IT项目管理

Main Key Terms

Part One： IT Project Management

1. Introduction To Project Management

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

项目是为创造一个特定的产品、服务或者成果而采取的临时性的努力。

project management Project management is "the application of knowledge, skills, tools and techniques to project activities to meet project requirements"

项目管理是指在项目活动中运用专门的知识、技能、工具和技术，以满足项目需求。

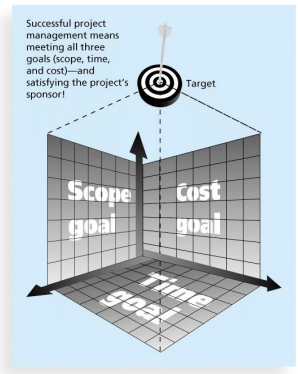
project attributes

A project

- has a unique purpose 特定目的
- is temporary 临时性的
- is developed using progressive elaboration 不断完善逐步开展
- requires resources, often from various areas 来自不同领域的资源
- should have a primary customer or sponsort 一个主要客户或发起人
- involves uncertainty 不确定性

triple constraint

scope, time, cost 范围 时间 成本



Project Stakeholders

Stakeholders are the people involved in or affected by project activities

Stakeholders include

- the project sponsor
- the project manager
- the project team
- support staff
- customers
- users
- suppliers
- opponents to the project

project manager (hard and soft skills)

Project managers work with project sponsors, project team, and other people involved in a project to meet project goals

The Role of the Project Manager

Job descriptions vary, but most include responsibilities like planning, scheduling, coordinating, and working with people to achieve project goals

Remembe that 97% of successful projects were led by experienced project managers, who can often help influence success factors

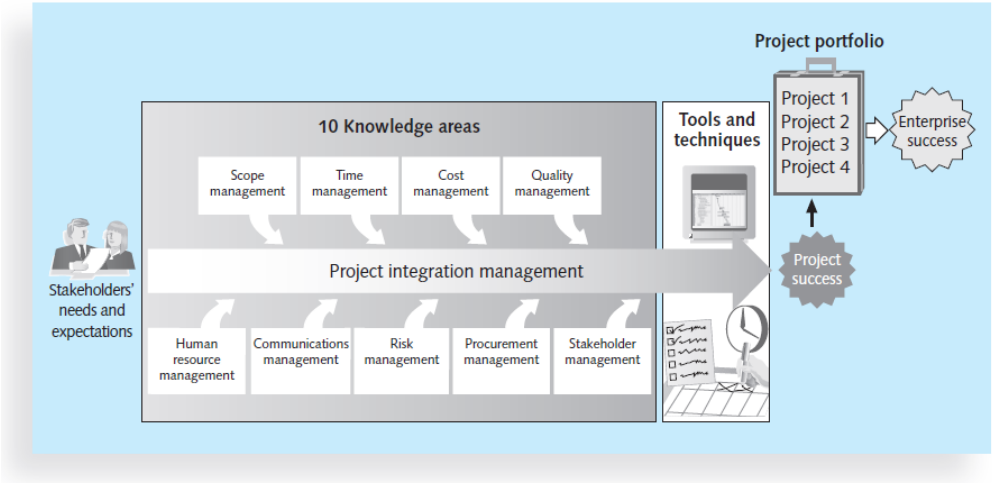
Suggested Skills for Project Managers

The Project Management Body of Knowledge

Application area knowledge, standards, and regulations
Project environment knowledge
General management knowledge and skills
Soft skills or human relations skills

Ten Most Important Skills and Competencies for Project Managers

1. People skills
2. Leadership
3. Listening
4. Integrity, ethical behavior, consistent
5. Strong at building trust
6. Verbal communication
7. Strong at building teams
8. Conflict resolution, conflict management
9. Critical thinking, problem solving
10. Understands, balances priorities



PMI 项目管理协会

The Project Management Institute (PMI) is an international professional society for project managers founded in 1969

There are communities of practices in many areas, like information systems, financial services, and health care

PMO 项目管理办公室

Project Management Office

PMP 项目管理师

PMI provides certification as a Project Management Professional (PMP)

A PMP has documented sufficient project experience, agreed to follow a code of ethics, and passed the PMP exam

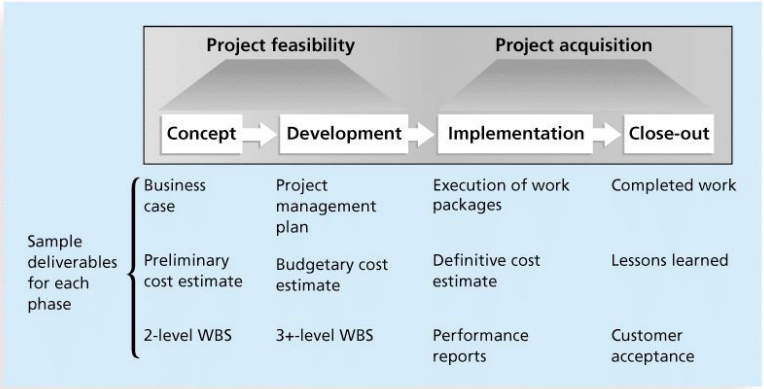
2. The Project Management and Information Technology Context

Deliverable 可交付成果

A product or service, such as a technical report, a training session, a piece of hardware, or a segment of software code, produced or provided as part of a project

可交付成果是一个产品或者服务，例如报告、培训课程、硬件模块或者软件代码片段，这些是作为项目的一部分而产生或提供的。

project life cycle 项目生命周期



项目可行性阶段：概念 开发

项目获取阶段：实施 收尾

成果示例：

概念阶段：商业案例 初步成本估算 2层WBS（工作分解结构）

开发阶段：项目管理计划 成本预算 3+层WBS

实施阶段：工作包执行 确定的成本估算 绩效报告

收尾阶段：完成的工作 教训总结 客户验收

systems development life cycle (SDLC) 系统开发生命周期

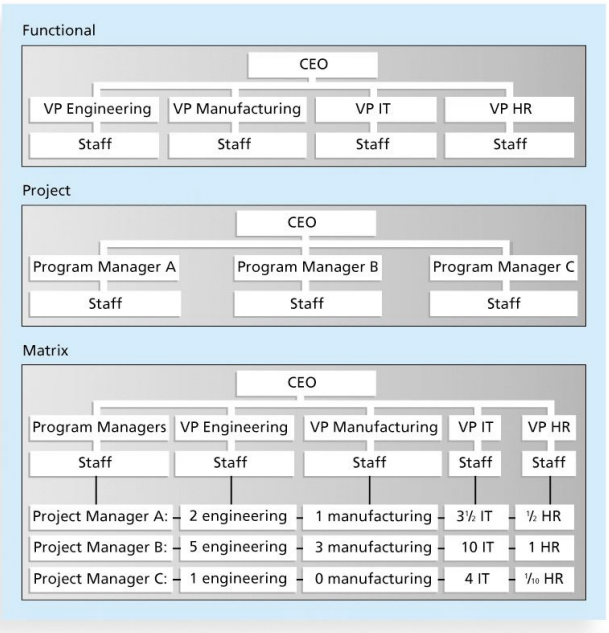
The Systems Development Life Cycle (SDLC) is a framework for describing the phases involved in developing and maintaining information systems

系统开发生命周期是一个描述开发信息系统不同阶段的框架。

Systems development projects can follow

- Predictive life cycle: 可预测生命周期
  the scope of the project can be clearly articulated and the schedule and cost can be predicted
  可以很明确的表达项目的范围，精确预测进度和成本
  通用模型：瀑布模型 螺旋模型 渐增式构建模型 原型模型 快速应用开发模型RAD
- Adaptive Software Development (ASD) life cycle: 自适应软件开发
  requirements cannot be clearly expressed, projects are mission driven and component based, using time-based cycles to meet target dates
  生命周期的早期需求不能被清晰的表述，项目是受任务驱动的，基于组件的，使用基于时间的周期来满足目标日期。

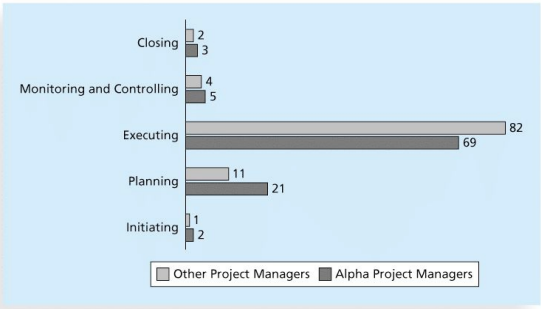
Organizational Structures (Functional, Project, and Matrix)



3. Project Management Process Groups: A Case Study

5 process groups

- initiating processes 启动：定义和批准项目或项目阶段
- planning processes 计划：制定和维护一个可执行的计划
- executing processes 执行：协调人力和其他资源来完成工作
- monitoring and controlling processes 监控：规律的测量和监视项目进展，以保证项目团队能满足项目目标
- closing processes 收尾：对项目或者项目阶段的正式验收，并有效的终止



A process is a series of actions directed toward a particular result

Project management can be viewed as a number of interlinked processes

process groups and KAs mapping

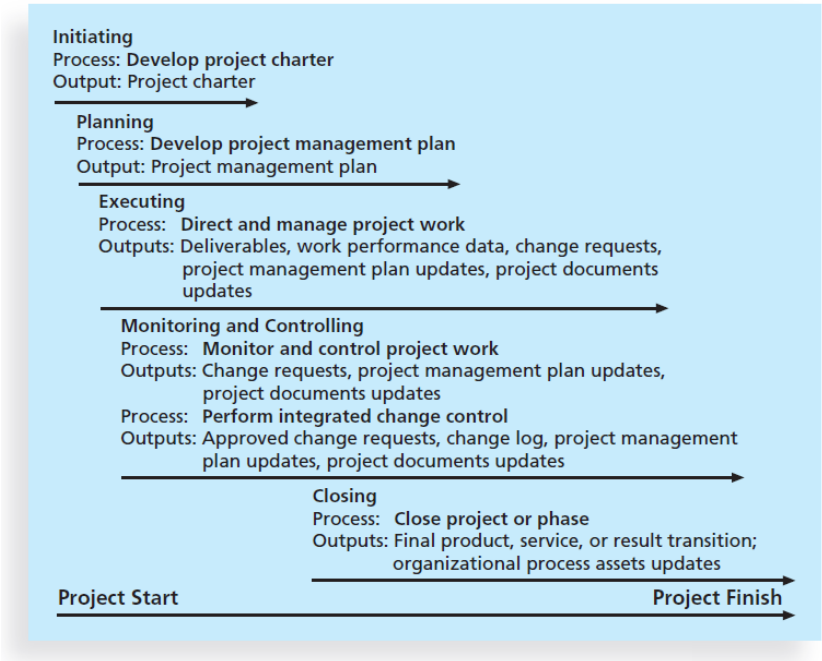
TABLE 3-1 Project management process groups and knowledge area mapping

Knowledge Area	Project Management Process Groups				
	Initiating	Planning	Executing	Monitoring and Controlling	Closing
Project Integration Management	Develop project charter	Develop project management plan	Direct and manage project work	Monitor and control project work, Perform integrated change control	Close project or phase
Project Scope Management		Plan scope management, Collect requirements, Define scope, Create WBS		Validate scope, Control scope	
Project Time Management		Plan schedule management, Define activities, Sequence activities, Estimate activities resources, Estimate activity durations, Develop schedule		Control schedule	

Project Cost Management		Plan cost management, Estimate costs, Determine budget		Control costs	
Project Quality Management		Plan quality management	Perform quality assurance	Control quality	
Project Human Resource Management		Plan human resource management	Acquire project team, Develop project team, Manage project team		
Project Communications Management		Plan communications management	Manage communications	Control communications	
Project Risk Management		Plan risk management, Identify risks, Perform qualitative risk analysis, Perform quantitative risk analysis, Plan risk responses		Control risks	
Project Procurement Management		Plan procurement management	Conduct procurements	Control procurements	Close procurements
Project Stakeholder Management	Identify stakeholders	Plan stakeholder management	Manage stakeholder engagement	Control stakeholder engagement	

4. Project Integration Management

project integration management processes 项目综合管理过程



项目启动：

制定项目章程：与干系人共同工作，制定一个正式批准项目的文件，即章程；

计划：

制定项目管理计划：协调所有计划努力，制定一个连贯一直的文件——项目管理计划；

执行：

指导和管理项目执行：通过项目管理计划中的有关活动，来执行项目管理计划。输出：可交付成果，工作绩效信息，变更请求，项目管理计划更新，项目文档更新；

监控：

监控项目工作：检查项目活力是否符合项目绩效目标。输出：变更请求，项目管理计划更新，项目文档更新；

综合变更控制：识别、评估和管理贯穿项目生命周期的变更。输出：变更请求状态更新，项目管理计划更新，项目文档更新；

收尾：

项目或阶段收尾：完成所有项目活动，以正式结束项目或项目阶段。输出：最终产品，服务或成果的转移，组织过程资产的更新。

project charter 项目章程

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

项目章程是用来正式确认项目存在并明确项目目标和项目管理的一种文件。

a signed charter is a key output of project integration management
项目章程的基本信息：
项目名称和授权日期，项目经理姓名和联系方式，总的进度（开始日期完成日期里程碑），预算，项目目标的简要说明，项目的成功标准，项目管理方法，角色和职责矩阵图，签名，评述

develop project management plan 制定项目管理计划

A project management plan is a document used to coordinate all project planning documents and help guide a project’ s execution and control
项目管理计划是用于协调所有项目计划文档，并帮助指导项目的执行和控制的一种文件。

NPV

Net present value (NPV) analysis is a method of calculating the expected net monetary gain or loss from a project by discounting all expected future cash inflows and outflows to the present point in time

NVP是一种计算预期净货币收益或损失的方法，该计算方法将当前时间点之后的所有未来预期现金流入和流出都作折现计算。

Projects with a positive NPV should be considered if financial value is a key criterion
正的NPV——比较财务价值的关键标准
The higher the NPV, the better

NPV Calculations：

1. Determine estimated costs and benefits for the life of the project and the products it produces
   为项目生命周期和其他产出的产品确定预期成本和收益
2. Determine the discount rate (check with your organization on what to use)
   确定折现率
3. Calculate the NPV (see text for details)
   计算NPV

Discount rate	**8%**					
Assume the project is completed in Year 0			**Year**			
	0	**1**	**2**	**3**	**Total**	
Costs	140,000	40,000	40,000	40,000		
Discount factor	1	0.93	0.86	0.79		
Discounted costs	**140,000**	**37,200**	**34,400**	**31,600**	**243,200**	
Benefits	0	200,000	200,000	200,000		
Discount factor	1	0.93	0.86	0.79		
Discounted benefits	**0**	**186,000**	**172,000**	**158,000**	**516,000**	
Discounted benefits - costs	(140,000)	148,800	137,600	126,400	**272,800**	←**NPV**
Cumulative benefits - costs	(140,000)	8,800	146,400	272,800		
		↑				
ROI ⟶	**112%**					
	Payback In Year 1					

$$\text{NPV} = \sum_{t=0\ldots n} A_t/(1+r)^t \qquad \text{discount factor is } 1/(1+r)t$$

$$\text{Year 0: discount factor} = 1/(1+0.08)^0 = 1$$

$$\text{Year 1: discount factor} = 1/(1+0.08)^1 = .93$$

$$\text{Year 2: discount factor} = 1/(1+0.08)^2 = .86$$

$$\text{Year 3: discount factor} = 1/(1+0.08)^3 = .79$$

numbers, while others do not. Check with yourorganization for their preferences

Return Of Investment（ROI）

Return on investment (ROI) is calculated by subtracting the project costs from the benefits and then dividing by

the costs

投资回报率是项目的收益减去成本并除以成本的结果

The higher the ROI, the better

Weighted Scoring Model 加权评分模型

A weighted scoring model is a tool that provides a systematic process for selecting projects based on many criteria

加权评分模型是一种基于多种标准进行项目选择的系列方法

Identify criteria important to the project selection process

Assign weights (percentages) to each criterion so they add up to 100%

Assign scores to each criterion for each project

Multiply the scores by the weights and get the total weighted scores

The higher the weighted score, the better

Performing Integrated Change Control 执行综合变更控制

Three main objectives are:

- Influencing the factors that create changes to ensure that changes are beneficial

  影响那些产生变更的因素以确保变更都是有利的

- Determining that a change has occurred 确定一个变更已经出现过
- Managing actual changes as they occur 及时的管理真正的变更

change control board (CCB) 变更管理委员会

A change control board is a formal group of people responsible for approving or rejecting changes on a project

一个变更控制委员会是负责批准或否决项目变更的正式团体

CCBs provide guidelines for preparing change requests, evaluate change requests, and manage the implementation of approved changes

CCB的主要职责是为准备变更请求提供指南，评价变更请求，以及管理和实施核准的变更

Includes stakeholders from the entire organization 干系人

Change Control System 变更控制系统

A change control system is a formal, documented process that describes when and how official project documents and work may be changed

一个变更控制系统是一个正式的、文档化的过程，描述了正式文档何时以及如何被变更

Describes who is authorized to make changes and how to make them

描述哪些人被授权进行变更、变更所需的书面工作以及项目将要使用的自动或手工跟踪系统

Configuration Management 配置管理

Configuration management ensures that the descriptions of the project’ s products are correct and complete

配置管理确保关于项目产品的描述是正确且完整的

5. Project Scope Management

Scope refers to all the work involved in creating the products of the project and the processes used to create them

范围是指开发项目产品所涉及的所有工作和用来开展工作的所有流程。

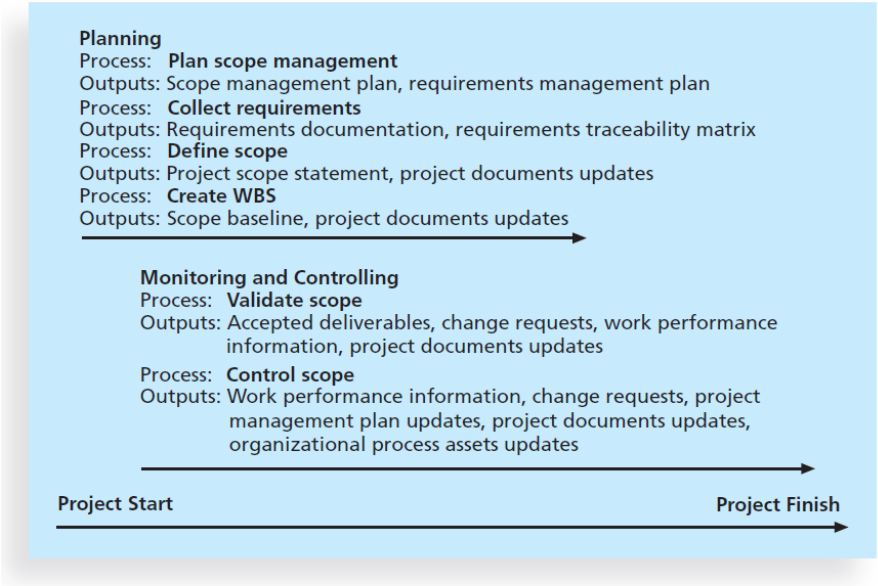
A deliverable is a product produced as part of a project, such as hardware or software, planning documents, or meeting minutes

可交付成果指作为项目的一部分而产生的产品。

Project scope management includes the processes involved in defining and controlling what is or is not included in a project

项目范围管理是指对项目包括什么与不包括什么的界定和控制的过程。

project scope management processes



计划：

制定范围管理计划：确定项目的范围和需求如何管理。项目团队和合适的项目干系人共同创建一个范围管理计划和需求管理计划；

收集需求：定义并记录项目最终产品的特点和功能，以及创造这些产品的过程。输出：项目团队编制的需求文档和需求跟踪矩阵；

定义范围：评审范围管理计划、项目章程、需求文档和组织过程资产来创建一份范围说明书，并且随着需求的拓展和变更请求得到批准而增加更多的信息。输出：项目范围说明书，项目文档的更新；

创建WBS（工作分解结构）：将主要的项目可交付成果分解成更细小和更易管理的部分。输出：范围基线，项目文档的更新；

监控：

验证范围：项目可交付成果的正式接受。关键的项目干系人进行审查，然后正式接受项目的可交付成果。如果不接受，客户或项目发起人通常会请求做些变更。输出：被接受的可交付成果，变更请求，工作绩效信息，项目文档更新。

控制范围：对整个项目生命周期内的范围变化进行控制，这对许多IT项目是一种挑战。输出：工作绩效信息，变更请求，项目管理计划，项目文档和组织过程资产的更新。

scope planning

How to prepare a detailed project scope statement 准备详细的范围说明书

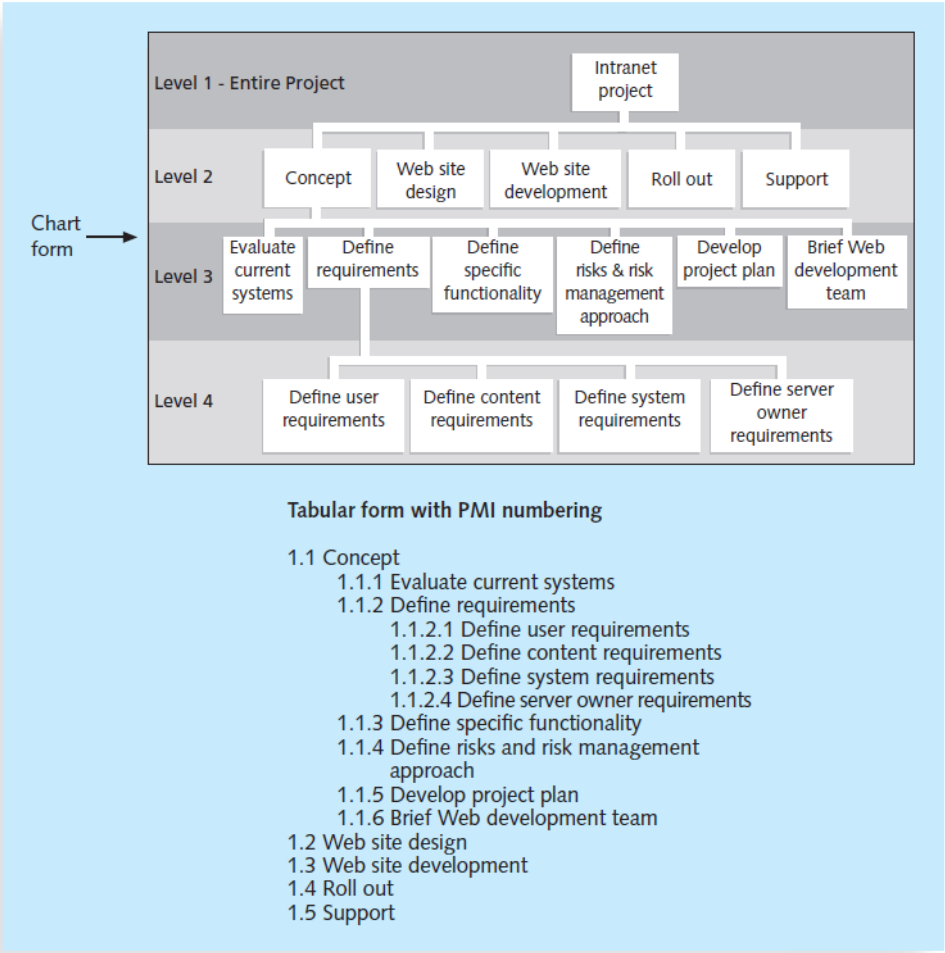
How to create a WBS 创建一个WBS

How to maintain and approve the WBS 维护和批准WBS
How to obtain formal acceptance of the completed project deliverables 获得正式验收已完成的项目可交付成果
How to control requests for changes to the project scope 控制项目范围变更的请求

scope definition 定义范围

Project scope statements should include at least a product scope description, product user acceptance criteria, and detailed information on all projectdeliverables.

项目范围说明书至少应该包括产品范围描述，用户可接受的产品指标，所有可支付成果的详细信息。



Creating the Work Breakdown Structure (WBS) 工作分解结构

A **WBS** is a deliverable-oriented grouping of the work involved in a project that defines the total scope of the project

工作分解结构是对项目所涉及工作面向交付成果的分组，定义了项目的全部范围。

Decomposition is subdividing project deliverables into smaller pieces

分解：把项目可交付成果划分为更小的部分

A work package is a task at the lowest level of the WBS

工作包是WBS最底层的一项任务

The scope baseline includes the approved project scope statement and its associated WBS and WBSdictionary

基线范围包括批准的项目范围说明书和与之相关的WBS以及WBS字典

Approaches to Developing WBSs

Using guidelines 使用指南: Some organizations, like the DOD, provide guidelines for preparing WBSs

The analogy approach 类比法: Review WBSs of similar projects and tailor to your project

The top-down approach 自上而下法: Start with the largest items of the project and break them down

The bottom-up approach 自下而上法: Start with the specific tasks and roll them up

Mind-mapping approach 思维导图法: Mind mapping is a technique that uses branches radiating out from a core idea to structure thoughts and ideas

WBS dictionary WBS字典

A WBS dictionary is a document that describes detailed information about each WBS item

WBS字典是一个描述WBS每项条目详细信息的文件。

Advice for Creating a WBS and WBS Dictionary 建议

A unit of work should appear at only one place in the WBS.

每个单元的工作应该在WBS中只能出现一次

The work content of a WBS item is the sum of the WBS items below it

每一个WBS条目中的工作内容是该条目一下所有条目之和

A WBS item is the responsibility of only one individual, even though many people may be working on it

每一个WBS只对应一个负责人

Project team members should be involved in developing the WBS to ensu

re consistency and buy-in

项目成员应该全身心投入WBS的创建中去从而确保连贯性和大宗买进

Each WBS item must be documented in a WBS dictionary to ensure accurate understanding of the scope of work included and not included in thatitem

每一个WBS条目都必须记录在WBS字典中，确保精确理解条款包括或不包括的工作范围

scope control 控制范围

Scope control involves controlling changes to the project scope

范围控制设计对项目范围的变更管理，同时考虑到项目目标和业务策略

Goals of scope control are to 目标

- influence the factors that cause scope changes

  影响那些导致范围变更的因素

- assure changes are processed according to procedures developed as part of integrated change control

  确保变更是按照综合变更控制中开发的过程来处理的

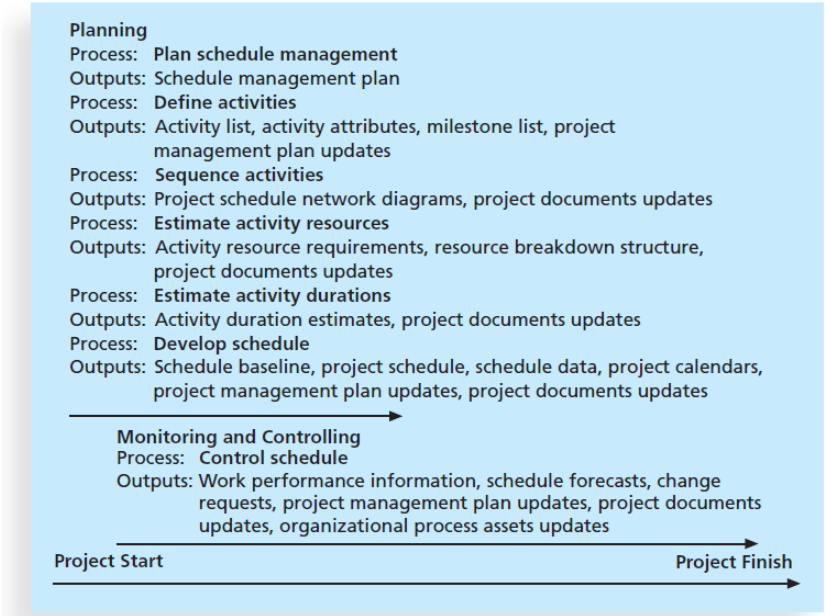
- manage changes when they occur

  当变更出现时对其进行管理

Variance is the difference between planned and actual performance 偏差

6. Project Time Management

Project time management processes



计划：

计划进度管理：确定将用于计划、执行和控制项目进度的政策、流程和文档。输出：进度管理计划。

定义活动：识别项目团队成员和干系人必须执行并产生项目的可交付成果的特定互动。输出：活动清单，活动属性，里程碑清单，更新的项目管理计划。

排序活动：识别和记录项目活动之间的关系。输出：项目的进度网络图，更新的项目管理计划。

估算活动资源：估算一个项目团队应该使用多少资源——人力、设备和原料——来执行活动。输出：活动资源需求，资源分解结构，更新的项目文档。

估算活动工期：估算完成单项活动所需的工作时间。输出：活动工期估算，更新的项目文档。

制定进度计划：分析活动序列、活动资源估算和互动工期估算来创建项目进度。输出：进度基线，项目进度，进度数据，项目日历，更新的项目计划，更新的项目文件。

监视和控制：

控制进度：控制和管理项目进度的变更。输出：工作绩效信息，进度预测，请求变更，项目管理计划的更新，项目文档的更新，组织过程资产的更新。

Activity definition 定义活动

An activity or task is an element of work normally found on the work breakdown structure (WBS) that has an expected duration, a cost, and resource requirements

活动或任务是工作的组成要素，通常出现在WBS中，有预期的工期、成本和资源要求。

An activity list is a tabulation of activities to be included on a project schedule that includes 活动列表包含在项目进度中

- the activity name 活动名称
- an activity identifier or number 活动表示或者编号
- a brief description of the activity 简短描述

Activity attributes provide more information such as predecessors, successors, logical relationships, leads and lags, resource requirements, constraints, imposed dates, and assumptions related to the activity

活动属性提供了与进度相关的更多信息，如前导活动，后继活动，逻辑关系，提前和滞后，资源需求，约束，强制日期，与活动相关的假设。

A **milestone** is a significant event that normally has no duration

里程碑是项目中一个通常没有工期的重要事件

It often takes several activities and a lot of work to complete a milestone

需要一些活动和大量的工作来完成一个里程碑

activity sequencing 排序活动

Involves reviewing activities and determining dependencies

A dependency or relationship is the sequencing of project activities or tasks

依赖或关系与项目活动或任务的排序有关

You must determine dependencies in order to use critical path analysis

Three types of Dependencies 创建依赖关系的三个基本原因

Mandatory dependencies 强制依赖: inherent in the nature of the work being performed on a project, sometimes referred to as hard logic

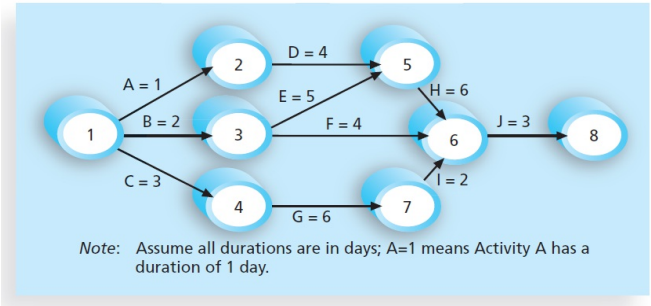
Discretionary dependencies 自由依赖: defined by the project team., sometimes referred to as soft logic and should be used with care since they may limit later scheduling options

External dependencies 外部依赖: involve relationships between project and non-project activities

Network Diagrams 网络图

A network diagram is a schematic display of the logical relationships among, or sequencing of, project activities

网络图是项目活动之间的逻辑关系或者顺序的示意性表示



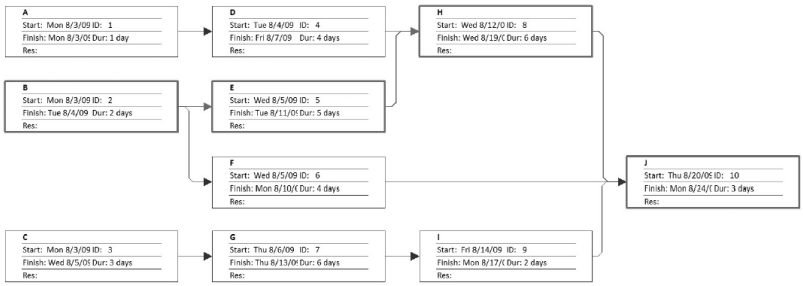
Arrow Diagramming Method (ADM) 箭线图法

Also called activity-on-arrow (AOA) network diagrams 双代号网络图

Activities are represented by arrows 箭头表示关系

Nodes or circles are the starting and ending points of activities 节点代表一个活动的开始和结束

Can only show finish-to-start dependencies 只能表示FS依赖



Precedence Diagramming Method(PDM) 前导图法

Activities are represented by boxes 活动在方框内

Arrows show relationships between activities 箭头表示关系

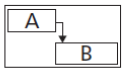
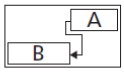
More popular than ADM method and used by project management software 比ADM更常用，使用项目管理软件

Better at showing different types of dependencies 表示不同的依赖关系

Task Dependency Types (FS,SF,FF,SS)

Task dependencies

The nature of the relationship between two linked tasks. You link tasks by defining a dependency between their finish and start dates. For example, the "Contact caterers" task must finish before the start of the "Determine menus" task. There are four kinds of task dependencies in Microsoft Project.

Task dependency	Example	Description
Finish-to-start (FS)		Task (B) cannot start until task (A) finishes.
Start-to-start (SS)		Task (B) cannot start until task (A) starts.
Finish-to-finish (FF)		Task (B) cannot finish until task (A) finishes.
Start-to-finish (SF)		Task (B) cannot finish until task (A) starts.

Estimating Activity Resources 估算活动资源

Before estimating activity durations, you must have a good idea of the quantity and type of resources that will be assigned to each activity; resource are people, equipment, and materials

在估算每个活动的工期之前，必须清楚分配给每个活动的资源（人、设备和材料）的数量和种类。

Activity Duration Estimating 估算活动工期

Duration includes the actual amount of time worked on an activity plus elapsed time

工期包括活动上花费的实际时间和占用时间

Effort is the number of workdays or work hours required to complete a task

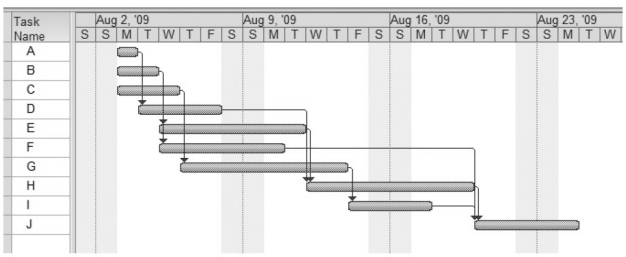
人工量是完成任务所需的工作天数或者工作小时数

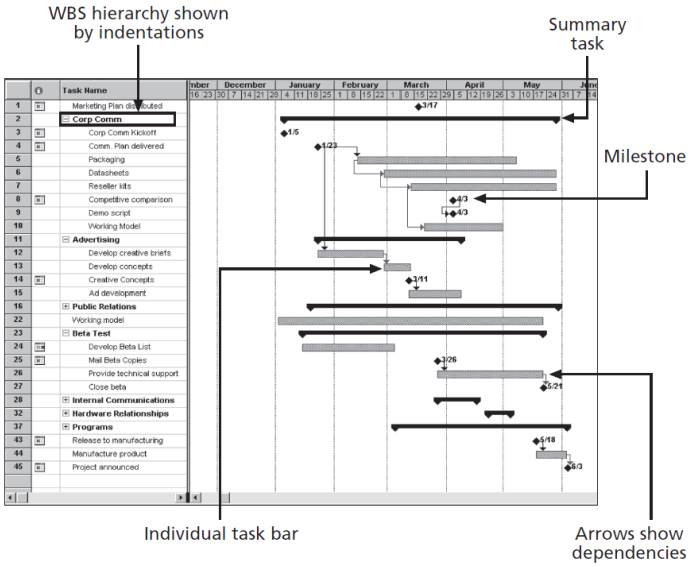
Effort does not normally equal duration

Developing the Schedule 制定进度

Uses results of the other time management processes to determine the start and end date of the project

Important tools and techniques include Gantt charts, critical path analysis, and critical chain scheduling, and PERT analysis





Gantt Charts 甘特图

Gantt charts provide a standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format

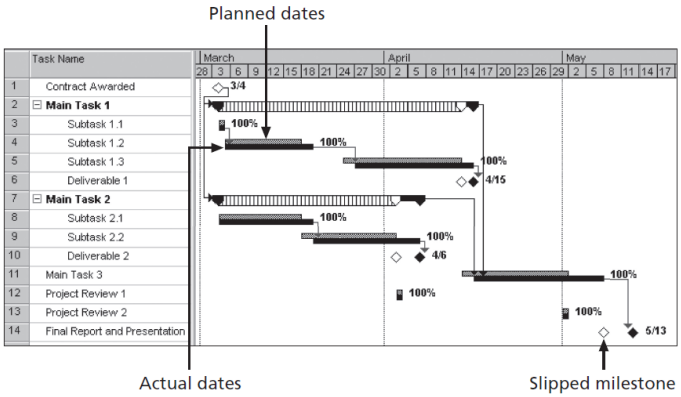
Symbols include:

- A black diamond: a milestones 黑色菱形：里程碑
- Thick black bars: summary tasks 头尾都有箭头的粗黑条：概要任务
- Lighter horizontal bars: durations of tasks 浅灰色横条：每个单独任务的工期
- Arrows: dependencies between tasks 箭头：关系或依赖

SMART Criteria SMART准则

Milestones should be

- Specific 明确的
- Measurable 可度量的
- Assignable 可分配的
- Realistic 现实的
- Time-framed 有时间限制的



Tracking Gantt Chart 追踪甘特图

Tracking Gantt chart—a Gantt chart that compares planned and actual project schedule information.

追踪甘特图是一个比较计划和实际项目进度的信息甘特图

The planned schedule dates for activities are called the **baseline dates**, and the entire approved planned schedule is called the **schedule baseline.**

活动的计划进度日期被称为基线日期，整个经过审批的计划进度被称为进度基线

Critical Path Method (CPM) 关键路径法

A critical path for a project is the series of activities that determines the earliest time by which the project can be completed

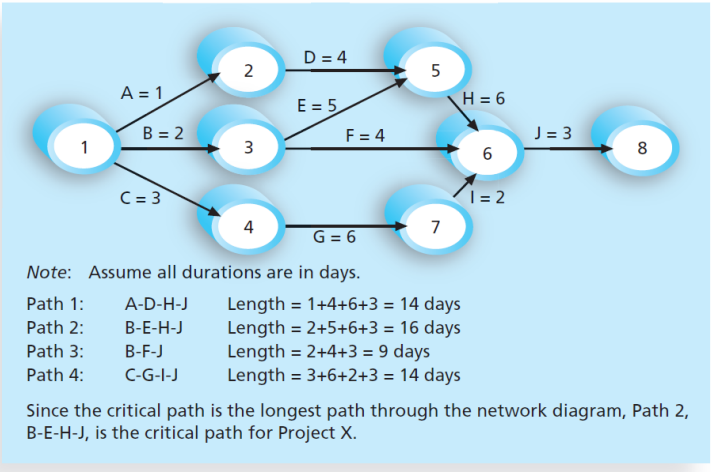
关键路径决定了项目最早完成时间的活动序列

The critical path is the longest path through the network diagram and has the least amount of slack or float

是网络图的最长路径，其时差或者浮动最少

Slack or float is the amount of time an activity may be delayed without delaying a succeeding activity or the project finish date

时差或者浮动是指在不延误后继活动或者项目完成时间的情况下，任务可以推后的时间



Note: Assume all durations are in days.

Path 1:	A-D-H-J	Length = 1+4+6+3 = 14 days
Path 2:	B-E-H-J	Length = 2+5+6+3 = 16 days
Path 3:	B-F-J	Length = 2+4+3 = 9 days
Path 4:	C-G-I-J	Length = 3+6+2+3 = 14 days

Since the critical path is the longest path through the network diagram, Path 2, B-E-H-J, is the critical path for Project X.

Calculating the Critical Path 计算关键路径

First develop a good network diagram

Add the duration estimates for all activities on each path through the network diagram

The longest path is the critical path

If one or more of the activities on the critical path takes longer than planned, the whole project schedule will slip unless the project manager
takes corrective action

Using Critical Path Analysis to Make Schedule Trade-offs 使用关键路径分析来保持进度均衡

ES 最早开始时间是基于项目网络逻辑可以开始的最早的可能时间

EF 最早完成时间是基于项目网络逻辑可以开始的最晚的可能时间

LS 最晚开始时间是一个活动在不延迟项目完成时间的最晚可能开始的时间

LF 最晚完成时间是一个活动在不延迟项目完成时间的最晚可能完成的时间

Free slack or free float is the amount of time an activity can be delayed without delaying the early start of any immediately following activities

自由时差或自由浮动时间是一个活动在不延误紧接活动的最早开始时间的情况下可以被延误的时间

Total slack or total float is the amount of time an activity may be delayed from its early start without delaying the planned project finish date

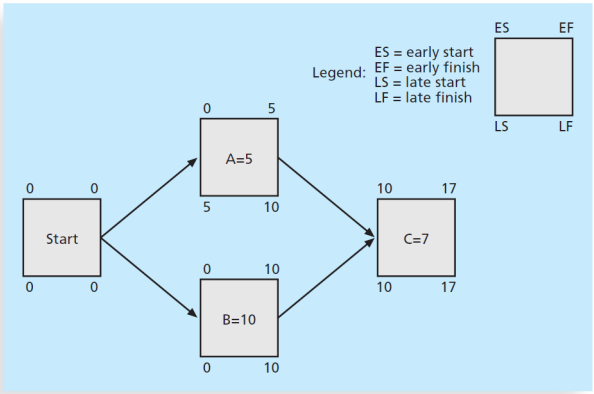
总时差或总浮动时间是一个活动从它最早开始的时间起，在没有拖延计划项目完成日期的情况下被耽搁的时间

A forward pass through the network diagram determines the early start and finish dates

正推法决定每个活动的最早开始和最早完成时间

A backward pass determines the late start and finish dates

逆推法决定最晚开始时间和最晚完成时间



Using the Critical Path to Shorten a Project Schedule 使用关键路径缩短项目进度

Three main techniques for shortening schedules

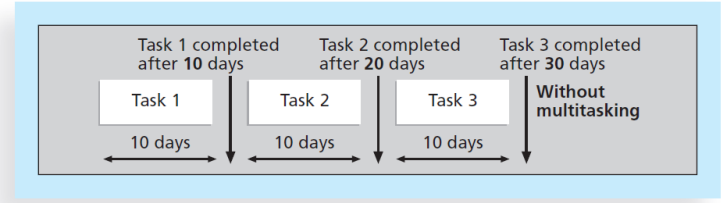
- Shortening durations of critical activities/tasks by adding more resources or changing their scope
  增加资源或减小活动范围
- **Crashing** activities by obtaining the greatest amount of schedule compression for the least incremental cost
  赶工：以最少的成本最大限度的压缩工期
- **Fast tracking** activities by doing them in parallel or overlapping them
  快速跟进：并行执行那些通常以顺序方式执行的活动

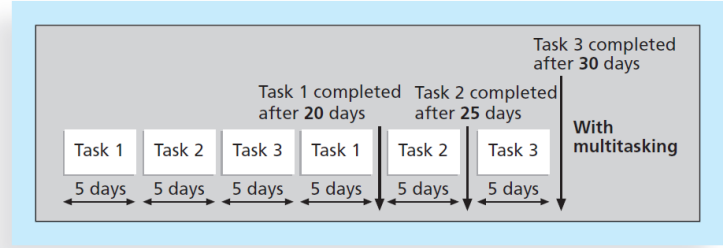
Critical Chain Scheduling 关键链调度

a method of scheduling that considers limited resources when creating a project schedule and includes buffers to protect the project completion date

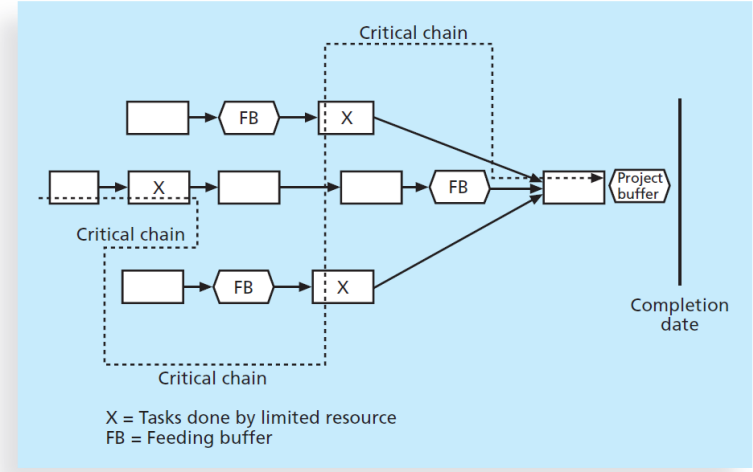
关键链调度是一种进度计划方法，在创建项目进度时考虑有限的资源，并且将缓冲包括进来以保护项目完成期限

Uses the Theory of Constraints (TOC) 约束理论
◦ a management philosophy developed by Eliyahu M. Goldratt and introduced in his book The Goal.





Attempts to minimize multitasking 多任务
◦ when a resource works on more than one task at a time 一个资源在同一时间用于多个任务造成任务延误



Buffers and Critical Chain 缓冲
A buffer is additional time to complete a task 缓冲是完成任务的附加时间
Murphy’ s Law states that if something can go wrong, it will 墨菲定律
Parkinson’ s Law states that work expands to fill the time allowed 帕金森定律：工作会占满所有可用的时间
Critical chain scheduling removes buffers from individual tasks and instead creates
关键链调度去掉单个任务的缓冲
◦ a project buffer or additional time added before the project’ s due date
项目缓冲：在项目的完工日期之前增加的附加时间
◦ feeding buffers or additional time added before tasks on the critical path
汇入缓冲：在前导是非关键路径任务的关键链任务之前增加的附加时间

Program Evaluation and Review Technique (PERT) 计划评审技术
PERT is a network analysis technique used to estimate project duration when there is a high degree of uncertainty about the individual activity
duration estimates
在单个活动工期估计高度不确定的情况下，用来评估项目工期的技术
PERT uses probabilistic time estimates 概率时间估算
◦ duration estimates based on using optimistic, most likely, and pessimistic estimates of activity durations, or a threepoint estimate
基于乐观的活动工期估算、最可能的活动工期估算和悲观的活动工期估算

$$\text{PERT weighted average} = \frac{\text{optimistic time} + 4 * \text{most likely time} + \text{pessimistic time}}{6}$$

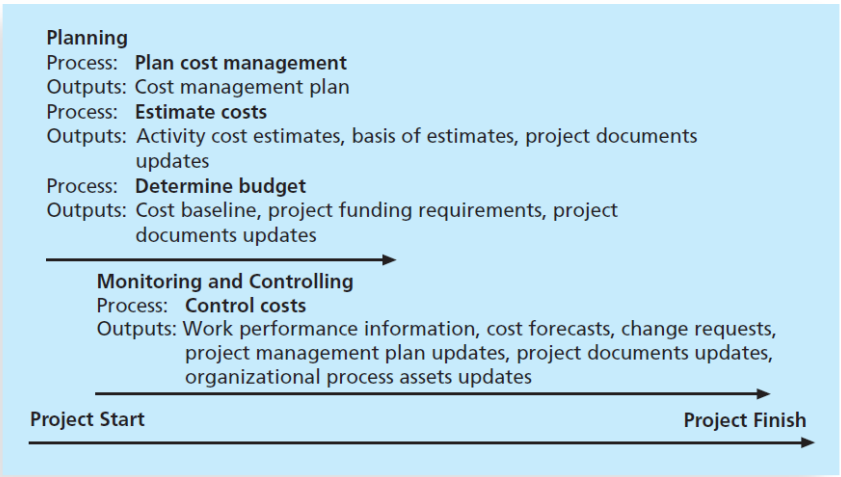
7. Project Cost Management

Cost is a resource sacrificed or foregone to achieve a specific objective or something given up in exchange
Costs are usually measured in monetary units like dollars
Project cost management includes the processes required to ensure that the project is completed within an approved

budget

项目成本管理包括用来确保在批准的预算范围内完成项目的必要过程

project cost management processes



计划：

计划成本管理：确定用于计划、执行、控制项目成本的政策、程序和文档。输出：活动成本管理计划。

成本估算：完成项目所需资源的近似或估算成本。输出：活动的成本估算、估算的基础和更新的项目文档。

确定预算：将整体成本估算配置到各单项工作，已建立一个衡量绩效的基线。输出：成本基线，项目资金需求和更新的项目文档。

监测和控制：

成本控制：控制项目的变更。输出：工作绩效信息，成本预测，请求变更，更新的项目管理计划，更新的项目文档，更新的组织过程资产。

（第四章内容）

Internal rate of return (IRR) 内部收益率

The discount rate that results in an NPV of zero for a project.

Payback period 资金回收期

The amount of time needed to recoup the total dollars invested in a project, in terms of net cash inflows.

以净现金流的形式补偿项目总的投资所需要的时间

Estimating Costs 成本估算

Project managers must take cost estimates seriously if they want to complete projects within budget constraints

如果项目经理想在预算限制内完成项目，必须进行严格的成本估算

Type of Estimate	When Done	Why Done	How Accurate
Rough order of magnitude (ROM)	Very early in the project life cycle, often 3–5 years before project completion	Provides estimate of cost for selection decisions	−50% to +100%
Budgetary	Early, 1–2 years out	Puts dollars in the budget plans	−10% to +25%
Definitive	Later in the project, less than 1 year out	Provides details for purchases, estimates actual costs	−5% to +10%

粗粒度估算：提供了项目技术成本的一个粗略估算。

预算估算：用于将资金分配到组织的预算中。

确定性估算：提供一个精确的项目成本估算。

Basic tools and techniques for cost estimates: 估算方法

◦ Analogous or top-down estimates: use the actual cost of a previous, similar project as the basis for estimating the cost of the current project

类比估算（自上而下估算）：使用以前想死项目的实际成本作为当前项目成本估算的根据

◦ Bottom-up estimates: involve estimating individual work items or activities and summing them to get a project total

自下而上估算：估算单个工作项目或活动的成本

◦ Parametric modeling uses project characteristics (parameters) in a mathematical model to estimate project costs ,COCOMO

参数估算：在一个数学模型中应用项目特征（参数）以估算成本

三点估算：估算最有可能的、乐观的和悲观的项目成本。

Typical Problems with IT Cost Estimates

Estimates are done too quickly 太快

People lack estimating experience 缺乏经验

Human beings are biased toward underestimation 低估困难

Management desires accuracy 准确性

Determining the Budget 成本预算

Cost budgeting involves allocating the project cost estimate to individual work items over time

成本预算设计将项目成本估算随时间分配给个体材料资源或单个工作项

Important goal is to produce a **cost baseline 成本基线**

◦ a time-phased budget that project managers use to measure and monitor cost performance

成本基线是分时段的预算，项目经理用它来衡量和监控成本性能

Types of Costs and Benefits

Tangible costs or benefits are those costs or benefits that an organization can easily measure in dollars

有形成本或有型收益：能够容易的用货币来衡量的成本或收益

Intangible costs or benefits are costs or benefits that are difficult to measure in monetary terms

无形成本或无形收益：很难用货币来衡量的成本或收益

Direct costs are costs that can be directly related to producing the products and services of the project

直接成本：与项目的产品和服务的生产直接相关的成本

Indirect costs are costs that are not directly related to the products or services of the project, but are indirectly related to performing the project

简介成本：与项目的产品和服务的生产不直接相关的成本

Sunk cost is money that has been spent in the past; when deciding what projects to invest in or continue, you should not include sunk costs

沉没成本：过去已经花掉的钱

Reserves are dollars included in a cost estimate to mitigate cost risk

储备金包含于成本估算中，为减轻未来难以预测清醒带来的成本风险而准备

◦ **Contingency reserves** allow for future situations that may be partially planned for (sometimes called known unknowns) and are included in the project cost baseline

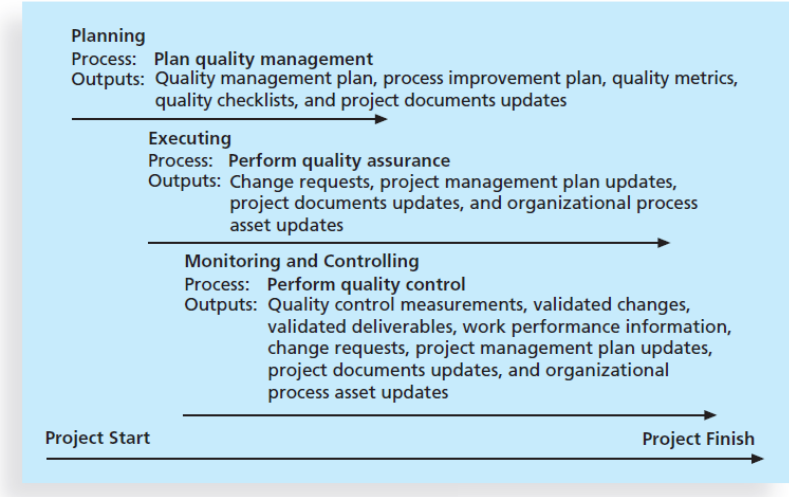
应急准备金：为一部分可以预计的未来情况（已知的不确定事件）做准备，包含于项目成本基线中

◦ **Management reserves** allow for future situations that are unpredictable (sometimes called unknown unknowns

管理准备金：为不能预测未来情况（位置的不确定事件）做准备

8. Project Quality Management

project quality management processes



计划：

计划质量管理：确认与项目有关的质量需求和标准以及如何满足它们。输出：质量管理计划，过程改进计划，质量度量，质量检查表和项目文档更新

执行：

实施质量保证：对整体项目绩效进行定期的评估以确保项目能够满足相关的质量标准。输出：变更请求，项目管理计划，项目文档更新，组织过程资产更新

监控：

控制质量：监控特定的项目结果，确保他们遵循了相关质量标准，并确定提高整体质量的方法。

Performing Quality Assurance 实施质量保障

Quality assurance includes all the activities related to satisfying the relevant quality standards for a project
质量保证包括满足一个项目相应质量标准的所有相关活动

Another goal of quality assurance is continuous quality improvement 另一个目标：不断改进质量

Benchmarking 基准比较法

A quality audit 质量审计

Controlling Quality 质量控制

Cause-and-Effect Diagrams 因果图

Cause-and-effect diagrams trace complaints about quality problems back to the responsible production operations
将关于质量问题的抱怨追溯至负有责任的生产运营环节

They help you find the root cause of a problem 发现产生质量问题的根本原因

Also known as **fishbone** or **Ishikawa diagrams 鱼骨图 石川图**

Quality Control Charts 控制图

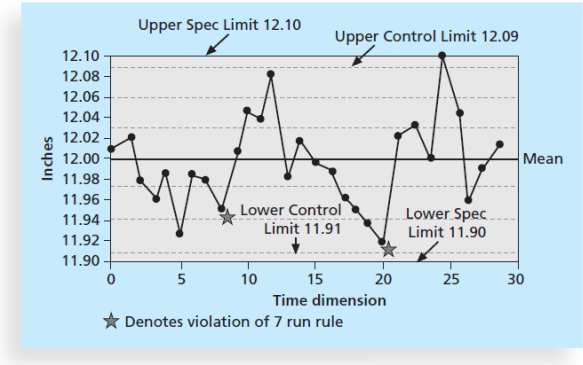
A control chart is a graphic display of data that illustrates the results of a process over time
用数据的图形表示，表明一个过程随时间变化的结果

The main use of control charts is to prevent defects, rather than to detect or reject them

Quality control charts allow you to determine whether a process is in control or out of control

◦ When a process is in control, any variations in the results of the process are created by random events; processes that are in control do not need to be adjusted

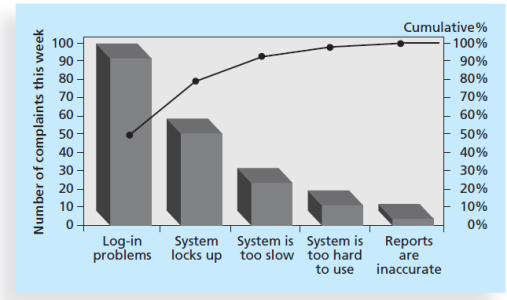
◦ When a process is out of control, variations in the results of the process are caused by non-random events; you need to identify the causes of those non-random events and adjust the process to correct or eliminate them



The Seven Run Rule 七点运行法则

The seven run rule states that if seven data points in a row are all below the mean, above the mean, or are all increasing or decreasing, then the
process needs to be examined for non-random problems

如果质量控制图上连续7个数据点都在平均值以下、都在平均值以上，或者所有点都呈现出上升或下降的趋势，那么需要检查者个过程是否有非随机问题



Pareto Charts 帕累托图

A Pareto chart is a histogram that can help you identify and prioritize problem areas
帕累托图是一个柱状图，可以帮助你识别问题领域并进行排序

Pareto analysis is also called the 80-20 rule, meaning that 80 percent of problems are often due to 20 percent of the causes

帕累托分析，80-20法则，80%的问题经常是由于20%的原因引起的

Six Sigma 六西格玛

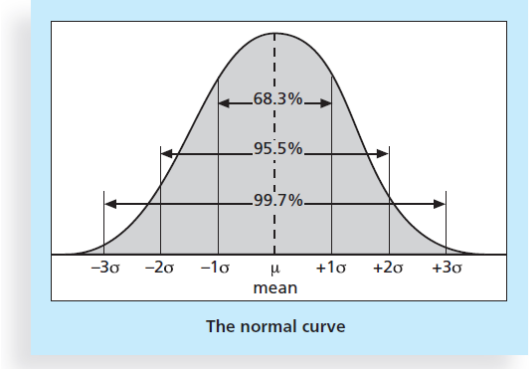
Six Sigma is "a comprehensive and flexible system for achieving, sustaining, and maximizing business success. Six Sigma is uniquely driven by close understanding of customer needs, disciplined use of facts, data, and statistical analysis, and diligent attention to managing, improving, and reinventing business processes" *

六西格玛：一种灵活的综合系统方法，通过它实现、维持、最大化商业的成功。他密切理解客户需求、事实、数据和统计分析的规范使用，以及对管理、改进、业务流程再造的密切关注等因素唯一驱动的。

Basic Information on Six Sigma
The target for perfection is the achievement of no more than 3.4 defects per million opportunities
Six Sigma projects normally follow a five-phase improvement process called DMAIC

DMAIC
DMAIC is a systematic, closed-loop process for continued improvement that is scientific and fact based
DMAIC stands for:
- Define 界定: Define the problem/opportunity, process, and customer requirements
- Measure 度量: Define measures, then collect, compile, and display data
- Analyze 分析: Scrutinize process details to find improvement opportunities
- Improve 改进: Generate solutions and ideas for improving the problem
- Control 控制: Track and verify the stability of the improvements and the predictability of the solution

Six Sigma and Statistics
The term sigma means standard deviation
Standard deviation measures how much variation exists in a distribution of data
Six Sigma projects strive for no more than 3.4 defects per million opportunities



The normal curve

Six 9s of Quality
Six 9s of quality is a measure of quality control equal to 1 fault in 1 million opportunities

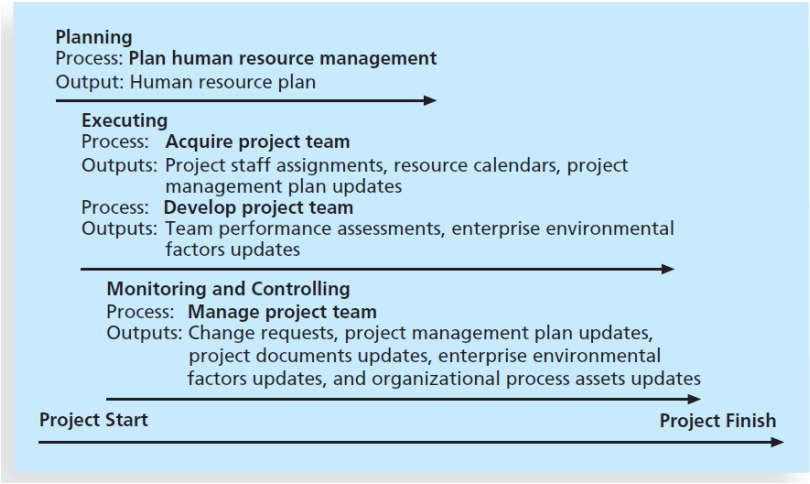
The Cost of Quality 质量成本
The cost of quality is the cost of conformance plus the cost of nonconformance 一致成本加不一致成本
- **Conformance** means delivering products that meet requirements and fitness for use

一致指交付满足要求的和适用的产品
- **Cost of nonconformance** means taking responsibility for failures or not meeting quality expectations

不一致成本指对故障或没有满足质量期望负债

9. Project Human resource Management

Project human resource management
Making the most effective use of the people involved with a project
人力资源管理：最有效的发挥每个参与项目人员的作用的过程
Project human resource management processes



计划：

计划人力资源管理：对项目角色、责任以及报告关系进行识别和归档。输出：人力资源计划。

执行：

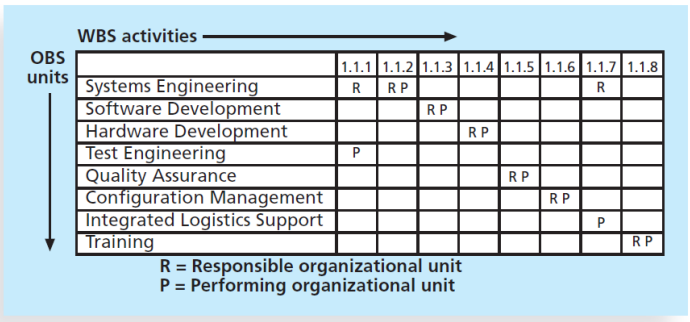
组建项目团队：指派所需的人员到项目工作中。输出：项目人员的分配，资源日历，项目管理计划

建设项目团队：为提高项目绩效而对个人技能和项目团队技能的建设。输出：团队绩效评估，企业环境因素更新。

监测和控制：

管理项目团队：项目成员绩效追踪、人员激励、提供实时反馈、解决问题和冲突、协调变更来提高项目绩效，输出：请求变更，项目管理计划更新，项目文档更新，企业环境因素更新，组织过程资产更新。

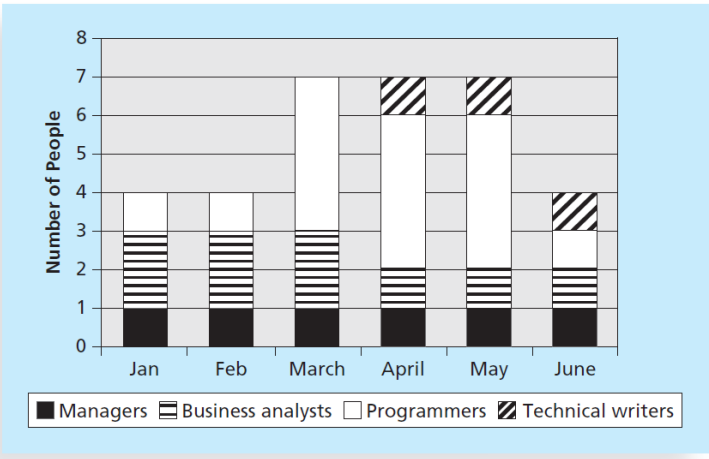
RAM



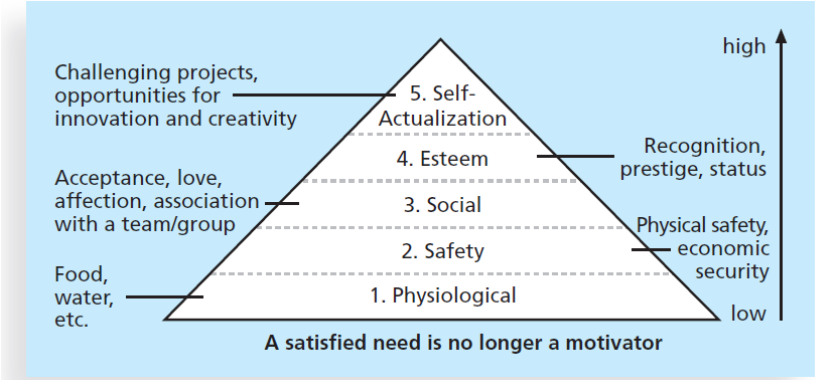
RACI responsibility acountability consultation informed

	Car Owner	Shop Owner	Mechanic	Parts Supplier
Pay for parts and services	A, R	C		
Determine parts and services needed	C		A, R	C
Supply parts		C	C	A, R
Install parts	I	A	R	

resource histogram



Maslow’ s Hierarchy of Needs 马斯洛的需求层次理论



生理 安全 社交 尊重 自我实现

Acquiring the Project Team 组建项目团队

Acquiring qualified people for teams is crucial

The project manager who is the smartest person on the team has done a poor job of recruiting!

Resource Assignment 资源分配

Staffing plans and good hiring procedures are important, as are incentives for recruiting and retention

Resource Loading 资源负荷

Resource loading refers to the amount of individual resources an existing schedule requires during specific time periods

资源负荷是指在特定时间段内，既定进度计划所需的个体资源的数量

Overallocation means more resources than are available are assigned to perform work at a given time

过度分配是指在给定时间内分配给某项工作的资源超过了它可用的资源

Resource Leveling 资源平衡

Resource leveling is a technique for resolving resource conflicts by delaying tasks

资源平衡是通过任务延迟来解决资源冲突的技术

Benefits of Resource Leveling 资源平衡的优点

When resources are used on a more constant basis, they require less management

当资源使用情况比较稳定时，需要的管理较少

It results in fewer problems for project personnel and accounting department

减少财务部与项目人员的问题

It often improves morale

提高士气

Developing the Project Team 建设项目团队

The main goal of team development is to help people work together more effectively to improve project performance

团队建设的主要目标是帮助人们更有效地一起工作来提高项目绩效

Tuckman Model 塔克曼模型

Forming 形成阶段

Storming 震荡阶段

Norming 规范阶段

Performing 执行阶段

Adjourning 终止阶段

Training 培训

Training can help people understand themselves, each other, and how to work better in teams

Team building activities include

◦ physical challenges 体能挑战

◦ psychological preference indicator tools 心里偏好暗示

三种智力方面团队建设训练：

Meyers-Briggs Type Indicator (MBTI)

MBTI is a popular tool for determining personality preferences and helping teammates understand each other 判断个性

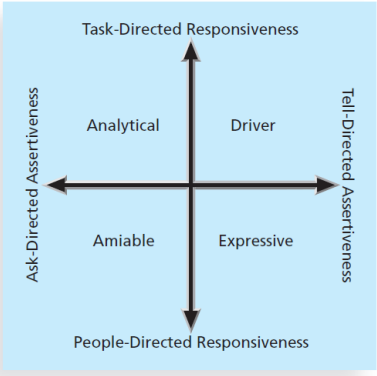
Four dimensions include:

◦ Extrovert/Introvert (E/I) 外向/内向

◦ Sensation/Intuition (S/N) 知觉/直觉

◦ Thinking/Feeling (T/F) 理性/感性

◦ Judgment/Perception (J/P) 判断/感知

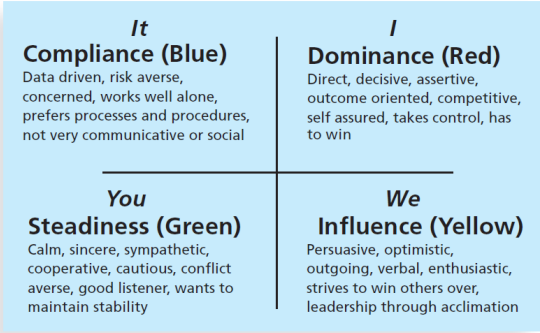


Social Styles Profile 社交类型模型

People are perceived as behaving primarily in one of four zones, based on their assertiveness and responsiveness:

- Drivers 驱动型
- Expressives 表现型
- Analyticals 分析型
- Amiables 友好型

People on opposite corners (drivers and amiables, analyticals and expressives) may have difficulties getting along



DISC Profiles

Also uses a four-dimensional model of normal behavior

- Dominance 支配
- Influence 影响
- Steadiness 稳健
- Compliance 服从

People in opposite quadrants can have problems understanding each other

Managing the Project Team

Project managers must lead their teams in performing various project activities

After assessing team performance and related information, the project manager must decide

- if changes should be requested to the project
- if corrective or preventive actions should be recommended
- if updates are needed to the project management plan or organizational process assets.

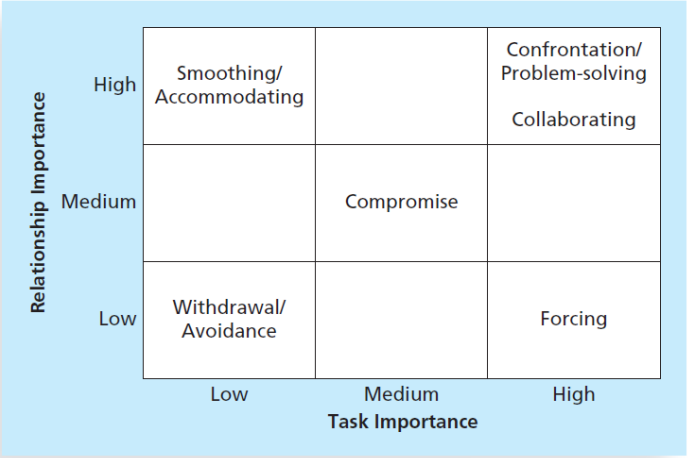
Tools and Techniques 技巧

Observation and conversation 观察与交谈

Project performance appraisals 项目绩效评价

Interpersonal skills 人际技能

Conflict management 冲突管理

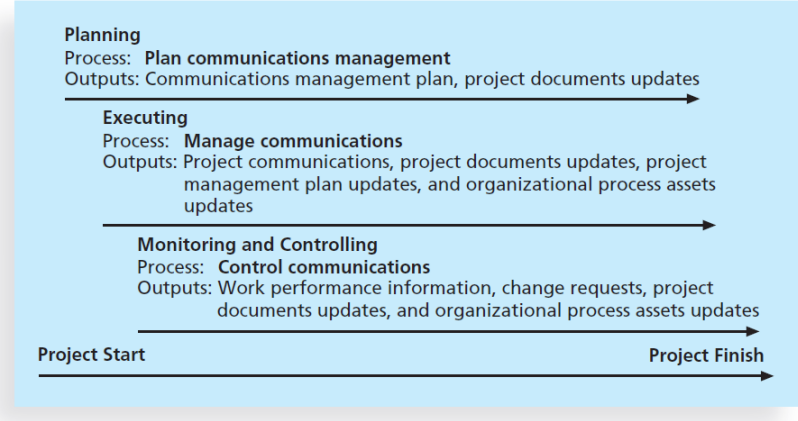


Conflict Handling Modes 冲突解决模式

1. Confrontation: Directly face a conflict using a problemsolving approach
   对抗（问题解决模式）：项目管理人员直面冲突；当任务和关系的重要性很高时，最有效。
2. Compromise: Use a give-and-take approach
   妥协（包容）：公平交换；任务和关系的重要性一般。
3. Smoothing: De-emphasize areas of difference and emphasize areas of agreement
   平滑：不强调或避免地区的差异，强调达成一致；关系的重要性较高，任务的重要性较低。
4. Forcing: The win-lose approach
   强制：项目经理以另一种观点的潜在牺牲为代价，施加其观点；任务非常重要，关系不重要。
5. Withdrawal: Retreat or withdraw from an actual or potential disagreement
   退出（避免）：项目经理撤退或退出一个实际或潜在的分歧；最不理想，除非任务和关系的重要性都很低。
6. Collaborating: Decision makers incorporate different viewpoints and insights to develop consensus and commitment
   协作：决策者将不同的观点和见解发展成共识和承诺；承诺遵循以满足组织的最佳利益

10. Project Communications Management

Project communications management processes



计划：

计划沟通管理：确定干系人的信息和沟通需求——谁需要什么信息，何时需要，如何发送。输出：沟通管理计划，项目文档更新。

执行：

管理沟通：创建、分发、存储、检索和处置建立在上述沟通管理计划的项目沟通。输出：项目沟通，项目文档更新，项目管理计划更新，组织过程资产更新。

监控：

控制沟通：监控项目沟通，确保干系人进行沟通的需求得到满足。输出：工作绩效信息，更改请求，项目文档更新，组织过程资产更新。

Performance Reporting 绩效报告

Performance reporting keeps stakeholders informed about how resources are being used to achieve project objectives

绩效报告使干系人了解资源是如何用于实现项目目标的

- Status reports describe where the project stands at a specific point in time
  状态报告：描述在一个特定的时间点项目所处的位置
- Progress reports describe what the project team has accomplished during a certain period of time
  进度报告：描述在一定时间内项目团队所完成的工作
- Forecasts predict future project status and progress based on past information and trends
  预测：基于过去的信息和发展趋势预测未来的状态和进展

Communications Channels 沟通渠道

$$\text{number of communication channels} = \frac{n(n-1)}{2}$$

where n is the number of people involved

Effective face-to-face interactions

Encouraging More Face-to-Face Interactions

Short, frequent meetings are often very effective in IT projects

Stand-up meetings force people to focus on what they really need to communicate

Some companies have policies preventing the use of e-mail between certain hours or even entire days of the week

Classifications for Communication Methods

Interactive communication 互动沟通

Push communication 推送沟通

Pull communication 拉式沟通：应要求发送给接受者

Suggestions for Improving Project Communications

Develop better communication skills

Run effective meetings

Use e-mail and other technologies effectively

Use templates for project communications

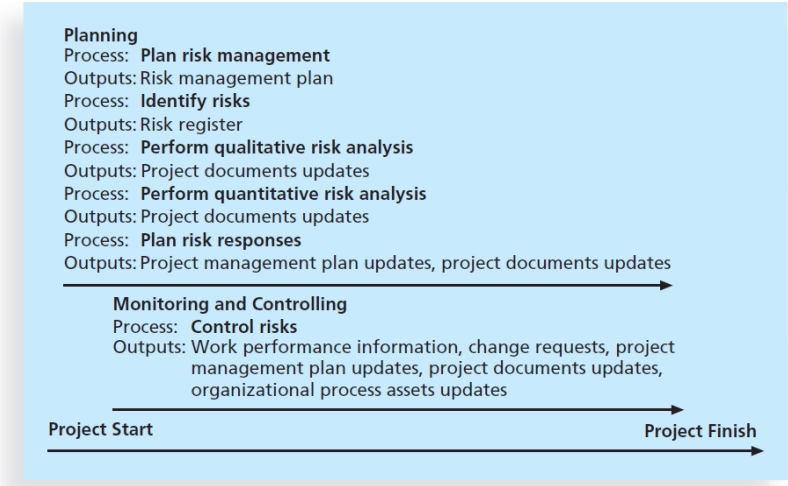
Key: 1 = Excellent, 2 = Adequate, 3 = Inappropriate						
How Well Medium Is Suited to:	Hard Copy	Phone Call	Voice Mail	E-mail	Meeting	Web Site
Assessing commitment	3	2	3	3	1	3
Building consensus	3	2	3	3	1	3
Mediating a conflict	3	2	3	3	1	3
Resolving a misunderstanding	3	1	3	3	2	3
Addressing negative behavior	3	2	3	2	1	3
Expressing support or appreciation	1	2	2	1	2	3
Encouraging creative thinking	2	3	3	1	3	3
Making an ironic statement	3	2	2	3	1	3
Conveying a reference document	1	3	3	3	3	2
Reinforcing one's authority	1	2	3	3	1	1
Providing a permanent record	1	3	3	1	3	3
Maintaining confidentiality	2	1	2	3	1	3
Conveying simple information	3	1	1	1	2	3
Asking an informational question	3	1	1	1	3	3
Making a simple request	3	1	1	1	3	3
Giving complex instructions	3	3	2	2	1	2
Addressing many people	2	3 or 1*	2	2	3	1

11. Project Risk Management

A dictionary definition of risk is "the possibility of loss or injury"

风险：可能对项目目标产生负面或者正面影响的不确定性。

Project risk management processes



计划：

计划风险管理：针对某一项目决定如何编制与计划风险管理活动。输出：风险管理计划。

识别风险：决定哪些风险可能影响项目，并将每种风险的特性形成文档。输出：风险登记表。

实施定性风险分析：根据发生概率和影响对风险进行优先级排序。输出：项目文档更新。

实施定量风险分析：量化分析每一个风险可能对项目标准造成的影响。输出：项目文档更新。

计划风险响应：采取应对步骤来提高几率并降低威胁性以达到项目的各种目标。项目管理计划更新，项目文档更新。

监控：

控制风险：在整个项目生命周期中监测已识别和遗留的风险，识别新的风险，执行风险响应计划，并评估风险响应策略的有效性。输出：工作绩效信息，变更请求，项目管理计划更新，项目文档更新，组织过程资产更新

Negative Risk

Negative risk involves understanding potential problems that might occur in the project and how they might impede project success

消极风险包含了项目中的潜在问题以及他们如何阻止项目成功

Positive risk

Positive risks are risks that result in good things happening; sometimes called opportunities

积极风险产生投资机会

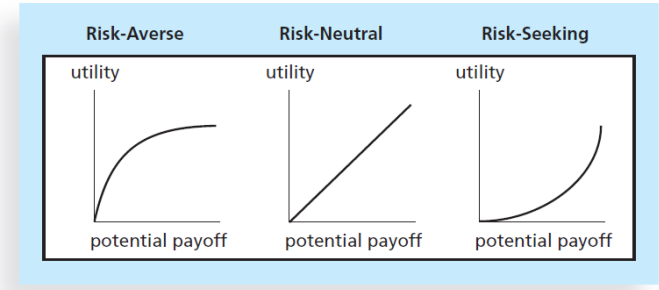
The goal of project risk management is to minimize potential negative risks while maximizing potential positive risks

项目风险管理的目标：消极风险最小化，积极风险最大化

Risk Utility 风险效用

Risk utility or risk tolerance is the amount of satisfaction or pleasure received from a potential payoff

风险效用是指从潜在回报中得到的满意度



◦ Utility rises at a decreasing rate for people who are risk-averse

◦ Those who are risk-seeking have a higher tolerance for risk and their satisfaction increases when more payoff is at stake

◦ The risk-neutral approach achieves a balance between risk and payoff

Risk management plan—a plan that documents the procedures for managing risk throughout a project

风险管理计划：记录了项目全过程中的风险管理的流程

Contingency plans are predefined actions that the project team will take if an identified risk event occurs

应急计划：如果所识别的风险事件发生，项目团队将会采取的预先规定的措施

Fallback plans are developed for risks that have a high impact on meeting project objectives, and are put into effect if

attempts to reduce the risk are not effective
退路计划：对项目目标的完成具有很大影响的风险编制的计划，如果降低风险的措施无效则实施该计划
Contingency reserves or allowances are provisions held by the project sponsor or organization to reduce the risk of cost or schedule overruns to an acceptable level
应急储备金或应急津贴：由项目发起人或组织所提供的储备，用于将项目成本或进度超出预期的风险降低到可接受的程度。
management reserves are funds held for unknown risks
管理储备金：为未知风险准备

Identifying Risks 识别风险
Identifying risks is the process of understanding what potential events might hurt or enhance a particular project
识别风险是理解哪些潜在事件可能损害或增强某个特定项目的过程
Risk identification tools and techniques include:
- Brainstorming 头脑风暴
- The Delphi Technique 德尔菲技术
- Interviewing 访谈
- SWOT analysis SWOT分析

Brainstorming
Brainstorming is a technique by which a group attempts to generate ideas or find a solution for a specific problem by amassing ideas spontaneously and without judgment
团队通过本能的、不加判断的汇集一些想法，产生新的观点，或找出解决某一特定问题的方案
An experienced facilitator should run the brainstorming session 有经验的主持人
Be careful not to overuse or misuse brainstorming. 不能滥用

Delphi Technique
The Delphi Technique is used to derive a consensus among a panel of experts who make predictions about future developments
从一组预测未来发展的专家中得到一致的意见
Provides independent and anonymous input regarding future events 独立的，匿名的
Uses repeated rounds of questioning and written responses and avoids the biasing effects possible in oral methods, such as brainstorming
重复使用几个回合的提问并记录下回答，发挥群组输入的优点，又避免对面商议中可能出现的偏见效应

Interviewing
Interviewing is a fact-finding technique for collecting information in face-to-face, phone, email, or instant-messaging discussions
通过面对面、电话、电子邮件、即时通信讨论，收集信息，寻求事实
Interviewing people with similar project experience is an important tool for identifying potential risks
与有类似项目经理的人进行面谈

SWOT Analysis
SWOT analysis (strengths, weaknesses, opportunities, and threats) can also be used during risk identification
优势 劣势 机会 风险
Helps identify the broad negative and positive risks that apply to a project 消极/积极风险

Risk Register 风险登记表
A risk register is:
A document that contains the results of various risk management processes and that is often displayed in a table or spreadsheet format
一份包含了各种风险管理过程结果的文件，通常用表格或者电子表格形式展现
A tool for documenting potential risk events and related information
一个用于记录潜在风险事件机器相关信息的工具

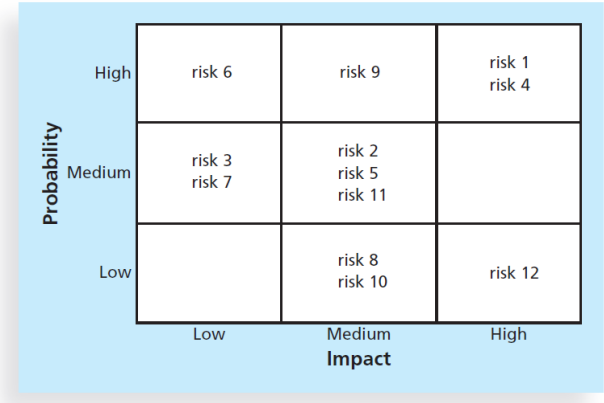
No.	Rank	Risk	Description	Category	Root Cause	Triggers	Potential Responses	Risk Owner	Probability	Impact	Status
R44	1										
R21	2										
R7	3										

Performing Qualitative Risk Analysis 风险定性分析
Assess the likelihood and impact of identified risks to determine their magnitude and priority
评估已知风险的可能性和概率，确定其大小和优先级
Risk quantification tools and techniques include:

- Probability/impact matrixes
- The Top Ten Risk Item Tracking
- Expert judgment

Probability/Impact Matrix 概率/影响矩阵

A probability/impact matrix or chart lists the relative probability of a risk occurring on one side of a matrix or axis on a chart and the relative impact of the risk occurring on the other



Top Ten Risk Item Tracking 十大风险事项追踪

Top Ten Risk Item Tracking is a qualitative risk analysis tool that helps to identify risks and maintain an awareness of risks throughout the life of a project

	MONTHLY RANKING			
Risk Event	Rank This Month	Rank Last Month	Number of Months in Top Ten	Risk Resolution Progress
Inadequate planning	1	2	4	Working on revising the entire project management plan
Poor definition	2	3	3	Holding meetings with project customer and sponsor to clarify scope
Absence of leadership	3	1	2	After previous project manager quit, assigned a new one to lead the project
Poor cost estimates	4	4	3	Revising cost estimates
Poor time estimates	5	5	3	Revising schedule estimates

Watch List 观察表

A watch list is a list of risks that are low priority, but are still identified as potential risks

优先级低，但仍然被认为是有潜在风险的风险列表

Qualitative analysis can also identify risks that should be evaluated on a quantitative basis

定性风险也可能识别哪些应被定量评价基础上的风险

Performing Quantitative Risk Analysis 风险定性分析

Large, complex projects involving leading edge technologies often require extensive quantitative risk analysis

前沿技术的大型复杂项目通常需要较为深入的风险定量分析

Main techniques include:

- Decision tree analysis
- Simulation
- Sensitivity analysis

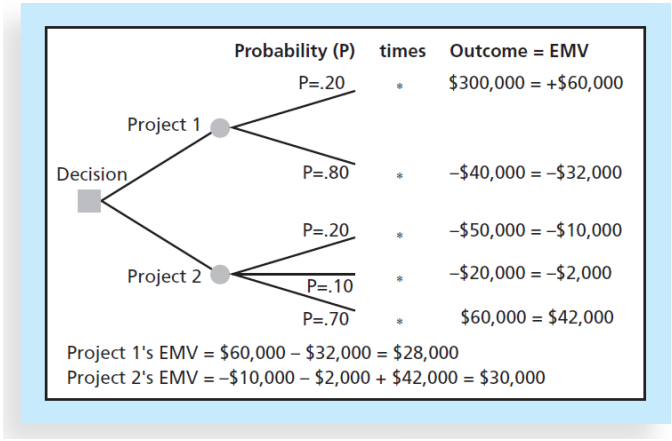
Decision Trees and Expected Monetary Value (EMV) 决策树和预期货币值

A decision tree is a diagramming analysis technique used to help select the best course of action in situations in which future outcomes are uncertain

决策树是一种图形方法，可以帮助在未来结果不确定的情况下选择最好的行动路径

Estimated monetary value (EMV) is the product of a risk event probability and the risk event’ s monetary value

预期货币值是风险事件概率和风险事件货币值的乘积



Simulation 模拟

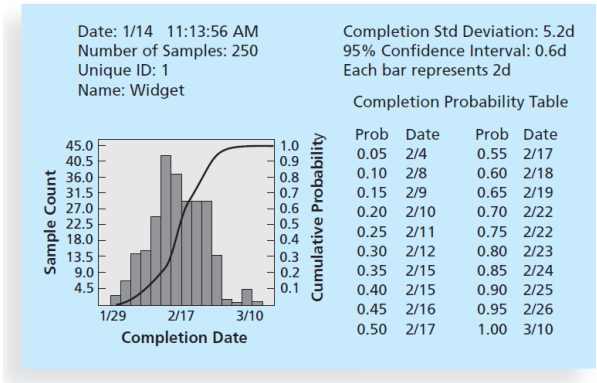
Simulation uses a representation or model of a system to analyze the expected behavior or performance of the system 用系统的模型或表示法来分析系统的预期行为或绩效

Monte Carlo analysis simulates a model’ s outcome many times to provide a statistical distribution of the calculated results

蒙特卡罗分析：通过多次模拟一个模型的结果，来提供计算结果的统计分布

Steps of a Monte Carlo Analysis 步骤：

1. Assess the range for the variables being considered 评估所有考虑变量的范围
2. Determine the probability distribution of each variable 决定每个变量的概率分布
3. For each variable, select a random value based on the probability distribution 为每个变量，根据概率分布选择随机值
4. Run a deterministic analysis or one pass through the model 利用为每个变量选定的数值组合，进行确定性分析
5. Repeat steps 3 and 4 many times to obtain the probability distribution of the model’ s results 多次重复步骤3和4，获得各模型结果的概率分布

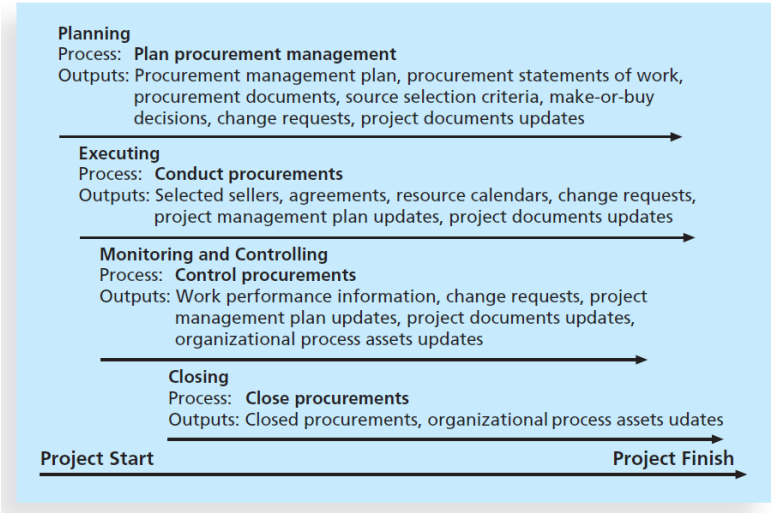


Sensitivity Analysis 灵敏度分析

Sensitivity analysis is a technique used to show the effects of changing one or more variables on an outcome 通过改变一个或多个变量，观察其结果的影响

12. Project Procurement management

Project Procurement management processes



计划：

计划采购管理：决定采购什么，何时采购，如何采购。输出：采购管理计划，采购工作说明书，采购文档，资源选择标准，资质/外包决策，变更请求和项目文档请求

执行：

实施采购：获得卖家的响应，选择卖方并授予合同。输出：卖家，协议，资源日历，变更请求，项目管理计划更新，项目文档更新

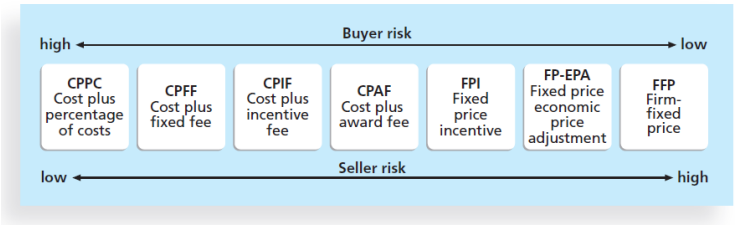
监控：

控制采购：管理与卖家的关系、合同履约监管并进行必要的修改。输出：工作绩效报告，变更请求，项目管理计划更新，项目文档更新，组织过程资产更新

收尾：

采购收尾：每个合同或协议的完成和结算。输出：收尾的采购，组织过程资产更新

Types of contracts: CPIF, CPFF, CPAF, CPPC, FFP, FPIF



成本加激励，成本加固定费，成本加奖励费， 成本加百分比，有奖励的固定价格，经济价格调整的固定价格，严格固定价格

Planning Procurement Management 计划采购管理

Tools and Techniques for **Planning Purchases and Acquisitions**
Expert judgment 专家审判
Market research 市场调研
Make-or-buy analysis 自制/外购分析

Contract Statement of Work (SOW) 工作说明书
A statement of work is a description of the work required for the procurement 采购所需工作的描述
A SOW is a type of scope statement 范围说明书

Request for Proposal (RFP) 采购文档
Request for Proposals: Used to solicit proposals from prospective sellers
从可能的供应商那里征求方案的文件
◦A proposal is a document prepared by a seller when there are different approaches for meeting buyer needs
卖方准备的、可以满足买方需要的不同方案的文档

Requests for Quotes (RFQ) 报价邀请函

Requests for Quotes: Used to solicit quotes or bids from prospective suppliers

用来从预期供应商那里征求报价或者投标的文件

◦A bid, also called a tender or quote (short for quotation), is a document prepared by sellers providing pricing for standard items that have been clearly defined by the buyer

投标，也成为标书或者报价，是卖方准备的文件，针对买方所清晰定义的各项条款所定义的文档

Conducting Procurements 实施采购

5 steps:

Deciding whom to ask to do the work 决定要谁来做

Sending appropriate documentation to potential sellers 把适当的文档发送给潜在卖方

Obtaining proposals or bids 获得建议书或投标书

Selecting a seller 选择一个卖方

Awarding a contract 签订合同

Approaches for Procurement

Organizations can advertise to procure goods and services in several ways:

◦ Approaching the preferred vendor

◦ Approaching several potential vendors

◦ Advertising to anyone interested

A bidders' conference can help clarify the buyer's expectations

		Proposal 1		Proposal 2		Proposal 3, etc.	
Criteria	Weight	Rating	Score	Rating	Score	Rating	Score
Technical approach	30%						
Management approach	30%						
Past performance	20%						
Price	20%						
Total score	100%						

建议书评价表：加权评分模型

Seller Selection

Organizations often do an initial evaluation of all proposals and bids and then develop a short list of potential sellers for further evaluation

Sellers on the short list often prepare a best and final offer (BAFO)

Final output is a contract signed by the buyer and the selected seller

Controlling Procurements 控制采购

Ensures that the seller's performance meets contractual requirements

确保卖家的性能符合合同要求

Contracts are legal relationships, so it is important that legal and contracting professionals be involved in writing and administering contracts

在撰写和管理合同时，借助法律和合同方面的人员

It is critical that project managers and team members watch for constructive change orders（建设性变更单）, which are oral or written acts or omissions by someone with actual or apparent authority that can be construed to have the same effect as a written change order

项目经理和团队成员应当关注建设性变更单，指具有实际或明显权利的人，以口头或非正式的书面形式提出的意见，可以认为与书面变更命令有同样的效力

Closing Procurements 采购收尾

Involves completing and settling contracts and resolving any open items

The project team should:

Determine if all work was completed correctly and satisfactorily

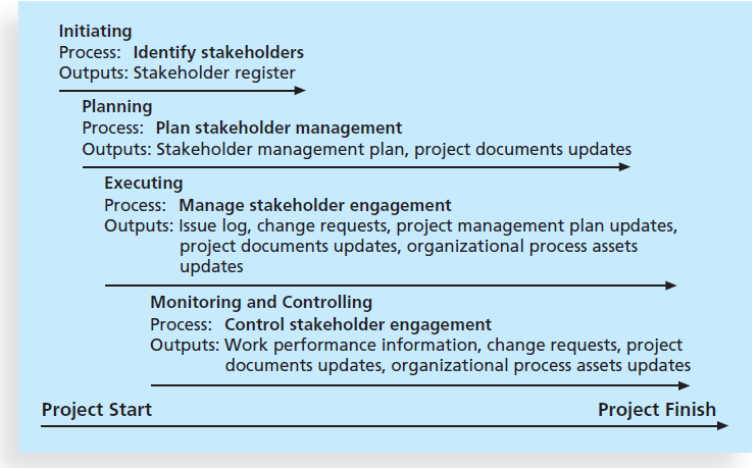
Update records to reflect final results

Archive information for future use

The contract itself should include requirements for formal acceptance and closure

13. Project Stakeholder Management

Project stakeholder management processes



启动：

干系人识别：识别项目中或受项目影响的所有人，用最好的方法管理他们。输出：干系人登记表。

计划：

干系人管理计划：在项目决策和活动中有效吸引干系人的策略，要基于他们的需求、兴趣和潜在的影响。输出：干系人管理计划和项目文档更新。

执行：

参与干系人管理：和项目干系人交流和工作，来满足他们的需求和期望、解决问题并培养参与项目决策和活动。输出：问题日志，变更请　求，项目管理计划更新，项目文档更新，组织过程资产更新。

监控：

参与干系人控制：对干系人进行监察，根据干系人需要调整计划和策略。输出：工作绩效信息，变更申请，项目文档更新，组织过程资产更新。

Identifying stakeholders 识别干系人

Internal project stakeholders generally include the project sponsor, project team, support staff, and internal customers for the project. Other internal stakeholders include top management, other functional managers, and other project managers
because organizations have limited resources

内部干系人：项目发起人，项目团队，支持人员，项目的内在客户；高层管理人员，其他职能经理和项目经理

External project stakeholders include the project' s customers (if they are external to the organization), competitors, suppliers, and other external groups that are potentially involved in the project or affected by it, such as government officials and concerned citizens

外部干系人：项目的客户，竞争对手，供应商，其他外部小组（政府官员和有关公民）

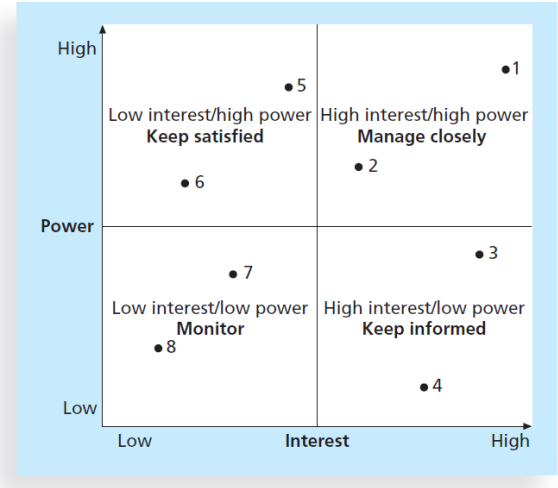
Stakeholder Register 干系人登记表

Name	Position	Internal/ External	Project Role	Contact Information
Stephen	VP of Operations	Internal	Project sponsor	stephen@globaloil.com
Betsy	CFO	Internal	Senior manager, approves funds	betsy@globaloil.com
Chien	CIO	Internal	Senior manager, PM's boss	chien@globaloil.com
Ryan	IT analyst	Internal	Team member	ryan@globaloil.com
Lori	Director, Accounting	Internal	Senior manager	lori@globaloil.com
Sanjay	Director, Refineries	Internal	Senior manager of largest refinery	sanjay@globaloil.com
Debra	Consultant	External	Project manager	debra@gmail.com
Suppliers	Suppliers	External	Supply software	suppliers@gmail.com

Classifying Stakeholders 干系人分类

A power/interest grid can be used to group stakeholders based on their level of authority (power) and their level of concern (interest) for project outcomes

通过小组中干系人的权威（权力）等级和项目成果关注度（兴趣）创建一个权力/兴趣网络



Stakeholder Engagement Levels 干系人水平

Unaware: Unaware of the project and its potential impacts on them

Resistant: Aware of the project yet resistant to change

Neutral: Aware of the project yet neither supportive nor resistant

Supportive: Aware of the project and supportive of change

Leading: Aware of the project

Interpersonal Skills of Project Manager

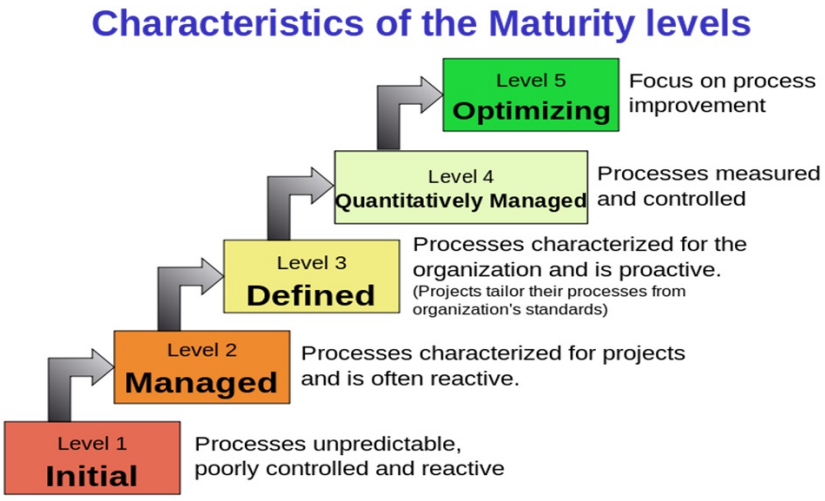
leadership 领导力

influencing 影响力

decision-makingskills 决策力

Part Two: Quality Engineering

1. CMMI



执行级：执行过程满足该过程域的特定目标并支持生产产品所需要的工作

管理级：有基本的基础设施的支持

定义级：过程有严格的定义

量化管理级：过程是适用统计的以及其他量化管理的手段进行管理的

优化级：通过理解变化过程中固有的常见原因而提高优化过程

2. IOS9001

What is the difference between CMMI and ISO9001

ISO9001是通用的国际标准,适用于各类组织。CMMI是美国军方为评价软件供应商的质量水平,委托SEI开发的一个评价模型,只用于软件业。

CMMI更详细,更专业。
ISO9001只建立了一个可接受水平，而CMMI是一个具有五个水平的评估工具。

The types of the final test exercises:

1. Single Choice
2. Comprehensive Question
3. Calculation
4. Analysis