Software Project Management

Lecture 4

Words of Wisdom

- We must understand that life is difficult, if we know and accept it, it is no longer difficult.
- *Do men think that they will be left alone on saying "We believe" and that they will not be tested? We did test those before them and Allah will certainly know those who are true from those who are false" Al-Quran (29:2-3).*

Changeability

- The software entity is constantly subject to pressures for change. Of course, so are buildings, cars, and computers. But manufactured things are infrequently changed.
- Software of a system embodies its function, and the function is the part that most feels the pressure of change
- In part it is because software can be changed more easily – it is pure thought stuff, infinitely malleable

- Building do in fact get change but the high cost of change understood by all serve to dampen the whims of the changes
- The software product is embodied in a cultural matrix of applications, users, laws, and machine vehicles. These change continually, and their changes inevitably force change upon the software product.

Invisibility

- Software is invisible and un-visualizable.
- A geometric reality is captured in a geometric abstraction
- The reality of software is not inherently embedded in space
- As soon as we attempt to diagram software structure, we find it to constitute not one, but several, general directed graphs superimposed one upon another.
- This lack not only obstruct the process of design within one mind, it severely hinders communication among minds.

Engineering

- Derived from old French engin = skill, which stems from Latin ingenium = ability to invent, brilliance, genius
- The word was created in the 16th century and originally described a profession that we would probably call an artistic inventor (*"Encyclopedia" by The Software Toolworks, 1991)*
- Engineering is applied science
- Engineering is the application of science for practical purposes
- Engineers put theory into practice.

Engineering

- ABET, USA
  - The profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the material and forces of nature for the benefit of mankind
- The profession of or work performed by an engineer. Engineering involves the knowledge of the mathematical and natural sciences (biological and physical) gained by study, experience, and practice that are applied with judgment and creativity to develop ways to utilize the materials and forces of nature for the benefit of mankind (International Technology Education Association).

Engineering Software

- Engineering methods put a lot of emphasis on planning before you build
- Design, Plan and then Construct
- Construction is much bigger in both cost and time than design and planning
  - 80-90%
- What is the proportion in Software Engineering?
  - 10-30%
  - Software construction is so cheap as to be free
  - All effort is of design

Engineering Software

- Design requires creative and talented people
- Creative processes are not easily planned, and so predictability may well be an impossible target
  - Everything else in software development depends on the requirements. If you cannot get stable requirements you cannot get a predictable plan
- This raises an important question about the nature of design in software compared to its role in other branches of engineering
- “We should be very wary of the traditional engineering metaphor for building software. It's a different kind of activity and requires a different process” (Martin Fowler, The New methodology)

Management

- The group of individuals who make decisions about how a business is run.
- A stream of decision and actions to achieve goal(s) efficiently and effectively.
- Management is the process of designing and maintaining an environment in which individuals, working together in groups, efficiently [and effectively] accomplish selected aims.

Management

- Effectiveness and Efficiency
  - Effectiveness: The achievement of objectives
  - Efficiency: The achievement of ends with least amount of resources
- Managing is concerned with productivity
- “Productivity” ?
  - Productivity = outputs/inputs
  - Productivity can be increased by
    - Using “same” amount of resource but more output
    - Using less resources but giving “same” output
    - Using less resources but more output
- Business vs non-business

Management Approaches

- Scientific Approach - Taylor
  - To increase efficiency (in production) by applying scientific methods
- Sociological Approach – Emile Durkheim
  - Groups, by establishing their values and norms control human conduct in any social organization
- Socio-Technical Approach – Elton Mayo
  - Business operations are a matter not merely of machinery and methods but also of gearing these with the social system to develop a complete socio-technical system

Five Functions of Management

- Planning
- Organizing
- Staffing
- Leading
- Controlling

- Involves selecting missions and objectives and the actions to achieve them
- Requires decisions making that is, choosing future courses of action from among alternatives

Five Functions

- Planning
- Organizing
- Staffing
- Leading
- Controlling

- People working together in groups to achieve some goal must have roles to play
- Organizing involves establishing an “intentional” structure of roles for people to fill in an organization.
  - intentional in the sense of making sure that all the tasks necessary to accomplish goals are assigned.

Five Functions

- Planning
- Organizing
- Staffing
- Leading
- Controlling

- Involves filling, and keeping filled the positions in the organization structure.
- This is done by identifying work-force requirements, inventorying the people available; and
- Recruiting, selecting, placing, promoting, appraising, planning the careers of, compensating, and training or otherwise developing both candidates and current jobholders so that tasks are accomplished effectively and efficiently

Five Functions

- Planning
- Organizing
- Staffing
- Leading
- Controlling

- Influencing people so that they will contribute to organization and group goals
- Predominantly with the interpersonal aspect of managing.
- Deals with problems arising from people's desires and attitudes. Their behavior as individuals and in groups
- Involves motivation, leadership styles and approaches, and communication

Five Functions

- Planning
- Organizing
- Staffing
- Leading
- Controlling

- Measuring and correcting individual and organizational performance to ensure that events conform to plans
- Involves measuring performance against goals and plans, showing where deviations form standard exist, and helping to correct them

Project

- A project is a temporary endeavor undertaken to create a unique product, service, or result *(PMI PMBok)*

- A project is a sequence of tasks with a beginning and an end that is bound by time, resources, and desired results
- A project has
  - A specific desired outcome
  - A deadline or target date
  - And a budget

Project life-cycle

- Project has start and an end – thus a life-cycle
- Projects are usually divided into several project phases
- Collectively, the project phases are known as project life cycle
- Project life cycles generally define
  - What technical work should be done in each phase?
  - When the deliverables are to be generated in each phase and how each deliverable is reviewed, verified, and validated?
  - Who is involved in each phase?
  - How to control and approve each phase?

Project phase

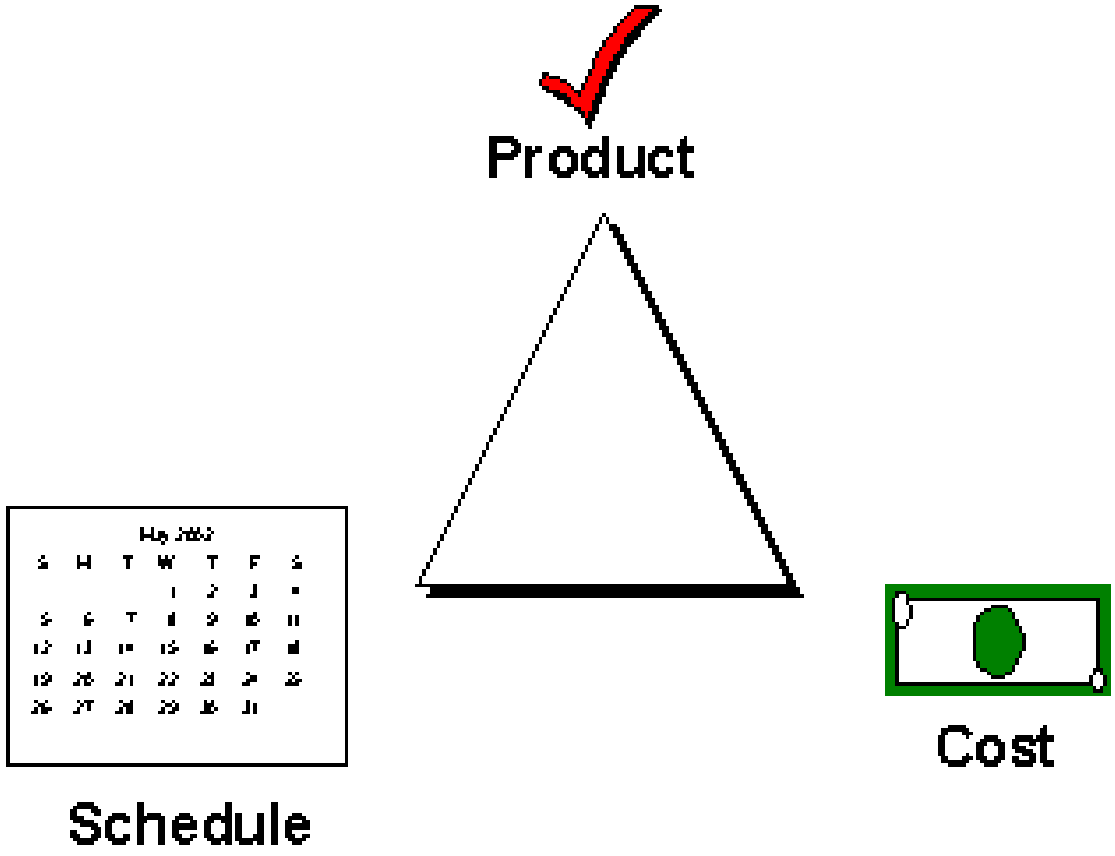
- A collection of logically related project *activities*
- Each project phase is marked by completion of one or more major *deliverables*
  - A deliverable is a tangible, variable work product such as design document, or a prototype
  - Activity is an element of work performed during the course of a project. An activity normally has an expected duration, an expected cost, and expected resource requirements. Activities are often sub divided in to tasks.

Six features shared by all projects

- A project has a defined beginning and end. Getting from the beginning to the end of project typically involves a definable sequence of steps or activities
- Project use resources that have been specifically allocated to the work of the project
  - Resources are the time, people, money, equipment, and facilities used to complete a project
- Every project produces a unique outcome.
- Projects (hopefully) follow a planned, organized approach to met their objectives
- A project usually involves a team of people to get it done
- Project always have a unique set of stakeholders. Stakeholders almost always bring different expectations about end results to the project.

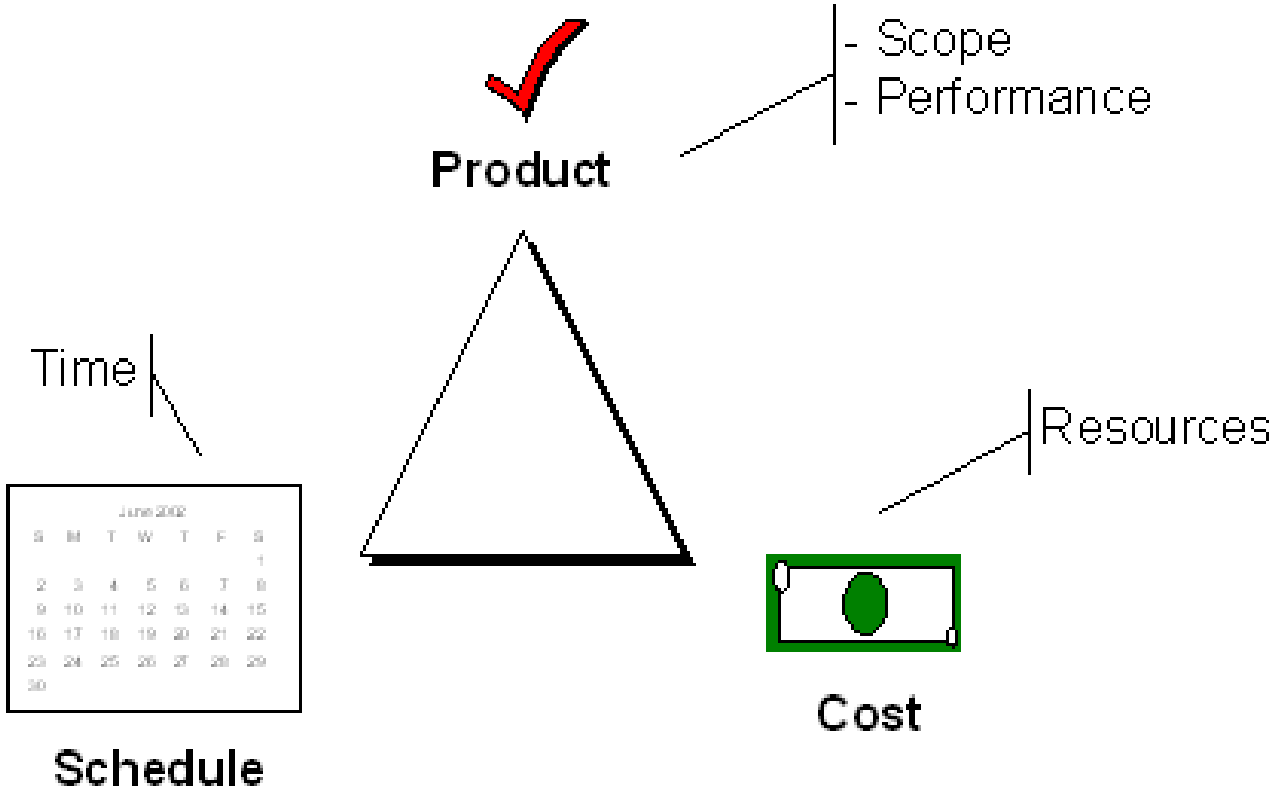
Project Management Trade-off Triangle

- Fast, cheap, good. Choose two.

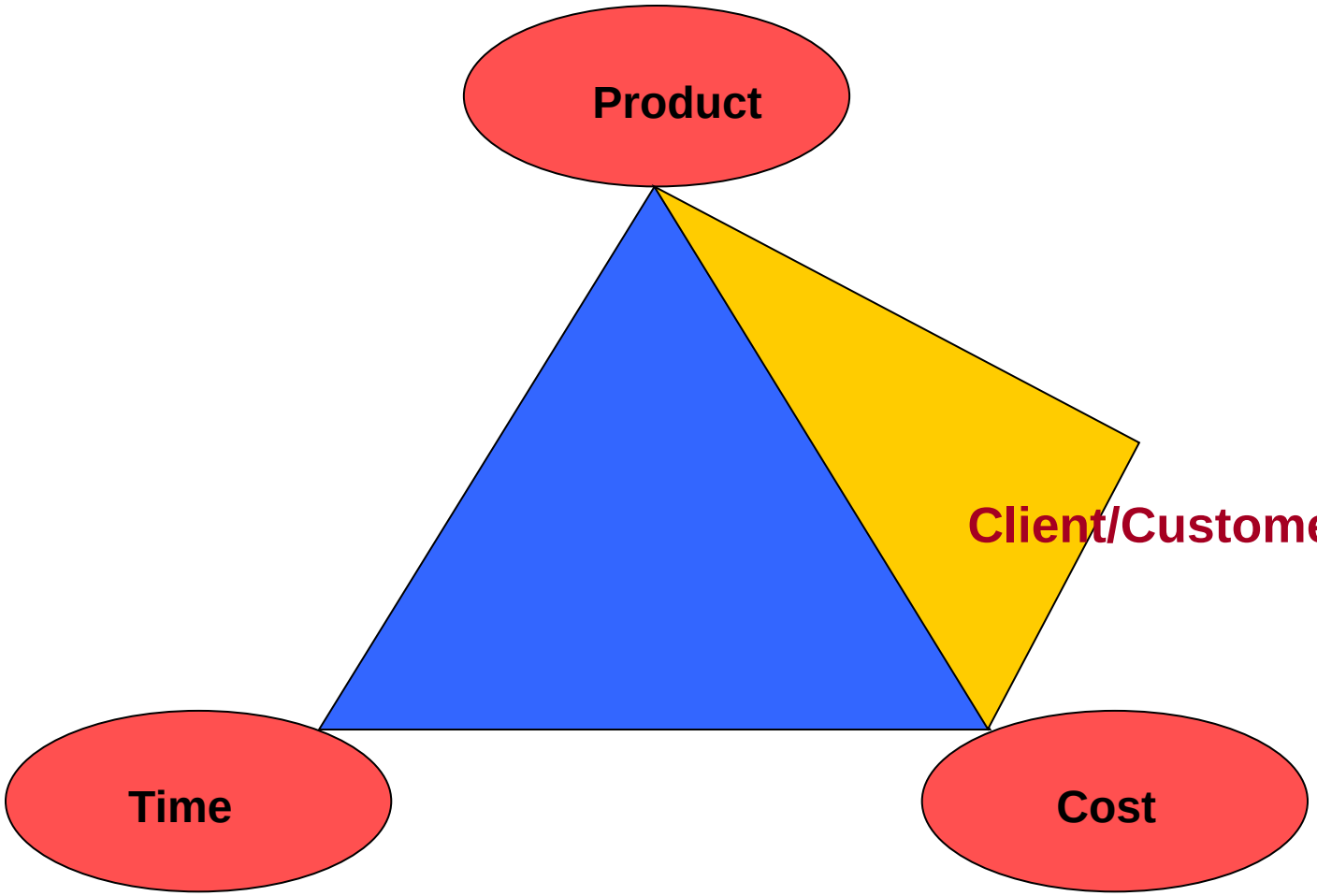


Project Management Trade-off Triangle

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



Project Success



Project management

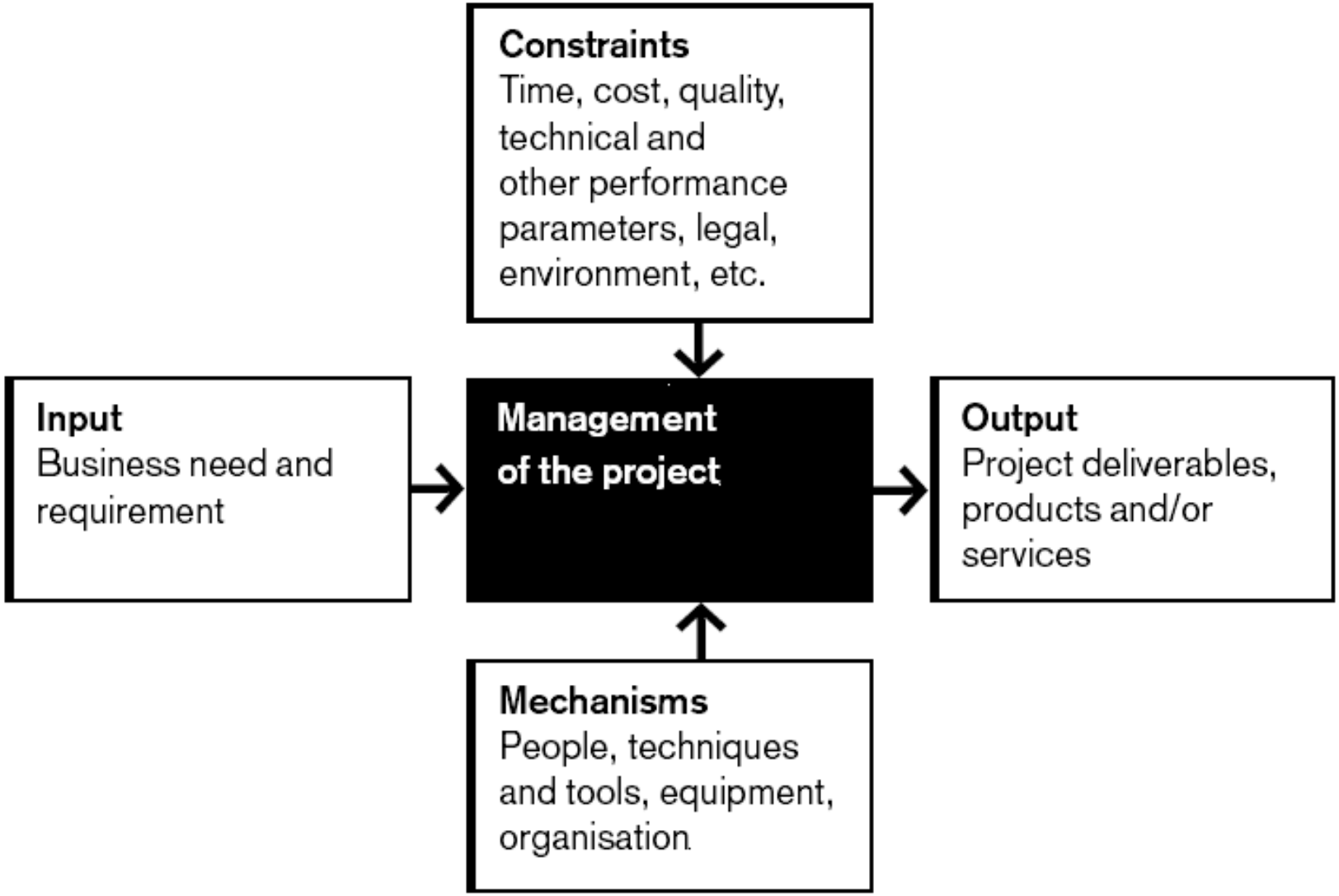
- The application of knowledge skills, tools, and techniques to project activities to meet project requirements. (PMI)
  - to meet or exceed stakeholder needs and expectations from a project!!!
- Managing a project includes:
  - Identifying requirements
  - Establishing clear and achievable objectives
  - Balancing the competing demands for quality, scope, time and cost
  - Adapting the specifications, plans, and approach to the different concerns and
  - expectations of the various stakeholders.

Programme Management

- A programme is a collection of projects related to some extent to a common objective.
- Programme Management is the effective management of that programme.
- It can variously cover managing any or all of the following:
  - a portfolio of projects related to some common objective;
  - an organization's business strategy which is to be implemented through projects;
  - the interdependencies between a number of projects;
  - resource allocation amongst a portfolio of projects.

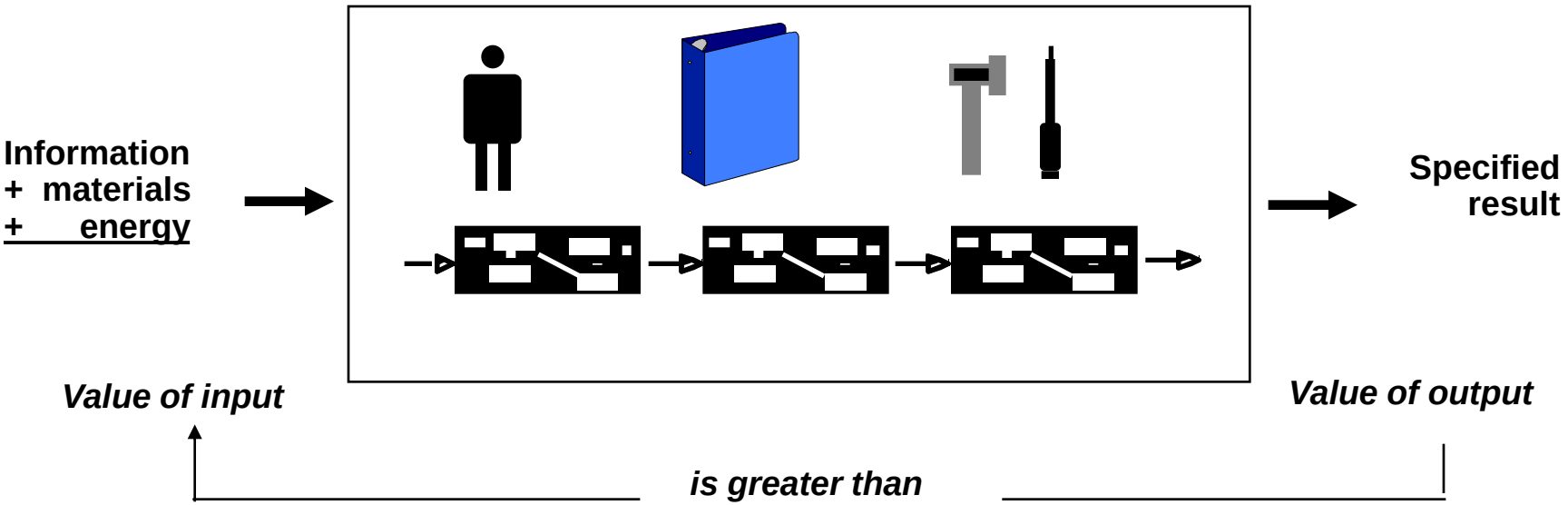
- Portfolio Management
  - the management of a number of projects that do not share a common objective.

Project Management Process



What is a Process?

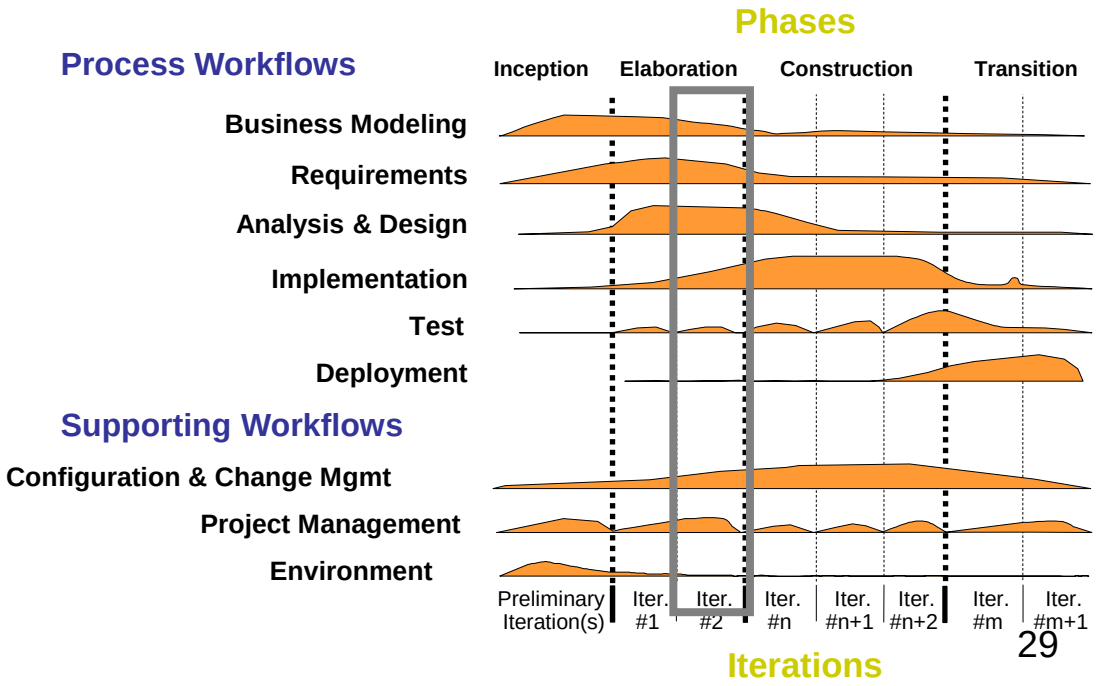
- process n. a bounded set of interrelated activities that takes one or more kinds of inputs and creates outputs that are of value to the customer by means of one or more transformations



Adapted from *Quality Process Management*, by Gabriel Pall, 1987

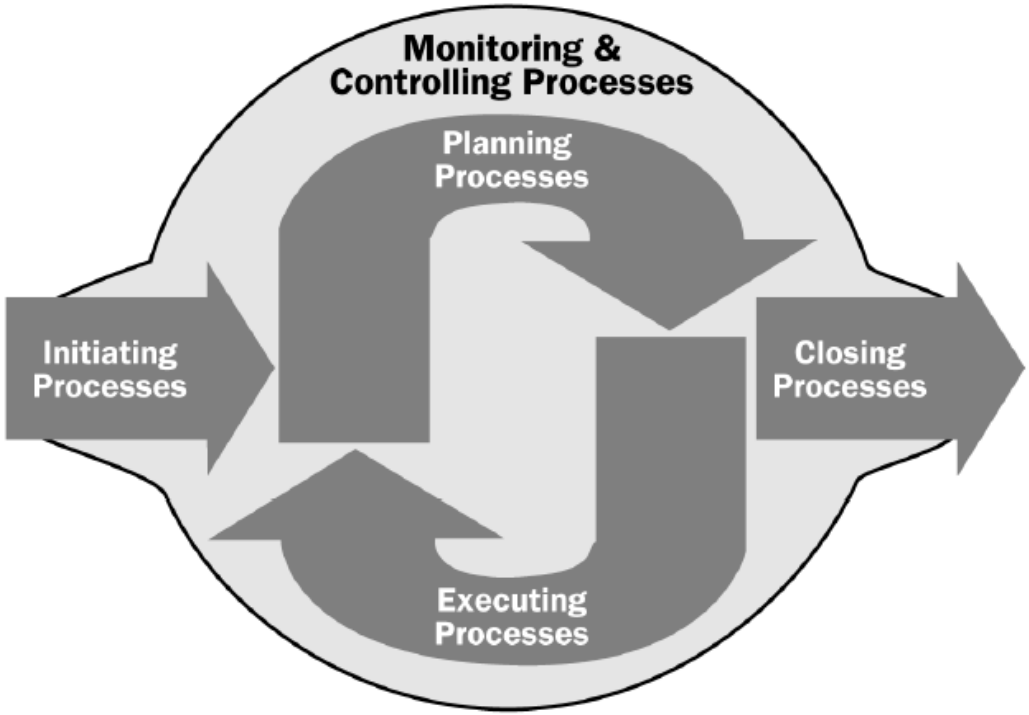
Type of Processes

- PM processes
  - describing and organizing the work of the project
  - PM in RUP
- Product-oriented processes
  - specifying and building the project's product
  - Core processes in RUP



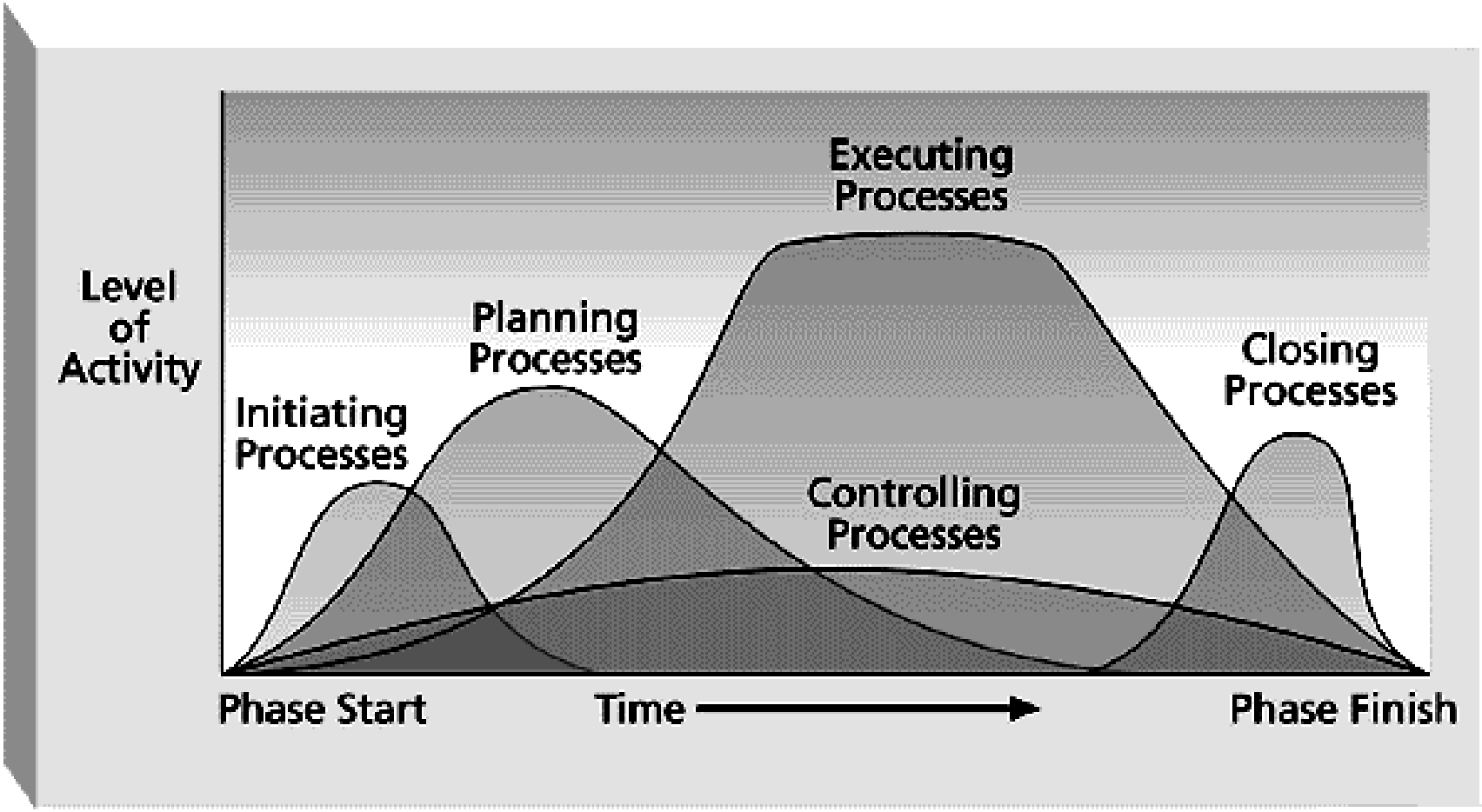
Project Management processes

- Project management is accomplished through the application and management pr
  - Initiating
  - Planning
  - Executing
  - Monitoring and
  - Closing



- These can be repeated for every phase of a project

Process Groups



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

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

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

Q&A