Chapter 4: Project Integration Management

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Learning Objectives

1. Describe an ***overall framework*** for project integration management as it relates to the other project management knowledge areas and the project life cycle.
2. Discuss the ***strategic planning process*** and apply ***different project selection methods.***
3. Explain the importance *of* ***creating a project charter*** to formally initiate projects.
4. Describe ***project management plan*** development, understand the content of these plans, and review approaches for creating them.

Learning Objectives

5. Explain ***project execution***, its relationship to project planning, the factors related to successful results, and tools and techniques to assist in directing and managing project work
6. Describe ***the process of monitoring and controlling*** a project
7. Understand the ***integrated change control*** process, planning for and managing changes on information technology (IT) projects, and developing and using a change control system
8. Explain the importance of developing and following good procedures for ***closing projects***

Opening case

Nick Carson是硅谷一家公司生物科技项目的项目经理。该项目是为用于装配和分析人体染色体的DNA测试仪器而开发的硬件和软件。生物科技项目是该公司最大的项目，并且在未来有着巨大的成长潜力和收益。不幸的是，这个项目已经进行了三年，并且更换了三位不同的经理。在管理层任命Nick为项目经理之前，他是这个项目是软件开发人员。高层管理要求他要在4个月内开发出第一个版本，在9个月内开始投入生产。这时公司正与一家更大的公司谈判双方未来的并购事宜，这也影响到了高层管理对完成这个项目的迫切感。

Nick精力充沛，非常聪明，并且具有保证项目成功的技术背景。他研究了技术问题，发现了影响DNA测试仪器工作的一些重要缺陷。然而对出任项目经理这一新的角色，他也感到困难重重。虽然Nick和他的团队按时研制出了产品，但由于Nick没有集中处理好项目的所有方面，高层管理还是非常生气。Nick并未给高层管理提供项目的准确进度安排或其他详细计划，只是承担了软件集成和解决纠纷的职责，所以并没有扮演好项目经理的角色。

Opening case

未经与Nick协商，首席执行官聘请了一位新人Jim，作为自己与Nick团队的中间人，公司首席执行官和其他高层经理很喜欢Jim。他经常与他们会面，交流想法。他开始着手制定公司可在未来使用的、帮助管理项目的标准。例如，他为制定规划和进度报告制作样板，并将它们发布在公司的局域网上。然而，Jim和Nick相处得并不好。Jim意外地将一封本要发给公司首席执行官的电子邮件发给了Nick。在这封邮件里，Jim说Nick正忙于他儿子的出生。

Nick看完邮件后很气愤，他冲到首席执行官的办公室理论。随后行政总裁建议，将Nick调往另一部门，但Nick不同意。最后，首席执行官向Nick提出让他离开公司并给他一笔遣散费。Nick向首席执行官提出，他还没有休完二个月假期以及较高比例的股票期权。在与妻子商议后他发觉，如果辞职他将会得到7万多美元。于是Nick接受了遣散方案。有了这样一次失败的作为项目经理的经验之后，他觉得还是适合做一名技术专家。而Jim呢，在他的位置上干得很起劲，并帮助公司改善了项目管理，确保公司在高度竞争的市场中取得了成功。

Nick的错误

1）不懂项目的综合管理

- 不能与所有干系人形成良好的沟通。
  - 与项目团队——沟通好
  - 与DNA项目的重要干系人——他的上级领导沟通不好，对高层管理的需求知之甚少
- 错误地认为项目整合管理就是软件的集成管理，忽略了项目整合管理的真谛——关注良好的沟通和关系管理
  - 还在做软件开发的老工作，同时承担了软件集成的角色

2）没有运用整体和系统的思考问题

3）项目整合管理应在整个组织的环境中进行，而不是在一个项目内部进行

- Nick所在的公司正与某大公司进行并购谈判，高层管理期望了解的项目工作情况对公司持续运作和未来的影响。

最终结局

Nick

* Lost the position of Project Manager
* Committed to becoming a technical expert

Jim

* Helped the company improve project management practices
* It has gained more opportunities in the highly competitive market

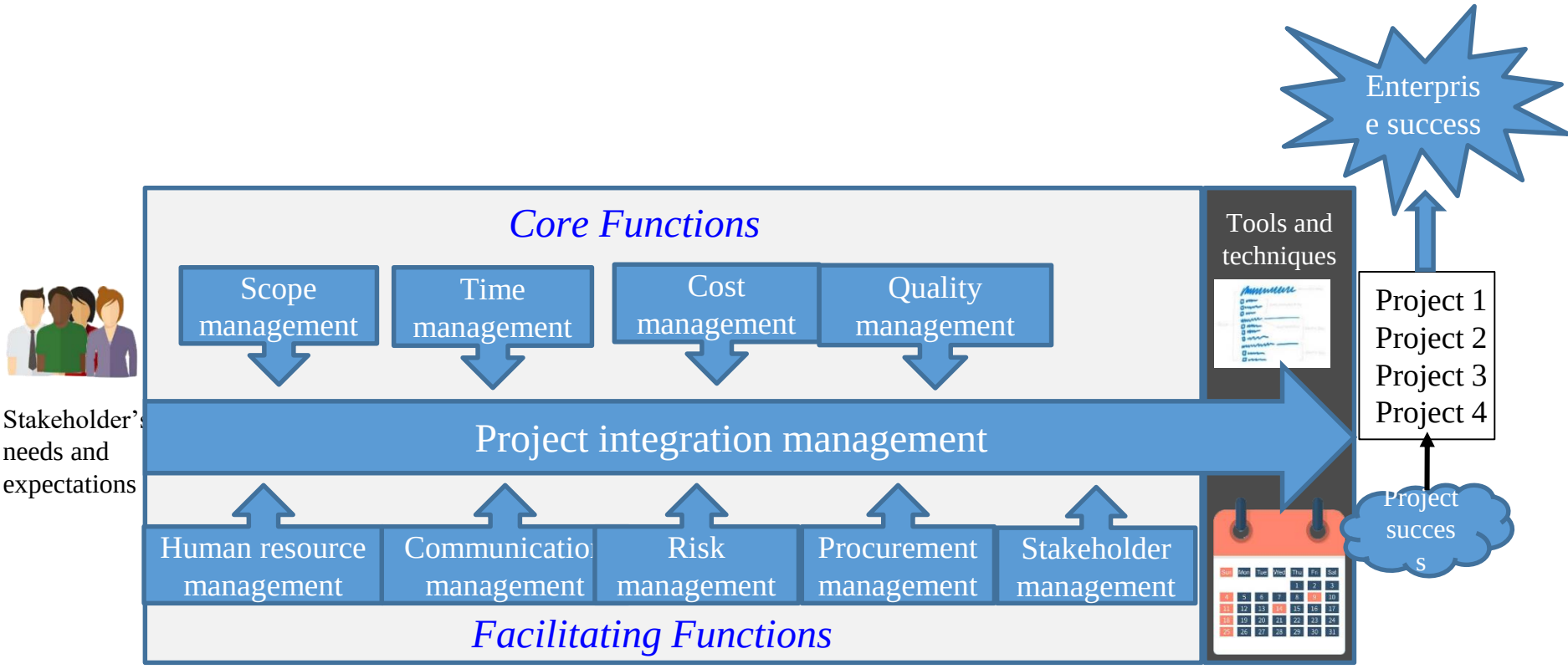
How to do?

- Develop the project charter
- Develop the project management plan
- Direct and manage project execution
- Monitor and control project work
- Perform integrated change control
- Close the project or phase

Main Contents

1. What is project integration management ?
2. Strategic planning and project selection
3. Methods for selecting projects
4. Developing a project charter
5. Developing a project management plan
6. Directing and managing project work
7. Monitoring and controlling project work
8. Performing integrated change control
9. Closing projects or phases

Figure 1-2 Project Management Framework



1. What is project integration management ?

Project integration management involves coordinating **all of the other** project management knowledge areas throughout **a project's life cycle.**

- *It ensures that all the elements of a project come together at the right times to complete a project successfully.*
- *Project integration management requires the approval and support from top management.*

Note !!!

project integration is different from software integration.

1. What is project integration management ?

1. **Developing the project charter** involves working with stakeholders to create the document that formally authorizes a project—the charter.
2. **Developing the project management plan** involves coordinating all planning efforts to create a consistent, coherent document—the project management plan.
3. **Directing and managing project work** involves carrying out the project management plan by performing the activities included in it.

1. What is project integration management ?

4. **Monitoring and controlling project work** involves overseeing activities to meet the performance objectives of the project
5. **Performing integrated change control i**nvolves identifying, evaluating, and managing changes throughout the project life cycle.
6. **Closing the project or phase i**nvolves finalizing all activities to formally close the project or phase.

1. What is project integration management ?

Initiating
Process: develop project charter
Output: project charter

Planning
Process: develop project management plan
Output: project management plan

Executing
Process: direct and manage project work
Outputs: deliverables; work performance data; change requests;
project management plan updates;
project document updates

Monitoring and controlling
Process: monitor and control project work
Outputs: change requests; work performance report;
Process: perform integrated change control
Outputs: approved change requests; a change log; project document updates;

Closing
Process: close project or phase
Output: final product, service, or result transition

Project start → **Project finish**

2. Strategic planning and project selection

Strategic planning involves determining ***long-term objectives*** by analyzing the ***strengths*** and ***weakness*** of an organization, studying ***opportunities*** and ***threats*** in the business environment, predicting future trends, and projecting the need for new products and services.

The strategic plan provides important information for the organization to identify and select potential projects

SWOT analysis – analyzing strengths, weaknesses, opportunities and threats, which can be performed by using ***mind mapping***.

2. Strategic planning and project selection

The problem when establishing SWOT table

STRENGTHS

1，擅长什么？
2，组织有什么新技术？
3，能做什么别人做不到的？
4，和别人有什么不同的？
5，顾客为什么亲？
6，最近因何成功？

WEAKNESSES

1，什么做不来？
2，缺乏什么技术？
3，别人有什么比我们好？
4，不能够满足何种顾客？
5，最近因何失败？

OPPORTUNITIES

1，市场中有什么适合我们的机会？
2，可以学什么技术？
3，可以提供什么新的技术/服务？
4，可以吸引什么新的顾客？
5，怎样可以与众不同？
6，组织在5-10年内的发展？

THREATS

1，市场最近有什么改变？
2，竞争者最近在做什么？
3，是否赶不上顾客需求的改变？
4，政治环境改变是否会伤害组织？
5，是否有什么事可能会威胁到组织的生存？

2. Strategic planning and project selection

A team of four people is preparing to start a new business in the film industry. They use SWOT to analyze only projects with potential.

STRENGTHS

1. Experienced and Connections
2. Good at the new technology
3. Good at personal communication
4. Impressive projects completed

WEAKNESSES

1. No financial or accounting experience
2. No clear market strategy for products
3. Insufficient funds
4. No website and lack of technical

OPPORTUNITIES

1. A big project wanted us to bid
2. Sustainable development of film industry
3. Two major conferences can promote the development

THREATS

1. Other companies provide services
2. Larger and more experienced teams
3. Great risks in the film industry

2. Strategic planning and project selection

Based on their SWOT analysis, the four entrepreneurs outline potential projects as follows:

· Find an external accountant or firm to help run the business.

· Hire someone to develop a company Web site, focusing on our experience and past projects.

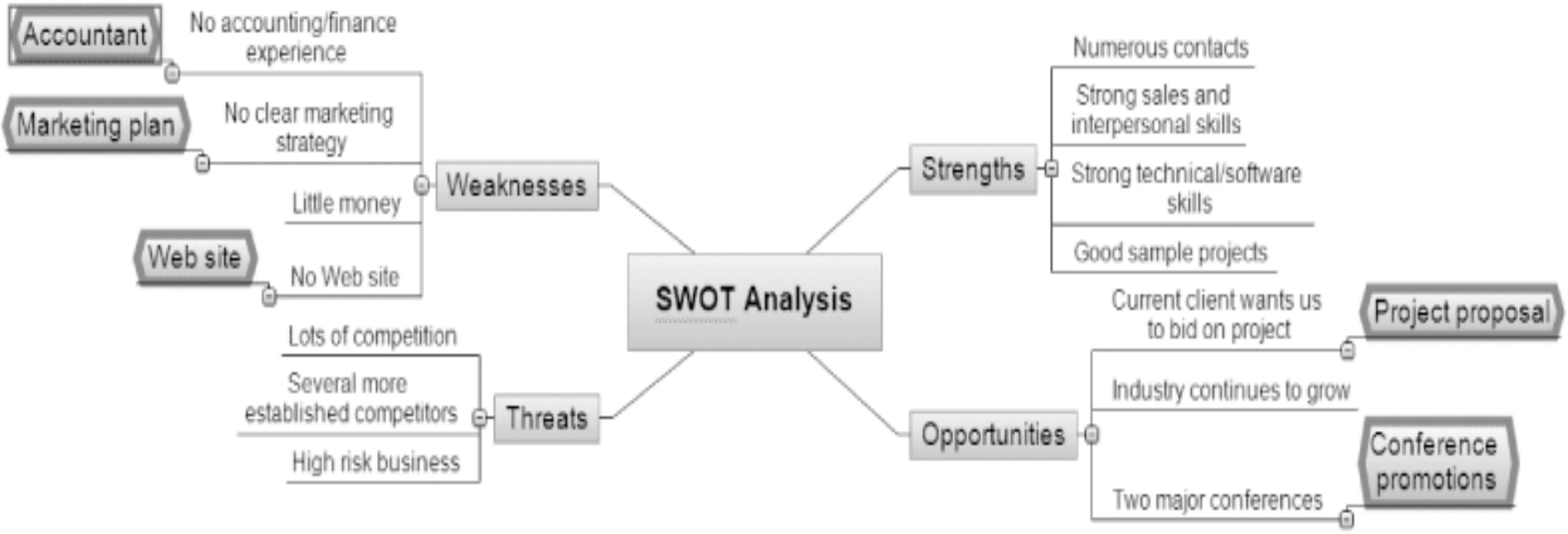
· Develop a marketing plan.

· Develop a strong proposal to get the large project the current client mentioned.

· Plan to promote the company at two major conferences this year.

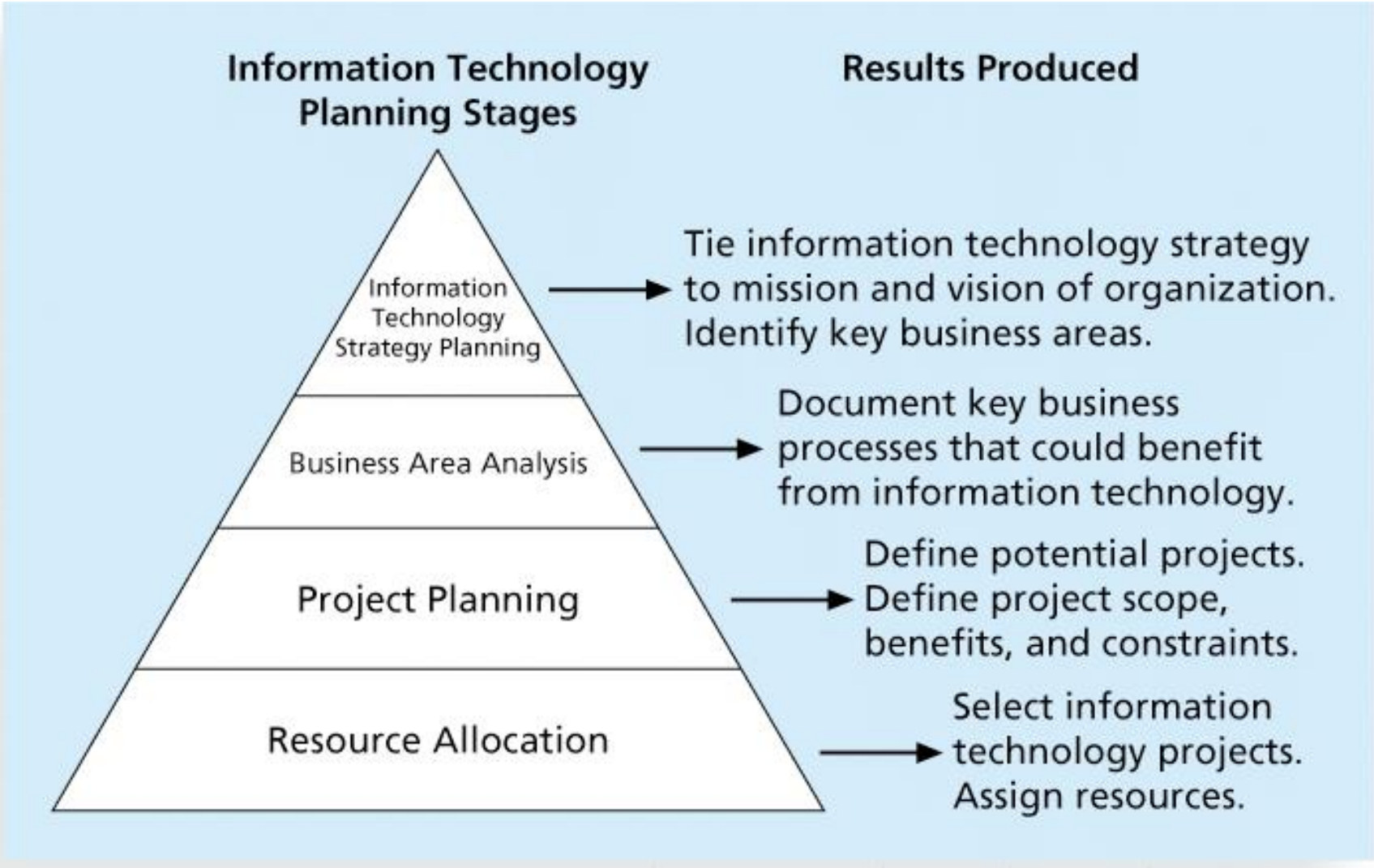
2. Strategic planning and project selection

Mind mapping, a technique that uses branches radiating from a core idea to structure thoughts and ideas. The human brain does not work in a linear fashion. People come up with many unrelated ideas.



2. Strategic planning and project selection

Identifying potential projects – 4 stages



2. Strategic planning and project selection

- An organization must develop a strategy for using IT to define how it will support the organization's objectives.
- Information systems often are central to business strategy.
  ① being a low-cost producer
  ② providing specialized products or services regardless of the distance
  ③ providing services online

3. Methods for selecting projects

- Focusing on broad organizational needs
- Categorizing IT projects
- Net present value analysis
- Return on investment
- Payback analysis
- Using a weighted scoring model
- Implementing a balanced scorecard

3. Methods for selecting projects

Focusing on broad organizational needs

It is often difficult to provide strong justification for many IT projects, but everyone agrees they have a high value.

Three important criteria for projects:

There is a ***need*** for the project

There are ***funds*** available

There's a strong ***will*** to make the project succeed

3. Methods for selecting projects

Categorizing IT Projects

- Problems
- Opportunities
- Directives

Which one is easier to get approval and funding for project? Why?

Some other categorization?

- Timing
- Priority

3. Methods for selecting projects

Net Present Value Analysis

- Calculating the expected net monetary gain or loss from a project by discounting all expected future cash inflows and out follows to the present point in time.

$$NPV = \sum_{t=0,1,\ldots,n} A_t/(1+r)^t$$

- Projects with a positive NPV should be considered if financial value is a key criterion
- The higher the NPV, the better

3. Methods for selecting projects

Net Present Value Analysis

Discount rate	10%					
Project 1	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Benefits	0	2000	3000	4000	5000	14000
Costs	5000	1000	1000	1000	1000	9000
Cash flow	-5000	1000	2000	3000	4000	**5000**
NPV	**2300**					
Project 2	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Benefits	1000	2000	4000	4000	4000	15000
Costs	2000	2000	2000	2000	2000	10000
Cash flow	-1000	0	2000	2000	2000	**5000**
NPV	**3190**					

3. Methods for selecting projects

Net Present Value Analysis

Discount rate	10%					
Project 1	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Benefits	0	2000	3000	4000	5000	14000
	0.91	0.83	0.75	0.68	0.62	
	0	1660	2250	2720	3100	9730
Costs	5000	1000	1000	1000	1000	9000
	0.91	0.83	0.75	0.68	0.62	
	4,550	830	750	680	620	7430
NPV						**2300**

3. Methods for selecting projects

Net Present Value Analysis

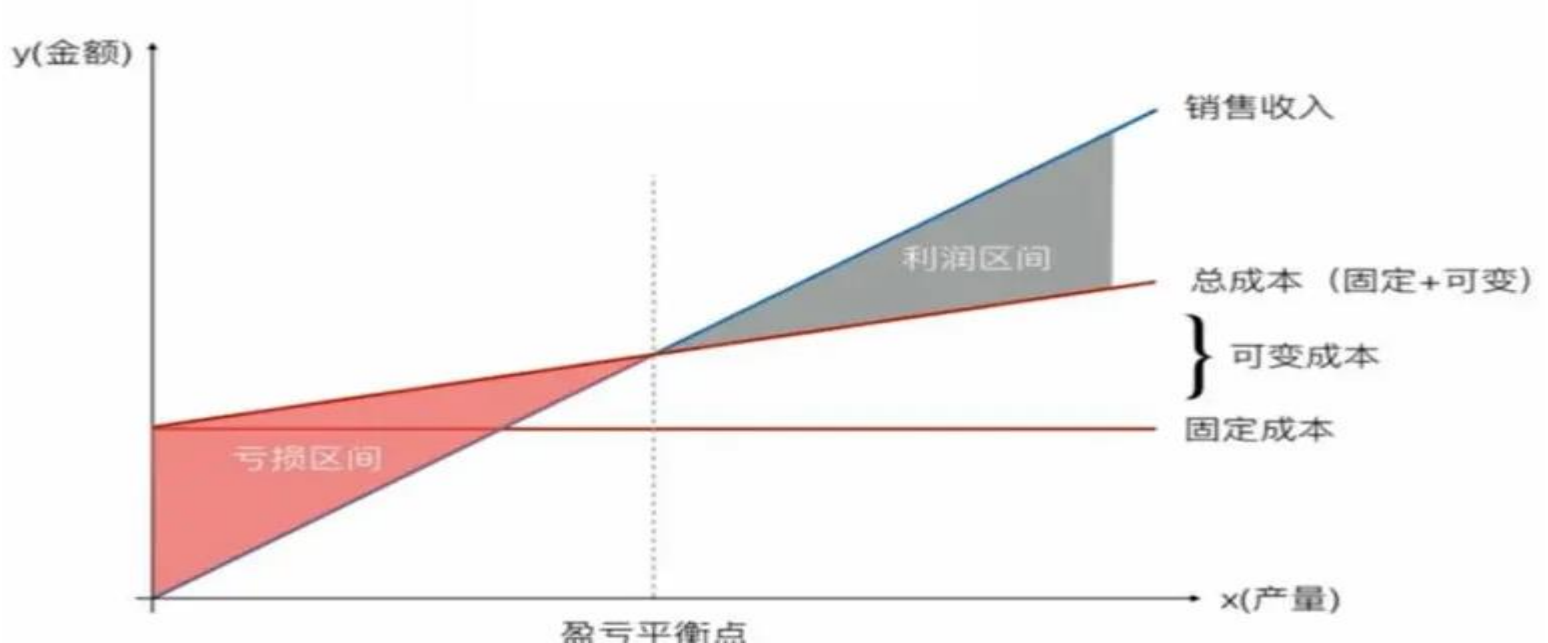
Discount rate	10%					
Project 2	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Benefits	1000	2000	4000	4000	4000	15000
	0.91	0.83	0.75	0.68	0.62	
	910	1660	3000	2720	2480	10770
Costs	2000	2000	2000	2000	2000	10000
	0.91	0.83	0.75	0.68	0.62	
	1,820	1660	1500	1360	1240	7580
NPV						**3190**

3. Methods for selecting projects

Return on investment : The higher the ROI, the better

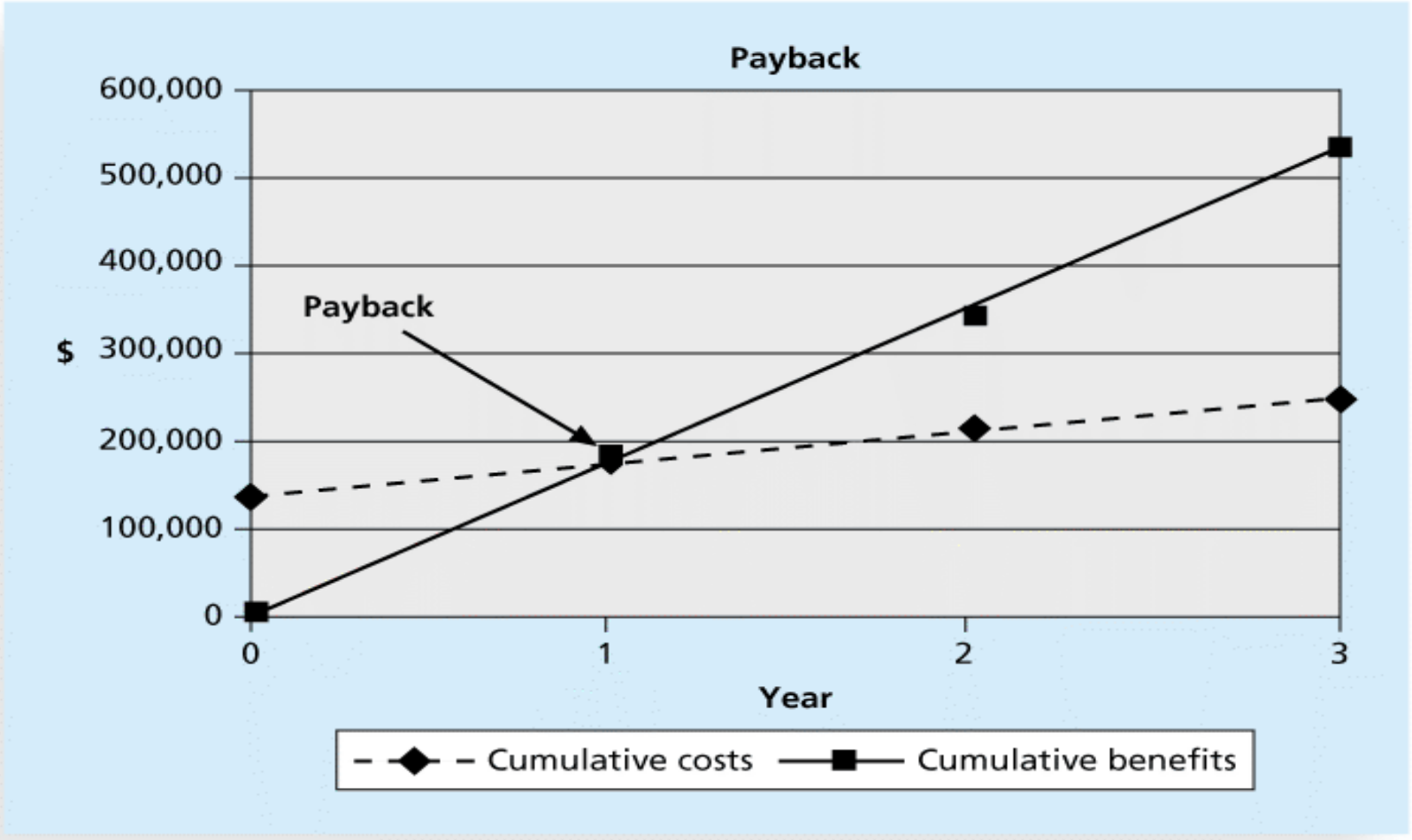
$$ROI = \frac{total\ discounted\ benefits - total\ discounted\ costs}{discounted\ costs}$$

Required rate of return is the minimum acceptable rate of return on an investment.



3. Methods for selecting projects

Payback period is the amount of time it will take to recoup the total dollars invested in a project, in terms of net cash inflows.



3. Methods for selecting projects

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					

3. Methods for selecting projects

Discount rate	10.00%					
Assume the project is completed in Year 0			**Year**			
	0	1	2	3	**Total**	
Costs	140,000	60,000	60,000	60,000		
Discount factor						
Discounted costs						
Benefits	0	200,000	250,000	250,000		
Discount factor						
Discounted benefits						
Discounted benefits - costs	(140,000)					**NPV**
Cumulative benefits - costs	(140,000)					
ROI						
		Payback in Year				

3. Methods for selecting projects

Discount rate	10.00%					
Assume the project is completed in Year 0			**Year**			
	0	1	2	3	**Total**	
Costs	140,000	60,000	60,000	60,000		
Discount factor	1.00	0.91	0.83	0.75		
Discounted costs	**140,000**	**54,600**	**49,800**	**45,000**	**289,400**	
Benefits	0	200,000	250,000	250,000		
Discount factor	1.00	0.91	0.83	0.75		
Discounted benefits	**0**	**182,000**	**207,500**	**187,500**	**577,000**	
Discounted benefits - costs	(140,000)	127,400	157,700	142,500	**287,600**	← **NPV**
Cumulative benefits - costs	(140,000)	-12,600	145,100	287,600		
		↑				
ROI →	**99%**					
	Payback in Year 2					

3. Methods for selecting projects

Using a weighted scoring model

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

$$Final\ score = \sum_{i=1,2,\ldots,n} \alpha_i * C_i$$

α_i: weights; C_i: criteria

List some possible criteria for IT projects ?

3. Methods for selecting projects

Possible criteria for IT projects include:

- Supports key business objectives
- Has strong internal sponsor;
- Has strong customer support
- Uses realistic level of technology
- Can be implemented in one year or less
- Provides positive NPV
- Has low risk in meeting scope, time, and cost goals

3. Methods for selecting projects

Using a weighted scoring model

The steps to build a weighted scoring model are：

- Identify criteria important to the project selection process
- Assign weights 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

3. Methods for selecting projects

	A	B	C	D	E	F
1	**Criteria**	**Weight**	**Project 1**	**Project 2**	**Project 3**	**Project 4**
2	Supports key business objectives	25%	90	90	50	20
3	Has strong internal sponsor	15%	70	90	50	20
4	Has strong customer support	15%	50	90	50	20
5	Uses realistic level of technology	10%	25	90	50	70
6	Can be implemented in one year or less	5%	20	20	50	90
7	Provides positive NPV	20%	50	70	50	50
8	Has low risk in meeting scope, time, and cost goals	10%	20	50	50	90
9	**Weighted Project Scores**	**100%**	**56**	**78.5**	**50**	**41.5**
10						
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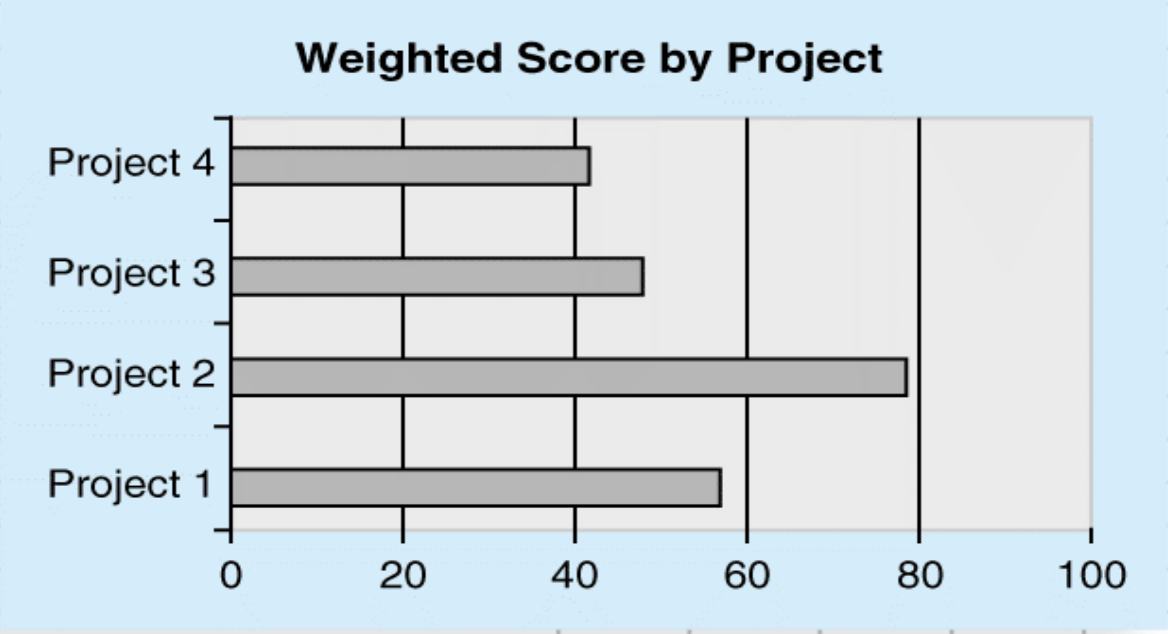


3. Methods for selecting projects

Implementing a balanced scorecard

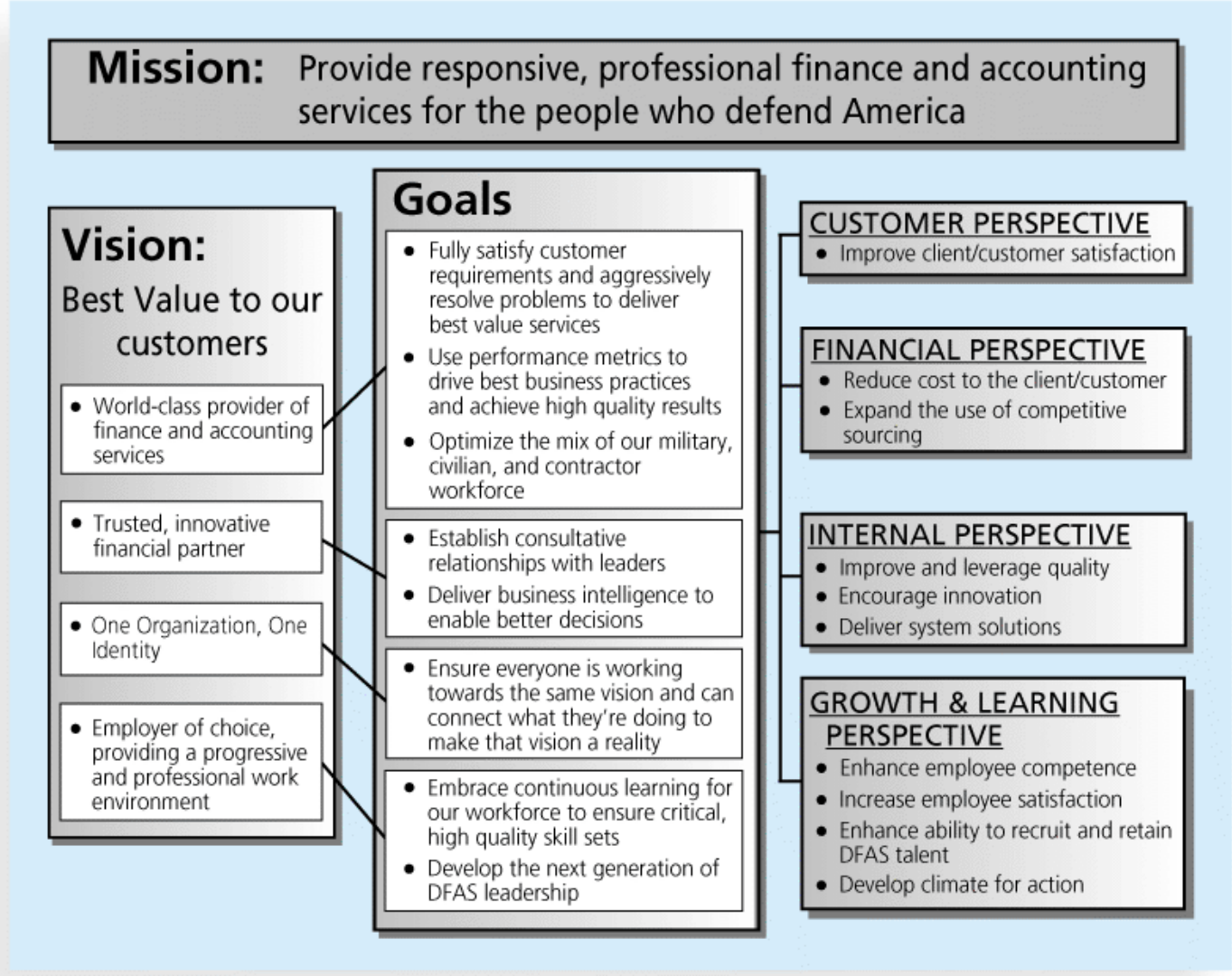
A balanced scorecard is a methodology that converts an organization's value drivers to a series of defined metrics, such as customer service, innovation, operational efficiency, and financial performance, to a series of defined metrics.

Drs. Robert Kaplan and David Norton developed this approach to help select and manage projects that align with business strategy.

Refer to www.balancedscorecard.org for more details

3. Methods for selecting projects

Implementing a balanced scorecard



3. Methods for selecting projects

Implementing a balanced scorecard

战略地图		平衡计分卡	
流程：运营管理 主题：地面周转	目标	指标	目标值
利润和RONA	•盈利性 •收入增长 减少飞机	•市场价值 •座位收入 •飞机租赁成本	•30%CAGR •20%CAGR •5%CAGR
吸引和保持更多的客户	•吸引和保持更多的客户 •航班准时 •最低票价	•回头客数量 •客户数量 •FAA准时到达率 •客户排序	•70% •每年提高12% •第一名 •第一名
快速地面周转	•快速地面周转	•降落时间 •准时起飞率	•30分钟 •90%
战略工作胜任管理 战略系统员工安排 地面员工协调一致	•开发必要的技能 •开发支持系统 •地面员工与战略协调一致	•战略工作准备度 •信息系统可用性 •战略意识 •地面员工持股比例	•第一年70%第三年90%第五年100% •100% •100% •100%

4. Developing a project charter

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

- Instead of project charters, some organizations initiate projects using *a simple letter of agreement*, while other use much longer *documents or formal contracts*.
- Key project stakeholders should sign a project charter to acknowledge agreement on the need and intent of the project; a signed charter is ***a key output*** of project integration management

4. Developing a project charter

Initiating

Process: develop project charter

Inputs: a statement of work;
a business case;
agreements;
enterprise environmental factors;
organizational process assets;

Output : project charter

Tools： **expert judgment**

facilitation techniques

(brainstorming and meeting management)

4. Developing a project charter

Inputs for Developing a Project Charter

- A project statement of work
- A business case
- Agreements
- **Enterprise environmental factors**
- **Organizational process assets,** which include formal and informal plans, policies, procedures, guidelines, information systems, financial systems, management systems, lessons learned, and historical information.

4. Developing a project charter

组织过程资产和事业环境因素的区别

组织过程资产	事业环境因素
组织过程资产是项目组可选择的、可裁剪的	事业环境因素是不可选择的、只能适应的、不可裁剪的
带程序的项目产出一般为组织过程资产，如变更控制程序、财务控制程序、问题与缺陷管理程序、风险控制程序等。	带系统的要素一般为事业环境因素，如项目管理信息系统、配置管理系统、信息收集与发布系统等。
组织过程资产是历史经验信息，对项目管理起到”帮助”作用	事业环境因素都是可观存在的，对项目管理起到“限制“作用

4. Developing a project charter

Project Title: DNA-Sequencing Instrument Completion Project
Date of Authorization: February 1
Project Start Date: February 1 **Projected Finish Date:** November 1

Key Schedule Milestones:

- Complete first version of the software by June 1
- Complete production version of the software by November 1

Budget Information: The firm has allocated $1.5 million for this project, and more funds are available if needed. The majority of costs for this project will be internal labor. All hardware will be outsourced.

Project Manager: Nick Carson, (650) 949-0707, ncarson@dnaconsulting.com

Project Objectives: The DNA-sequencing instrument project has been underway for three years. It is a crucial project for our company. This is the first charter for the project, and the objective is to complete the first version of the software for the instrument in four months and a production version in nine months.

Main Project Success Criteria: The software must meet all written specifications, be thoroughly tested, and be completed on time. The CEO will formally approve the project with advice from other key stakeholders.

Approach:

- Hire a technical replacement for Nick Carson and a part-time assistant as soon as possible.
- Within one month, develop a clear work breakdown structure, scope statement, and Gantt chart detailing the work required to complete the DNA sequencing instrument.
- Purchase all required hardware upgrades within two months.
- Hold weekly progress review meetings with the core project team and the sponsor.
- Conduct thorough software testing per the approved test plans.

ROLES AND RESPONSIBILITIES

Name	Role	Position	Contact Information
Ahmed Abrams	Sponsor	CEO	aabrams@dnaconsulting.com
Nick Carson	Project Manager	Manager	ncarson@dnaconsulting.com
Susan Johnson	Team Member	DNA expert	sjohnson@dnaconsulting.com
Renyong Chi	Team Member	Testing expert	rchi@dnaconsulting.com
Erik Haus	Team Member	Programmer	ehaus@dnaconsulting.com
Bill Strom	Team Member	Programmer	bstrom@dnaconsulting.com
Maggie Elliot	Team Member	Programmer	melliot@dnaconsulting.com

Sign-off: (Signatures of all the above stakeholders)

Ahmed Abrams
Susan Johnson
Erik Haus
Maggie Elliot
Nick Carson
Renyong Chi
Bill Strom

Comments: (Handwritten or typed comments from above stakeholders, if applicable)

"I want to be heavily involved in this project. It is crucial to our company's success, and I expect everyone to help make it succeed." —Ahmed Abrams

"The software test plans are complete and well documented. If anyone has questions, do not hesitate to contact me." —Renyong Chi

4. Developing a project charter

- The format of the charter can ***vary tremendously*** according to the type, size and complexity and some other factors of the projects.

- The difficult part is getting people with the proper knowledge and authority to write and sign the project charter.

5. Developing a project management plan

西北大学 Northwest University

Initiating
Process: develop project charter
Output: project charter

Planning
Process: develop project management plan
Output: project management plan

Executing
Process: direct and manage project work
Outputs: deliverables; work performance data; change requests;
project management plan updates;
project document updates

Monitoring and controlling
Process: monitor and control project work
Outputs: change requests; work performance report;
Process: perform integrated change control
Outputs: approved change requests; a change log; project document updates;

Closing
Process: close project or phase
Output: final product, service, or result transition

Project start **Project finish**

5. Developing a project management plan

Project management plan is a document used to coordinate all project planning documents and help ***guide a project's execution and control*.**

- Plans created in the other knowledge areas are subsidiary parts of the project management plan.
- Document planning assumptions, decisions, communication, content \ extent \ timing of key management reviews
- Provide a ***baseline*** for progress measurement and project control.

5. Developing a project management plan

Functions:

1. Guide the execution of the project
2. Help managers to manage and control team
3. Provide a benchmark for performance evaluation and measurement
4. Act as a platform for communications among stakeholders

5. Developing a project management plan

Planning

Process: develop project management plan

Inputs: project charter;

outputs from planning processes;

enterprise environmental factors;

organizational process assets;

Output： project management plan

Tools： expert judgment

5. Developing a project management plan

Project management plan is:

- Unique, dynamic, flexible, subject to change
- Fit the needs of specific projects
- As detailed as needed for each project

Project management plan contents:

- An introduction or overview of the project
- A description of how the project is organized
- The management and technical processes
- Sections describing the work, the schedule, and the budget

5. Developing a project management plan

Software Project Management Plan (SPMP) Outline

1. **Introduction**
   - Project Overview
   - Project Deliverables
   - Evolution of the SPMP
   - Reference Materials
   - Definitions and Acronyms

2. **Project Organization**
   - Process Model
   - Organizational Structure
   - Organizational Boundaries and Interfaces
   - Project Responsibilities

3. **Managerial Process**
   - Management Objectives and Priorities
   - Assumptions, Dependencies, and Constraints
   - Risk Management
   - Monitoring and Controlling Mechanisms Staffing Plan

4. **Technical Process**
   - Methods, Tools, and Techniques
   - Software Documentation
   - Project Support Functions

5. **Work Packages, Schedule, and Budget**
   - Work Packages
   - Dependencies
   - Resource Requirements
   - Budget and Resource Allocation
   - Schedule

5. Developing a project management plan

Table 4-2. Sample Contents for a Software Project Management Plan (SPMP)

MAJOR SECTION HEADINGS	SECTION TOPICS
Overview	Purpose, scope, and objectives; assumptions and constraints; project deliverables; schedule and budget summary; evolution of the plan
Project Organization	External interfaces; internal structure; roles and responsibilities
Managerial Process Plan	Start-up plans (estimation, staffing, resource acquisition, and project staff training plans); work plan (work activities, schedule, resource, and budget allocation); control plan; risk management plan; closeout plan
Technical Process Plans	Process model; methods, tools, and techniques; infrastructure plan; product acceptance plan
Supporting Process Plans	Configuration management plan; verification and validation plan; documentation plan; quality assurance plan; reviews and audits; problem resolution plan; subcontractor management plan; process improvement plan

IEEE Standard 1058-1998.

6. Directing and managing project work

Initiating
Process: develop project charter
Output: project charter

Planning
Process: develop project management plan
Output: project management plan

Executing
Process: direct and manage project work
Outputs: deliverables; work performance data; change requests;
project management plan updates;
project document updates

Monitoring and controlling
Process: monitor and control project work
Outputs: change requests; work performance report;
Process: perform integrated change control
Outputs: approved change requests; a change log; project document updates;

Closing
Process: close project or phase
Output: final product, service, or result transition

Project start → **Project finish**

6. Directing and managing project work

- Involves managing and performing the work described in the project management plan
- The majority of time and money is usually spent on execution
- The application area of the project directly affects project execution because the products of the project are produced during execution

6. Directing and managing project work

Executing

Process: direct and manage project work

Inputs: project management plan;
approved change requests;
enterprise environmental factors;
organizational process assets;

Outputs: deliverables; work performance data; change requests;
project management plan updates;
project document updates;

Tools: expert judgment; meetings;
project management information systems;

6. Directing and managing project work

coordinate Planning and Execution

- Project planning and execution are intertwined and inseparable activities
- Those who will do the work should help to plan the work
- Project managers must solicit input from the team to develop realistic plans

6. Directing and managing project work

Providing Leadership and a Supportive Culture

- Project managers must lead by example to demonstrate the importance of creating and then following good project plans
- Organizational culture can help project execution by
  - ✓ providing guidelines and templates
  - ✓ tracking performance based on plans
- Project managers may still need to break the rules to meet project goals, and senior managers must support those actions

6. Directing and managing project work

Capitalizing on Product, Business, and Application Area Knowledge

- It is often helpful for IT project managers to have prior technical experience
- *On small projects*, the project manager may be required to perform some of the technical work or mentor team members to complete the projects
- *On large projects,* the project manager must understand the business and application area of the project

6. Directing and managing project work

Project Execution Tools and Techniques

- ***Expert judgment***: Experts can help project managers and their teams make many decisions related to project execution.
- ***Meetings*****:** Meetings allow people to develop relationships, pick up on important body language or tone of voice, and have a dialogue to help resolve problems.
- ***Project management information systems***: There are hundreds of project management software products available on the market today, and many organizations are moving toward powerful enterprise project management systems that are accessible via the Internet.

7. Monitoring and controlling project work

Initiating
Process: develop project charter
Output: project charter

Planning
Process: develop project management plan
Output: project management plan

Executing
Process: direct and manage project work
Outputs: deliverables; work performance data; change requests;
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Outputs: approved change requests; a change log; project document updates;

Closing
Process: close project or phase
Output: final product, service, or result transition

Project start → **Project finish**

7. Monitoring and controlling project work

Monitoring project work includes collecting, measuring, and disseminating performance information, and also involves assessing measurements and analyzing trends to determine what process improvements can be made.

- Schedule and cost forecasts, ***validated changes,*** and work performance information provide details on how project execution is going.
- ***Change requests*** include ***recommended corrective*** and ***preventive actions*** and ***defect repairs***.

7. Monitoring and controlling project work

Monitoring and controlling

Process: monitor and control project work

Inputs: project management plan;
schedule and cost forecasts;
validated changes;
work performance information;
enterprise environmental factors;
organizational process assets;

Outputs： change requests;
work performance report;

8. Performing integrated change control

Integrated change control involves identifying, evaluating, and managing changes throughout the project life cycle.

- All projects will have some changes, and managing them is a key issue in project management, especially for IT projects.
- It is important that projects have a formal *change control system*.

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

- It also describes the people authorized to make changes,
- the paper work required for those changes,
- any automated or manual tracking systems the project will use.

8. Performing integrated change control

- A **change control system** is a formal, documented process that describes when and how official project documents and work may be changed
- Describes who is authorized to make changes and how to make them

◆ **change control board （ CCB ）**

◆ **Configuration management**

◆ **A process for communication changes**

8. Performing integrated change control

Change Control Board (CCB)

- A **change control board** is a formal group of people responsible for approving or rejecting changes on a project
- CCBs provide guidelines for preparing change requests, evaluate change requests, and manage the implementation of approved changes
- Includes stakeholders from the entire organization

8. Performing integrated change control

Configuration Management

- **Configuration management** ensures that the descriptions of the project's products are correct and complete。
- Involves identifying and controlling the functional and physical design characteristics of products and their support documentation
- Configuration management specialists **identify and document configuration requirements, control changes, record and report changes, and audit the products to verify conformance to requirements.**

8. Performing integrated change control

Monitoring and controlling

Process: perform integrated change control

Inputs: project management plan

work performance information

change requests

enterprise environmental factors

organizational process assets

Output : approved change requests

a change log

project document updates

Tools : CCB; Configuration management; communication

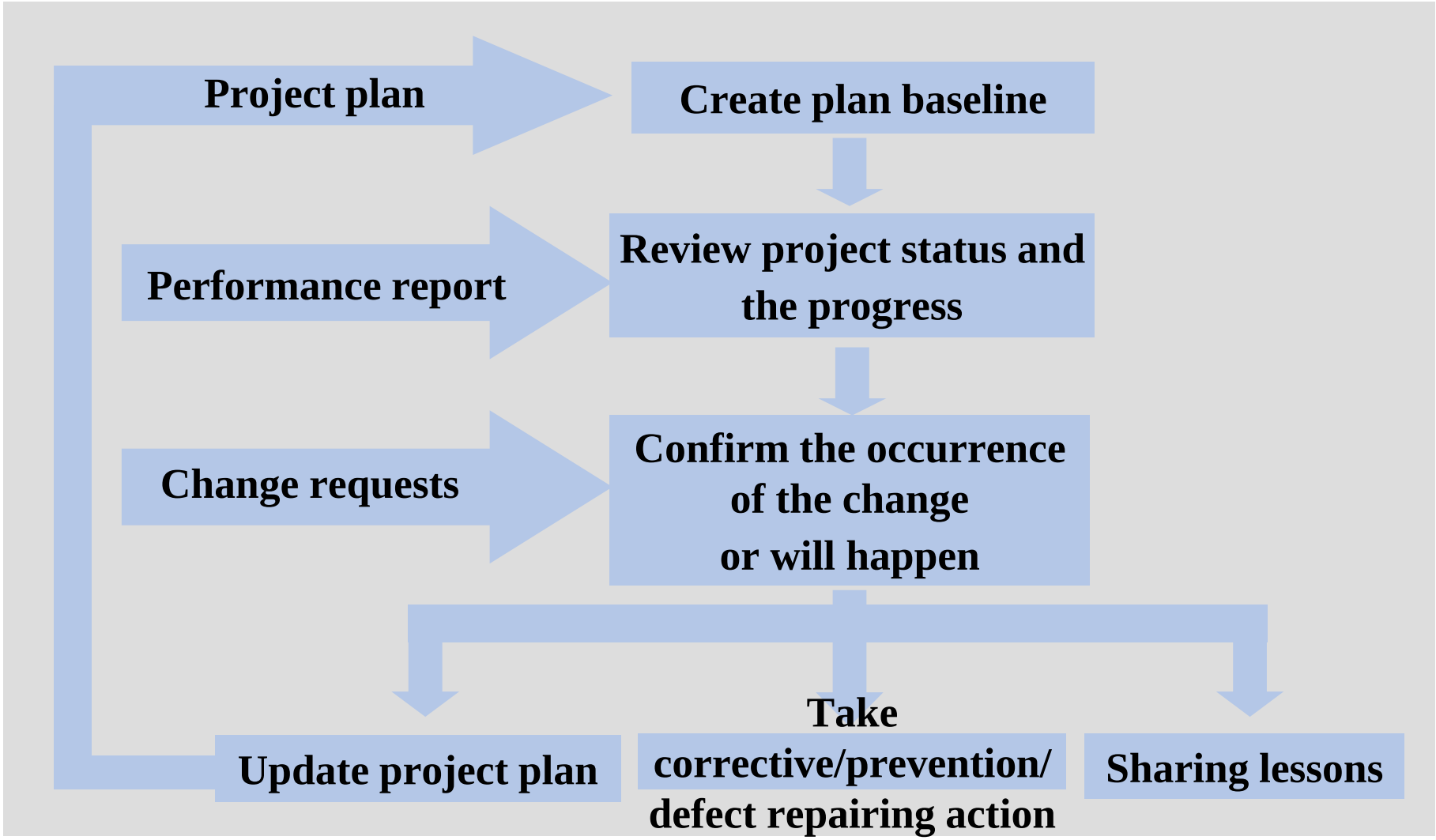
8. Performing integrated change control

- Three main objectives are:
  - Influencing the factors that create changes to ensure that changes are beneficial
  - Determining that a change has occurred
  - Managing actual changes as they occur

How to identifying project changes?

*The project management plan provides **the baseline** for identifying and controlling project changes.*

8. Performing integrated change control



一个变更失控的项目案例

王先生刚出任项目经理，并承接了一个中型软件项目。上任时公司高层再三叮咛他一定要尊重客户，充分满足客户需求。项目开始比较顺利，但进入到后期，客户频繁的需求变更带来很多额外工作。

王先生动员大家加班，保持了项目的正常进度，客户相当满意。但需求变更却越来越多。为了节省时间，客户的业务人员不再向王先生申请变更，而是直接找程序员商量。程序员疲于应付，往往直接改程序而不做任何记录，很多相关文档也忘记修改。很快王先生就发现：需求、设计和代码无法保持一致，甚至没有人能说清楚现在系统“到底改成什么样了”。

版本管理也出现了混乱，很多人违反配置管理规定，直接在测试环境中修改和编译程序。但在进度压力下，他也只能佯装不知此事。但因频繁出现“改好的错误又重新出现”的问题，客户已经明确表示“失去了耐心”。

一个变更失控的项目案例

而这还只是噩梦的开始。一个程序员未经许可擅自修改了核心模块，造成系统运行异常缓慢，大量应用程序超时退出。虽然最终花费了整整3天的时间解决了这个问题，但客户却投诉了，表示“无法容忍这种低下的项目管理水平”。更糟糕的是，因为担心系统中还隐含着其他类似的错误，客户高层对项目的质量也疑虑重重。

随后发生的事情让王先生更加为难：客户的两个负责人对界面风格的看法不一致，并为此发生了激烈争执。王先生知道如果发表意见可能会得罪其中一方，于是保持了沉默。最终客户决定调整所有界面，王先生只好立刻动员大家抓紧时间修改。可后来当听说因修改界面而造成了项目一周的延误后，客户方原来发生争执的两人这次却非常一致，同时气愤地质问王先生：“为什么你不早点告诉我们要延期!早知这样才不会让你改呢!”王先生委屈极了，疑惑自己到底错在哪里了。

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随后发生的事情让王先生更加为难：客户的两个负责人对界面风格的看法不一致，并为此发生了激烈争执。王先生知道如果发表意见可能会得罪其中一方，于是保持了沉默。最终客户决定调整所有界面， 王先生只好立刻动员大家抓紧时间修改。可后来当听说因修改界面而造成了项目一周的延误后，客户方原来发生争执的两人这次却非常一致，同时气愤地质问王先生：“为什么你不早点告诉我们要延期!早知这样才不会让你改呢!”王先生委屈极了，疑惑自己到底错在哪里了。

一个变更失控的项目案例

(1) 没有明确的授权。事先应该明确客户方有权提出变更申请的人员和实施方有权受理变更的人员，并要控制双方人数。

(2) 对变更没有进行必要的审核。并不是所有的变更都要修改，也不是所有变更都要立刻修改，审核的目的就是为了决定是否需要修改和什么时候修改。

(3) 对变更的影响没有评估。变更都是有代价的，应该评估一下变更的代价和对项目的影响，要让客户了解变更的后果，并与客户一起做判断。

(4) 应该让客户确认是否接受变更的代价。在评估代价并且与客户讨论的过程中，可以请客户一起做判断："我可以修改，但您能接受后果吗?"。

变更控制中需要注意的问题

要特别注意的是：要在项目开始就对项目组和客户进行宣传和培训，让所有成员都理解变更控制的重要意义；在项目过程中要对变更控制的执行情况进行审计，发现违反规定的事件要严肃处理，否则过程很快就会失效。

实施变更之前有四个重要控制点：

授权、审核、评估和确认；

在实施过程中要进行跟踪和验证，确保变更被正确执行。

项目管理离不开变更管理，项目经理所要做的既不是接受也不是拒绝，而是管理。

变更控制中需要注意的问题

4W1H	实施整体变更控制
what 做什么	审查所有变更请求 批准变更，管理可交付成果，项目文件和项目管理计划的变更，并对变更处理结果进行沟通的过程。 作用：确保对项目中已记录在案的变更做综合评审
why 为什么做	如果不考虑变更对整体项目目标或计划的影响就开展变更，往往会加剧整体项目风险
who 谁来做	项目管理团队进行，不涉及基准的，有储备的变更项目团队批准；设计基准的无储备的变更由CCB批准
when 什么时候做	本过程需要早整个项目期间开展
how 如何做	遵循整体变更控制流程 步骤，审查对项目文件，可交付成果或项目管理计划的所有变更请求，并决定对变更请求的处置方案， 专家判断 变更控制工具 数据分析 决策 会议

变更控制中需要注意的问题

5	变更申请日期： 年 月 日 要求完成日期： 年 月 日	
6	1 变更内容描述【业务用户】	描述变更接受对客户业务的正面促进
7		描述变更拒绝对客户业务的负面冲击
8	2 IT技术评审【技术经理】 技术可执行性评审意见 可行 不可行 技术	
9	方案监督描述（可选）	
10	3. 变更对进度的影响（天）【技术经理】	变更导致项目额外活动的工期综合（天）
11		如活动位于关键路径上，描述对于关键路径的影响（天）
12	4. 变更对产品质量的影响描述：	项目组需要额外的人数项目
13		人力成本（人时）： 人时工资率（元）：
14		非人力成本（元）：
15	5.变更对产品质量的影响描述：	变更对已有测试用例的影响
16		变更对已有测试任务的影响
17		变更对已有缺陷的影响
18	6. 因为变更而引起的风险	
19	7. CCB对变更的意见	
20	接受 不同意 搁置	
21	意见：	
22	CCB组长确认（PM）：	日期：年 月 日
23		

#	CCR	种类	变更原因与描述	提出日期	请求人	当前状态	状态日期	审批人	受影响的配置项	负责人	配置日期	关闭人
1	CCRO 01	Bug类	XXXXX	###	XXX	已归人	#####	XXX	Btp11 00.c	XXX	###	XXX
2												

8. Performing integrated change control

Change Control on Information Technology Projects

- **Former view**: The project team should strive to do exactly what was planned on time and within budget
- **Problem:** Stakeholders rarely agreed up-front on the project scope, and time and cost estimates were inaccurate
- **Modern view:** Project management is a process of constant communication and negotiation
- **Solution:** Changes are often beneficial, and the project team should plan for them

9. Closing projects or phases

Initiating
Process: develop project charter
Output: project charter

Planning
Process: develop project management plan
Output: project management plan

Executing
Process: direct and manage project work
Outputs: deliverables; work performance data; change requests;
project management plan updates;
project document updates

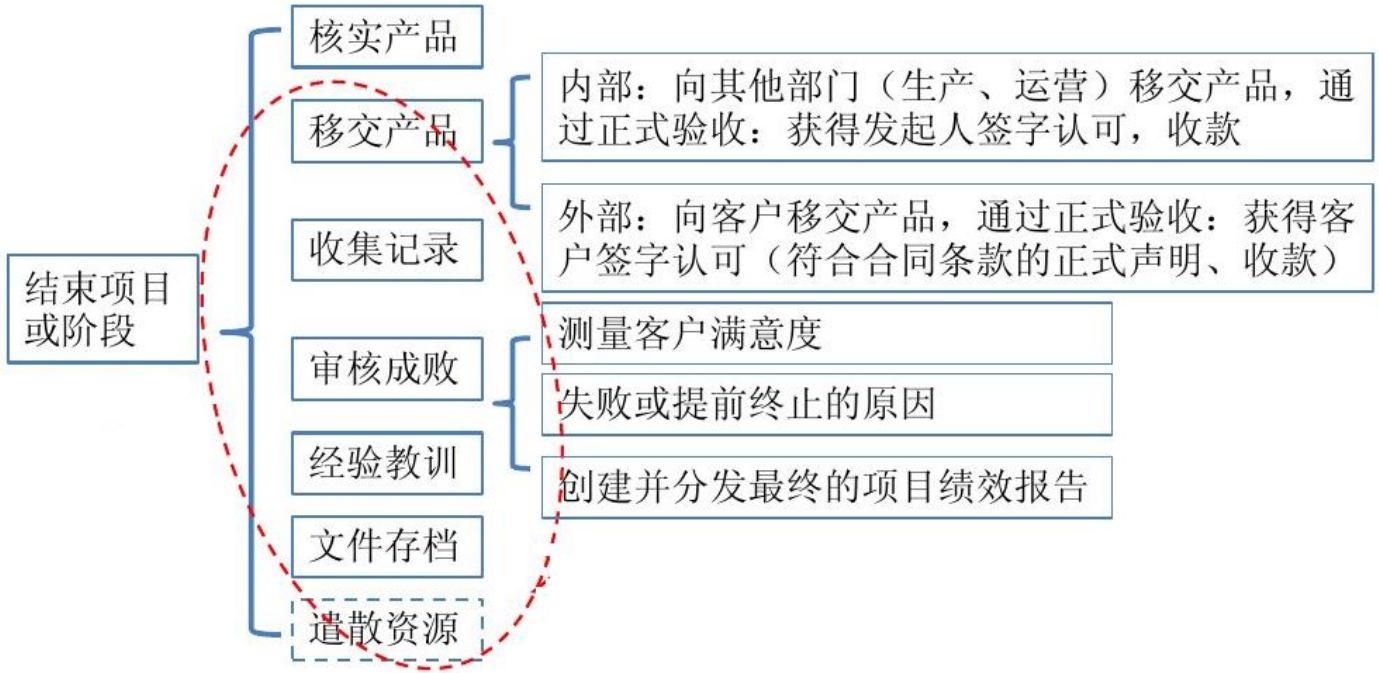
Monitoring and controlling
Process: monitor and control project work
Outputs: change requests; work performance report;
Process: perform integrated change control
Outputs: approved change requests; a change log; project document updates;

Closing
Process: close project or phase
Output: final product, service, or result transition

Project start **Project finish**

9. Closing projects or phases

- To close a project or phase, you must finalize all activities and transfer the completed or cancelled work to the appropriate people
- Main outputs include
  - Final product, service, or result transition
  - Organizational process asset updates



9. Closing projects or phases

Closing

Process: close project or phase

Inputs: project management plan;

accepted deliverables;

organizational process assets;

Output： final product, service, or result transition

organizational process asset updates

Tools： expert judgment

9. Closing projects or phases

9. Closing projects or phases

	行政收尾	合同收尾
定义	项目内部收尾程序	结束合同并结清账目，并与外部客户交接
发生时间	每个项目或阶段结束时，是项目或阶段最后的活动	合同活动结束时，在项目或阶段结束之前开展工作
经验总结方式	经验教训总结	采购审计
审批人	发起人或高级管理层向项目经理签发书面确认函	采购管理员签发书面确认函
交接对象	项目团队	外部客户
顺序	先处理合同收尾，再开展行政收尾。	
联系	◆ 核实产品 ◆ 总结经验教训 ◆ 整理并归档资料 ◆ 更新组织过程资产	

10. Using Software to Assist in Project Integration Management

- Several types of software can be used to assist in project integration management
- Documents can be created with word processing software
- Presentations are created with presentation software
- Tracking can be done with spreadsheets or databases
- Communication software like e-mail and Web authoring tools facilitate communications
- Project management software can pull everything together and show detailed and summarized information
- **Business Service Management** (BSM) tools track the execution of business process flows

10. Using Software to Assist in Project Integration Management

Figure 4-9. Sample Portfolio Management Software Screen

Summary

- Project integration management involves coordinating all of the other knowledge areas throughout a project's life cycle
- Main processes include
  - Develop the project charter
  - Develop the project management plan
  - Direct and manage project execution
  - Monitor and control project work
  - Perform integrated change control
  - Close the project or phase