition
- Procurement Planning
- Project Plan Development

PMI: Executing Process

Coordinating people and other resources to carry out the plan

- Project Plan Execution
- Scope Verification
- Quality Assurance
- Team Development
- Information Distribution
- Solicitation
- Source Selection
- Contract Administration

PMI: Controlling Process

Ensuring that project objectives are met by monitoring and measuring progress and taking corrective measures when necessary

- Overall Change Control
- Scope Change Control
- Schedule Control
- Cost Control
- Quality Control
- Performance Reporting
- Risk Response Control

PMI: Closing Process

Formalizing acceptance of the project or phase and bringing it to an orderly end

- Administrative Closure
- Contract Close-out

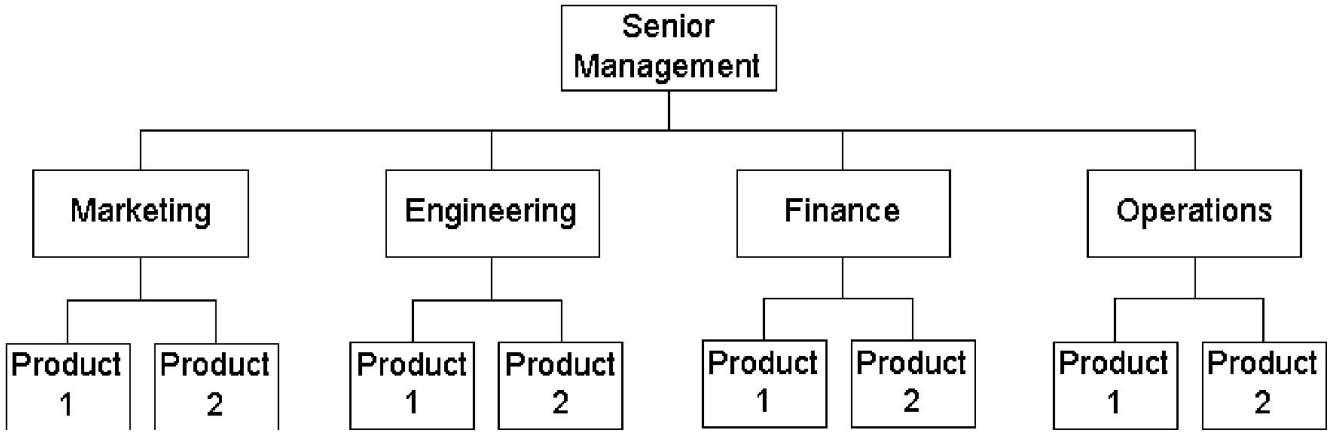
PMI Knowledge Areas

Process Groups / Knowledge Area	Initiating	Planning	Executing	Controlling	Closing
4. Project Integration Management		4.1 Project Plan Development	4.2 Project Plan Execution	4.3 Integrated Change Control	
5. Project Scope Management	5.1 Initiation	5.2 Scope Planning 5.3 Scope Definition		5.4 Scope Verification 5.5 Scope Change Control	
6. Project Time Management		6.1 Activity Definition 6.2 Activity Sequencing 6.3 Activity Duration Estimating 6.4 Schedule Development		6.5 Schedule Control	
7. Project Cost Management		7.1 Resource Planning 7.2 Cost Estimating 7.3 Cost Budgeting		7.4 Cost Control	
8. Project Quality Management		8.1 Quality Planning	8.2 Quality Assurance	8.3 Quality Control	
9. Project Human Resource Management		9.1 Organizational Planning 9.2 Staff Acquisition	9.3 Team Development		
10. Project Communications Management		10.1 Communications Planning	10.2 Information Distribution	10.3 Performance Reporting	10.4 Administrative Closure
11. Risk Project Management		11.1 Risk Management Planning 11.2 Risk Identification 11.3 Qualitative Risk Analysis 11.4 Quantitative Risk Analysis 11.5 Risk Response Planning		11.6 Risk Monitoring and Control	
12. Project Procurement Management		12.1 Procurement Planning 12.2 Solicitation Planning	12.3 Solicitation 12.4 Source Selection 12.5 Contract Administration		12.6 Contract Closeout

Organizational Structures

- Functional
- Matrix
- Projectized

Functional Organization



Pros

–Clear definition of authority
–Eliminates duplication
–Encourages specialization
–Clear career paths

Cons

–"Walls": can lack customer orientation
–"Silos" create longer decisions cycles
–Conflicts across functional areas
–Project leaders have little power

Derivatives of Functional Organizations

- Project Expediter Organization
- Project Coordinator

Matrix Organization

•Pros–Project integration across functional lines

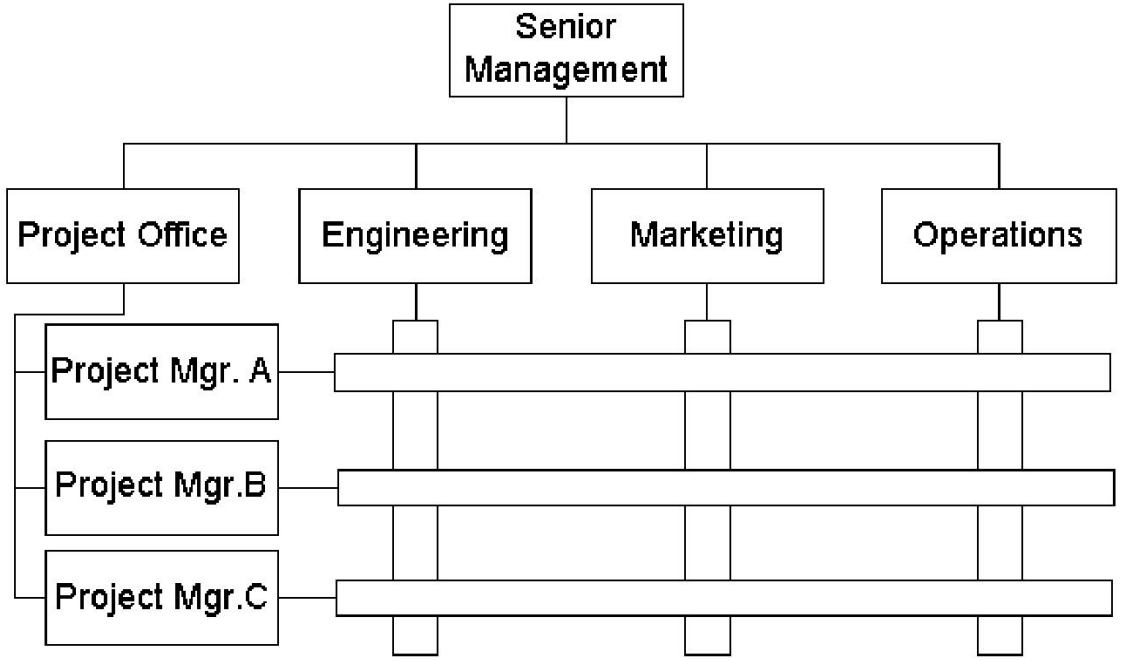
–Efficient use of resources

–Retains functional teams

•Cons–Two bosses for personnel

–Complexity

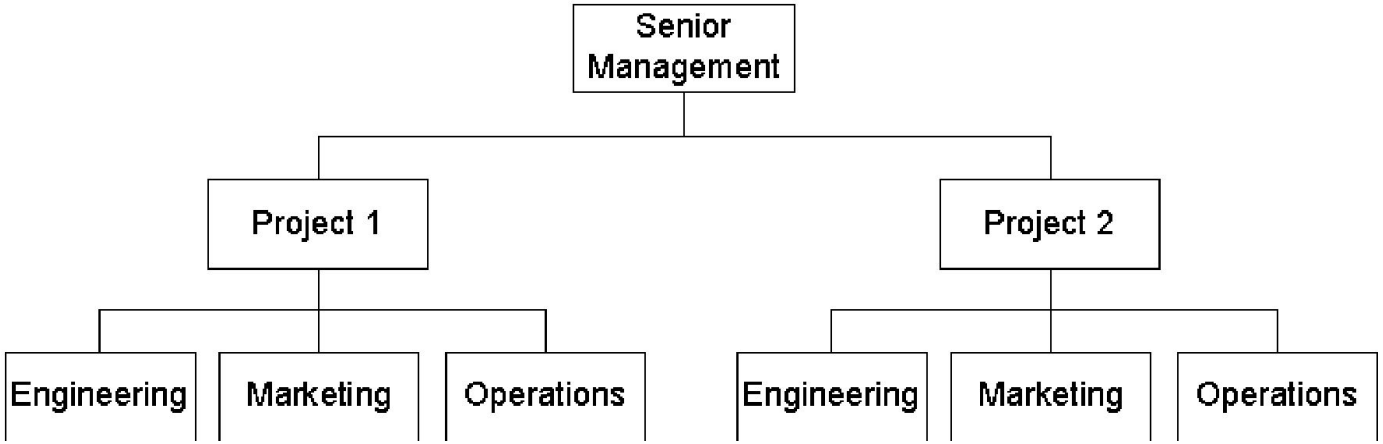
–Resource & priority conflicts



Matrix Forms

- Weak, Strong, Balanced
- Degree of relative power
- Weak: functional-centric
- Strong: project-centric

Projectized Organization



- Pros

–Unity of command

–Effective inter-project communication

- Cons
  - Duplication of facilities
  - Career path

Examples: defence avionics, construction

Organizational Structure Influences on Projects

Organization Type / Project Characteristics	Functional	Matrix			Projectized
		Weak Matrix	Balanced Matrix	Strong Matrix	
Project Manager's Authority	Little or None	Limited	Low to Moderate	Moderate To High	High to Almost Total
Percent of Performing Organization's Personnel Assigned Full-time to Project Work	Virtually None	0-25%	15-60%	50-95%	85-100%
Project Manager's Role	Part-time	Part-time	Full-time	Full-time	Full-time
Common Title for Project Manager's Role	Project Coordinator/ Project Leader	Project Coordinator/ Project Leader	Project Manager/ Project Officer	Project Manager/ Program Manager	Project Manager/ Program Manager
Project Management Administrative Staff	Part-time	Part-time	Part-time	Full-time	Full-time

Statement of Work (SOW)

- A description of the work required for the procurement.
- Sets the "boundary conditions"
- SOW vs. CSOW (Contract SOW)

If a SOW is used as part of a contract to describe only the work required for that particular contract, it is called a *contract statement of work*.

- Can be used in the final contract –be careful, be specific, be clear

CSOW

- The contract SOW is a type of scope statement that describes the work in sufficient detail to allow prospective suppliers to determine if they are capable of providing the goods and services required and to determine an appropriate price.
- A contract SOW should be clear, concise, and as complete as possible.
- It should describe all services required and include performance reporting.

SOW Template

I. **Scope of Work:** Describe the work to be done to detail. Specify the hardware and software involved and the exact nature of the work.

II. **Location of Work:** Describe where the work must be performed. Specify the location of hardware and software and where the people must perform the work

III. **Period of Performance:** Specify when the work is expected to start and end, working hours, number of hours that can be billed per week, where the work must be performed, and related schedule information. Optional "Compensation" section.

IV. **Deliverables Schedule:** List specific deliverables, describe them in detail, and specify when they are due.

V. **Applicable Standards:** Specify any company or industry-specific standards that are relevant to performing the work. Often an Assumptions section as well.

VI. **Acceptance Criteria:** Describe how the buyer organization will determine if the work is acceptable.

VII. **Special Requirements:** Specify any special requirements such as hardware or software certifications, minimum degree or experience level of personnel, travel requirements, documentation, testing, support, and so on.

Project Charter

A **project charter** is a document that formally recognizes the existence of a project and provides direction on the project s objectives and management.

It authorizes the project manager to use organizational resources to complete the project.

Inputs for Project Charter

***A project statement of work*:** A statement of work is a document that describes the products or services to be created by the project team. It usually includes a description of the business need for the project, a summary of the requirements and characteristics of the products or services, and organizational information, such as appropriate parts of the strategic plan, showing the alignment of the project with strategic goals.

***A business case*:** Many projects require a business case to justify their investment. Information in the business case, such as the project objective, high-level requirements, and time and cost goals are included in the project charter.

***A contract*:** If you are working on a project under contract for an external customer, the contract should include much of the information needed for creating a good project charter. Some people might use a contract in place of a charter; however, many contracts are difficult to read and can often change, so it is still a good idea to create a project charter.

Enterprise environmental factors: These factors include relevant government or industry standards, the organization s infrastructure, and marketplace conditions. Managers should review these factors when developing a project charter.

Organizational process assets: It include formal and informal plans, policies, procedures, guidelines, information systems, financial systems, management systems, lessons learned, and historical information that can be used to influence a project s success.

Project Charter

Major Tool is Expert Judgement.

Output is project charter covering the following:

Project Charter Outline

- The project s title and date of authorization
- The project manager s name and contact information
- A summary schedule, including the planned start and finish dates; if a summary milestone schedule is available, it should also be included or referenced
- A summary of the project s budget or reference to budgetary documents
- A brief description of the project objectives, including the business need or other justification for authorizing the project
- Project success criteria, including project approval requirements and who signs off on the project
- A summary of the planned approach for managing the project, which should describe stakeholder needs and expectations, important assumptions, and constraints, and refer to related documents, such as a communications management plan, as available
- A roles and responsibilities matrix
- A sign-off section for signatures of key project stakeholders
- A comments section in which stakeholders can provide important comments related to the project

TABLE 4-1 Project charter for the DNA-sequencing instrument completion project

Project Title: DNA-Sequencing Instrument Completion Project
Date of Authorization: February 1
Project Start Date: February 1 **Projected Finish Date:** November 1

Key Schedule Milestones:

- Complete first version of the software by June 1
- Complete production version of the software by November 1

Budget Information: The firm has allocated $1.5 million for this project, and more funds are available if needed. The majority of costs for this project will be internal labor. All hardware will be outsourced.

TABLE 4-1 Project charter for the DNA-sequencing instrument completion project (cont)

Project Manager: Nick Carson, (650) 949-0707, ncarson@dnaconsulting.com

Project Objectives: The DNA-sequencing instrument project has been underway for three years. It is a crucial project for our company. This is the first charter for the project, and the objective is to complete the first version of the software for the instrument in four months and a production version in nine months.

Main Project Success Criteria: The software must meet all written specifications, be thoroughly tested, and be completed on time. The CEO will formally approve the project with advice from other key stakeholders.

Approach:

- Hire a technical replacement for Nick Carson and a part-time assistant as soon as possible.
- Within one month, develop a clear work breakdown structure, scope statement, and Gantt chart detailing the work required to complete the DNA sequencing instrument.
- Purchase all required hardware upgrades within two months.
- Hold weekly progress review meetings with the core project team and the sponsor.
- Conduct thorough software testing per the approved test plans.

ROLES AND RESPONSIBILITIES

Name	Role	Position	Contact Information
Ahmed Abrams	Sponsor	CEO	aabrams@dnaconsulting.com
Nick Carson	Project Manager	Manager	ncarson@dnaconsulting.com
Susan Johnson	Team Member	DNA expert	sjohnson@dnaconsulting.com
Renyong Chi	Team Member	Testing expert	rchi@dnaconsulting.com
Erik Haus	Team Member	Programmer	ehaus@dnaconsulting.com
Bill Strom	Team Member	Programmer	bstrom@dnaconsulting.com
Maggie Elliot	Team Member	Programmer	melliot@dnaconsulting.com

Sign-off: (Signatures of all the above stakeholders)

Ahmed Abrams
Susan Johnson
Erik Haus
Maggie Elliot
Nick Carson
Renyong Chi
Bill Strom

Comments: (Handwritten or typed comments from above stakeholders, if applicable)

"I want to be heavily involved in this project. It is crucial to our company's success, and I expect everyone to help make it succeed." —Ahmed Abrams

"The software test plans are complete and well documented. If anyone has questions, do not hesitate to contact me." —Renyong Chi