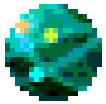
北京航空航天大学
COLLEGE OF SOFTWARE BEIHANG UNIVERSITY 软件学院



Software project management

How to manage a software project in the entire complex and changeable environment successfully!

北航软件学院　贾经冬

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Background investigation

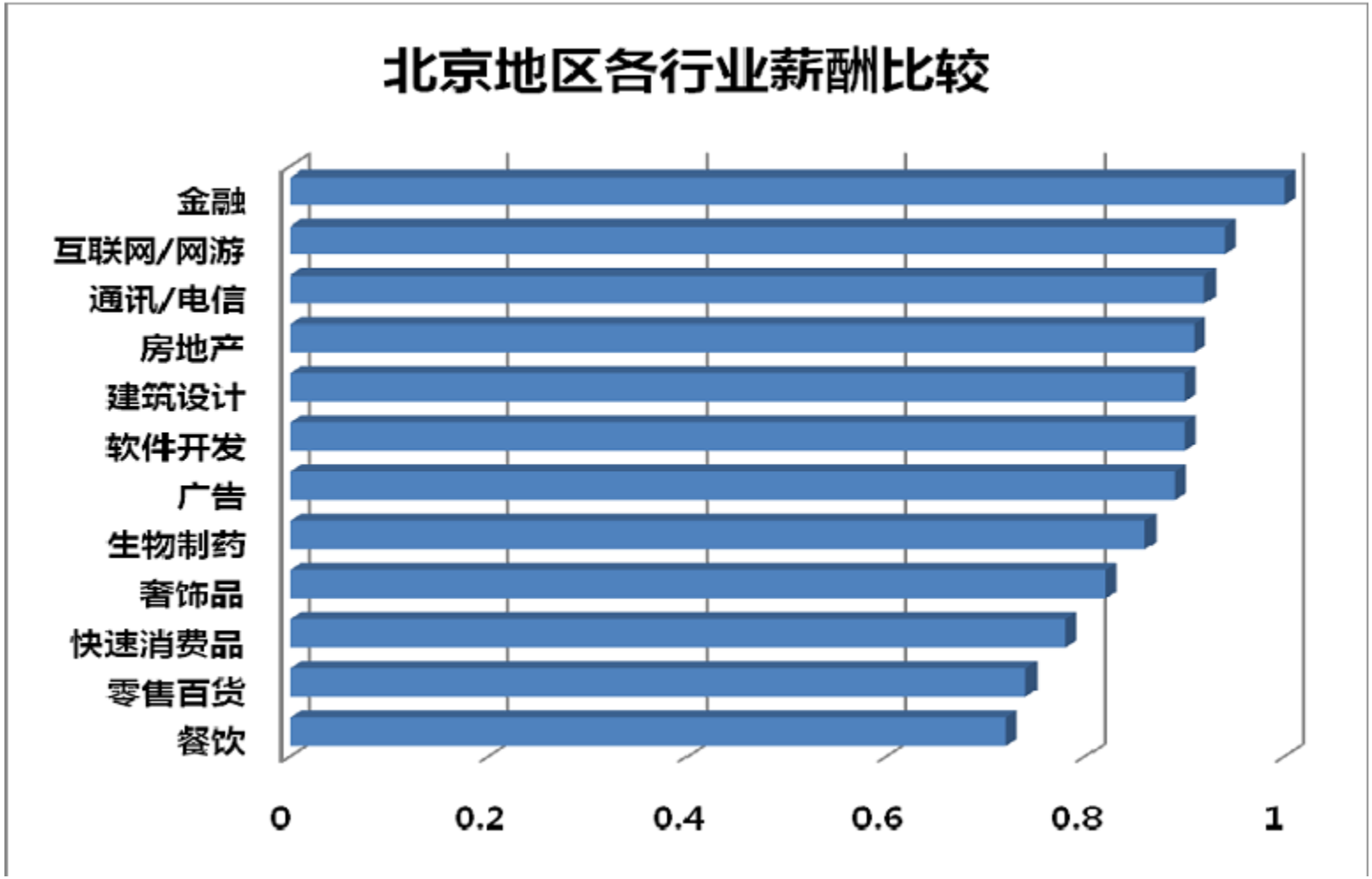
- **Knowledge in PM**
  - **No programming experience**
  - **No experience in project management**
  - **With less than two years of experience in project management**
  - **Many years of experience in project management**
- **Professional fields**

Course objectives

Project Manager !

In Microsoft project manager is a professional management personnel who takes and ensures software products with high quality to be finished and released. His task includes listening to the demand, product function definition, planning and design, making all kinds of complicated decisions so as to ensure the working smoothly and track bugs. In short, project manager is fully in charge of the final completion of the software product.

the leader and coordinator, agitator, but not the boss.



《2011年北京地区薪酬福利调研报告》_众达朴信管理咨询□

Syllabus

“Software Project Management”

Personal Assignment:20%
Exam:80%
Experience sharing: help to greatly improve performance
Optional assignments: read a related literature, and report in classroom by PPT(please send me the literature before Monday, and PPT Thursday)

The sharing content : project background, functions, your role, the successful or failing experience from your point of view.
The sharing demand: prepare ppt, send to me before Thursday.

Support materials

1.软件项目管理（英文版 第5版）

Bob Hughes， Mike Cotterell
2010.06
China Machine Press

2.PMBOK

Support materials

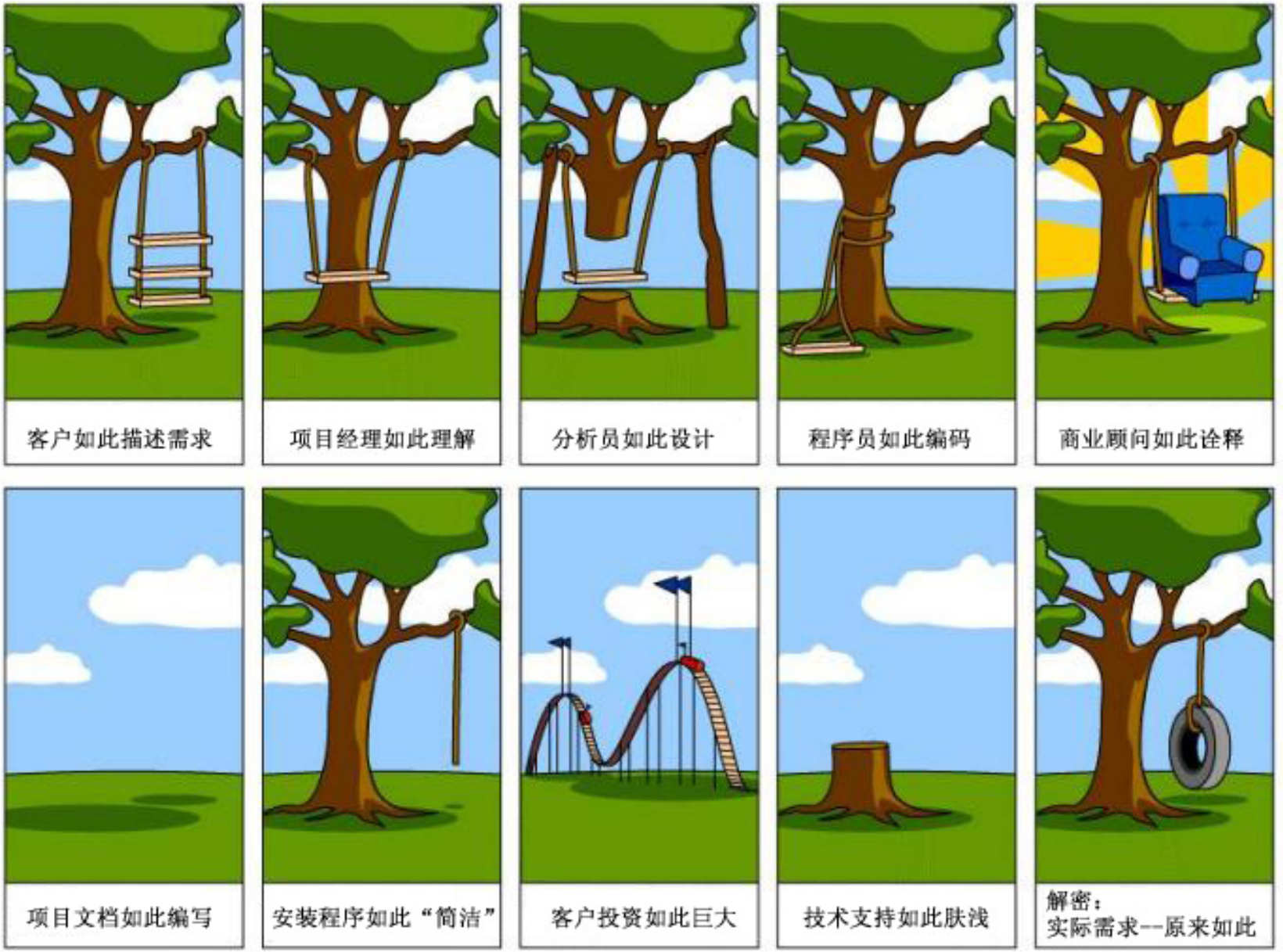
3.软件项目管理

贾经冬、林广艳编著
2012.12
高等教育出版社

Chapter 1: Introduction to Software Project Management

Main contents

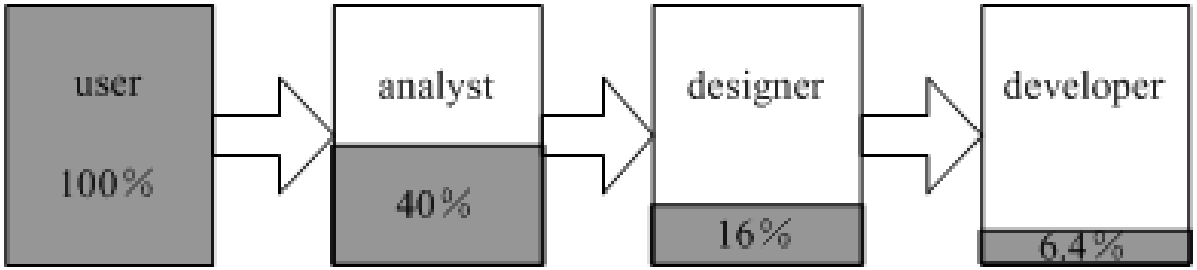
- The importance of software project management
- Basic concept of the project and project management
- Software project characteristics analysis


客户如此描述需求
项目经理如此理解
分析员如此设计
程序员如此编码
商业顾问如此诠释
项目文档如此编写
安装程序如此“简洁”
客户投资如此巨大
技术支持如此肤浅
解密：
实际需求--原来如此

Common problems in the software project

What problems?

1.communication



Case:项目接近尾声了，系统测试组正在执行系统测试。问题又出来了：这组功能牛头不对马嘴，怎么回事啊？开发组一看就明白了：你们设计的什么测使用例？需求早就变了，系统测使用例为什么不变更？测试组觉得自己又一次被排斥到项目组织之外：谁来告诉我需求变更的情况呢？需求规格可是原来的老样子。

Common problems in the software project

What problems?

- 2.Requirement description
- **Case:**
  - 不成熟的客户，对自己的业务描述不清楚，甚至还不如开发人员了解的全面呢；
  - 抵触情绪存在而不愿意描述需求；
  - 用户不愿意进行需求总结，导致后期不停变化
  - 项目经理对需求的先入为主导致分析员理解错误
  - 技术人员对需求的加工

Common problems in the software project

What problems?

- **3. schedule control**
- **Case:**
  - 老板在项目在进行过程中询问项目的进展情况，你挠挠头皮：设计做的差不多了，一部分已经开始编码了。老板不满意了：什么时候能交活？你有些底气不足：至少还得一个多月的时间。老板着急了：就剩两周的时间了，你要花一个月，上一周你还答应可以在三周内完成。六周过去了，你的项目组还在测试，还在修改代码。两个月过去了，项目终于完成了。尽管客户有不少抱怨，但总算做了验收。你自己却惴惴不安：下一个项目会怎样？

Common problems in the software project

What problems?

- **4. estimation**

- **Case:**
  - 你分派给工程师小乙一个接口模块，小乙确保一周内可以完成。一周过去了，小乙告诉你已经完成**90%**了；两周过去了，还是**90%**；小乙总算在第三周完成了剩下的**10%**。可是接口模块的延迟导致整个项目的进度推迟了两周.

Common problems in the software project

- **5. relationship with the other teams**
- **Case:**
  - 为了保证项目的健康运行，老板下了很大的决心招聘了专职的SQA来作为他的“耳目”，SQA以极高的热情投入了工作，发现的问题层出不穷：项目组没有开例会；计划的制订不符合流程；项目计划没有及时更新等。与此同时，关于SQA的问题也源源不断：不了解、不结合项目组实际情况；光有问题，没有建议（SQA发现的问题我们每个人都能跟发现）；对项目组没有作用等。僵持的局面出现了：项目组里弥漫着对立的情绪.

Common problems in the software project

- **6.document**

- **Case:**
  - 项目组在开发的过程中几乎没有任何文档，有的只是几张草图。在项目的后期大家往往为了一个图形或符号的含义争得面红耳赤。讨论的过程中某个同事突然有所发现：我们上个月不就是这么说的吗？还好，总算有人能够回忆旧事。

A case

- 一个真实案例
- 公司甲方（是一家太阳能企业，刚成立不久，所以IT部门还不是特别规范或者说人员流动比较大）去年开始实施一个OA系统，乙方是北京一家做OA的企业。在项目实施的一年中，甲方（不是乙方）换了2个项目经理，虽然系统上线了，但是现在新来的第3个甲方项目节经理认为项目已经失败了，原因是甲方认为OA的部分功能不能满足企业的业务需求，同时甲方的业务人员也抱怨系统不好用，经常出故障，需要重启服务器才能解决问题。
- 而乙方则抱怨甲方频繁换经理，导致每次需要和新来的甲方经理重新沟通一遍需求。
- 甲方抱怨乙方系统架构不合理，需求也没有做好，有些功能根本没有实现，不能满足公司业务需求，比如：甲方的IT部门原先直接归总经理管，所有文件直接由总经理审批。但是现在业务发生了变更，最近IT部门划归财务部门管理，由财务总监负责审批IT部门的所有申请。但是现有OA系统的设计不支持这样的变化。
- 现在，甲方不打算把余款付给乙方，除非乙方重新设计和实施OA。否则甲方打算重新换一家新的乙方公司重做OA，并且有可能对薄公堂。

The mythical man-month

- **"The gap between the best software engineering practice and the average practice is very wide–perhaps wider than in any other engineering discipline."**

  – Fred Brooks

Standish chaos-report

Table I

Standish project benchmarks over the years

Year	Successful (%)	Challenged (%)	Failed (%)
1994	16	53	31
1996	27	33	40
1998	26	46	28
2000	28	49	23
2004	29	53	18
2006	35	46	19
2009	32	44	24
2012	**34**	**51**	**15**

Chaos report

- **The chairman Jim Johnson** of t**he Standish Group** cited three reasons for the improvement in software quality—better project management, iterative development and the emerging Web infrastructure.
- **The report is in doubt recenly in a paper——"The Rise and Fall of the Chaos Report Figures"** in the January/February 2010 issue of IEEE Software magazine

common causes of the Software project problem

- Poor project planning and management
- On the lack of demand management : not clear or changing needs
- Uncontrolled quality problems
- Unrealistic expectations/inaccurate estimates
- Naive adoption of new technology

Management and technology is equally important for modern software development.

10 keys to successful software projects

- **Clear Vision**
- Stable, Complete, Written Requirements
- Detailed User Interface Prototypes
- Effective Project Management
- Accurate Estimates
- A Focus on Quality
- Technology Expertise
- Active Risk Management
- Remember, Software Is Created By Humans
- Two-Phase Budgeting

来源：www.construx.com， Steve McConnell，

The second contain

- Project and Project Management definitions
- History and Development of project management
- Project management certification and knowledge
- **Constraint**
- **Project life cycle**

Which one is a project ?

- Development of a new product or service
- Development of a new or amended information system
- Officiating at the meeting
- Celebrate the 20-year anniversary of a school
- Clean the main building

What is a Project?

- A project is a temporary endeavor undertaken to create a unique product, service, or result.
- temporary——The temporary nature of projects indicates 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. Temporary does not necessarily mean short in duration. Temporary does not generally apply to the product, service, or result created by the project; most projects are undertaken to create a lasting outcome.
- unique——Every project creates a unique product, service, or result. Although repetitive elements may be present in some project deliverables, this repetition does not change the fundamental uniqueness of the project work.

Project

- An ongoing work effort is generally a repetitive process because it follows an organization's existing procedures.
- In contrast, because of the unique nature of projects, there may be uncertainties about the products, services, or results that the project creates.
- Project tasks can be new to a project team, which necessitates more dedicated planning than other routine work.
- In addition, projects are undertaken at all organizational levels. A project can involve a single person, a single organizational unit, or multiple organizational units.

The result of project

- A project can create:
  - A product that can be either a component of another item or an end item in itself,
  - A capability to perform a service (e.g., a business function that supports production or distribution), or
  - A result such as an outcome or document (e.g., a research project that develops knowledge that can be used to determine whether a trend is present or a new process will benefit society).

What is Project Management?

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

Project Management

- Project management is accomplished through the appropriate application and integration of the 42 logically grouped project management processes comprising the 5 Process Groups. These 5 Process Groups are:
  - Initiating,
  - Planning,
  - Executing,
  - Monitoring and Controlling, and
  - Closing.

Project Management

- Managing a project typically includes:
  - Identifying requirements,
  - Addressing the various needs, concerns, and expectations of the stakeholders as the project is planned and carried out,
  - Balancing the competing project constraints :Scope, Quality, Schedule, Budget, Resources, and Risk.

Program Management

- A program(项目群)is defined as a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually
- Programs may include elements of related work outside the scope of the discrete projects in the program.
- A project may or may not be part of a program but a program will always have projects.

Program Management

- Projects within a program are related through the common outcome or collective capability.
- If the relationship between projects is only that of a shared client, seller, technology, or resource, the effort should be managed as a portfolio of projects rather than as a program.
- Program management focuses on the project interdependencies and helps to determine the optimal approach for managing them

Program Management

- Example?

An example of a program would be a new communications satellite system with projects for design of the satellite and of the ground stations, construction of each, integration of the system, and launch of the satellite.

Portfolio Management

- A portfolio(项目组合)refers to a collection of projects or programs and other work that are grouped together to facilitate effective management of that work to meet strategic business objectives.
- The projects or programs of the portfolio may not necessarily be interdependent or directly related.

Portfolio Management

- Portfolio management refers to the centralized management of one or more portfolios, which includes identifying, prioritizing, authorizing, managing, and controlling projects, programs, and other related work, to achieve specific strategic business objectives.
- Portfolio management focuses on ensuring that projects and programs are reviewed to prioritize resource allocation, and that the management of the portfolio is consistent with and aligned to organizational strategies.

Operation managment

- Operations are an organizational function performing the ongoing execution of activities that produce the same product or provide a repetitive service.
- Projects require project management while operations require business process management or operations management.
- Operations are permanent endeavors that produce repetitive outputs, with resources assigned to do basically the same set of tasks according to the standards institutionalized in a product life cycle. Unlike the ongoing nature of operations, projects are temporary endeavors.

History and Development of project management

- ancientry

History and Development of project management

- Modern times
  - Sprouts : recognized as of in the 1940s of the 20th century. the United States finished the mission of the development of first atomic bomb using project management, known as the " Manhattan Project “
  - Maturity : in the 1950s, the Program Evaluation Review Technique (PERT) and CPM (critical path law), Apollo Lunar Landing Program

History and Development of project management

- Propagation and modernization
  - 70 ~ 80 years of the 20 century,
  - oriented to the market,
  - to meet competition,
  - to build the initial formation of modern project management framework

History and Development of project management

- New development
  - In the 1990s of the 20th century
  - Pay attention to the factor of people
  - Pay Attention to Customers
  - Pay attention to the flexible management
  - Pay attention to the management tools
  - Expanding of application : software project management

International organization of project management 1

- **IPMA(International Project Management Association）**
  - Create : 1965
  - Character: no profit international organization
  - Members : National Project Management Association
  - Functions : Promoting the Development of International Project Management
  - Product and service : research and development, education and training, standards and quality certification

International organization of project management 2

- **PMI （Project Management Institute)**
  - Create : 1969,
  - Character: international organizations
  - Member: enterprises, universities and research institutions
  - Functions : Promoting the Development of International Project Management

International Project Management Professional Qualifications

- **PMI**

Project Management Professional ---PMP

- **IPMA (**Four - level certificate **)**
  - **Level A:** Certificated Projects Director
  - **Level B:** Certified Senior Project Manager
  - **Level C:** Certified Project Manager
  - **Level D:** Certified Project Management Associate

PMP vs IPMP

	PMP	IPMP
certification authority	PMI	IPMA
influence	great	small
Certification criterion	uniform	No uniform
Domestic organization	The State Foreign Experts	Project Management Research Committee of China
Certificate validity	Audit every 3 years	no

CPMP

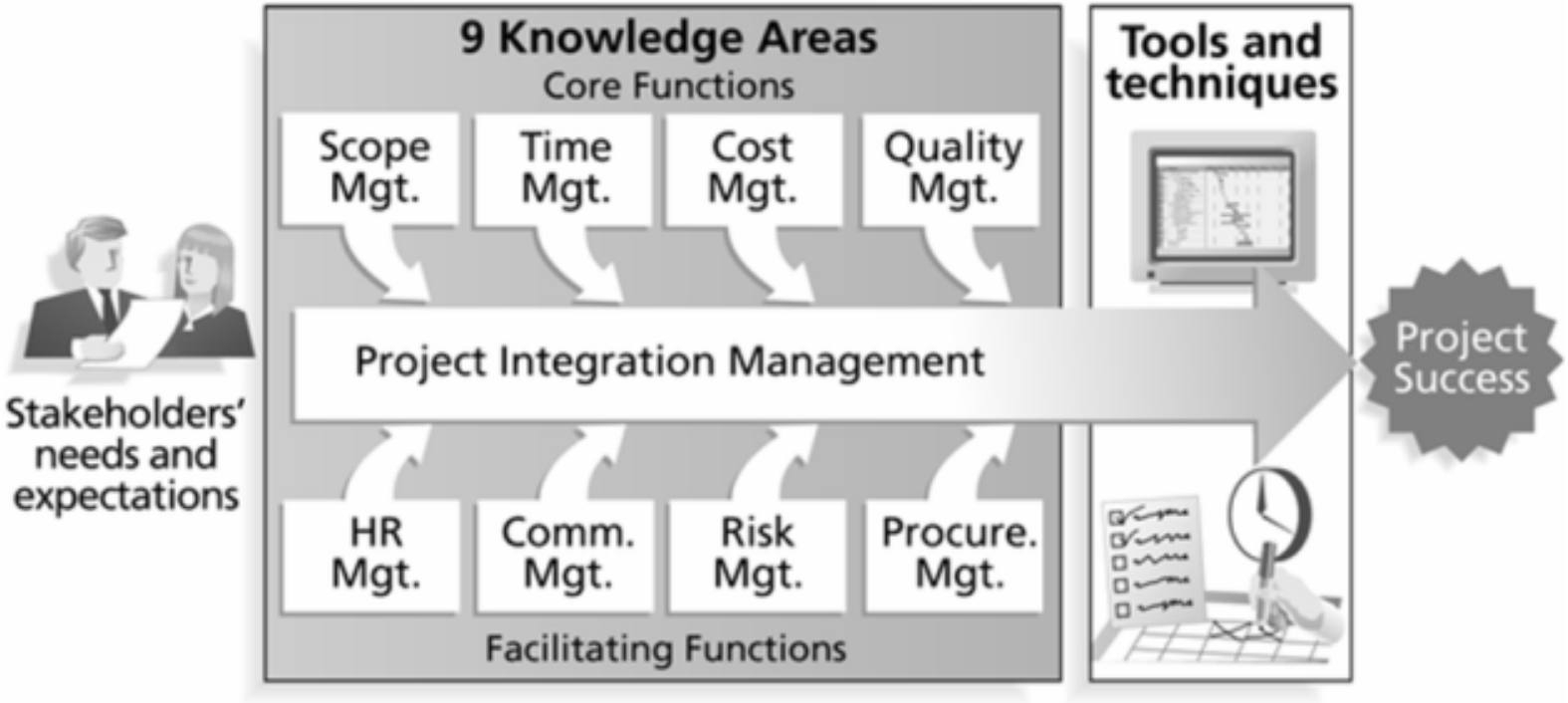
- **CPMP:(China Project Management Professional)**中国项目管理师:国家职业资格认证是中华人民共和国劳动和社会保障部在全国范围内推行的四级项目管理专业人员资质认证体系的总称。
- 考试级别: 四级认证体系 (一级高级项目管理师；二级项目管理师；三级助理项目管理师；四级项目管理员)

国际项目管理知识体系

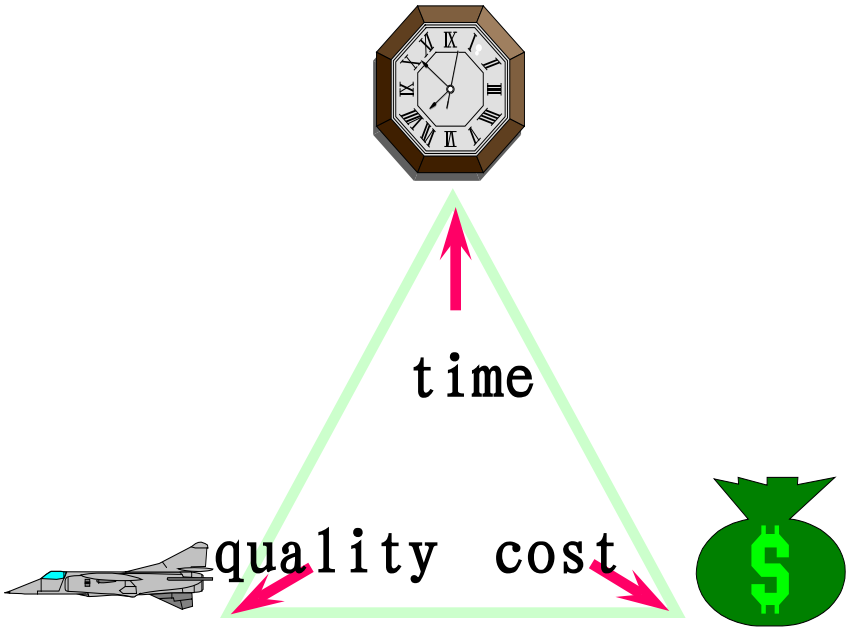
- PMI---PMBOK
  - Planned in 1976，launched in 1987
  - PMBOK　(Project Management Body of Knowledge)
  - Nine knowledge areas
- IPMA
  - builded in 1991, launched in 1996
  - ICB (IPMA Competence Baseline)
  - 42 elements of knowledge and practice, 28 core elements, 14 increased element

PMBOK2008	项目管理过程				
知识领域	启动（2）	规划（20）	执行（8）	监视（10）	收尾（2）
项目整合管理	1.制定项目章程	2.制定项目管理计划	3.指导与管理项目执行	4.监视项目工作 5.实施整体变更控制	6.结束项目或阶段
项目范围管理		1.收集需求 2.定义范围 3.创建工作分解结构		4.核实范围 5.控制范围	
项目时间管理		1.定义活动 2.排列活动顺序 3.估算活动资源 4.估算活动持续时间 5.制定进度计划		6.控制进度	
项目成本管理		1.估算成本 2.制定预算		3.控制成本	
项目质量管理		1.规划质量	2.实施质量保证	3.实施质量控制	
项目人力资源管		1.制定人力资源计划	2.组建项目团队 3.建设项目团队 4.管理项目团队		
项目沟通管理	1.识别干系人	2.规划沟通	3.发布信息 4.管理干系人期望	5.报告绩效	
项目风险管理		1.规划风险管理 2.识别风险 3.实施定性风险分析 4.实施定量风险分析 5.规划风险应对		6.监控风险	
项目采购管理		1.规划采购	2.实施采购	3.管理采购	4.结束采购

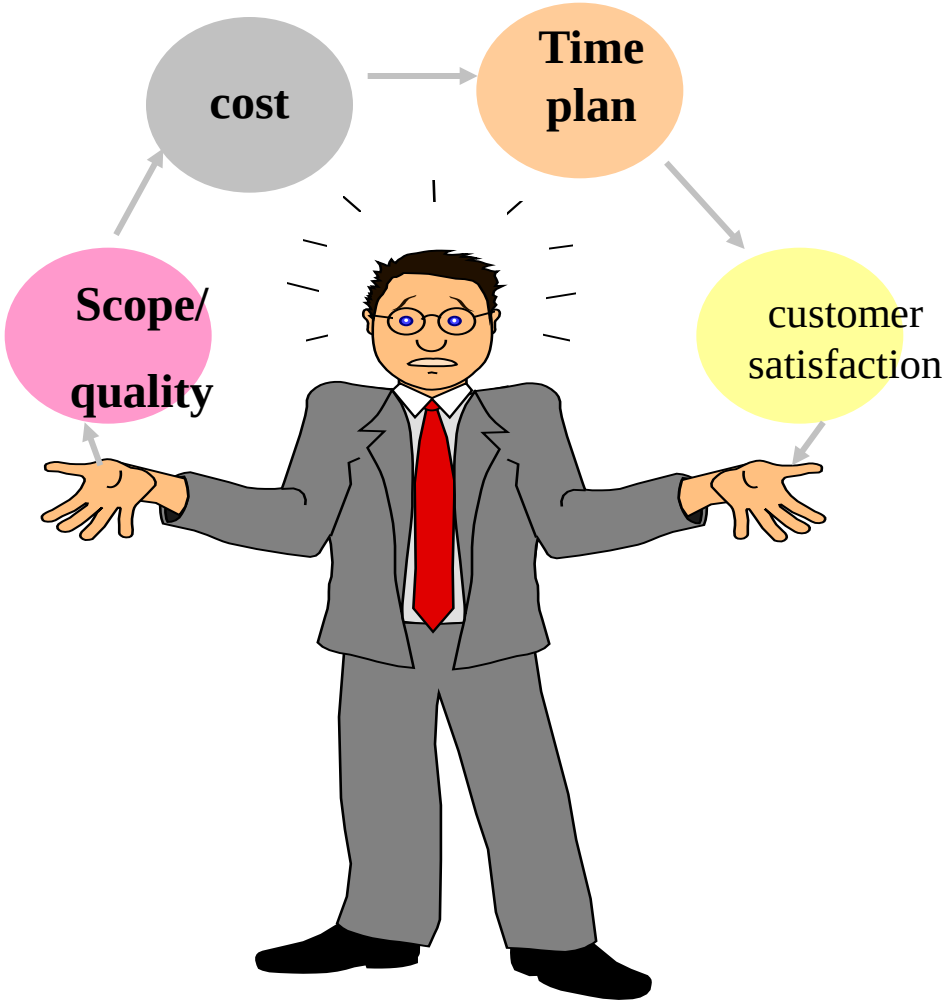
The framework of PM



The Project Constraint



The Project Constraint



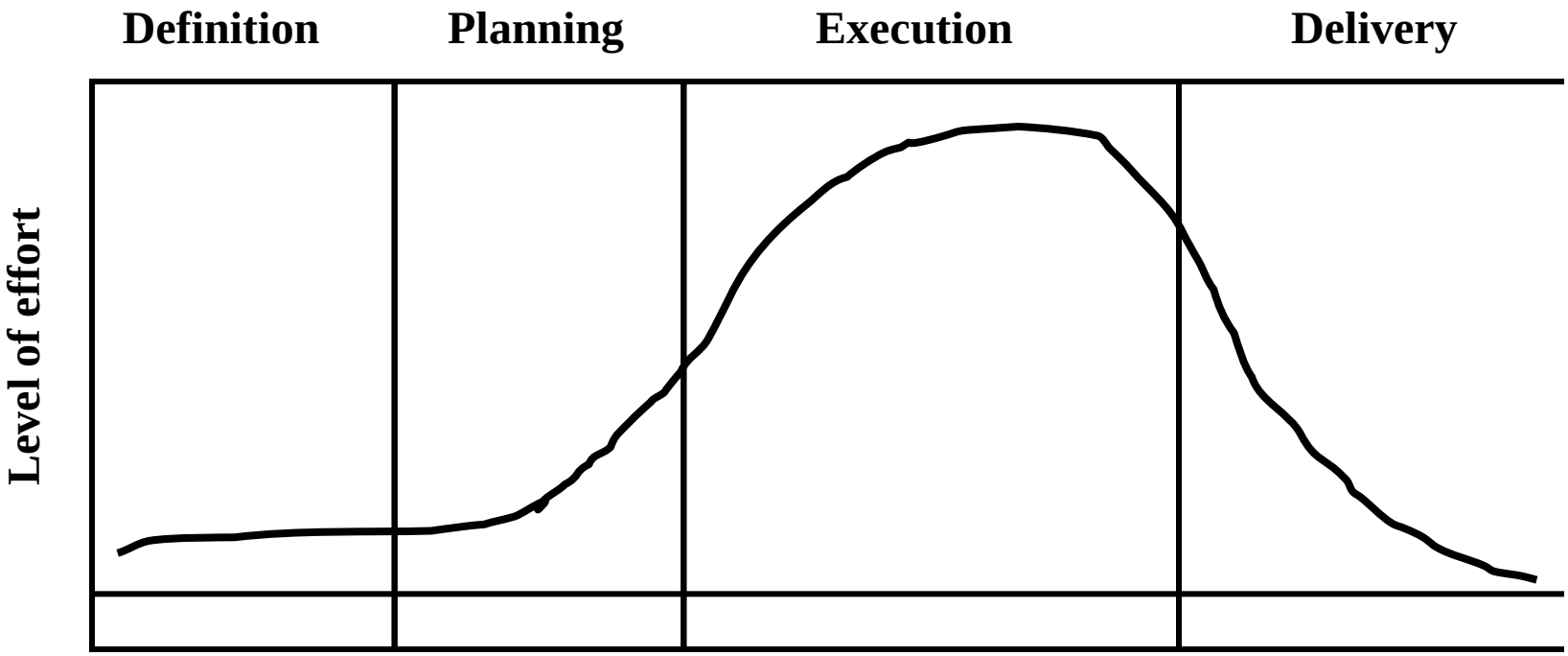
The Project Life Cycle

- A project life cycle is a collection of generally sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application.
- While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved.

Characteristics of the Project Life Cycle

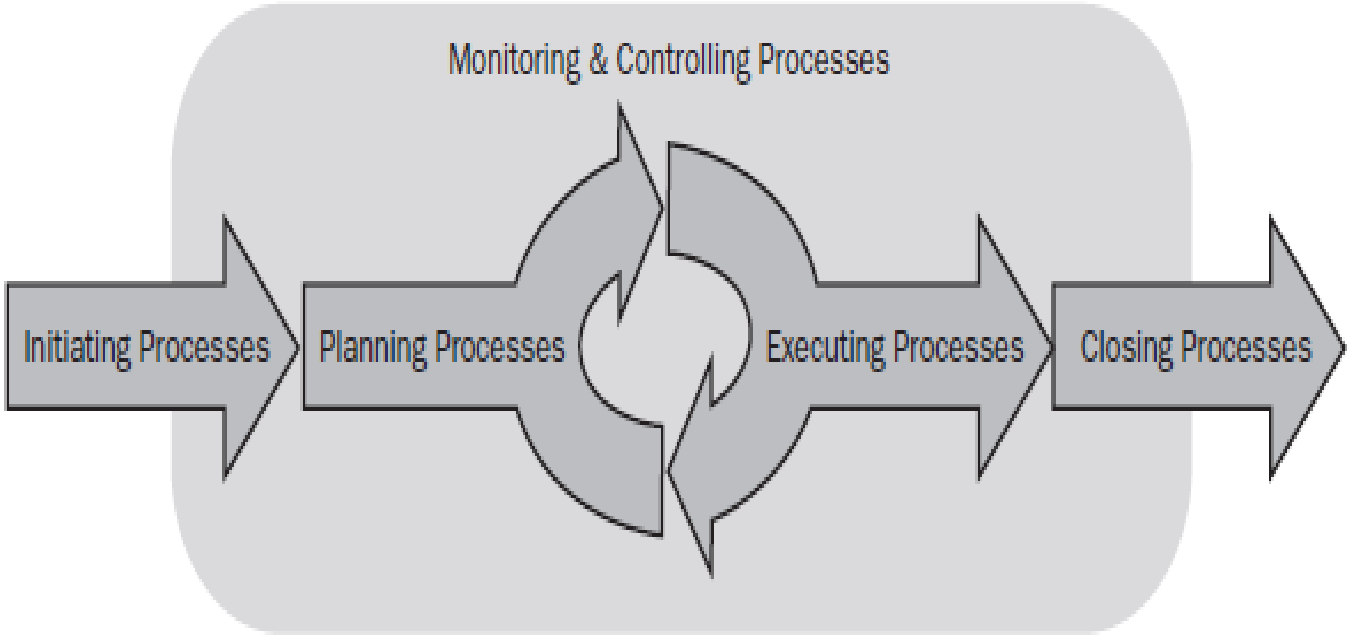
- Projects vary in size and complexity. No matter how large or small, simple or complex, all projects can be mapped to the following life cycle structure:
  - Starting the project,
  - Organizing and preparing,
  - Carrying out the project work, and
  - Closing the project.

Project Life Cycle



Definition	Planning	Execution	Delivery
1. Goals	1. Schedules	1. Status reports	1. Train customer
2. Specifications	2. Budgets	2. Changes	2. Transfer documents
3. Tasks	3. Resources	3. Quality	3. Release resources
4. Responsibilities	4. Risks	4. Forecasts	4. Reassign staff
5. Teams	5. Staffing		5. Lessons learned

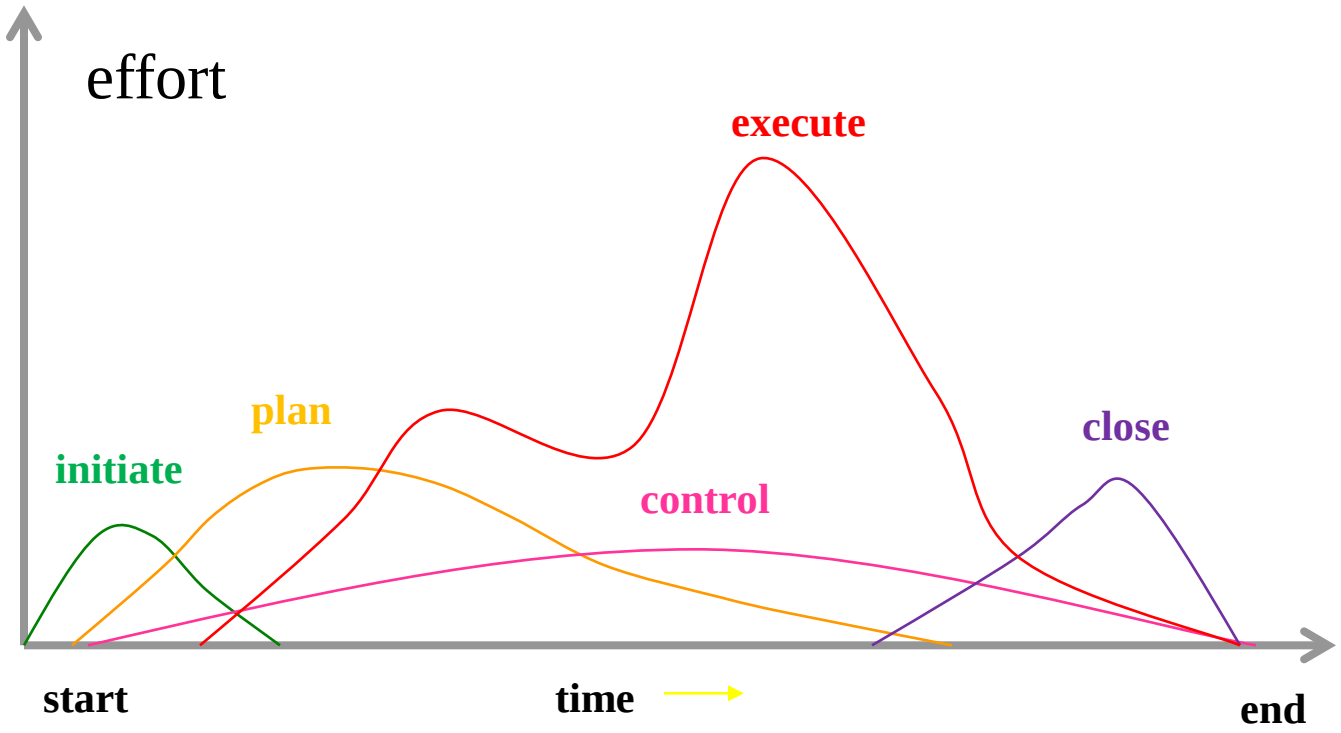
Project phases



Product vs. Project Life Cycle Relationships

- The product life cycle consists of generally sequential, non-overlapping product phases determined by the manufacturing and control need of the organization. The last product life cycle phase for a product is generally the product's retirement.
- Project life cycles occur in one or more phases of a product life cycle.

Overlapped phase



scope of software services classification

- **Project software**
- **Product software**

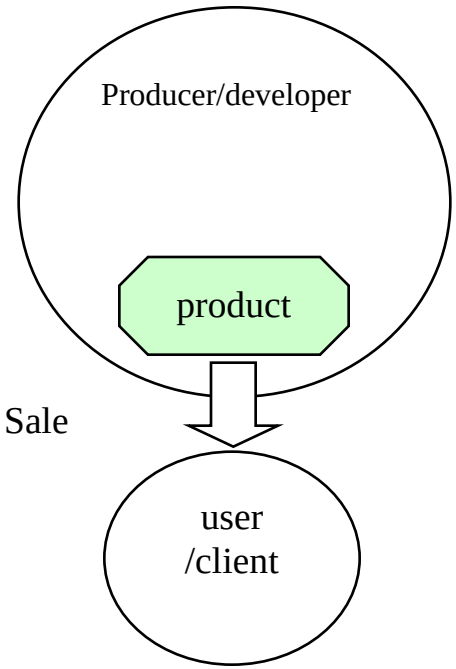


Figure a：software product project

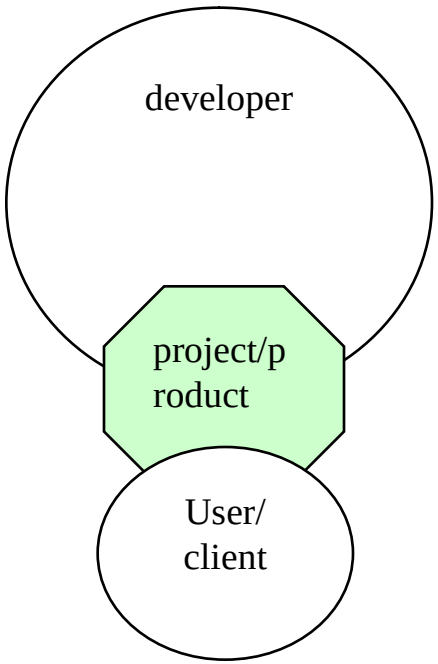


Figure b： software application project

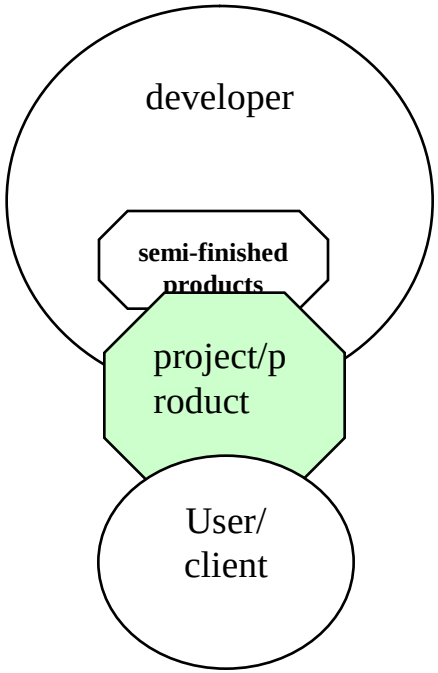
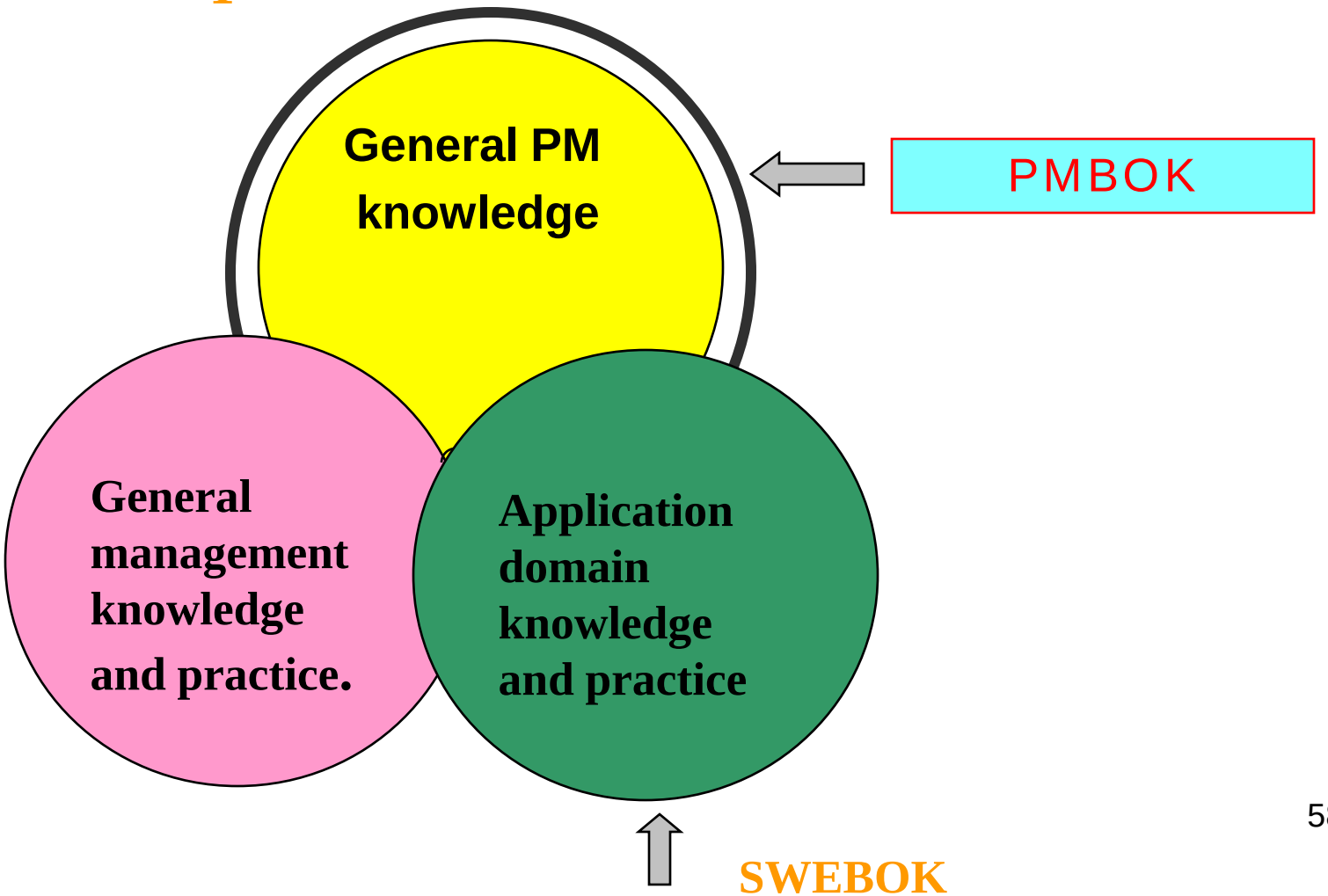


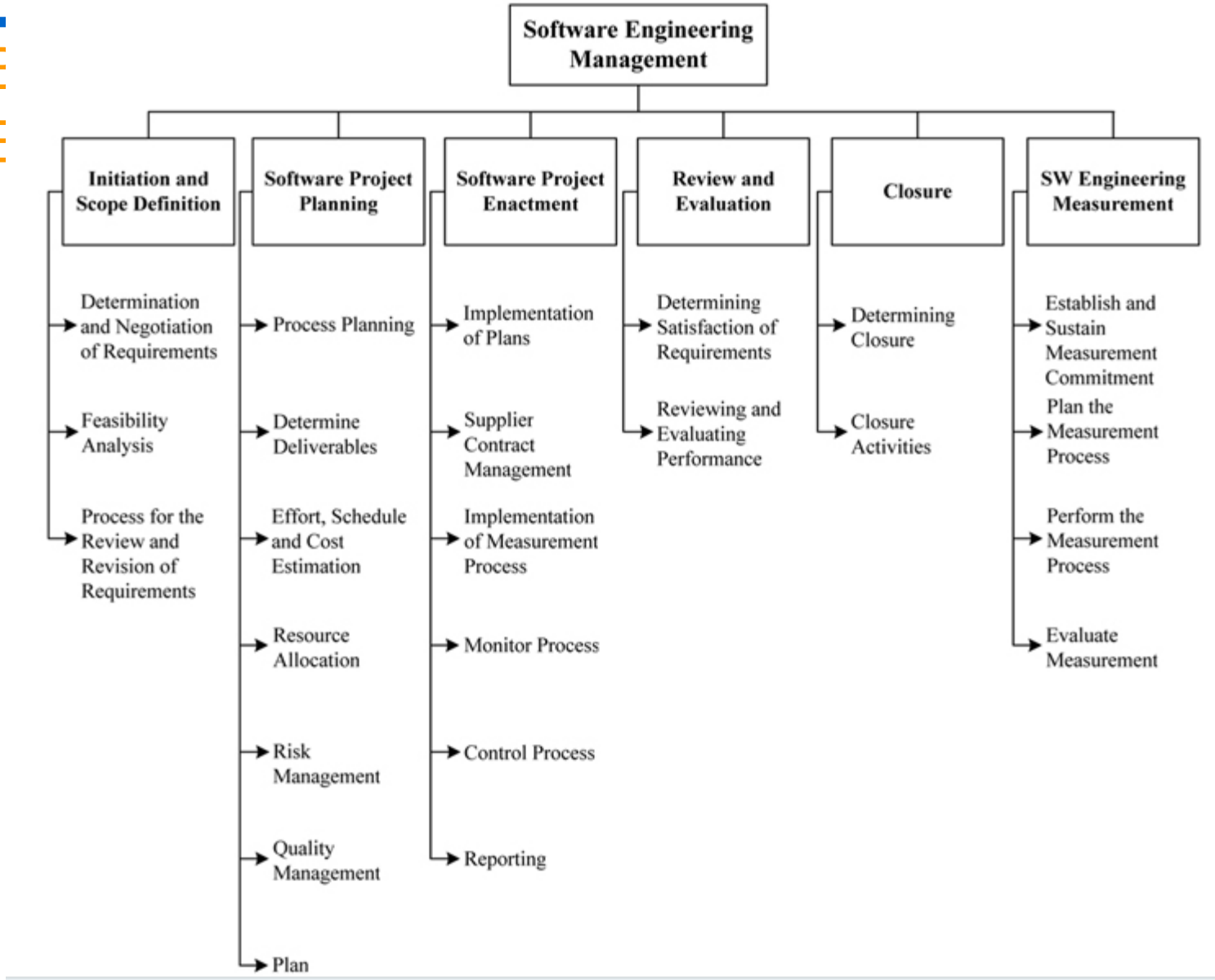
Figure c：mixed project

Discipline of SPM

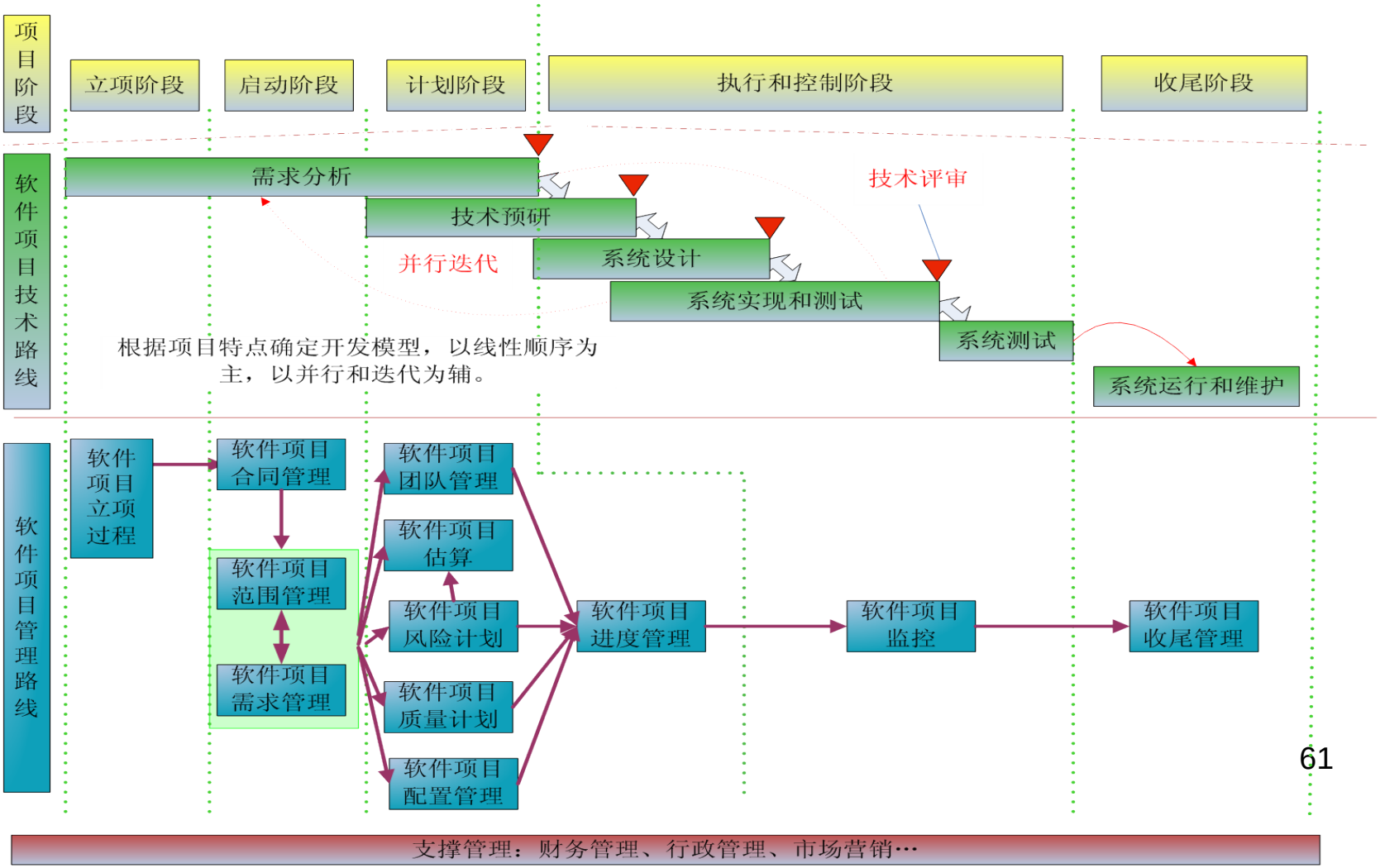


SE Knowledge Area

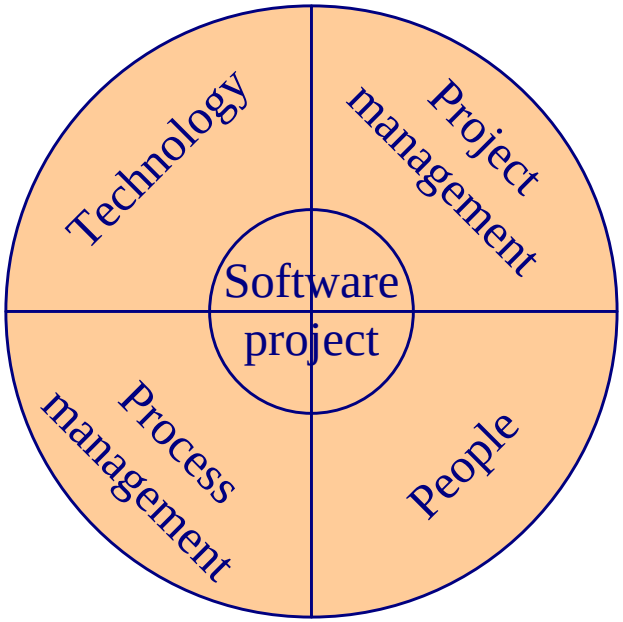
SE1 Software design
SE2 Using APIs
SE3 Software tools and environments
SE4 Software processes
SE5 Software requirements and specifications
SE6 Software validation
SE7 Software evolution
SE8 Software project management
SE9 Component-based computing
SE10 Formal methods
SE11 Software reliability
SE12 Specialized systems development


Software Engineering Management
Initiation and Scope Definition
Software Project Planning
Software Project Enactment
Review and Evaluation
Closure
SW Engineering Measurement
Determination and Negotiation of Requirements
Feasibility Analysis
Process for the Review and Revision of Requirements
Process Planning
Determine Deliverables
Effort, Schedule and Cost Estimation
Resource Allocation
Risk Management
Quality Management
Plan
Implementation of Plans
Supplier Contract Management
Implementation of Measurement Process
Monitor Process
Control Process
Reporting
Determining Satisfaction of Requirements
Reviewing and Evaluating Performance
Determining Closure
Closure Activities
Establish and Sustain Measurement Commitment
Plan the Measurement Process
Perform the Measurement Process
Evaluate Measurement

The process of spm



Software project management fundamentals



Software project management fundamentals

Project Management Fundamentals

- Estimation and Scheduling
- Planning
- Tracking
- Measurement

Technical Fundamentals

- Requirements Management
- Design
- Construction
- Software Configuration Management

Software project management fundamentals

Process management Fundamentals

- Process model Modules
- Quality management
- Development fundamental
- Product management

People management Fundamentals

- Select
- Organize
- prompt

People

1. Undermined motivation.
2. Weak Personnel.
3. Uncontrolled problem employees.
4. Heroics.
5. Adding people to a late project.
6. Noisy,crowded offices.
7. Friction between developers and customers.
8. Unrealistic expectations.
9. Lack of effective project sponsorship.
10. Lack of stakeholder buy-in.
11. Lack of user input.
12. Politics placed over substance.
13. Wishful thinking.

Project management

1. Overly optimistic schedules.
2. Insufficient risk management.
3. Contractor failure.
4. Insufficient planning.
5. Abandonment of planning under pressure.
6. Wasted time during the fuzzy front end.
7. Shortchanged upstream activities.
8. Inadequate design.
9. Shortchanged quality assurance.
10. Insufficient management controls.
11. Premature or overly frequent convergence.
12. Omitting necessary tasks from estimates.
13. Planning to catch up later.
14. Code-like-hell programming.

Process & Technology

Process

1. Requirements gold-plating.
2. Feature creep.
3. Developer gold-plating.
4. Push-me, pull-me negotiation.
5. Research-oriented development.

Technology

1. Silver-bullet syndrome.
2. Overestimated savings from new tools or methods.
3. Switching tools in the middle of a project.
4. Lack of automated source-code control.

Role and quality of a Project Manager

- The project manager is the person assigned by the performing organization to achieve 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 characteristics:
  - Knowledge. This refers to what the project manager knows about project management.
  - Performance. This refers to what the project manager is able to do or accomplish while applying their project management knowledge.
  - Personal. This refers to how the project manager behaves when performing the project or related activity. Personal effectiveness encompasses attitudes, core personality characteristics and leadership—the ability to guide the project team while achieving project objectives and balancing the project constraints.

项目经理所需要养成的六个习惯

从技术骨干提升为项目经理时

- 增强处理人际关系的经验：解决冲突、说服以及灌输想法
- 提高你的演讲能力
- 参加项目管理的培训课，阅读一些有关项目和风险管理的书籍和文章

- Understanding the most critical skills for managing IT projects

谁该为项目失败负主要责任

- 案例描述

小王被任命管理一个重要的软件项目，项目组有3个成员。如果该项目不能按照客户的质量要求如期完成，公司将损失大笔收入，这一损失将影响到公司的未来发展。 但结果是项目在小王手上失败了!项目不但延期了25%，而且客户还在公司的成员各自开发的模块间发现了明显的集成问题。

- 情形是这样的：

·小王过去是一个很好的程序员，在去年被提拔为经理。

·成员A是一个有能力的程序员，在项目的过程中他被小王的经理调去参加公司的培训课程，这造成了他30%的工作延期，培训回来以后，公司宣布他在完成该项目后将被提拔到新的岗位，于是他一直忙于熟悉新的岗位和经理，他的项目后期工作质量受到了严重影响。

谁该为项目失败负主要责任

- 成员B是最没经验的程序员，他的开发进度较慢，不幸的是在项目过程当中他生了5天病，这更加减慢了他的进度。尽管他努力追赶但由于没有任何有经验成员的帮助，他还是不能按时完成任务。
- 成员C是最有经验的程序员，他的绩效是公司的一个标杆。他被分配完成这个项目最困难的任务，并提前25%完成了该项工作。他还被分配负责集成所有的软件并进行测试，但他声称由于A和B的延误、A的低质量的原因，在你规定的发布时限之前，他没有时间对软件作彻底的测试。 小王曾经跟A就他不能专注于眼前的工作问题有过几次谈话，但没能见到任何改进。要求休完病假的B加班以赶上进度，他也照办了。小王要C帮助B，他说他做过努力，但他认为B缺乏经验太难交流。

综上所述，究竟谁该为项目的失败负主要责任?

Optional Homework:Your Background

- Name
- Day Job or Equivalent
- Final Project
- Project Management Experience
- Industry Experience
- Expectations & goals from the class

request： mail tome before the next course