

Chapter-1

Advantages of using formal project management:

1. Better control of financial, physical, and human resources
2. Improved customer relations
3. Shorter development times
4. Lower costs
5. Higher quality and increased reliability
6. Higher profit margins
7. Improved productivity
8. Better internal coordination
9. Higher worker morale

Project: is a temporary endeavor undertaken to create a unique product, service, or result.

- **Operations:** is work done to sustain the business
- **Projects end** when their objectives have been reached or the project has been terminated
- **Projects** can be large or small and take a short or long time to complete
- The world as a whole spends nearly \$10 trillion (25%) of its \$40.7 trillion gross product on projects of all kinds
- More than 16 million people regard project management as their profession

Project Attributes:

- Project Has a unique purpose
- Project Is temporary
- Project Is developed using progressive elaboration
- Project Requires resources, often from various areas
- Project Should have a primary customer or sponsor
 - The project sponsor usually provides the direction and funding for the project
- Project Involves uncertainty

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

Program: group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually

Program managers oversee programs; often act as bosses for project managers, provides leadership and direction for the project managers heading the projects within the program

The Triple Constraint of Project Management: Successful project management means meeting all three **goals (scope, time, and cost)** – and satisfying the project’s sponsor!

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

Project managers strive to meet the **triple constraint** by balancing project scope, time, and cost goals

Project Management Framework (Project Management Knowledge Areas):

- 4 **core** knowledge areas lead to specific project objectives (**scope, time, cost, and quality**)
- 4 **facilitating** knowledge areas are the means through which the project objectives are achieved (**human resources, communication, risk, and procurement management**)
- 1 knowledge area (**project integration management**) affects and is affected by all of the other knowledge areas

Stakeholders: are the people involved in or affected by project activities

Stakeholders include:

- The project sponsor
- The project team
- Customers
- Suppliers
- The project manager
- Support staff
- Users
- Opponents to the project

Project management tools and techniques assist project managers and their teams in various aspects of project management, some specific ones include

- Project charter, scope statement, and WBS (**scope**)
- Gantt charts, network diagrams, critical path analysis, critical chain scheduling (**time**)
- Cost estimates and earned value management (**cost**)

Super Tools: are those tools that have high use and high potential for improving project success, such as:

- Software for task scheduling (such as project management software)
- Scope statements
- Requirements analyses
- Lessons-learned reports

Tools already extensively used that have been found to improve project importance include:

- Progress reports
- Kick-off meetings
- Gantt charts
- Change requests

Why the Improvements Project Performance?

The reasons for the increase in successful projects vary. First, the **average cost** of a project has been more than **cut in half**. **Better tools** have been created to monitor and control progress and **better skilled project managers with better management processes** are being used. The fact that there are processes is significant in itself.

Project Success: There are several ways to define project success:

- The project met scope, time, and cost goals
- The project satisfied the customer/sponsor
- The results of the project met its main objective, such as making or saving a certain amount of money, providing a good return on investment, or simply making the sponsors happy

What Helps Projects Succeed?

- Executive support
- Experienced project manager
- Minimized scope
- Firm basic requirements
- Reliable estimates
- User involvement
- Clear business objectives
- Standard software infrastructure
- Formal methodology
- Other criteria, such as small milestones, proper planning, competent staff, and ownership.

What the Winners Do:

- Use an integrated project management toolbox (use standard/advanced PM tools, lots of templates)
- Grow project leaders, emphasizing business and soft skills
- Develop a streamlined project delivery process
- Measure project health using metrics, like customer satisfaction or return on investment

Project portfolio management, organizations group and manage projects and programs as a portfolio of investments that contribute to the entire enterprise's success

Portfolio managers help their organizations make wise investment decisions by helping to select and analyze projects from a strategic perspective

Project Management **Compared** to Project Portfolio Management:

Project Management (Tactical Goals)	Project Portfolio Management (Strategic Goals)
<ul style="list-style-type: none"> ▪ Are we carrying out projects well? ▪ Are projects on time and on budget? ▪ Do project stakeholders know what they should be doing? 	<ul style="list-style-type: none"> ▪ Are we working on the right projects? ▪ Are we investing in the right areas? ▪ Do we have the right resources to be competitive?

best practice is “an optimal way recognized by industry to achieve a stated goal or objective

- Make sure your projects are driven by your strategy; be able to demonstrate how each project you undertake fits your business strategy, and screen out unwanted projects as soon as possible
- Engage your stakeholders; ignoring stakeholders often leads to project failure; be sure to engage stakeholders at all stages of a project, and encourage teamwork and commitment at all times

portfolio categories: marketing, materials, IT, and human resources (HR).

IT project portfolio categories:

- **Venture:** Projects in this category help transform the business.
- **Growth:** Projects in this category would help the company grow in terms of revenues
- **Core:** Projects in this category must be accomplished to run the business.

Suggested Skills for Project Managers:

- Be comfortable with change
- Understand the organizations they work in and with
- Be able to lead teams to accomplish project goals
- 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

Role of the Project Manager: Job descriptions vary, but most include responsibilities like planning, scheduling, coordinating, and working with people to achieve project goals

Ten Most Important Skills and Competencies for Project Managers:

- | | |
|--------------------------------------|--|
| ▪ People skills | ▪ Leadership |
| ▪ Listening | ▪ Integrity, ethical behavior, consistent |
| ▪ Strong at building trust | ▪ Verbal communication |
| ▪ Strong at building teams | ▪ Conflict resolution, conflict management |
| ▪ Critical thinking, problem solving | ▪ Understands, balances priorities |

Different Skills Needed in Different Situations:

- **Large projects:** leadership, relevant prior experience, planning, people skills, verbal communication, and team-building skills were most important
- **High uncertainty projects:** risk management, expectation management, leadership, people skills, and planning skills were most important
- **Very novel projects:** leadership, people skills, having vision and goals, self-confidence, expectations management, and listening skills were most important

Importance of Leadership Skills:

- **Effective project managers** provide leadership by example
- A **leader** focuses on long-term goals and big-picture objectives while inspiring people to reach those goals
- A **manager** deals with the day-to-day details of meeting specific goals
- Project managers often take on the role of **both leader and manager**

Ethics in Project Management:

- Ethics, loosely defined, is a set of principles that guide our decision making based on personal values of what is “right” and “wrong”
- Project managers often face ethical dilemmas

Project Management Software:

- **Low-end tools:** handle single or smaller projects well, cost under \$200 per user
- **Midrange tools:** handle multiple projects and users, cost \$200-600 per user, Project 2007 most popular
- **High-end tools:** also called enterprise project management software, often licensed on a per-user basis, like VPMi Enterprise Online.

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Project Cannot Be Run in Isolation:

- Projects must operate in a broad organizational environment
- Project managers need to use systems thinking:
 - Taking a holistic view of carrying out projects within the context of the organization
- Senior managers must make sure projects continue to support current business needs

System View Of Project Management:

systems approach emerged in the 1950s to describe a more analytical approach to management and problem solving, three parts include:

- **Systems philosophy:** an overall model for thinking about things as systems
- **Systems analysis:** problem-solving approach
- **Systems management:** address business, technological, and organizational issues before making changes to systems

The Three-Sphere Model for Systems Management:

1. **Business**
 - a. What will the laptop project cost the college?
 - b. What will it cost students?
2. **Organization**
 - a. How will the project affect students who already have PCs or laptops?
 - b. Who will train students, faculty, and staff?
3. **Technology**
 - a. Should the laptops use Macintosh, Windows, or both types of operating systems?
 - b. What applications software will be loaded?

The Four Frames of Organizations:

1. **Structural Frame:** Focuses on roles and responsibilities, coordination and control. Organization chart help define this frame.
2. **Human Resources (HR) Frame:** Focuses on providing harmony between needs of the organization and needs of people.
3. **Political Frame:** Assumes organizations are coalitions composed of varied individuals and interest groups. Conflict and power are key issues.
4. **Symbolic Frame:** Focuses on symbols and meanings related to events. Culture is important.

3 basic organization structures:

- **Functional:** functional managers' report to the CEO
- **Project:** program managers report to the CEO
- **Matrix:** middle ground between functional and project structures; personnel often report to two or more bosses; structure can be weak, balanced, or strong matrix

Organizational culture is a set of shared assumptions, values, and behaviors that characterize the functioning of an organization

- ❖ Many experts believe the underlying causes of many companies' problems are not the structure or staff, **but the culture**

Ten characteristics of organizational culture:

- | | | |
|-----------------------|-----------------------|--------------------------|
| ❖ Member identity* | ❖ Group emphasis* | ❖ People focus |
| ❖ Unit integration* | ❖ Control | ❖ Risk tolerance* |
| ❖ Reward criteria* | ❖ Conflict tolerance* | ❖ Means-ends orientation |
| ❖ Open-systems focus* | | |

*Project work is most successful in an organizational culture where these items are strong/high and other items are balanced

Stakeholders Management:

- Project managers must take time to identify, understand, and manage relationships with all project stakeholders
- Using the four frames of organizations can help meet stakeholder needs and expectations
- Senior executives/top management are very important stakeholders

The Importance of Top Management Commitment:

- Without top management commitment, many projects will fail
- Some projects have a senior manager called a **champion** who acts as a key proponent for a project

How Top Management Can Help Project Managers?

- Providing adequate resources
- Approving unique project needs in a timely manner
- Getting cooperation from other parts of the organization
- Mentoring and coaching on leadership issues

IT governance addresses the authority and control for key IT activities in organizations, including IT infrastructure, IT use, and project management.

The Need for Organizational Commitment to Information Technology:

- If the organization has a negative attitude toward IT, it will be difficult for an IT project to succeed
- Having a Chief Information Officer (CIO) at a high level in the organization helps IT projects
- Assigning non-IT people to IT projects also encourages more commitment

The Need for Organizational Standards: Standards and guidelines help project managers be more effective.

[project life cycle](#) is a collection of project phases such as **concept, development, implementation, and close-out** that defines:

- What work will be performed in each phase
- What deliverables will be produced and when
- Who is involved in each phase
- How management will control and approve work produced in each phase

[A deliverable](#) is a product or service produced or provided as part of a project

[Project Phases:](#)

Early phases	<ul style="list-style-type: none"> • Resource needs are usually lowest • The level of uncertainty (risk) is highest • Project stakeholders have the greatest opportunity to influence the project
Middle phases	<ul style="list-style-type: none"> • The certainty of completing a project improves • More resources are needed
Final phase	<ul style="list-style-type: none"> • Ensuring that project requirements were met • The sponsor approves completion of the project

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

[Systems development projects can follow](#)

- **Predictive life cycle:** the scope of the project can be clearly articulated and the schedule and cost can be predicted
- **Adaptive Software Development (ASD) life cycle:** requirements cannot be clearly expressed, projects are mission driven and component based, using time-based cycles to meet target dates

[Predictive life cycle:](#)

- **Waterfall model:** has well-defined, linear stages of systems development and support
- **Spiral model:** shows that software is developed using an iterative or spiral approach rather than a linear approach
- **Incremental build model:** provides for progressive development of operational software
- **Prototyping model:** used for developing prototypes to clarify user requirements
- **Rapid Application Development (RAD) model:** used to produce systems quickly without sacrificing quality

[Agile software development](#) has become popular to describe new approaches that focus on close collaboration between programming teams and business experts

[Management reviews](#), also called [phase exits](#) or [kill points](#), should occur after each phase to evaluate the project's progress, likely success, and continued compatibility with organizational goals

Recent trends affecting IT project management:

- **Globalization:** lower trade and political barriers and the digital revolution have made it possible to interact almost instantaneously with billions of other people across the planet
- **Outsourcing:** outsourcing is when an organization acquires goods and/or sources from an outside source; offshoring is sometimes used to describe outsourcing from another country
- **Virtual teams:** a virtual team is a group of individuals who work across time and space using communication technologies

Important Issues and Suggestions Related to Globalization

Issues	Suggestions
<ul style="list-style-type: none"> ◦ Communications ◦ Trust ◦ Common work practices ◦ Tools 	<ul style="list-style-type: none"> ◦ Employ greater project discipline ◦ Think global but act local ◦ Keep project momentum going ◦ Use newer tools and technology

Virtual Teams Advantages:

- Increasing completeness and responsiveness by having a team of workers available 24/7
- Lowering costs because many virtual workers do not require office space or support beyond their home offices
- Providing more expertise and flexibility by having team members from across the globe working any time of day or night
- Increasing the work/life balance for team members by eliminating fixed office hours and the need to travel to work

Virtual Teams Disadvantages:

- Isolating team members
- Increasing the potential for communications problems
- Reducing the ability for team members to network and transfer information informally
- Increasing the dependence on technology to accomplish work

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process is a series of actions directed toward a particular result

- Project management can be viewed as a **number of interlinked processes**

The project management process groups include:

- Initiating processes **time spent (2%)** include defining and authorizing a project or project phase. Initiating processes take place during each phase of a project.
- Planning processes **time spent (21%)** devising and maintaining a workable scheme to ensure that the project addresses the organization's needs
- Executing processes **time spent (69%)** coordinating people and other resources to carry out the project plans and produce the products, services, or results of the project or project phase
- Monitoring and controlling processes **time spent (5%)** regularly measuring and monitoring progress to ensure that the project team meets the project objectives
- Closing processes **time spent (3%)** formalizing acceptance of the project or project phase and ending it efficiently

Mapping the Process Group to The Knowledge Areas:

Integration	
Develop project charter (Initiating)	Develop Project management plan (Planning)
Direct and manage project execution (Executing)	Monitor & control project work (Monitoring and Controlling) Perform integrated change control (Monitoring and Controlling)
Close project or project phase (Closing)	
Scope	
Collect requirements (Planning) Define scope (Planning) Create WBS (Planning)	Verify Scope (Monitoring and Controlling) Control Scope (Monitoring and Controlling)
Time	
Define activities (Planning) Sequence activities (Planning) Estimate activity resources (Planning)	Estimate activity durations (Planning) Develop schedule (Planning) Control schedule (Monitoring and Controlling)
Cost	
Estimate costs (Planning) Determine Budget (Planning)	Control costs (Monitoring and Controlling)
Quality	
Plan quality (Planning) Perform quality assurance (Executing)	Perform quality control (Monitoring and Controlling)
Human Resource	
Develop human resource plan (Planning)	Develop project team (Executing)

Acquire project team (Executing)	Manage project team (Executing)
Communication	
Identify stakeholders (Initiating) Plan communications (Planning) Distribute information (Executing)	Manage stakeholder expectations (Executing) Report performance (Monitoring and Controlling)
Risk	
Plan risk management (Planning) Identify risks (Planning) Perform qualitative risk analysis (Planning)	Perform quantitative risk analysis (Planning) Plan risk responses (Planning) Monitor & control the risks (Monitoring and Controlling)
Procurement	
Plan procurements (Planning) Conduct procurements (Executing)	Administer procurements (Monitoring and Controlling) Close procurements (Closing)

Developing an Information Technology Project Management Methodology

- Many organizations develop their **own** project management methodologies, especially for IT projects
- A **methodology** describes how things should be done
 - **Projects IN Controlled Environments (PRINCE2)**: a project management methodology developed in the U.K. that defines 45 separate sub-processes and organizes these into **eight** process groups

Starting Up a Project	Planning	Initiating a Project	Directing a Project
Controlling a Stage	Managing Product Delivery	Managing Stage Boundaries	Closing a Project

- **Agile**
- **Rational Unified Process (RUP)**: an iterative **software development process** that focuses on team productivity and delivers software best practices to all team members
- **Six Sigma**:
 - **DMAIC** (Define, Measure, Analyze, Improve, and Control) is used to improve an existing business process
 - **DMADV** (Define, Measure, Analyze, Design, and Verify) is used to create new product or process designs
- a **standard** describes what should be done

Pre-Initiation Tasks:

- Determine the scope, time, and cost constraints for the project
- Identify the project sponsor
- Select the project manager
- Develop a business case for a project
- Meet with the project manager to review the process and expectations for managing the project
- Determine if the project should be divided into two or more smaller projects

Knowledge Area	Initiating Process	Outputs
<i>Project Integration Management</i>	Develop project charter	Project charter
<i>Project Communications Management</i>	Identify stakeholders	Stakeholder register Stakeholder management strategy

kick-off meeting is a meeting held at the beginning of a project so that stakeholders can meet each other, review the goals of the project, and discuss future plans. The kick-off meeting is often held after the business case and project charter are completed, but it could be held sooner, as needed

Project Planning key output:

- team contract
- A project scope statement
- A work breakdown structure (WBS)
- A project schedule, in the form of a Gantt chart with all dependencies and resources entered
- A list of prioritized risks

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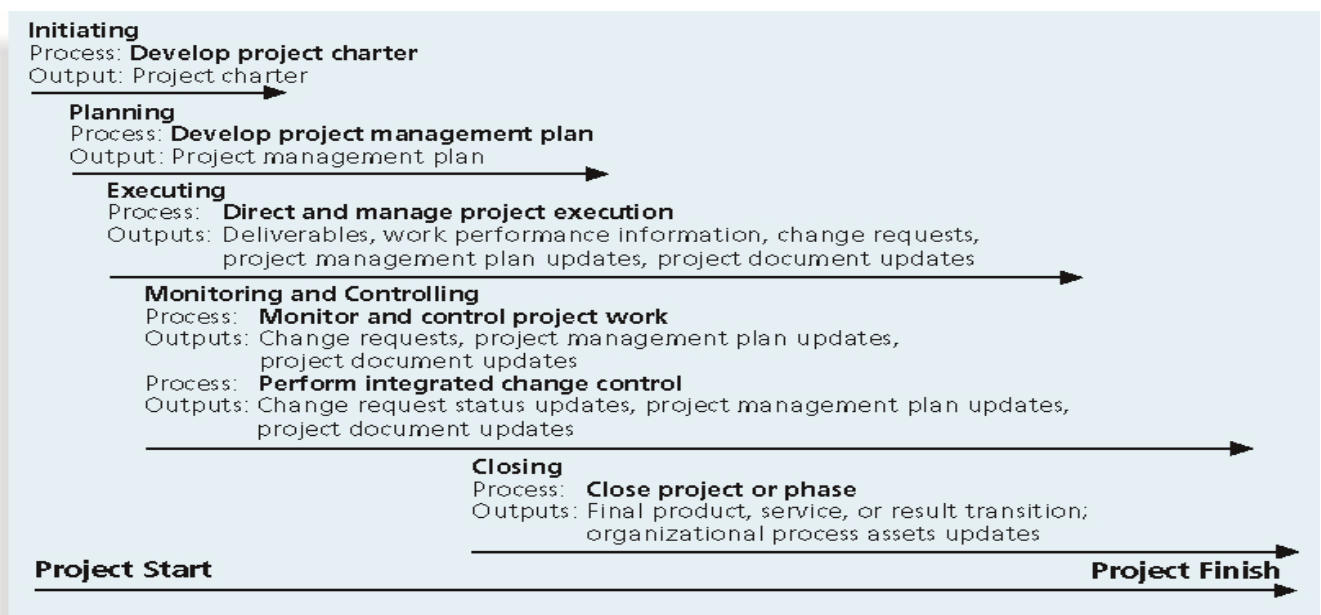
The key to Overall Project Success: Good Project Integration Management

- Project managers must coordinate all of the other knowledge areas throughout a project's life cycle
- Many new project managers have trouble looking at the "big picture" and want to focus on too many details (see opening case for a real example)
- Project integration management is not the same thing as software integration

Project Integration Management Processes:

- **Develop the project charter:** working with stakeholders to create the document that formally authorizes a project
- **Develop the project management plan:** coordinating all planning efforts to create a consistent, coherent document
- **Direct and manage project execution:** carrying out the project management plan by performing the activities included in it
- **Direct and manage project execution:** carrying out the project management plan by performing the activities included in it
- **Perform integrated change control:** coordinating changes that affect the project's deliverables and organizational process assets
- **Close the project or phase:** finalizing all project activities to formally close the project or phase

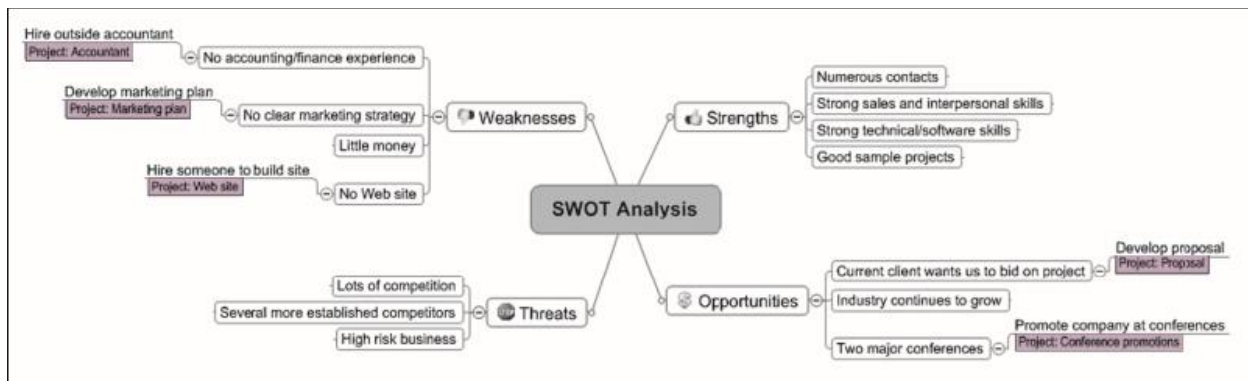
Project Integration Management Summary:



Strategic planning: involves determining long-term objectives, predicting future trends, and projecting the need for new products and services

- Identify potential projects
- Use realistic methods to select which projects to work on
- Formalize project initiation by issuing a project charter

SWOT analysis: Analyzing Strengths, Weaknesses, Opportunities, and Threats



Methods for Selecting Projects:

- Focusing on broad organizational needs
- Categorizing information technology projects
- Using a weighted scoring model
- Implementing a balanced scorecard
- Performing net present value or other financial analyses

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

categorization is whether the project addresses:

- A problem
- An opportunity
- A directive
- how long it will take to do and when it is needed
- The overall priority of the project

Financial Analysis of Projects:

- **Net present value (NPV) analysis:** 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 a positive NPV should be considered if financial value is a key criterion
 - The higher the NPV, the better

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

- **t** equals the year of the cash flow, **n** is the last year of the cash flow, **A** is the amount of cash flow each year, and **r** is the discount rate
- **Return on investment (ROI):** is calculated by subtracting the project costs from the benefits and then dividing by the costs $ROI = (\text{total discounted benefits} - \text{total discounted costs}) / \text{discounted costs}$
 - The higher the ROI, the better
 - Many organizations have a required rate of return or minimum acceptable rate of return on investment for projects Internal rate of return (**IRR**) can be calculated by finding the discount rate that makes the NPV equal to zero
- **Payback analysis:** 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: is a tool that provides a systematic process for selecting projects based on many 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

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

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

- 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

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 overall project management plan

Common Elements of a project management plan:

- Introduction or overview of the project
- Description of how the project is organized
- Management and technical processes used on the project
- Work to be done, schedule, and budget information

Project Execution:

- Project execution 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

Project Execution Tools and Techniques:

- **Expert judgment:** experts can help project managers and their teams make many decisions related to project execution
- **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

Baseline: is the approved project management plan plus approved changes.

Integrated change control:

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

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

Change Control System:

- 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):

- 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

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:

- 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

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 project or phase:

- 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

USING SOFTWARE 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

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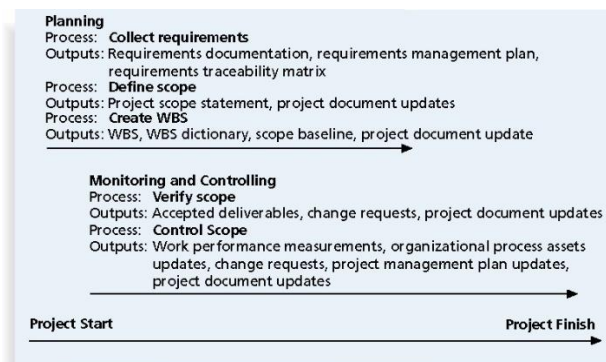
What is Project Scope Management?

- ▶ **Scope** refers to *all* the work involved in creating the products of the project and the processes used to create them
- ▶ A **deliverable** is a product produced as part of a project, such as hardware or software, planning documents, or meeting minutes.
- ▶ **Project scope management** includes the processes involved in defining and controlling what is or is not included in a project

Project Scope Management Processes:

- **Collecting requirements:** defining and documenting the features and functions of the products produced
- **Defining scope:** reviewing the project charter, requirements documents, and organizational process assets to create a scope statement
- **Creating the WBS:** subdividing the major project deliverables into smaller
- **Verifying scope:** formalizing acceptance of the project deliverables
- **Controlling scope:** controlling changes to project scope throughout the life of the project

Project Scope Management Summary



Methods for Collecting Requirements:

- Interviewing
- Focus groups and facilitated workshops
- Using group creativity and decision-making techniques
- Questionnaires and surveys
- Observation
- Prototyping
- Software tools

Documenting Requirements:

- **requirements management plan** describes how project requirements will be analyzed, documented, and managed
- **requirements traceability matrix (RTM)** is a table that lists requirements, various attributes of each requirement, and the status of the requirements to ensure that all requirements are addressed

the scope of a project should become more clear and specific

Decomposition is subdividing project deliverables into smaller pieces

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

Approaches to Developing WBSs:

- ❖ **Using guidelines:** some organizations, like the DOD, provide guidelines for preparing WBSs
- ❖ **The analogy approach:** review WBSs of similar projects and tailor to your project
- ❖ **The top-down approach:** start with the largest items of the project and break them down
- ❖ **The bottom-up approach:** start with the specific tasks and roll them up
- ❖ **Mind-mapping approach:** mind mapping is a technique that uses branches radiating out from a core idea to structure thoughts and ideas

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

Scope baseline is a part of the project management plan and acts as the reference point through the project life. It has several components. These include project **scope** document, the WBS itself and the WBS dictionary. **Scope Baseline** Document

Advice for Creating a WBS and WBS Dictionary:

- A unit of work should appear at only one place in the WBS
- The work content of a WBS item is the sum of the WBS items below it
- A WBS item is the responsibility of only one individual, even though many people may be working on it
- The WBS must be consistent with the way in which work is actually going to be performed; it should serve the project team first and other purposes only if practical
- Project team members should be involved in developing the WBS to ensure consistency and buy-in
- Each WBS item must be documented in a WBS dictionary to ensure accurate understanding of the scope of work included and not included in that item
- The WBS must be a flexible tool to accommodate inevitable changes while properly maintaining control of the work content in the project according to the scope statement

Scope creep: In project management refers to changes, continuous or uncontrolled growth in a project's scope, at any point after the project begins. This can occur when the scope of a project is not properly defined, documented, or controlled. It is generally considered harmful. It is related to but distinct from feature creep.

Scope creep can be a result of:

- poor change control
- lack of proper initial identification of what is required to bring about the project objectives
- weak project manager or executive sponsor
- poor communication between parties
- lack of initial product versatility

Scope verification involves formal acceptance of the completed project scope by the stakeholders

Goals of scope control are to:

- Influence the factors that cause scope changes
- Assure changes are processed according to procedures developed as part of integrated change control
- Manage changes when they occur

Variance is the difference between planned and actual performance

Best Practices for Avoiding Scope Problems:

- Keep the scope realistic
- Involve users in project scope management
- Use off-the-shelf hardware and software whenever possible
- Follow good project management processes