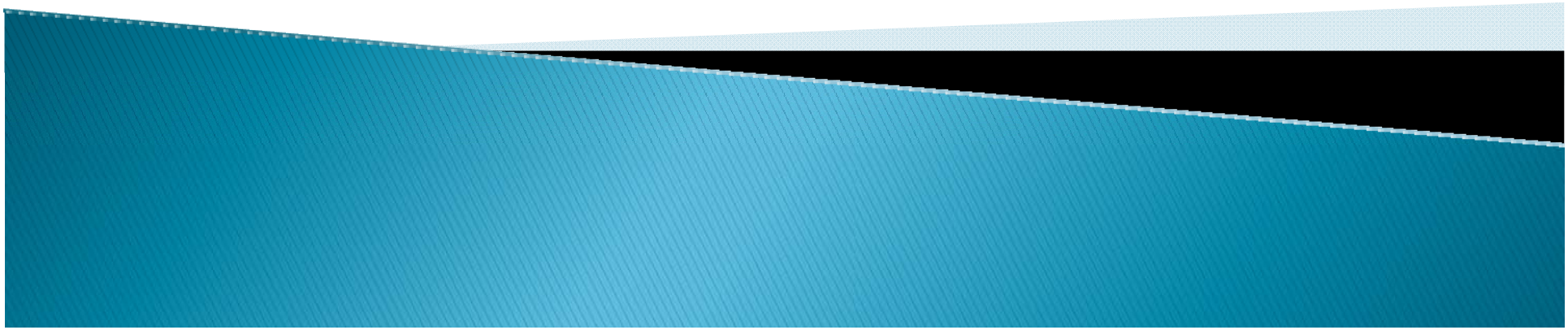
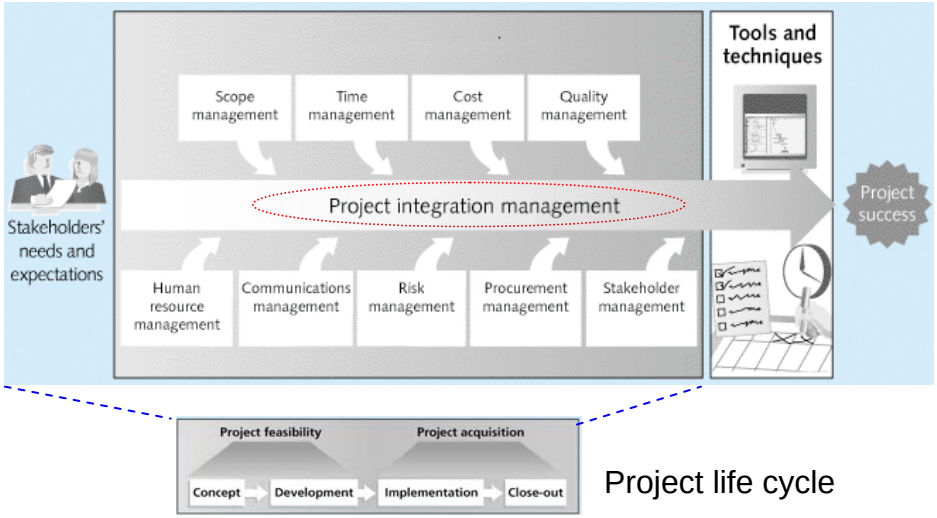
Project Integration Management



Project Integration Management



Project life cycle

Project Integration Management is **not** about managing software integration

- During the project life cycle, a project manager has to carry out scope management, time management, cost management, ...
- Keeping track of these tasks can be overwhelmingly hard
- Many new project managers have trouble looking at the “big picture” and prefer focusing only on some of the activities
- Project Integration Management is a way of making all relevant management processes work together throughout the project life cycle

Project Integration Management Processes

In order to coordinate all aspects of a project, project integration management needs a number of deliverables and activities

- 1. The Project Charter is what gives the authority to initiate the project and then used as a reference document when the project moves forward. It is usually written by the project sponsor.
- 2. The Project Management Plan is the master plan that includes an overview of the project and all planning documents such as the scope management, schedule, budget management, management of resources, risk management, *etc*

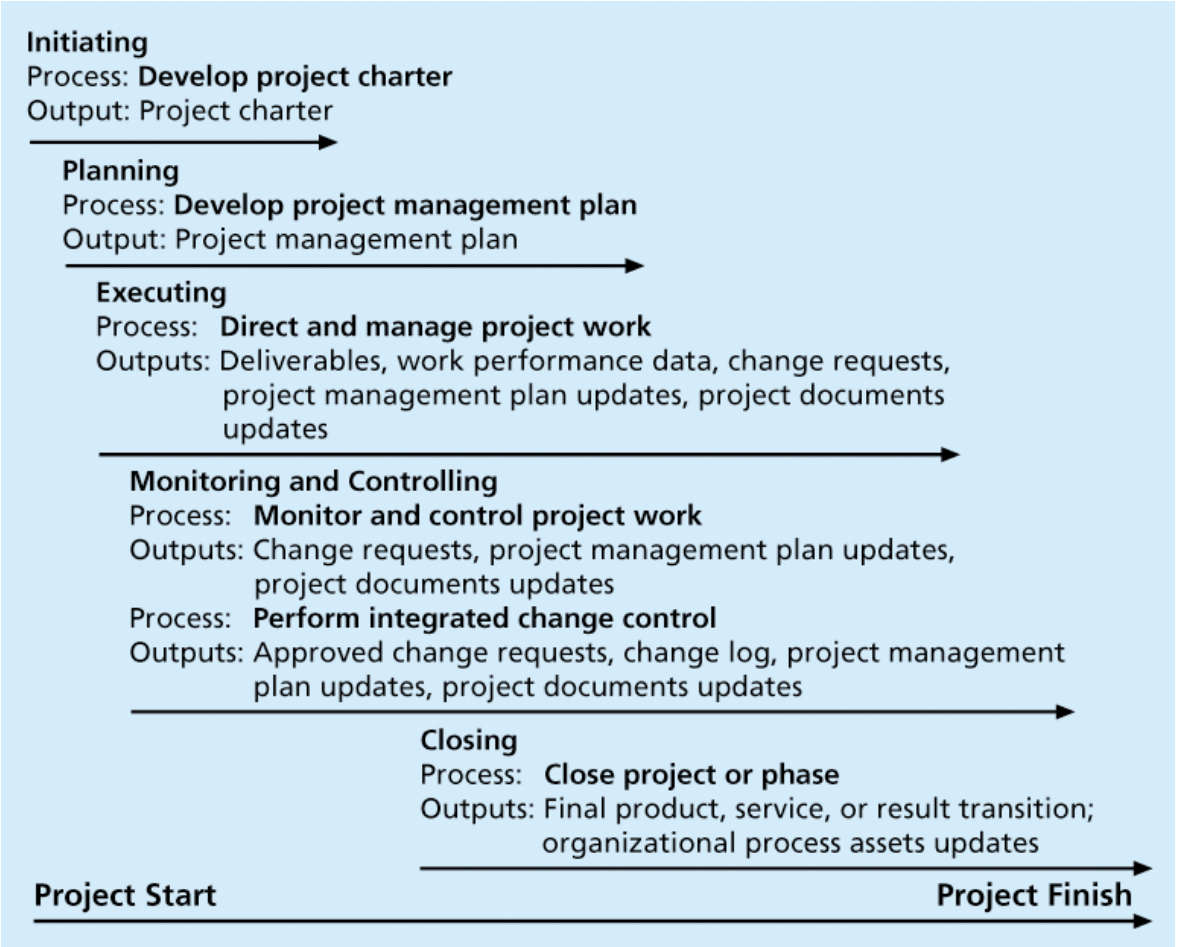
Project Schedule is not a Project Plan, it's just a part of it.

Project Integration Management Processes (cont'd)

- 3. Directing and Managing project work involves carrying out the project management plan by performing activities included in it, leading the project
- 4. Monitoring and Controlling project work involves overseeing activities to meet the performance objectives of the project, report its status
- 5. Integrated Change Control involves identifying, evaluating, and managing changes throughout the project life cycle, updating the project plan
- 6. Closing the project or phase involves finalizing all activities to formally close the project, review it, write conclusions and archive all project documents

Figure 4-1. Project Integration Management Summary

- PMBOK Guide defines six main deliverables and activities of the Project Integration Management
- Project manager's major efforts are related to integration management
- Project integration management must be carried out within the context of the entire organization instead of just a particular project



Initiating: Selecting Projects

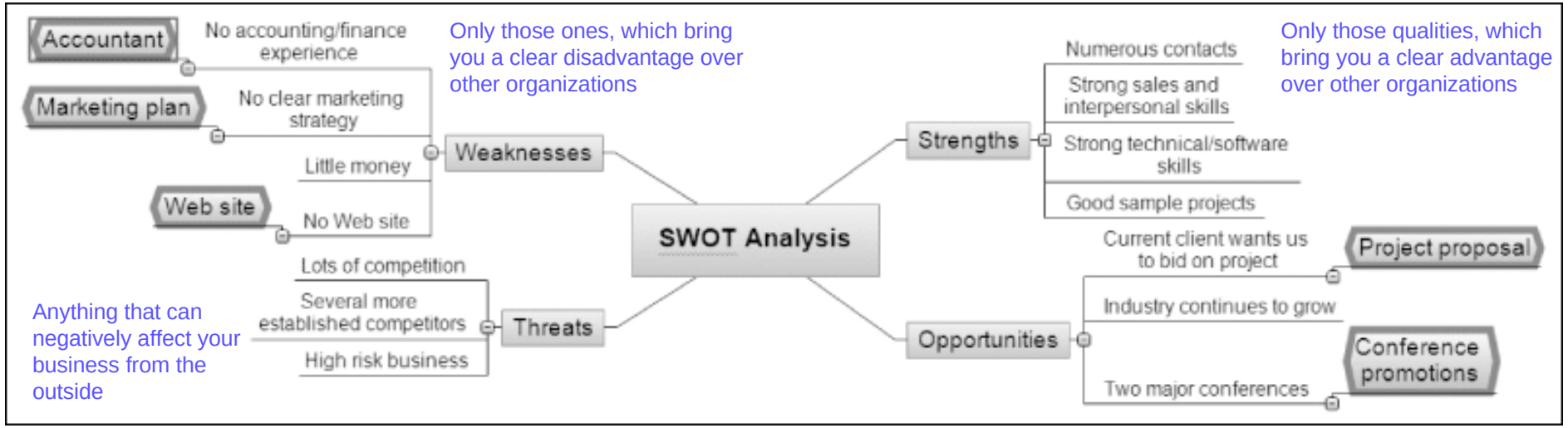
- An enthusiastic and creative IT manager usually can propose more projects than available time and resources to implement them
- It is often more difficult to provide strong business justification for an IT project than identify its scope
- Three important criteria for initiating projects:
  - There is a ***business need*** for the project
  - There are ***funds*** available to complete it
  - There's a strong ***will*** to make the project succeed

Strategic Planning and Project Selection

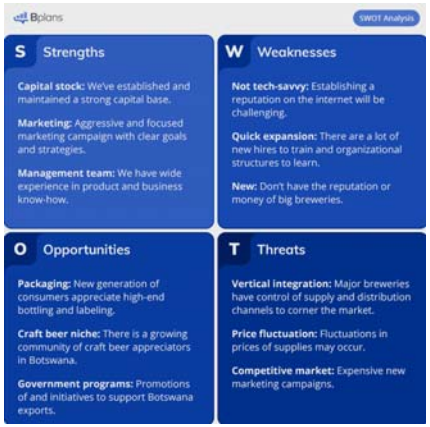
- You need to understand strategic plans of your organization to initiate the most valuable projects
- Strategic planning involves determining long-term objectives, predicting future trends, and projecting the need for new products and services
- Organizations often perform a SWOT analysis
  - analyzing **S**trengths, **W**eaknesses, **O**pportunities, and **T**hreats
- As part of strategic planning, organizations
  - identify potential projects
  - use realistic methods to select which projects to work on
  - formalize project initiation by issuing a project charter

Figure 4-2. Mind Map of a SWOT Analysis to Help Identify Potential Projects

- Most commonly, SWOT analysis is used at the organizational level

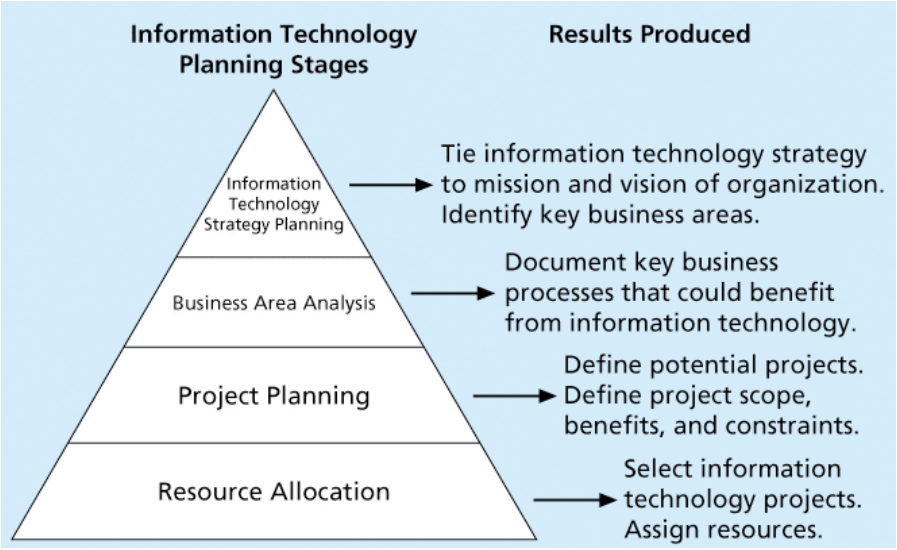


- Prepare a SWAT analysis diagram or a matrix
  - think of Strengths and Weaknesses as internal factors
  - consider Opportunities and Threats as external factors
- Analyze your position and update your strategic plan



A SWAT matrix

Figure 4-3. Information Technology Planning Process



- The updated strategic plan of the organization is used as a basis for selecting potential projects
- The process is hierarchical and commonly has four stages
- Commonly, a steering committee is established to facilitate the project selection process

Financial Analysis of Projects

- Financial considerations are often an important consideration in selecting projects
- The primary purpose of doing a financial analysis of a project is to evaluate the project profitability or cost-effectiveness relative to some alternative project
- Three primary methods for determining the projected financial value of projects:
  - Net present value (NPV) analysis
  - Return on investment (ROI)
  - Payback analysis

Net Present Value Analysis

- Basic calculation of profit may not be accurate for long term projects if it does not take into account fluctuation of real value of money

  profit = revenue - costs

- 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
- Projects with the highest NPV are more favorable (providing they have similar total cash flow)

Figure 4-4. Net Present Value Example

	A	B	C	D	E	F	G
1	Discount rate	10%					
2							
3	PROJECT 1	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
4	Benefits	$0	$2,000	$3,000	$4,000	$5,000	$14,000
5	Costs	$5,000	$1,000	$1,000	$1,000	$1,000	$9,000
6	Cash flow	($5,000)	$1,000	$2,000	$3,000	$4,000	$5,000
7	NPV →	$2,316					
8		Formula =npv(b1,b6:f6)					
9							
10	PROJECT 2	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
11	Benefits	$1,000	$2,000	$4,000	$4,000	$4,000	$15,000
12	Costs	$2,000	$2,000	$2,000	$2,000	$2,000	$10,000
13	Cash flow	($1,000)	$0	$2,000	$2,000	$2,000	$5,000
14	NPV →	$3,201					
15		Formula =npv(b1,b13:f13)					
16							
17							

Note that totals are equal, but NPVs are not because of the time value of money

According to the NPV criterion, Project 2 is a better choice

NPV Calculations

1. Determine estimated costs and benefits for the life of the project (Cash flow for each year)
2. Determine the discount rate (check with your organization on what to use)
3. Calculate NPVs for each year i

$$NPV_i = CashFlow_i / (1+r)^i$$

4. Calculate the NPV as a sum of NPVs

$$NPV = \Sigma NPV_i$$

Notes:

- Some organizations consider the investment year as year 0, while others start in year 1. Some people entered costs as negative numbers, while others do not. Check your organization preferences.
- NPV analysis may be inaccurate
  - the actual discount rate may change over time
  - projects that you try to compare can have different scale and duration
  - some unanticipated expenditures may come to surface at later project stages

Return on Investment

- A financial criterion that is also used for project selection
- Return on investment (ROI) is calculated by subtracting the project costs from the benefits and then dividing by the costs

  ROI = (total discounted benefits - total discounted costs) / discounted costs

- It's convenient to express it using %
- The higher the ROI, the better for the project
- Many organizations have a minimum acceptable rate for Return on Investment for projects
- ROI does not take time into account and the scale of projects

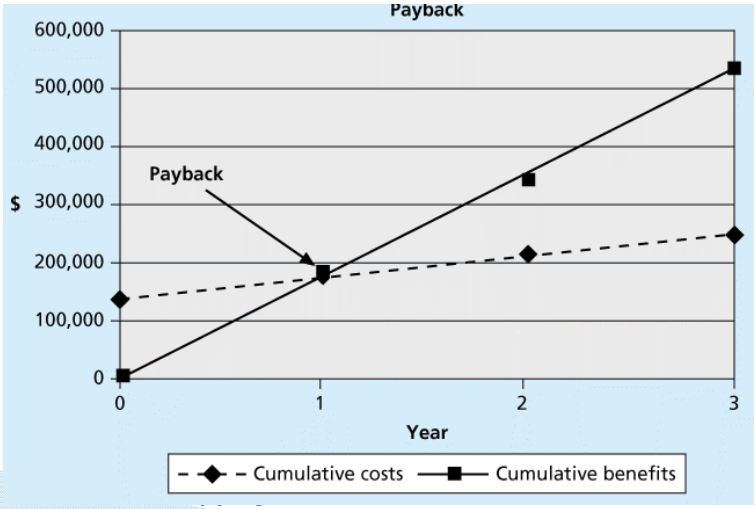
Figure 4-5. JWD Consulting NPV Example

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					

*ROI = (516 000 – 243 000)/ 243 000 = 1.12 *100% = 112%*

Payback Analysis

- Payback Analysis complements ROI by analyzing how soon the project may become profitable
- The payback period is the amount of time it will take to recoup, in the form of net cash inflows, the total dollars invested in a project
- Payback occurs when the net cumulative discounted benefits equals the costs
- Many organizations want IT projects to have a fairly short payback period

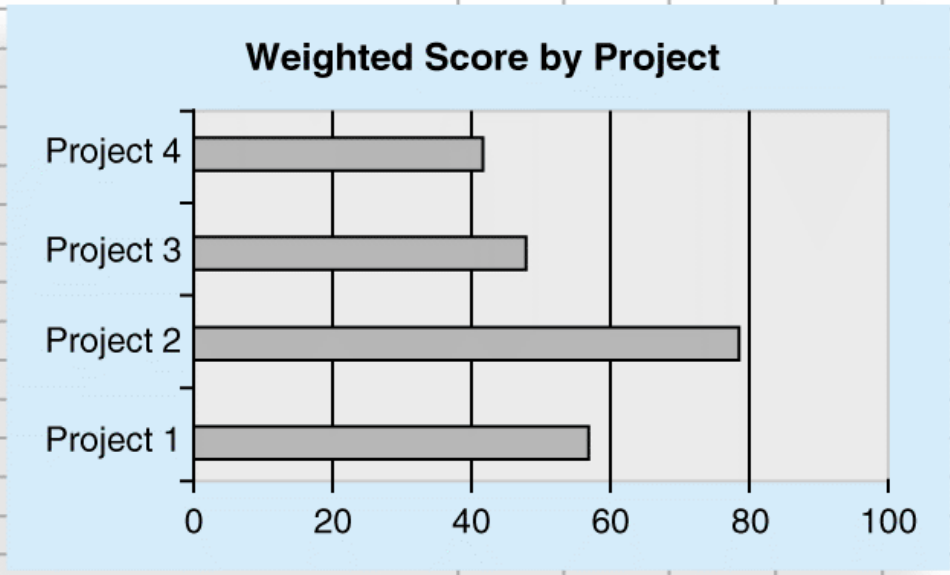


Weighted Scoring Model

- Some project selection criteria cannot be easily measurable, or their values cannot be directly compared against other criteria
- A weighted scoring model is a tool that provides a systematic process for selecting projects based on multiple criteria
  - 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

Figure 4-7. Sample Weighted Scoring Model for Project Selection

	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						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						



Initiating: Project Charter

- After deciding what project to work on, it is important to inform the rest of the organization
- Project Charter is not prepared by lawyers and it does not carry any legal weight
- Project Charter is a document that formally recognizes the existence of a project and outlines the project objectives, assigned staff and management
- PMBOK Guide has a section “Develop Project Charter”
  - “authorizes the existence of a project”
  - “provides the project manager with the authority”
- Assigned project managers should check that:
  - definitions of the boundaries of their authority are explained
  - project alignment to organizational strategy is very clear
  - key project stakeholders sign the project charter

Inputs for Developing a Project Charter

- The PMBOK Guide lists specific information that the charter should provide
  - A project statement of work
    - the product to be created, requirements and specifications
  - A business case
    - justification of investment, alignment to organizational strategy, success criteria
  - Enterprise environmental factors
    - relevant government and industry standards and company's infrastructure
  - Organizational process assets
    - company's policies, procedures, guidelines, information systems, financial systems, management systems that can affect the project
  - Agreements (if under contract)
    - references to contracts or work orders

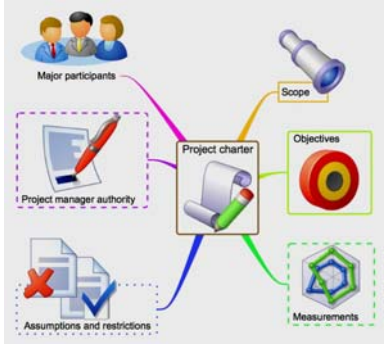


Table 4-1. Project Charter for the DNA-Sequencing Instrument Completion Project

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.

Table 4-1. Project Charter (cont.)

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

Figure 3-2. Kick-off Meeting Agenda

• The agenda needs preparation before the meeting
• Allocate time for each agenda item to prevent endless discussions
• Distribute it in advance

Kick-Off Meeting
[Date of Meeting]

Project Name: Project Management Intranet Site Project

Meeting Objective: Get the project off to an effective start by introducing key stakeholders, reviewing project goals, and discussing future plans

Agenda:

- Introductions of attendees
- Review of the project background
- Review of project-related documents (i.e., business case, project charter)
- Discussion of project organizational structure
- Discussion of project scope, time, and cost goals
- Discussion of other important topics
- List of action items from meeting

Action Item	Assigned To	Due Date

Date and time of next meeting:

- The first meeting between a project team, a sponsor and the client
- The manager should provide information to the team about the client and the project (so team members will not ask confusing questions in front of the client)

Planning: Project Management Plan

- Project planning is one of the most challenging tasks for project managers
- According to the PMBOK Guide, Project Management Plan is a document used to coordinate all project planning documents and help guide both project execution and control. Major input – the Project Charter
- Most of the work of project planning is thinking about what you need to do to get everything done and proper structuring of your findings
  - **Why** is it being initiated and funded ?
  - **What** are the major products and deliverables?
  - **Who** will be involved, responsible and organized?
  - **When** will the project and its milestones be completed?

Project Management Plan Content


IEEE Std 1058-1998

IEEE Standard for Software Project Management Plans

Sponsor

Software Engineering Standards Committee of the IEEE Computer Society

Approved 8 December 1998

IEEE-SA Standards Board

- Title page
- Records of change - versions
- Table of Contents with links to chapters
- Project Overview
  - Project name - a unique name to avoid confusion with other projects
  - A brief description - project goals, duration, estimated cost
  - The sponsor's name and contact details
  - Names of the project manager and team members
  - Project Deliverables – a list and brief description minimising technical terms
  - Important reference materials – all document needed for the project
  - Definitions and acronyms – IT terms which can confuse VPs

Project Management Plan Content

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.

There are many project plan templates available online that have been created according to IEEE 1058-1998 or ISO 16326:2009 standards

Executing: Directing and Managing

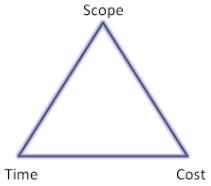
- Involves managing and performing the work described in the Project Management Plan
  - guide, train, and motivate staff to achieve project goals
- Project planning and execution are interrelated and inseparable activities
  - Those who will do the work should help to plan the work
  - Project managers must use input from the team to develop realistic plans
- Good planning is not sufficient for success
- Organizational culture can help project execution by
  - providing guidelines and templates
  - tracking project progress
  - resolving political issues

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

Monitoring and Controlling

- The purpose of monitoring is to keep the project on track
  - Check the plan
  - Check what is actually happening and compare the two
  - Rectify problems
- Changes are inevitable on most projects, so it's important to develop and follow a process to monitor and control changes
  - Reactive control – timely response to solve problems
  - Proactive control – analyze in advance and steer away from problems
- Monitoring project work includes collecting, measuring, and disseminating performance information
- A **baseline** is the approved project management plan plus approved changes

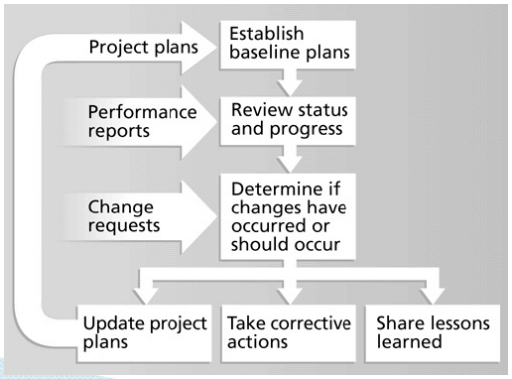


Change Control on Information Technology Projects

- Former view: The project team should strive to do exactly what was planned on time and within budget
- Problem:
  - Stakeholders rarely agreed at the planning stage on the project scope,
  - Time and cost estimates were usually inaccurate
  - Projects frequently could not meet the original goals
- Modern view: Project management is a process of constant communication and negotiation
- Solution: Changes can be beneficial providing that projects have a formal change control system

Performing Integrated Change Control

- Project change requests may be frequent and may come in many different forms
- Some changes may cause substantial impact on projects
- Integrated Change Control is needed to
  - Influence the factors that cause changes to ensure that changes are beneficial in terms how they affect major project constraints
  - Determine that a change has occurred by checking the project status
  - Manage actual changes as they occur to minimize their negative impact



Change Control System

- Change Control System is a formal, documented process that describes when and how official project documents and work may be changed
- Describes who can authorize to make changes and how to make them
- A very critical factor in change control is efficient communication to notify everyone involved

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

Making Timely Changes

- Some CCBs only meet occasionally, so it may take too long for changes to occur
- Some organizations have policies in place for time-sensitive changes
  - “48-hour policy” allows project team members to make decisions, then they have 48 hours to reverse the decision pending senior management approval
  - Delegate changes to the lowest level possible, but keep everyone informed of changes

Configuration Management

- Misinterpretation of technical requirements is typical of complex IT projects
- Configuration management ensures that the project products and deliverables meet the specified performance criteria
- Involves identifying and controlling the functional and physical design characteristics of products and their support documentation
  - break down the work into component deliverables (configuration items)
  - ensure that all changes to configuration items during the project are documented
  - determine whether deliverables conform to their requirements

Table 4-3. Suggestions for Performing Integrated Change Control

View project management as a process of constant communication and negotiation.
Plan for change.
Establish a formal change control system, including a change control board (CCB).
Use effective configuration management.
Define procedures for making timely decisions on smaller changes.
Use written and oral performance reports to help identify and manage change.
Use project management and other software to help manage and communicate changes.
Focus on leading the project team and meeting overall project goals and expectations.

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
  - Delivery of the final product confirmed by a project completion document (contact completion)
  - Organizational process asset updates – a set of project documents for archiving

Chapter 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