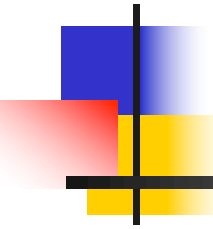
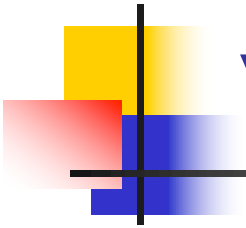


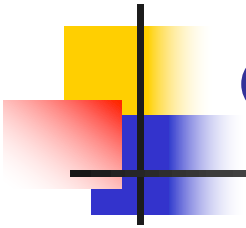
Software Project Management

Introduction



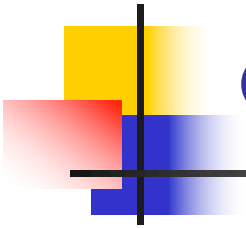
What is a project

- Dictionary Definition
  - A planned undertaking / A specific plan or design, *Merriam-Webster*
  - A task or planned program of work that requires a large amount of time, effort, and planning to complete, *Encarta*
- Non-routine project Vs routine job
- Focus on Activity, Plan, and Objective



Cont…

- A project is a temporary endeavor undertaken to create a unique product or service. It implies
  - a specific timeframe - definite beginning and end with interrelated activities
  - specific budget
  - unique specifications / Purpose
  - working across organizational boundaries
- Projects cease when declared objectives have been attained



Cont…

- Projects are unique – while characteristics are progressively elaborated
  - Progressively: proceeding in steps
  - Elaborated: worked with care and detail
- Scope of project should remain constant even as characteristics are "progressively elaborated"
- Projects are often divided into "subprojects" for more manageability

Cont…

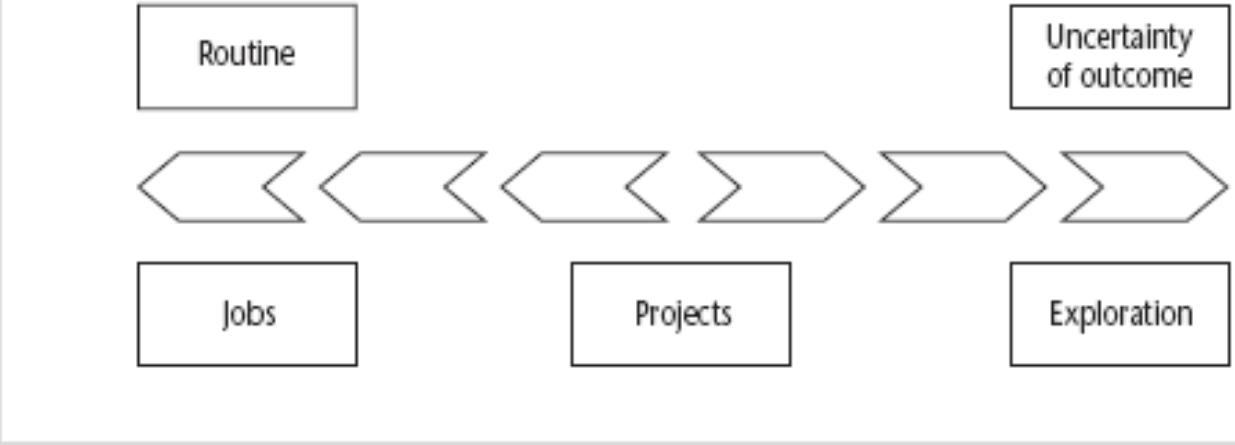
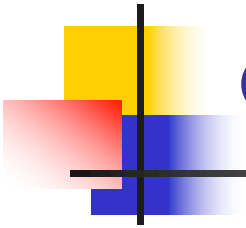


Figure 1.1 Activities most likely to benefit from project management

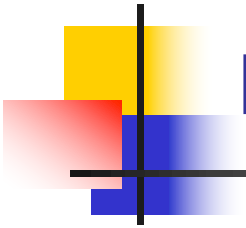
Projects Vs. Operations

- Projects
  - Performed by people
  - Constrained by limited resources
  - Planned, executed and controlled
  - Temporary
  - Unique
- Operations
  - Performed by people
  - Constrained by limited resource
  - Planned, executed and controlled
  - Ongoing
  - Repetitive



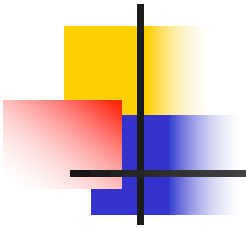
Cont…

- Distinguishing Characteristics
  - Non-routine tasks are involved
  - Planning is required
  - Specific objective are to be met or a specified product is to be created
  - a pre-determined time span
  - carried out for someone other than yourself
  - Involves several specialists
  - Carried out in several phases
  - resources that are available for use on the project are constrained
  - The project is large and complex



Exercise

- **Consider the following:**
  - **producing an edition of a newspaper**
  - **building the Channel Tunnel**
  - **getting married**
  - **amending a financial computer system to deal with a common European currency**
  - **a research project into what makes a good human–computer interface**
  - **an investigation into the reason why a user has a problem with a computer system**
  - **a second year programming assignment for a computing student**
  - **writing an operating system for a new computer**
  - **Installing a new version of a word processing package in an organization.**
- **Some would appear to merit the description 'project' more than others. Put them into an order that most closely matches your ideas of what constitutes a project. For each entry in the ordered list, describe the difference between it and the one above which makes it less worthy of the term 'project'.**

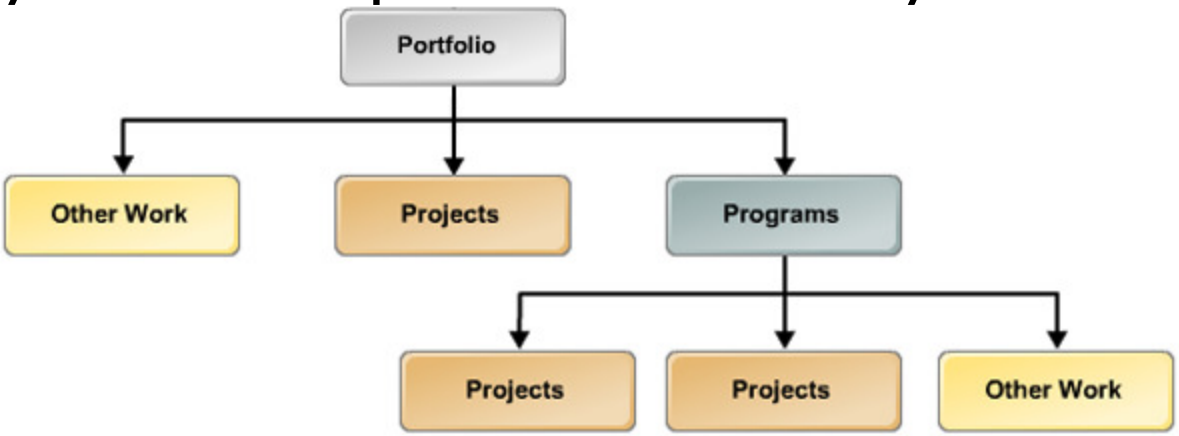


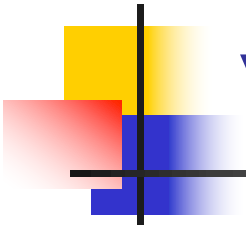
Program

- Programs are group of related projects managed in a coordinated way to obtain benefits and control not available from managing the projects individually
- Some programs have elements of ongoing operations

Portfolio

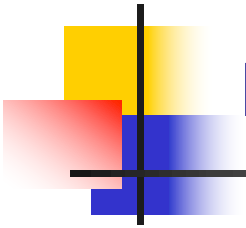
- Portfolio is a collection of projects, programs and/or other works grouped together to facilitate management of that work to meet strategic business objective
- The Projects or programs of the portfolio may not necessarily be interdependent or directly related





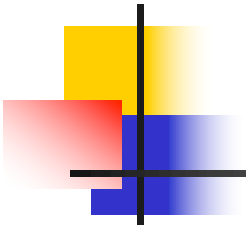
What is Management ?

- **Management Tasks (Open University Software Project Management module)**
  - Planning – deciding what is to be done;
  - Organizing – making arrangements;
  - Staffing – selecting the right people for the job, etc.;
  - Directing – giving instructions;
  - Monitoring – checking on progress;
  - Controlling – taking action to remedy hold-ups;
  - Innovating – coming up with new solutions;
  - Representing – liaising with users, etc



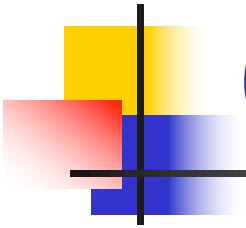
Project managers Vs. Program Managers

- Project managers work with project sponsors, a project team, and other people involved in a project to meet project goals
- Program managers oversee programs and often act as bosses for project managers



Project Management Office (PMO)

- Project Management Office (PMO)
  - "is an organizational body or entity assigned various responsibilities related to the centralized and coordinated management of those projects under its domain" (PMBOK Guide – 4)



Cont…

- Common features and configurations of PMO are
  - A central area for project personnel who can be loaned out to projects as needed (sharing resources)
  - A center for documentation, templates, project policies and other common organizational tools and techniques needed for project support
  - A center for the enhancement of communication across projects, programs and organizational boundaries
  - A center for continuous monitoring of project timelines

Project Management as a Discipline

- Project Management is the application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a defined project –balancing the following:
  - Scope, time, cost, and quality
  - Stakeholders' expectations
  - Requirements (needs) vs. unidentified requirements (expectations)
- Project managers strive to meet the triple constraint by balancing project scope, time , and cost goals

Triple Constraints

Why Projects fail

- Failure to align project with organizational objectives
- Poor scope
- Unrealistic expectations
- Lack of executive sponsorship
- Lack of project management
- Inability to move beyond individual and personality conflicts
- Politics

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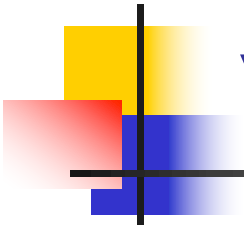
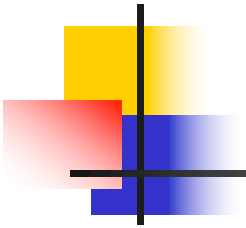


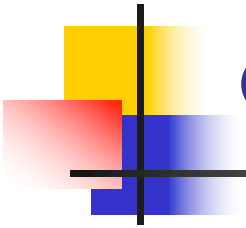
Why Projects Succeed

- Project Sponsorship at executive level
- Good project charter
- Strong project management
- The right mix of team players
- Good decision making structure
- Good communication
- Team members are working toward common goals



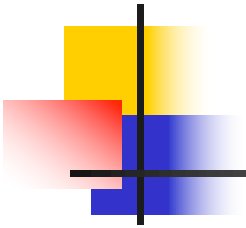
People Problems

- Most of project problems are people related
- You will find many operational leaders demonstrate a “just do-it” mentality. While that may be effective in some environments, this is NOT effective in managing change
- There will always be conflict over goals and scope, resources and between departments
- You are likely to find lack of understanding basic project management methods
- Some people will never get along



Cont…

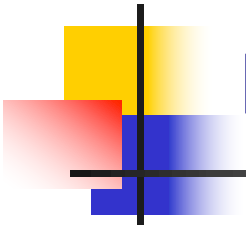
- Why?
  - Most of us get to where we are by some technical or specific set of skills
  - To get things done, one needs a good blend of:
    - Project management
    - Business knowledge
    - People management
    - Knowledge of organizational politics
    - AND an area of technical expertise



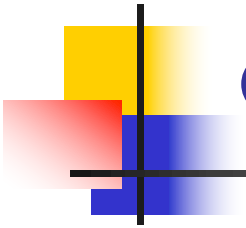
Project Management Context

- Project Phases are marked by the completion of a deliverable
  - Tangible, verifiable work product
  - Review of deliverables and approval/denial are “phase exits, stage gates, or kill points”
- Phases are collected into the Project Life Cycle
  - Set of defined work procedures to establish management control

Project, Project Management and Product Lifecycle



- Project Life Cycle refers to:
  - The sequence of the phases of the project work can vary depending on the project type;
    - In software projects - design, code, test, train, implement, …
    - In building projects - survey, designing, excavating, …
- Characteristics of project lifecycle:
  - Phases are sequential in nature
  - There is a transfer of technical information from one phase to another
  - Cost and Staffing levels are low at start and move higher towards the end

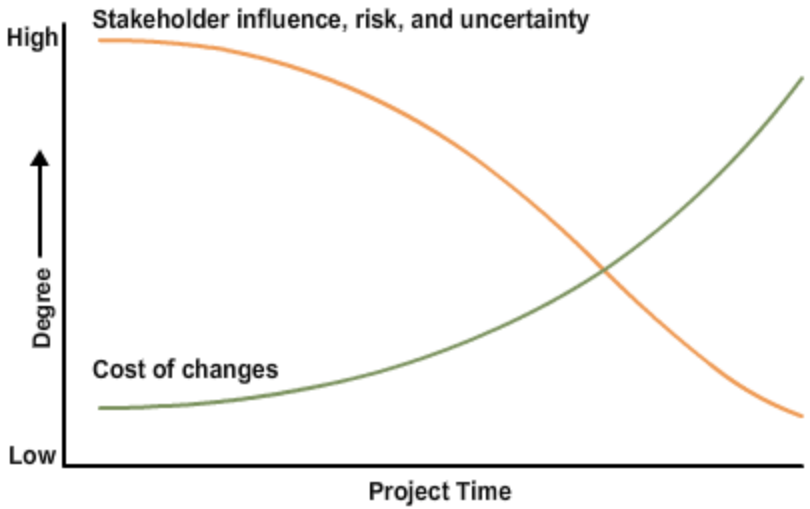


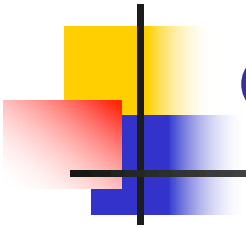
Cont…

- Project Management Life Cycle refers to:
  - The sequence of the phases in the management of the project work
  - It is the same regardless of the project type
  - These phases are INITIATING, PLANNING, EXECUTING, MONITORING & CONTROLLING, CLOSING described [PMI]

Cont…

- Stakeholder influences and risks are:
  - High at project start
  - Low at project end





Cont…

- Product Life Cycle is the context in which all projects occur
- Many projects are likely to be undertaken throughout the product lifecycle
  - Research and development, upgrade, expansion, even decommissioning projects

Phase-to-Phase Relationships in a project

- Phase-to-phase relationship types – for multi-phased projects:
  - Sequential
  - Overlapping
  - Iterative
- Factors that determine the types of relationships between phases:
  - Level of control
  - Effectiveness
  - Degree of uncertainty

Progressive Elaboration

- Successive layers of detail are added to the plans
- Deliverables from one phase are approved before work begins on the next phase.
- A phase may begin before approving the deliverables of a previous phase if risks are acceptable.
- Provides greater level of detail as the project progresses.

Details added to plan in progressive Elaboration

Organizational Cultures and Styles

Factors	Description
Policies	The organizational policies and procedures influence the projects the company undertakes.
Values	The values, beliefs, and expectations of an organization have a major impact on the organizational culture.
Management Style	The management style of the organization is another factor that affects the organizational culture.
Work environment	The work ethics followed by the organization also constitute the organizational culture.

Cont…

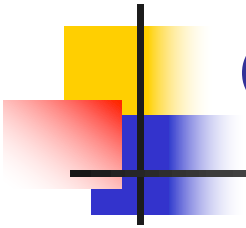
Project Aspect	Description
Project policies And procedures	The project policies and procedures should reflect that of the organization's as they are interdependent.
Project selection	The criteria for the selection of projects are determined by the organizational culture.
Project management style	The project manager should adopt to the management style of an organization.
Team performance assessments	A project manager should adhere to a company's prospects when assessing the performance of a team.

Enterprise Environmental Factors

- Internal or external factors.
- Have positive or negative influence on projects.
- Support or limit the project management options.
  - Examples include:
    - Organizational culture.
    - The human resources pool.
    - Marketplace conditions.
    - Stakeholder risk tolerances.
    - Political situations.
    - Project management information systems.

Organizational Process Assets

- Assets that influence project success.
  - Examples include:
    - Policies
    - Procedures
    - Guidelines
    - Formal and informal plans
    - Lessons learned documents
    - Historical information
    - Completed schedules
    - Earned value data
    - Risk data



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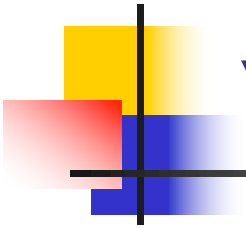
- Two categories of organizational process assets:
  - Processes and procedures.
  - Corporate knowledge base.

Organizational Contexts within which projects run

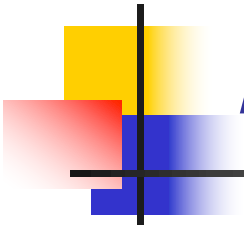


- Functional organization
- Matrix organization
- Projectized organization

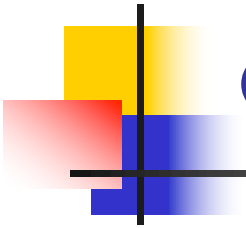
Contract Management Vs. Technical Project Management

- Many organization contract out IT development
  - The client organization appoint a 'Project Manager' to supervise the contract
  - PM will delegate many technical oriented decisions to the contractors
    - Example. A PM will not be concerned about the effort needed to write individual software component as long as the project fulfilled within budget and on time
- Supplier side
  - PM concerned more on technical management issues

Project Stakeholders: Roles in Project Management

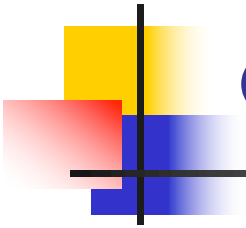


- People who have a stake or interest in the project
- Identified as early as possible
- Need to set up adequate communication channels with them right from the start
- Project leader also has to be aware that not everybody involved has same motivation and objectives.
  - End-users – ease of use
  - Managers – staff savings



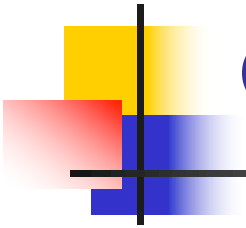
Cont…

- Stakeholders might be
  - Internal
    - under the direct managerial control of the project leader
  - External but in the same organization
    - Eg. The assistance of the users to carry out systems testing
  - Totally external to the organization
    - Customer (or users) who will benefit from the system
- Job of successful project leader is to recognize different interests and to be able to reconcile them.
- Project leaders needs to be a good communicator and negotiator



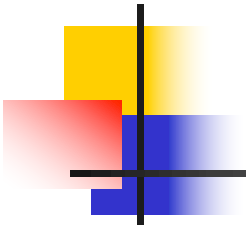
Cont…

- Generally Stakeholders has one of the three characteristics
  1. Stakeholder are people – individually or in group that are involved in a project
  2. Stakeholder are people – who has a positive or negative interest in the project
  3. Stakeholder are people – who can exert influence over project decisions and outcome of the project
- Three letters – I
  - Involvement
  - Interest
  - Influence



Cont…

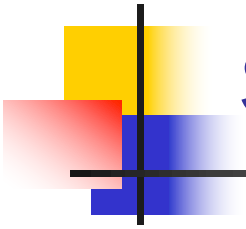
- Project stakeholders
- Project Initiator – owner (Customer)
- Project Commissioner (sponsor) e.g. CEO
- Project manager
- Project lead
- Project team members
- Subject matter experts (e.g. engineers)



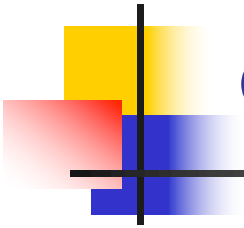
Project Manager's Roles

- Leadership
- Organization
- Communication
- Finance
- Technical know-how
- Politicking
- Team building
- Praising
- Punishing

Software Project [Fred Brooks]



- **Invisibility,**
  - A bridge or road can actually be seen.
  - With software, progress is not immediately visible.
- **Complexity,**
  - Per dollar, pound, euro, birr spent, software products contain more complexity than other engineered artefacts.



Cont…

- **Conformity,**
  - Physical systems can have some complexity, but are governed by physical laws that are consistent.
  - Software developers have to conform to the requirements of human clients (non-consistent, and vague).
- **Flexibility,**
  - The ease with which software can be changed is usually seen as one of its strengths.
  - The software will change to accommodate the other components
  - This means the software systems are likely to be subject to a high degree of change.

Activities Covered by SPM

- Software Project
  - is not only concerned with actual writing of software
- Off-the-shelf
  - No software writing as such
  - Still software project

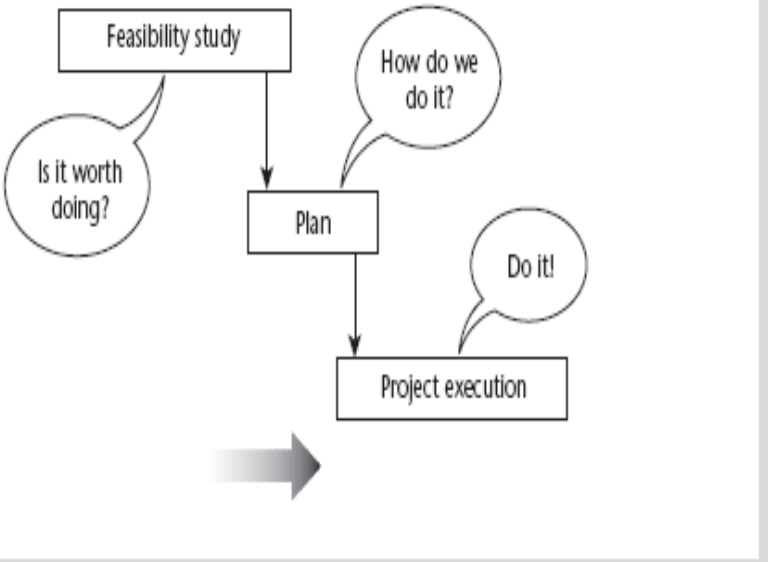
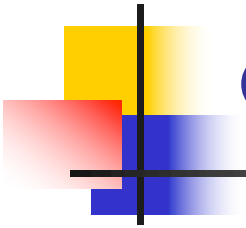


Figure 1.2 The feasibility study/plan/execution cycle



Cont…

- The Feasibility Study
  - A prospective project is worth starting
  - Gather information about the proposed system
  - Developmental and operational cost
  - Value of the benefits of the new system, are estimated
  - For Large system, it is a project in its own right
    - Part of strategic planning exercise examining and prioritizing a range of potential software development
- Planning
  - Project appears viable, project planning can take place
  - Large project, outline plan for the whole project , detail for the first stage
- Project Execution

Cont…

- Project Execution
  - Individual projects are likely to differ considerably but a classic project life cycle is shown in below

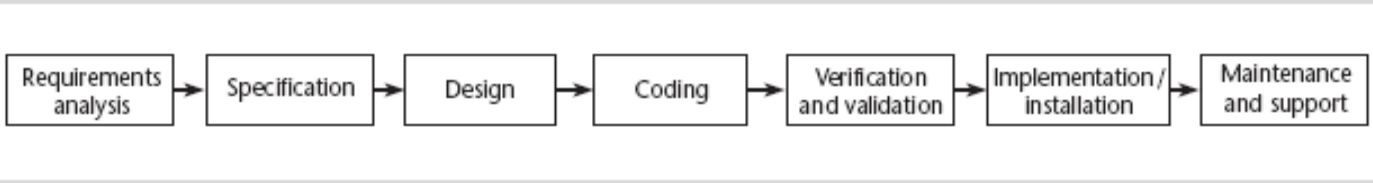
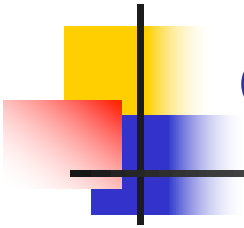
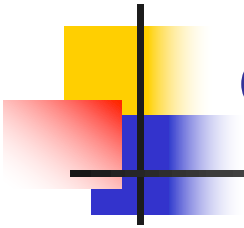


Figure 1.3 A typical project life cycle



Categorizing Software Projects

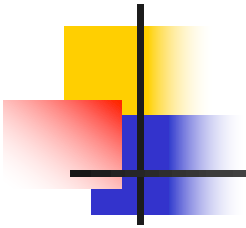
- Important to distinguish between the main types of Software project because what is appropriate in one context may not be so in another
- Information systems versus embedded systems
  - IS- system interfaces with the organization, stock control
  - ES- system interfaces with a machine , air conditioning equipment
- Objective versus products
  - Project distinguished - aim is to produce a product or meet certain objectives



Cont…

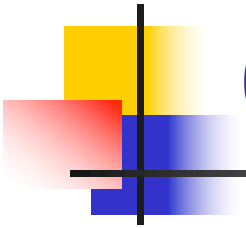
- Product
  - Details of which have been specified by the client
  - Client responsible for justifying the product
- Objectives
  - A new information system might be implemented to improve some service to users inside or outside an organization
- Many software projects have two stages.
  - First stage – is an objectives-driven project which recommended course of action and may even specify a new software system to meet identified requirements
  - Second stage – is a project actually to create the software product

- the United States Internal Revenue System was to abandon its tax system modernization programme after having spent $4 billion;
- the state of California spent $1 billion on its non-functional welfare database system;
- the £339 million United Kingdom air traffic control system was reported as being two years behind schedule;
- a discount stock brokerage company had 50 people working 14 hours or more a day to correct three months of records clerically—the report commented that the new system had been rushed into operation without adequate testing;
- in the United Kingdom, a Home Office immigration service computerization project was reported as having missed two deadlines and was nine months late;
- the Public Accounts Committee of the House of Commons in the United Kingdom blamed software bugs and management errors for £12 million of project costs in relation to an implementation of a Ministry of Agriculture computer system to administer farm subsidies.



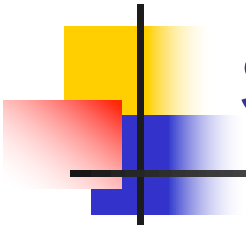
Problems with Software Projects

- Management Problems in Software: (Manager's point of view)
  - Poor estimates and plans;
  - Lack of quality standards and measures;
  - Lack of guidance about making organizational decisions;
  - Lack of techniques to make progress visible;
  - Poor role definition – who does what?
  - Incorrect success criteria.
- Staff and users points of view?



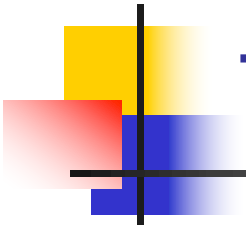
Cont…

- Problems identified by a number of students
  - Inadequate specification of work ;
  - management ignorance of IT;
  - Lack of knowledge of application area;
  - Lack of standards;
  - Lack of up-to-date documentation
  - Preceding activities not completed on time-include late delivery of equipment;
  - Lack of communication between users and technicians;
  - Lack of communication leading to duplication of work
  - Lack of commitment – especially when a project is tied to one person who then moves;
  - Narrow scope of technical expertise;
  - Etc…
- Many of the problems identified by students stem from Poor communications



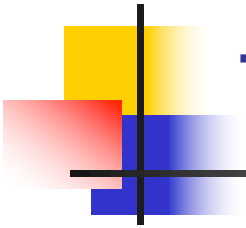
SPM Perspective

- Know your project?
- Perspectives:
  - People (flexibility, compassion, leading, consulting, …)
  - Business (Time to market, Capability, Quality, Cost)
  - Process
    - Always do (Build)
    - May do (Analysis, Design, Test)
    - Should do (Risk Management, Configuration Management, Inspection, Quality Assurance, Process Improvement)



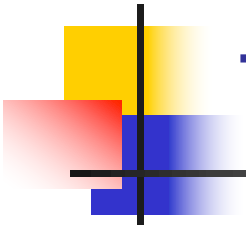
The Management Spectrum

- Effective SPM focuses on the four P's
  - People
  - Product
  - Process
  - Project



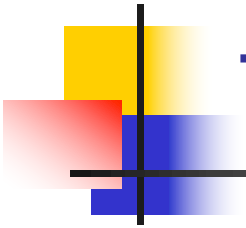
The People

- Since 1960, Motivated, Highly skilled software people,
- "People Factor" is so important that SEI developed a People Management Capability Maturity Model (PM-CMM)
- "To enhance the readiness of software organizations to undertake increasingly complex applications by helping to attract, grow, motivate, deploy, and retain the talent needed to improve their software development capability"



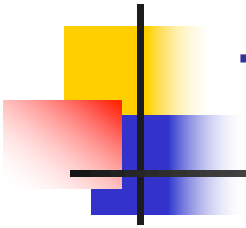
The People

- PM-CMM defines the following KPA for software people
  - Recruiting, selection, performance management, training, compensation, career development etc…
- Organization that achieve high levels of maturity in the people management area have a higher likelihood of implementing effective software engineering practices



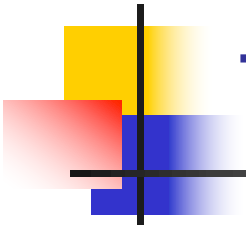
The Product

- Before a project can be planned
  - Product objectives and scope should be established
  - Alternative solution should be considered
  - Technical and management constraints should be identified
- Without this information, it is impossible
  - To define reasonable estimate of cost
  - Effective assessment of risk
  - A realistic breakdown of the project tasks
  - Manageable project schedule (meaningful indication of progress)



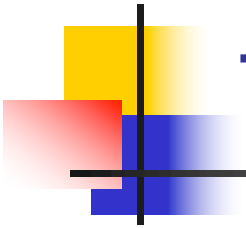
The Product

- The software developer and customer must meet to define product objectives and scope.
- (from the customer's point of view)
  - Objective identify the overall goals for the product without considering how these goals will be achieved
- Scope identifies the primary data, functions and behaviours that characterize the product
  - Bound these characteristics in a quantitative manner



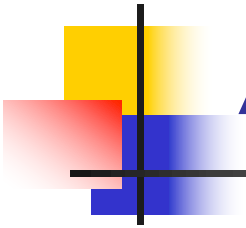
The Process

- A software process provides the framework from which a comprehensive plan for software development can be established
- A small number of framework activities are applicable to all software projects, regardless of their size or complexity
  - A number of different task sets
    - Tasks, milestones, work products and quality assurance points
  - Umbrella activities
    - SQA, SCM, and measurement

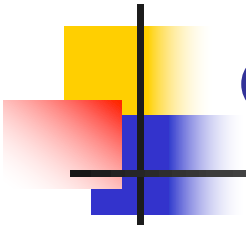


The Project

- We conduct planned and controlled software projects for one primary reason. It is the only way to manage complexity.
- Report in 2009
  - only 32 percent of projects succeeding; that is, they are delivered on time, on budget, with required features and functionality.
  - Forty four percent were “challenged,” meaning they were late, over budget, and/or had less than the required features and functionality.
  - Twenty four percent failed; that is, they were cancelled prior to completion, or delivered and never used.



Annex



Contents list of feasibility study

- Introduction: identifies what the document is;
- Description of current situation:
- Problem description;
- Proposed development
  - Business and financial aspects
  - Technical aspects
  - Organizational aspects
- Estimated costs
  - Development costs
  - Operational costs;
- Envisaged benefits;
- Recommendation.

Contents list for a project plan

- Introduction:
- Background: including reference to the business case;
- Project objectives;
- Constraints: these could be included with project objectives;
- Project products: both deliverable products that the client will receive and intermediate products;
- Methods;
- Activities to be carried out;
- Resources to be used;
- Risks to the project;
- Management of the project, including
  - Organizational responsibility
  - Management of quality
  - Configuration management