
Chapter 1.5 - Project Management

MI Qing (Lecturer)

Telephone: 15210503242

Email: miqing@bjut.edu.cn

Office: 410, Information Building

Topics Covered

✧ People management

- Project managers have to **choose people** for their team and **establish ways of working** that leads to effective team performance.

✧ Risk management

- Project managers **assess the risks** that may affect a project, monitor these risks and take action when problems arise.

✧ Project Scheduling

Software Management Distinctions

- ✧ The product is intangible.
 - Software cannot be seen or touched. Software project managers cannot see progress by simply looking at the artefact that is being constructed.
- ✧ Many software projects are 'one-off' projects.
 - Large software projects are usually different in some ways from previous projects. Even managers who have lots of previous experience may find it difficult to anticipate problems.
- ✧ Software processes are variable and organization specific.
 - We still cannot reliably predict when a particular software process is likely to lead to development problems.

Software Project Management

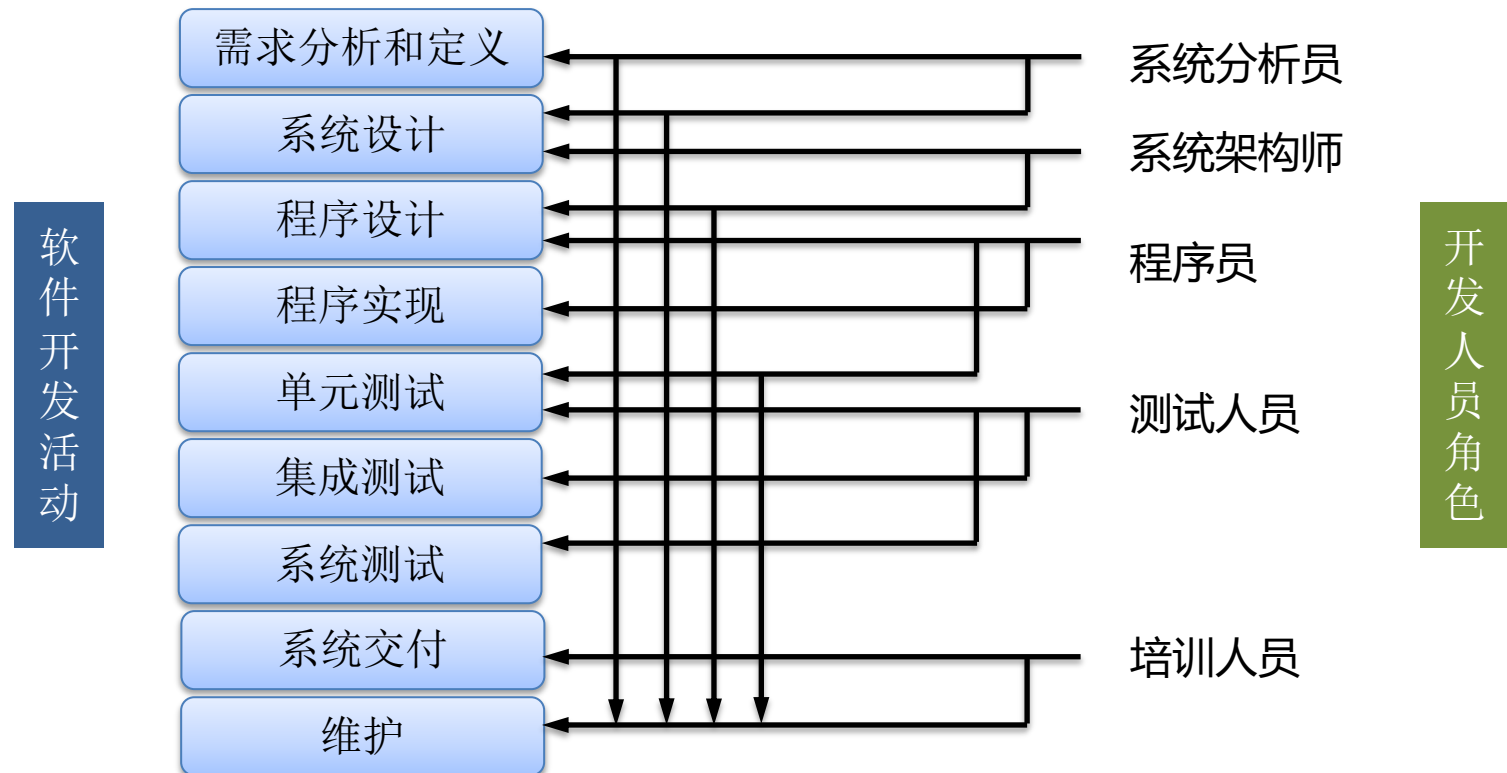
- ✧ Project management is needed because software development is always subject to **budget and schedule constraints** that are set by the organisation developing the software.
- ✧ Success Criteria
 - Deliver the software to the customer at the agreed time.
 - Keep overall costs within budget.
 - Deliver software that meets the customer's expectations.
 - Maintain a coherent and well-functioning development team.

People Management

People are an organisation's most important assets.

Managing People

✧ Poor people management is an important contributor to project failure.



Teamwork

- ✧ A good group is cohesive and has a team spirit. The people involved are motivated by the success of the group as well as by their own personal goals.
- ✧ The advantages of a cohesive group are:
 - Group quality standards can be developed by the group members.
 - Team members learn from each other and get to know each other's work.
 - Knowledge is shared. Continuity can be maintained if a group member leaves.
 - Refactoring and continual improvement is encouraged. Group members work collectively to deliver high quality results and fix problems, irrespective of the individuals who originally created the design or program.

People Management Factors

✧ Consistency

- Team members should all be treated in a comparable way without favourites or discrimination.

✧ Respect

- Different team members have different skills and these differences should be respected.

✧ Inclusion

- Involve all team members and make sure that people's views are considered.

✧ Honesty

- You should always be honest about what is going well and what is going badly in a project.

Selecting Group Members

- ✧ A manager or team leader's job is to create a cohesive group and organize their group so that they can work together effectively.
 - This involves creating a group with the right **balance of technical skills and personalities**, and organizing that group so that the members work together effectively.
 - May not be possible to appoint the ideal people to work on a project.



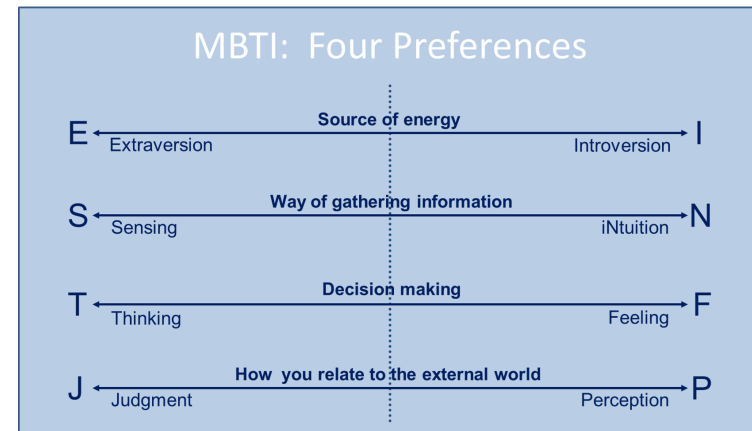
Group Composition

Group composed of members who share the same motivation can be problematic.

✧ Personality Types

- **Task-oriented**. The motivation for doing the work is the work itself.
- **Self-oriented**. The work is a means to an end which is the achievement of individual goals (e.g. to get rich, to play tennis, to travel).
- **Interaction-oriented**. The principal motivation is the presence and actions of co-workers.

✧ An effective group has a balance of all types.



编程语言经验

教育背景

沟通能力

适应性

应用领域经验

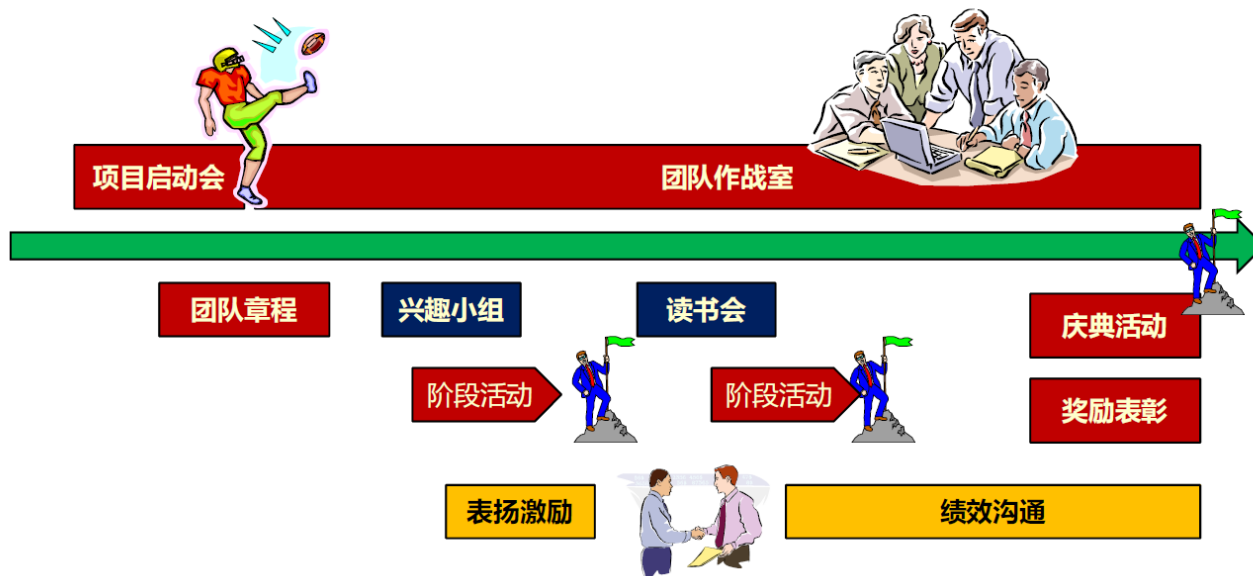
工作态度

Group Organization

- ✧ The way that a group is organized affects the decisions that are made by that group, the ways that information is exchanged and the interactions between the development group and external project stakeholders.
 - Should the project manager be the technical leader of the group?
 - Who will be involved in making critical technical decisions, and how will these be made?
 - How will interactions with external stakeholders and senior company management be handled?
 - How can groups integrate people who are not co-located?
 - How can knowledge be shared across the group?

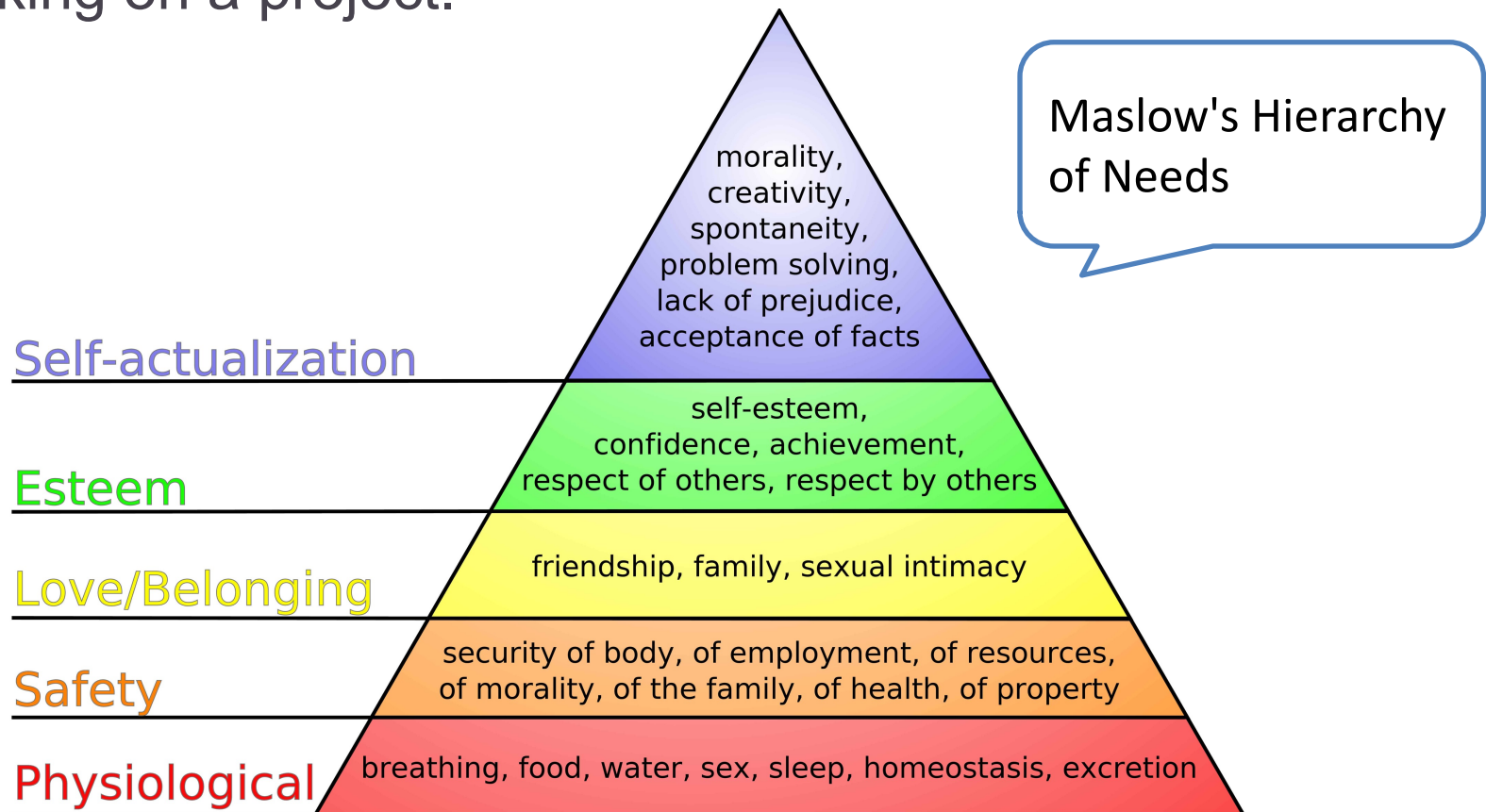
Group Communication

- ✧ Good communications are essential for effective group working.
- ✧ Good communications also strengthens group cohesion as it promotes understanding.



Motivating People

- ✧ An important role of a manager is to motivate the people working on a project.



Need Satisfaction

- ✧ In software development groups, basic physiological and safety needs are not an issue.
- ✧ Social
 - Provide communal facilities;
 - Allow informal communications.
- ✧ Esteem
 - Recognition of achievements;
 - Appropriate rewards.
- ✧ Self-realization
 - Training;
 - Responsibility.



Risk Management

Risk Management

- ✧ Risk management is concerned with **identifying risks and drawing up plans to minimise their effect** on a project.
- ✧ Software risk management is important because of the inherent uncertainties in software development.
 - These uncertainties stem from loosely defined requirements, requirements changes due to changes in customer needs, difficulties in estimating the time and resources required for software development, and differences in individual skills.
- ✧ You have to anticipate risks, understand the impact of these risks on the project, the product and the business, and take steps to avoid these risks.

Risk Classification

✧ Project risks

- Affect schedule or resources.

✧ Product risks

- Affect the quality or performance of the software being developed.

✧ Business risks

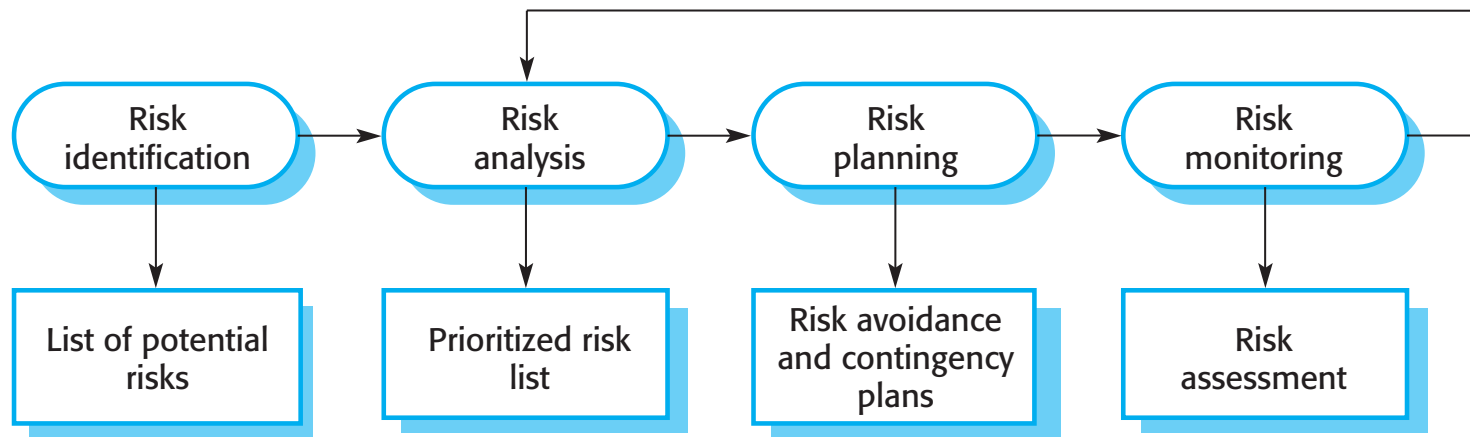
- Affect the organisation developing or procuring the software.

Examples

Risk	Affects	Description
Staff turnover	Project	Experienced staff will leave the project before it is finished.
Management change	Project	There will be a change of organizational management with different priorities.
Hardware unavailability	Project	Hardware that is essential for the project will not be delivered on schedule.
Requirements change	Project and product	There will be a larger number of changes to the requirements than anticipated.
Specification delays	Project and product	Specifications of essential interfaces are not available on schedule.
Size underestimate	Project and product	The size of the system has been underestimated.
CASE tool underperformance	Product	CASE tools, which support the project, do not perform as anticipated.
Technology change	Business	The underlying technology on which the system is built is superseded by new technology.
Product competition	Business	A competitive product is marketed before the system is completed.

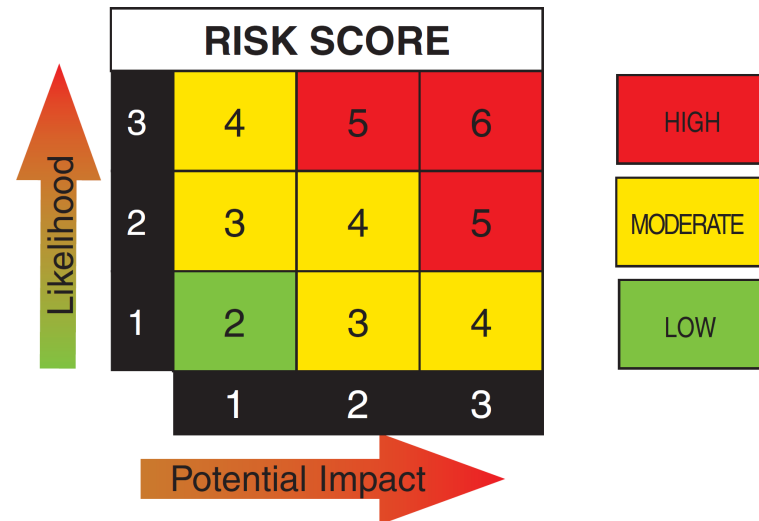
Risk Management Process

- ✧ Risk identification. Identify project, product and business risks.
- ✧ Risk analysis. Assess the likelihood and consequences of these risks.
- ✧ Risk planning. Draw up plans to avoid or minimise the effects of the risk.
- ✧ Risk monitoring. Monitor the risks throughout the project.



Risk Management Process

- ✧ Technology risks
- ✧ Organizational risks
- ✧ People risks
- ✧ Requirements risks
- ✧ Estimation risks
- ✧ Tools risks



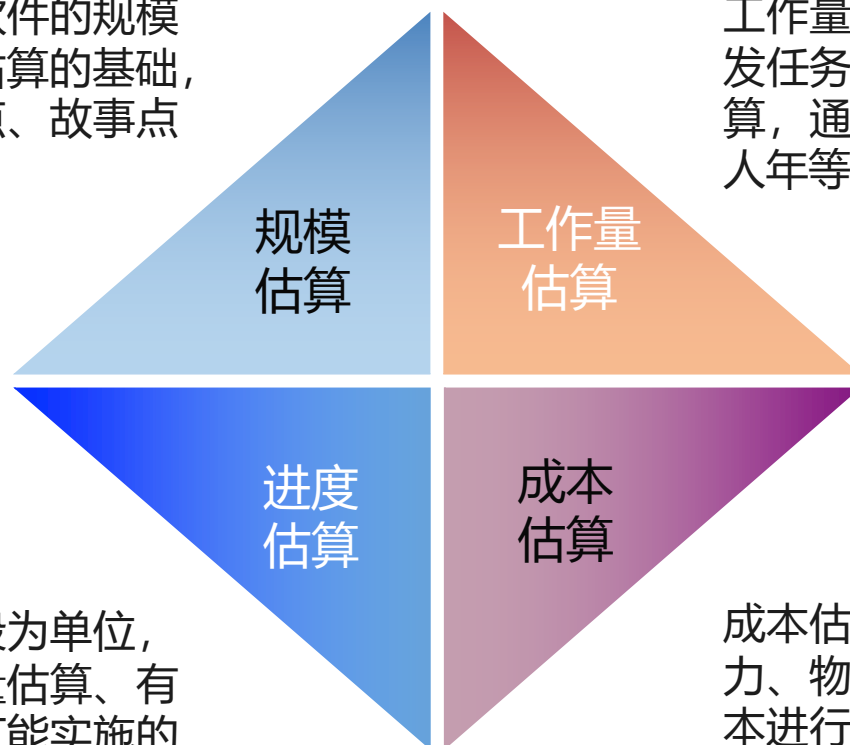
- ✧ Avoidance strategies
 - The probability that the risk will arise is reduced.
- ✧ Minimization strategies
 - The impact of the risk on the project or product will be reduced.
- ✧ Contingency plans
 - If the risk arises, contingency plans are plans to deal with that risk.

Project Scheduling

Project Estimation

规模估算是对所开发软件的规模进行估计，它是其他估算的基础，通常以代码行、功能点、故事点等作为衡量单位。

工作量估算是结合投入人力和开发任务所需要的工作时间进行估算，通常以人时、人天、人月、人年等作为衡量单位。



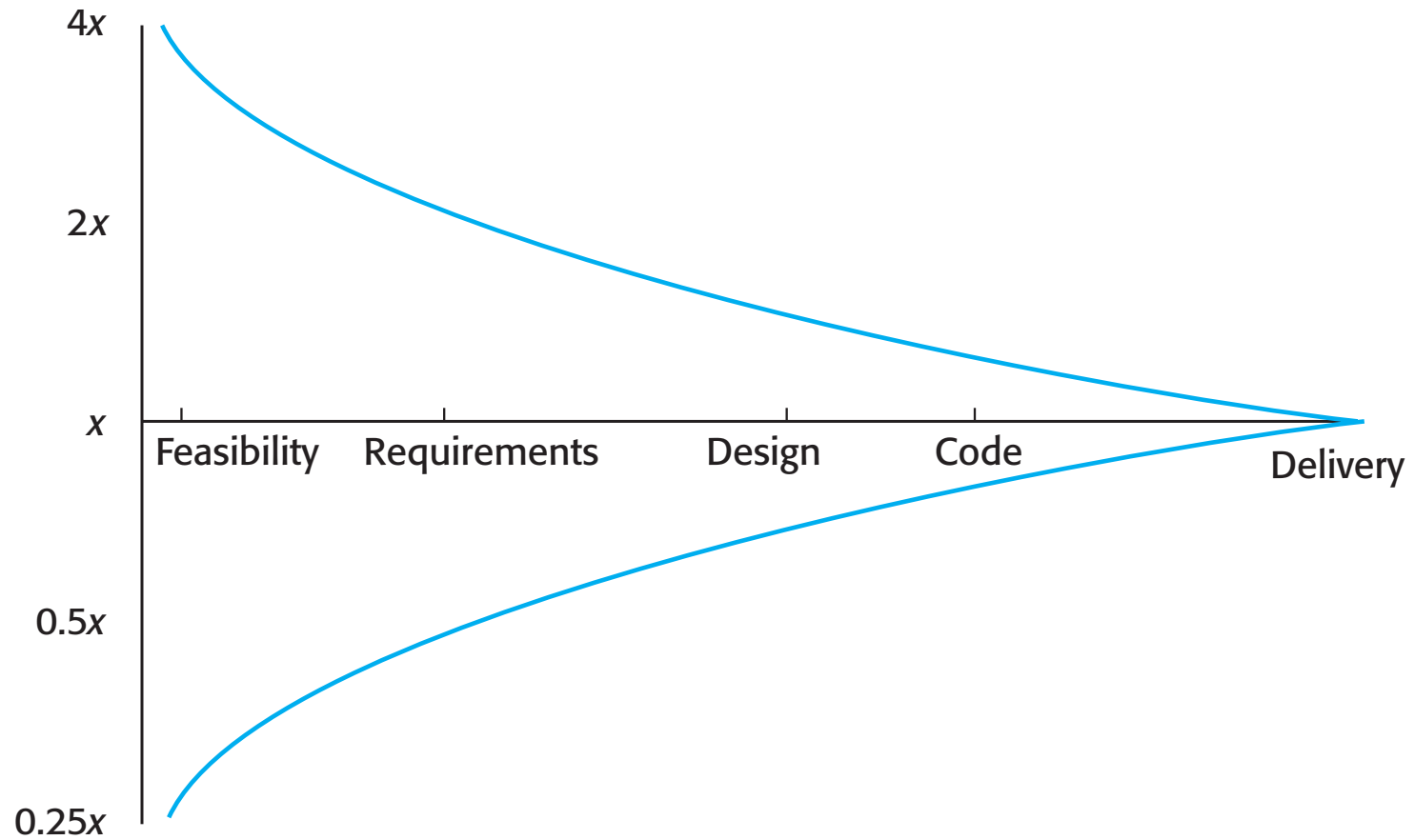
进度估算是以项目阶段为单位，通过任务分解、工作量估算、有效资源分配等对项目可能实施的进度给出正确的评估。

成本估算是包括项目投入的人力、物质、有形和无形的支出成本进行估算，一般软件项目以人力成本为主要部分。

Estimation Techniques

- ✧ Organizations need to make software effort and cost estimates. There are two types of technique that can be used to do this:
 - **Experience-based techniques.** The estimate of future effort requirements is based on the manager's experience of past projects and the application domain. Essentially, the manager makes an informed judgment of what the effort requirements are likely to be.
 - **Algorithmic cost modeling.** In this approach, a formulaic approach is used to compute the project effort based on estimates of product attributes, such as size, and process characteristics, such as experience of staff involved.

Estimate Uncertainty



Story-based Method

- ✧ The project team read and discuss the stories and rank them in order of the amount of time they think it will take to implement the story.
- ✧ Stories are assigned 'effort points' reflecting their size and difficulty of implementation.



举例：自动售货机

用户故事	说明
购买饮料	用户投钱并购买指定饮料
取消购买	用户投钱之后取消购买
输入管理密码	授权人输入管理密码，以便进行补货、定价、取钱等操作
补充饮料	在输入管理密码后，授权人补充饮料
设定价格	在输入管理密码后，授权人可以重新设定饮料价格
取出钱款	在输入管理密码后，授权人可以取出钱箱中的钱
打印月报	在输入管理密码后，授权人打印月销售报表
发出报警	在异常情况发生时，系统自动打开安全警报

COnstructive COnst Model (COCOMO)

- ✧ The COCOMO estimates the cost for software product development in terms of effort (resources required to complete the project work) and schedule (time required to complete the project work) based on the size of the software product.

$$\text{Effort (E)} = a * (\text{KLOC})^b \text{ MM}$$

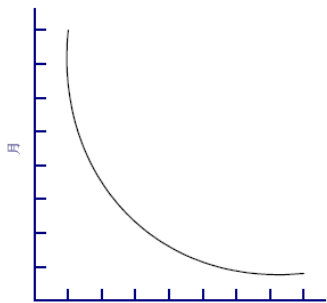
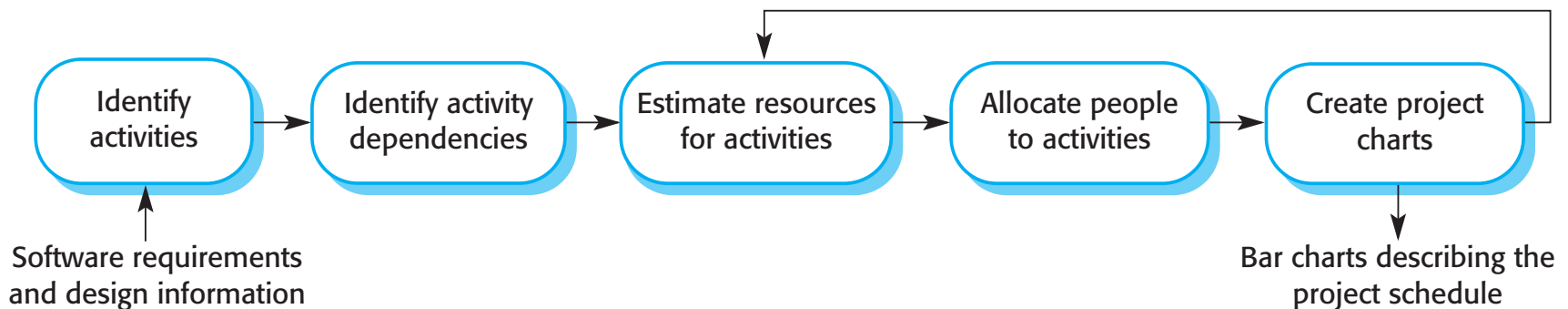
$$\text{Scheduled Time (D)} = c * (\text{E})^d \text{ Months(M)}$$

- **E** = Total effort required for the project in Man-Months (MM).
- **D** = Total time required for project development in Months (M).
- **KLOC** = the size of the code for the project in Kilo lines of code.
- **a, b, c, d** = The constant parameters for a software project.

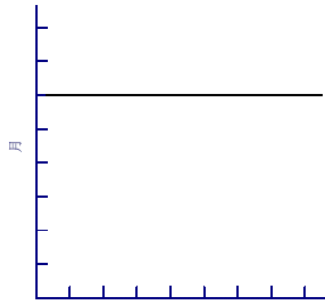
PROJECT TYPE	a	b	c	d
Organic	2.4	1.05	2.5	0.38
Semidetached	3	1.12	2.5	0.35
Embedded	3.6	1.2	2.5	0.32

Project Scheduling

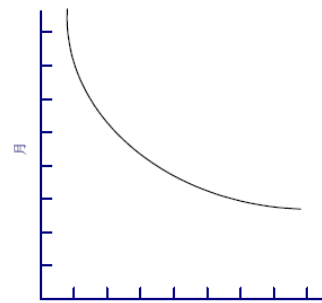
✧ Project scheduling is the process of deciding how the work in a project will be organized as separate tasks, and when and how these tasks will be executed.



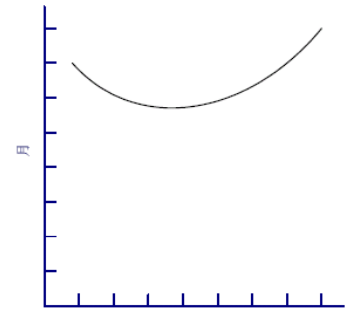
完全可分解的任务



无法分解的任务



需沟通的可分解任务



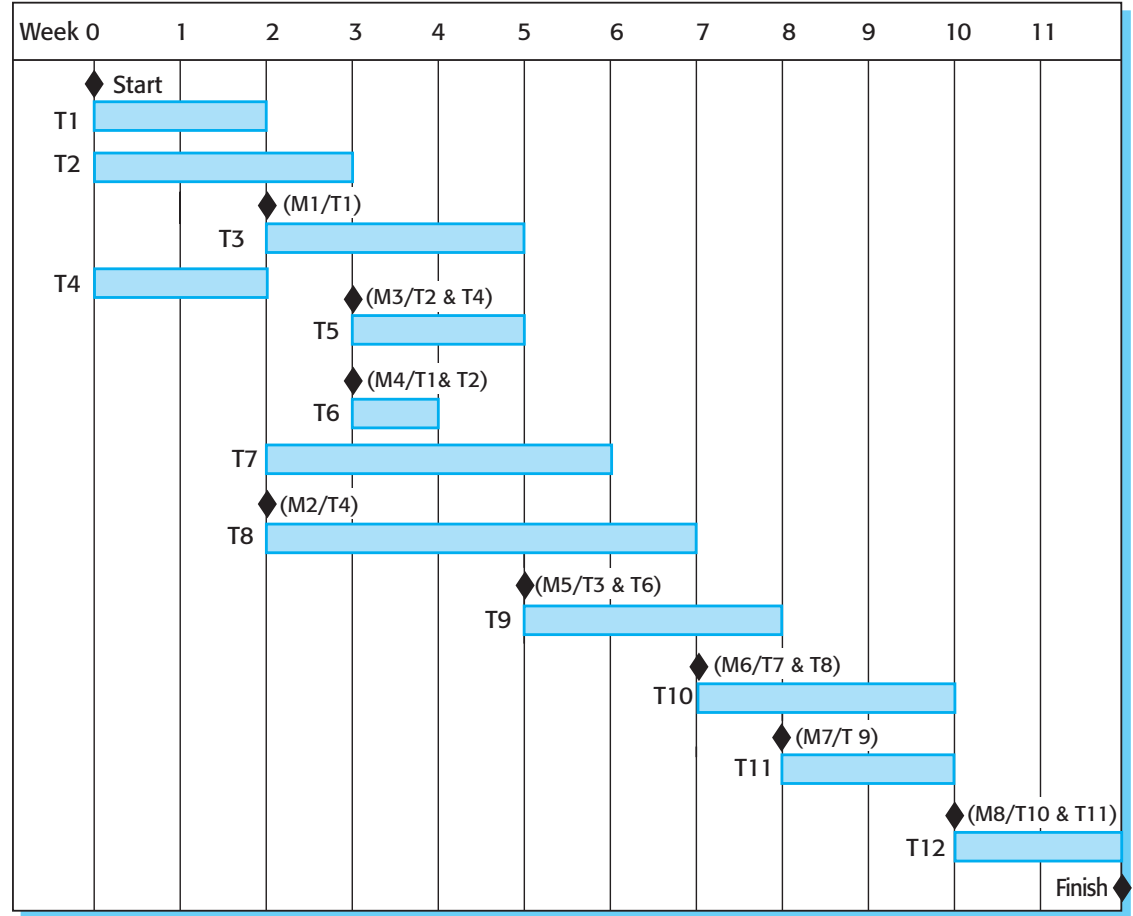
关系错综复杂的任务

Tasks, Durations, and Dependencies

Task	Effort (person-days)	Duration (days)	Dependencies
T1	15	10	
T2	8	15	
T3	20	15	T1 (M1)
T4	5	10	
T5	5	10	T2, T4 (M3)
T6	10	5	T1, T2 (M4)
T7	25	20	T1 (M1)
T8	75	25	T4 (M2)
T9	10	15	T3, T6 (M5)
T10	20	15	T7, T8 (M6)
T11	10	10	T9 (M7)
T12	20	10	T10, T11 (M8)

Gantt Chart (Activity Bar Chart)

- ✧ A Gantt chart is a type of bar chart that illustrates a project schedule.
- ✧ Modern Gantt charts also show the dependency relationships between activities and the current schedule status.



Staff Allocation Chart

