



Detailed Plans Up Front

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Project

Definition

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

- The temporary nature of projects indicates that a project has a definite beginning and end.
- The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists
- A project may also be terminated if the client (customer, sponsor, or champion) wishes to terminate the project
- Temporary does not necessarily mean the duration of the project is short. It refers to the project's engagement and its longevity
- Temporary does not typically apply to the product, service, or result created by the project; most projects are undertaken to create a lasting outcome

Project Management

Characteristics of considered projects:

- non-routine tasks are involved
- planning is required
- specific objectives are to be met or specific product is to be created
- predetermined time span
- work is carried on for someone other than yourself
- work involves several specialisms
- people are formed into a temporary work group
- work is carried out in several phases
- resources that are available for use on the project are constrained
- the project is large or complex

Projects are often utilized as a **means of directly or indirectly achieving objectives** within an organization's strategic plan. Projects are typically authorized as a result of one or more of the following strategic considerations:

- **Market demand** (e.g., a car company authorizing a project to build more fuel-efficient cars in response to gasoline shortages);
- **Strategic opportunity/business need** (e.g., a training company authorizing a project to create a new course to increase its revenues);
- **Social need** (e.g., a nongovernmental organization in a developing country authorizing a project to provide potable water systems, latrines, and sanitation education to communities suffering from high rates of infectious diseases);
- **Environmental consideration** (e.g., a public company authorizing a project to create a new service for electric car sharing to reduce pollution);
- **Customer request** (e.g., an electric utility authorizing a project to build a new substation to serve a new industrial park);
- **Technological advance** (e.g., an electronics firm authorizing a new project to develop a faster, cheaper, and smaller laptop based on advances in computer memory and electronics technology); and
- **Legal requirement** (e.g., a chemical manufacturer authorizing a project to establish guidelines for proper handling of a new toxic material).

Definition

Project management is the **application of knowledge, skills, tools, and techniques to project activities** to meet the project requirements. Project management is accomplished through the appropriate application and integration of logically grouped project management processes and activities

At the macro level the management of a software project typically requires to go activate the following processes/activities:

- Feasibility study
- Planning
- Project Execution
- Monitoring
- Closing

Project Manager

Definition

The **project manager** is the person assigned by the performing organization to lead the team that is responsible for achieving the project objectives.

In addition to any area-specific skills and general management proficiencies required for the project, effective project management requires that the project manager possess the following competencies:

- **Knowledge:** Refers to what the project manager knows about project management.
- **Performance:** Refers to what the project manager is able to do or accomplish while applying his or her project management knowledge.
- **Personal:** Refers to how the project manager behaves when performing the project or related activity. Personal effectiveness encompasses attitudes, core personality characteristics, and leadership, which provides the ability to guide the project team while achieving project objectives and balancing the project constraints.

Project Manager skills

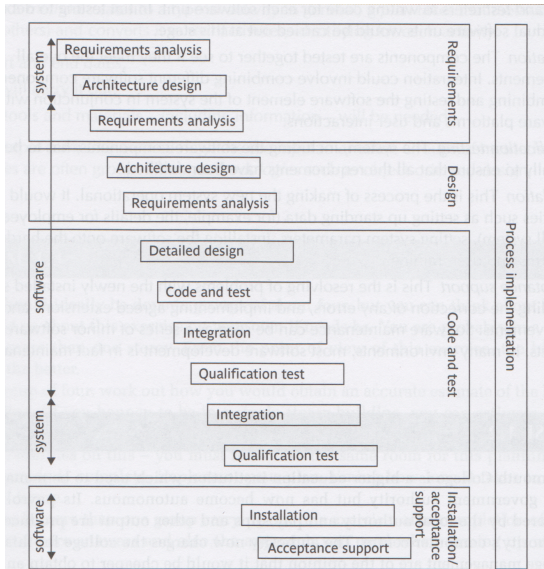
Project managers accomplish work through the project team and other stakeholders. Effective project managers acquire a **balance of technical, interpersonal, and conceptual skills** that help them analyze situations and interact appropriately. Important interpersonal skills are:

- **Leadership**: focusing the efforts of a group of people toward a common goal and enabling them to work as a team
- **Team building**: helping a group of individuals, bound by a common purpose
- **Motivation**: creating an environment to meet project objectives while providing maximum satisfaction related to what people value most
- **Communication**: identifying various communication channels, understand what information they need to provide, what information they need to receive, and which interpersonal skills will help them communicate effectively with various project stakeholders.
- **Influencing**: sharing power and relying on interpersonal skills to get others to cooperate towards common goals

Project Manager skills . . . continued

- **Decision making:** There are four basic decision styles normally used by project managers: command, consultation, consensus, and coin flip (random). There are four major factors that affect the decision style: time constraints, trust, quality, and acceptance
- **Political and cultural awareness:** The skillful use of politics and power helps the project manager to be successful
- **Negotiation:** is a strategy of conferring with parties of shared or opposed interests with a view toward compromise or reaching an agreement.
- **Trust building:** The ability to build trust across the project team and other key stakeholders is a critical component
- **Conflict management:** Managing conflict in a project environment involves building the trust necessary for all involved parties to be open and honest, and to engage in seeking a positive resolution to the situation creating the conflict
- **Coaching:** helping people recognize their potential through empowerment and development

ISO 12207 software development life cycle



Classes of projects

- Compulsory v. Voluntary users
- Informative vs. Embedded systems
- Objectives vs. Product driven

Is software project management different?

Peculiarities for SPM:

- **Invisibility** – intangible product, progress difficult to judge
- **Complexity** – highest complexity per euro
- **Conformity** – continuously changing contexts
- **Flexibility** – “easy” to change

Feasibility

Is it worth starting the project?

- Identification of a business case
- Market analysis and strategies
- Cost assessment (accuracy at this level cannot be high)

A small prototype could be developed to clarify project needs

Different situations can change the recipe

- You act as the Contractor
- In house software (build or buy): software that you need to run your business
- Participation to research and innovation proposals
 - Feasibility is “somehow assumed” once you deliver the proposal
 - the proposal generally includes detailed planning

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Feasibility study or the Business Case

A document reporting the effort of feasibility study generally includes:

- Introduction and background
- The proposed project
- The market
- Organizational and operational infrastructure
- The benefits
- Outline of the implementation plan
- Costs assessment
- The financial case
- Risk analysis
- Management plan

Project Execution

Project execution refer to the real performance of the activities foreseen in the plan and it includes the activities of **monitoring** and **control**

Project planning

Planning

Thinking **carefully** about something before you do it - even with uncertain projects this is worth doing as long as plans are **seen as provisional**

Planning requires to define at **best the work** to be performed by teams in order to reach the **project objectives** in minimum time and cost

- express objectives as kind of “**post conditions**” - e.g. “*customers should be able to get hot drinks*” is better than “*develop a coffee machine*”
- objectives are detailed in sub-objectives. Well defined objectives are “**SMART**”
 - **Specific** – concrete and well defined
 - **Measurable**
 - **Achievable**
 - **Relevant**
 - **Time Constrained**

Step Wise method

The **Step Wise** method is a PM method covering the planning of a project that is compatible with Prince2:

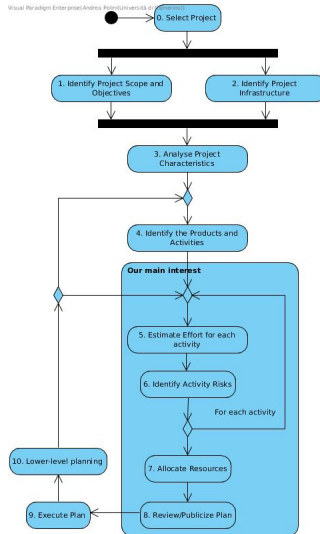


Bob Hughes and Mike Cotterell

Software Project Management, 5th Ed.

McGraw-Hill, 2009

Steps in Step Wise



Step 0: Select Project

Product portfolio management

Provides an overview of **all the projects** that an organization is undertaking or is considering. It **prioritizes the allocation of resources** to projects and decides which new project should be accepted

Company management decides which projects should start on the base of strategic objectives

Step 1: Identify project scope and objectives

- 1 Identify **objectives** (what the project must achieve) and **practical measures** of the effectiveness in meeting those objectives
- 2 Establish a **project authority** – **Project Management Board (PMB)**, has the responsibility for setting, monitoring and modifying decisions?
- 3 **Stakeholder analysis** - identify all stakeholders in the project and their interests
 - Internal to the project team
 - Internal to the organization
 - External to the organization (i.e. customers)
- 4 **Modify objectives** in the light of stakeholder analysis
- 5 **Establish methods of communication** with all parties

Step 2: Identify project infrastructure

- 1 Identify relationship between the **project and strategic planning**
- 2 Identify installation standards and procedures
 - **change control and configuration management**
 - **quality standards and procedures**
 - **measurement programme**
 - ...
- 3 Identify project team organization

Step 3: Analyse project characteristics

- 1 Distinguish the project as either objective or product driven
- 2 Analyse other project characteristics (e.g. safety critical?)
- 3 Identify high level project risks - e.g. acceptance from users
- 4 Take into account user requirements concerning implementation and methodologies
- 5 **Select development methodology and life-cycle approach**
- 6 Review overall resource estimates

Step 4: Identify project product and activities

- 1 Identify and describe project products (or **deliverables**)
 - **work will produce intermediate products** - documents, software, test suites, etc . . .
 - **Product Breakdown Structure (PBS)**
 - to each product should be described with a name, purpose, derivation, composition, form, standards, quality criteria to decide if it is acceptable
- 2 **Document generic product flows** - relations to be described with Product Flow Diagram (PFD)
- 3 Recognize product instances
- 4 **Produce ideal activity network**
- 5 **Modify the ideal to take into account need for stages and checkpoints**

Step 5: Estimate effort for each activity

- 1 Carry out bottom up estimates - elapsed time vs. effort
- 2 Revise plan to create controllable activities
 - long activities make project control difficult
 - activities should not be running when checkpoints have been defined - it is generally a good idea to **alienate activity reporting with monitoring and controlling** activities

Step 6: Identify activity risks

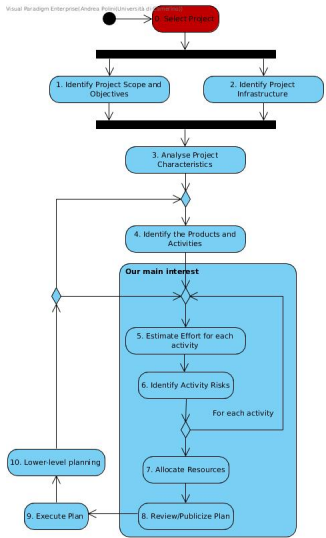
- 1 Identify and quantify activity based risks
- 2 Plan risk reduction and contingency measures where appropriate
- 3 Adjust overall plans and estimate to take account of risks

Step 7: Allocate resources

- 1 Identify and allocate resources
- 2 Revise plans and estimate to take into account resource constraints - a needed expert could be fully booked in certain period

Step 8: Review publicize plan

- 1 Review quality aspects of the project plan - which are the conditions that **establish when an activity can be closed**
- 2 Document plans and obtain agreement



Step 0 – Select Project

Concerns:

- identify which project proposal are worth implementation
- assessing the amount of risk failure
- decide how to share limited resources (staff time, finance) between projects
- being aware of dependencies between projects
- ensure to not duplicate work
- ensure to not miss necessary developments

Portfolio, Program, Projects

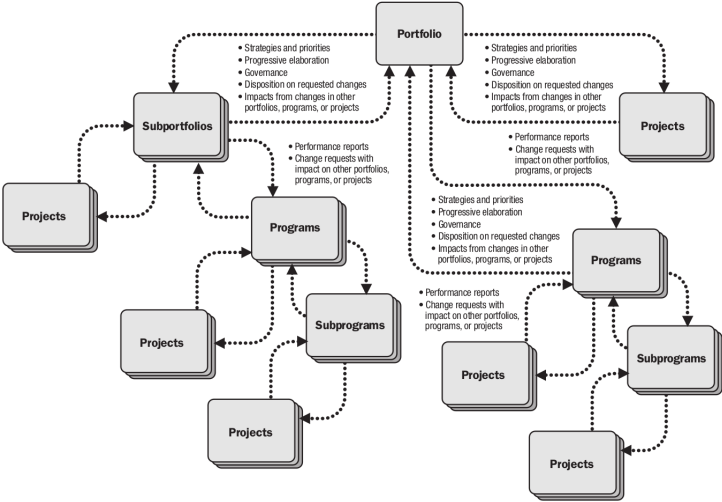
The relationship among **portfolios, programs, and projects** is such that a portfolio refers to a collection of projects, programs, subportfolios, and operations managed as a group to achieve strategic objectives.

Programs are grouped within a portfolio and are comprised of subprograms, projects, or other work that are managed in a **coordinated fashion** in support of the portfolio.

Individual projects that are either within or outside of a program are still considered part of a portfolio.

Although the **projects or programs within the portfolio may not necessarily be interdependent or directly related**, they are linked to the organization's strategic plan by means of the organization's portfolio.

Portfolio, Program, Projects



Evaluation of individual projects

- Technical assessment – can the required functionality be delivered with current affordable technologies?
- Cost-benefit analysis
 - Cost and benefit identification
 - Cost and benefit quantification
 - development costs
 - setup costs
 - operational costs
- Cash-flow forecasting

Cost-benefit evaluation techniques

- **Net profit** – difference between the total costs and the total income over the life of a project
- **Payback period** – time taken to pay back the initial investment
- **Return on Investment (ROI)**

$$ROI = \frac{\text{average annual profit}}{\text{total investment}} \times 100$$

- **Net Present Value (NPV)** – with r as discount rate

$$\text{Present value} = \frac{\text{value in year } t}{(1+r)^t}$$

- **Internal Rate of Return (IRR)** – rate at which it is not worthwhile to invest elsewhere – calculated as the discount rate leading to an NPV equal to zero.

Assessing projects financially

Consider the following cash flow projections for 4 different projects, and then compute the various indexes:

| Year | Project 1 | Project 2 | Project 3 | Project 4 |
|-------------|------------------|------------------|------------------|------------------|
| 0 | -100,000 | -1,000,000 | - 100,000 | -120,000 |
| 1 | 10,000 | 200,000 | 30,000 | 30,000 |
| 2 | 10,000 | 200,000 | 30,000 | 30,000 |
| 3 | 10,000 | 200,000 | 30,000 | 30,000 |
| 4 | 20,000 | 200,000 | 30,000 | 30,000 |
| 5 | 100,000 | 300,000 | 30,000 | 75,000 |

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Assessment based on static scenarios are not reliable....**uncertainty** has to be considered in **cost-benefit analysis**

Introducing Risks

Many different strategies for risks identification . . .

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- Risks identification and ranking – generally leads increase the discount rate
- use of likelihood for each cash-flow (generally optimistic, medium, pessimistic)
- define risk profiles using sensitivity analysis
- Use of decision trees