CONTENTS

Planning

- The demand for new or replacement systems exceeds the ability and resources of most organizations to conduct systems development projects either by themselves or with consultants.
- This means that organizations must set priorities and a direction for systems development that will yield development projects with the greatest net benefits.
- As a systems analyst, you must analyze user information requirements, and you must also help make the business case—or justify why the system should be built and the development project conducted.
- The reason for any new or improved information system (IS) is to add value to the organization.
- As systems analysts, we must choose to use systems development resources to build the mix of systems that add the greatest value to the organization.
- The source of systems projects is either initiatives from IS planning (proactive identification of systems) or requests from users or IS professionals (reactions to problems or opportunities) for new or enhanced systems.

2.1.1 Introduction

- The acquisition, development, and maintenance of information systems consume substantial resources for most organizations.
- This suggests that organizations can benefit from following a formal process for identifying and selecting projects.
- The first phase of the systems development life cycle—project identification and selection—deals with this issue.

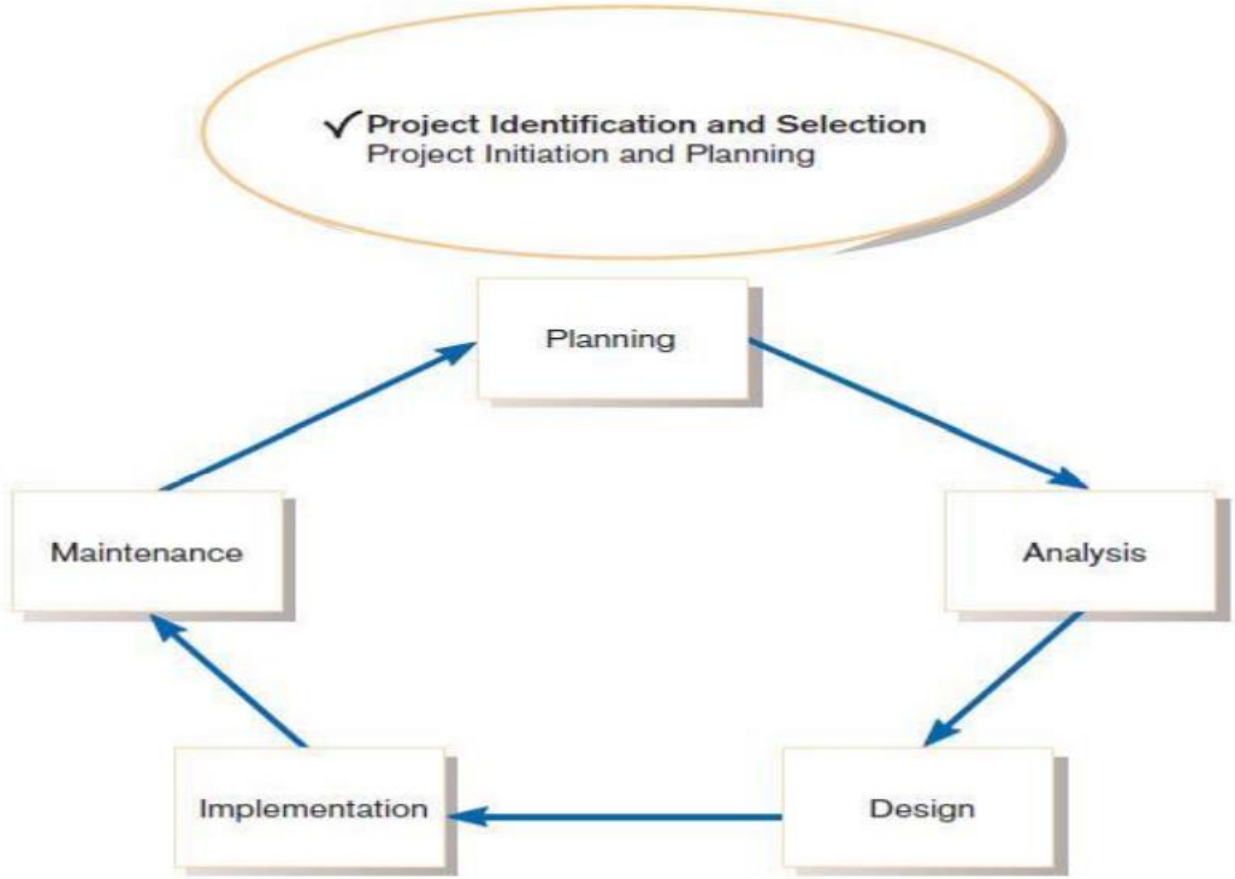


FIGURE
Systems development life cycle with project identification and selection highlighted

2.1.2 IDENTIFYING AND SELECTING SYSTEMS DEVELOPMENT PROJECTS

- The first phase of the SDLC is planning, consisting of project identification and selection, and project initiation and planning .
- During project identification and selection, a senior manager, a business group, an IS manager, or a steering committee identifies and assesses all possible systems development projects that an organization unit could undertake.
- Next, those projects deemed most likely to yield significant organizational benefits, given available resources, are selected for subsequent development activities.
- Organizations vary in their approach to identifying and selecting projects. In some organizations, project identification and selection is a very formal process in which projects are outcomes of a larger overall planning process.
- Information systems development requests come from a variety of sources.
- One source is requests by managers and business units for replacing or extending an existing system to gain needed information or to provide a new service to customers.

1. Identifying Potential Development Projects.

Organizations vary as to how they identify projects. This process can be performed by

- A key member of **top management**, either the CEO of a small- or medium sized organization or a senior executive in a larger organization;
- A **steering committee**, composed of a cross section of managers with an interest in systems;
- **User departments**, in which either the head of the requesting unit or a committee from the requesting department decides which projects to submit (often you, as a systems analyst, will help users prepare such requests); or
- The **development group** or a senior IS manager.

2. Classifying and Ranking IS Development Projects.

- The second major activity in the project identification and selection process focuses on assessing the relative merit of potential projects.
- As with the project identification process, classifying and ranking projects can be performed by top managers, a steering committee, business units, or the IS development group.
- Additionally, the criteria used when assigning the relative merit of a given project can vary.
- Commonly used criteria for assessing projects are summarized in Table in next slide

TABLE 4-2 Possible Evaluation Criteria When Classifying and Ranking Projects

Evaluation Criteria	Description
Value Chain Analysis	Extent to which activities add value and costs when developing products and/or services
Strategic Alignment	Extent to which the project is viewed as helping the organization achieve its strategic objectives and long-term goals
Potential Benefits	Extent to which the project is viewed as improving profits, customer service, and so forth, and the duration of these benefits
Resource Availability	Amount and type of resources the project requires and their availability
Project Size/Duration	Number of individuals and the length of time needed to complete the project
Technical Difficulty/Risks	Level of technical difficulty to successfully complete the project within given time and resource constraints

- An important project evaluation method that is widely used for assessing information systems development projects is called **value chain analysis.**
- Value chain analysis Analyzing is an organization's activities to determine where value is added to products and/or services and the costs incurred for doing so; usually also includes a comparison with the activities, added value, and costs of other organizations for the purpose of making improvements in the organization's operations and performance.
- Information systems projects providing the greatest benefit to the value chain will be given priority over those with fewer benefits.

3. Selecting IS Development Projects

- The final activity in the project identification and selection process is the actual selection of projects for further development.
- Project selection is a process of considering both short- and long-term projects and selecting those most likely to achieve business objectives.
- Additionally, as business conditions change over time, the relative importance of any single project may substantially change.
- Thus, the identification and selection of projects is a very important and ongoing activity.
- Numerous factors must be considered when making project selection decisions.

- Figure shows that a selection decision requires that the perceived needs of the organization, existing systems and ongoing projects, resource availability, evaluation criteria, current business conditions, and the perspectives of the decision makers will all play a role in project selection decisions.
- Numerous outcomes can occur from this decision process. Of course, projects can be accepted or rejected.

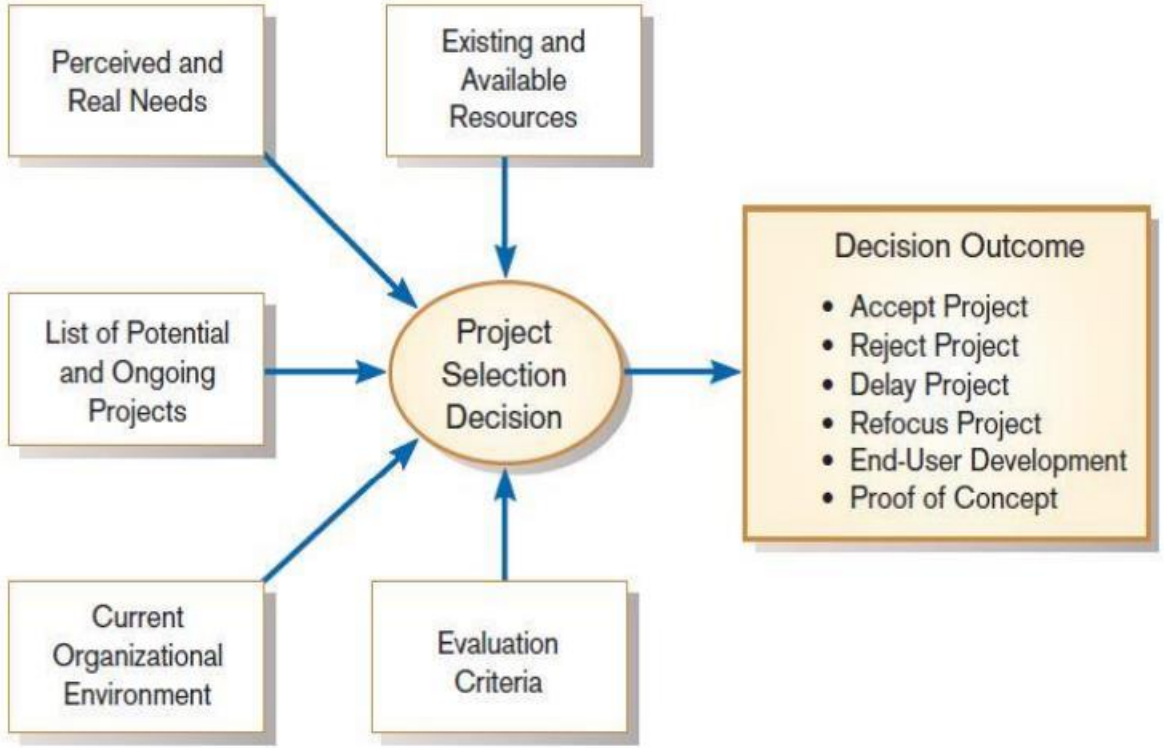
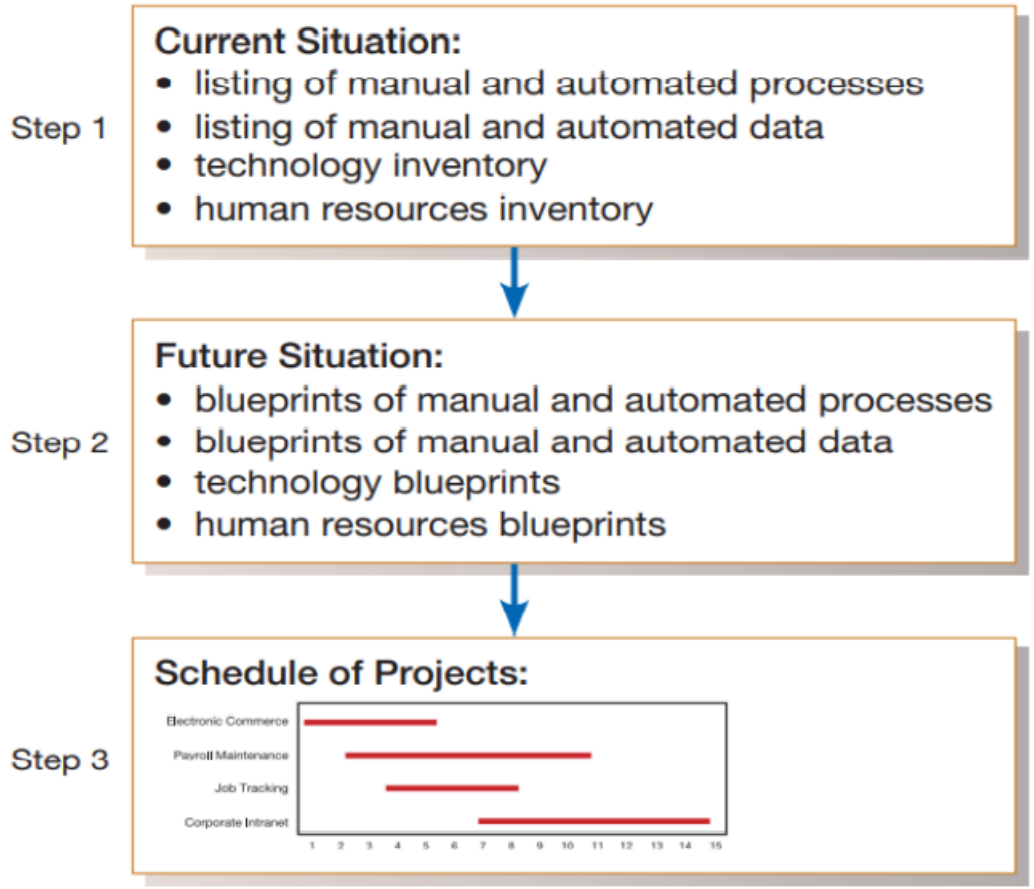


FIGURE
Project selection decisions must consider numerous factors and can have numerous outcomes.

INFORMATION SYSTEMS PLANNING (ISP)

- The second planning process that can play a significant role in the quality of project identification and selection decisions is called information systems planning (ISP).
- ISP is an orderly means of assessing the information needs of an organization and defining the information systems, databases, and technologies that will best satisfy those needs.
- This means that during ISP you (or, more likely, senior IS managers responsible for the IS plan) must model current and future organization informational needs and develop strategies and project plans to migrate the current information systems and technologies to their desired future state.
- ISP is a top-down process that takes into account the outside forces—industry, economic, relative size, geographic region, and so on—that are critical to the success of the firm.
- This means that ISP must look at information systems and technologies in terms of how they help the business achieve its objectives as defined during corporate strategic planning.

- Like corporate strategic planning, ISP is a three-step process in which the first step is to **assess current IS-related assets**—human resources, data, processes, and technologies.
- Next, **target blueprints** of these resources are developed. These blueprints reflect the desired **future state** of resources needed by the organization to reach its objectives as defined during strategic planning.
- Finally, **a series of scheduled projects** is defined to help move the organization from its current to its future desired state.



For example, a project may focus on reconfiguration of a telecommunications network to speed data communications or it may restructure work and data flows between business areas. Projects can include not only the development of new information systems or the modification of existing ones, but also the acquisition and management of new systems, technologies, and platforms. These three activities parallel those of corporate strategic planning, and this relationship is shown in Figure.

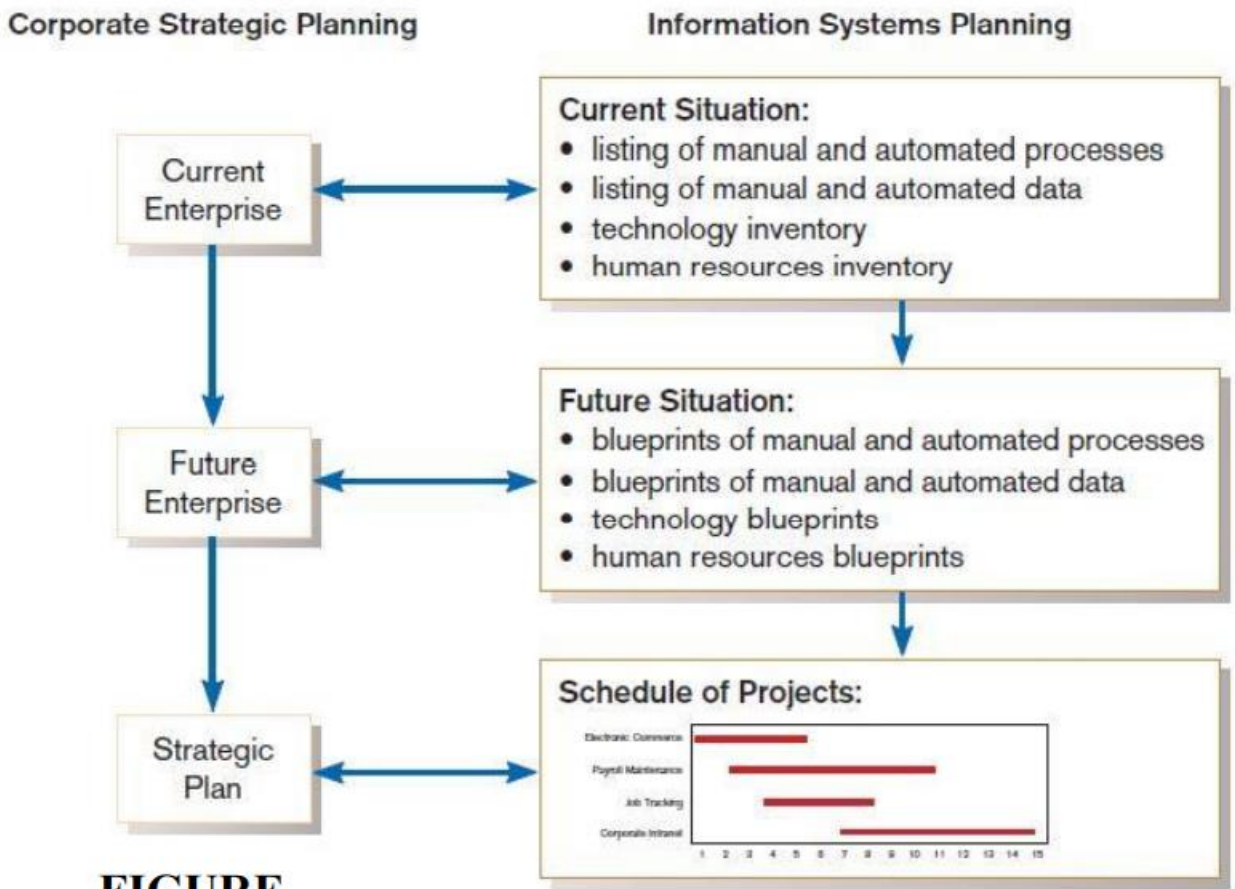


FIGURE
Parallel activities of corporate strategic planning and information systems planning

1. Describe the current situation

- The most widely used approach for describing the current organizational situation is generically referred to as **top-down planning**. Top-down planning attempts to gain a broad understanding of the informational needs of the entire organization. The approach begins by conducting an extensive analysis of the organization's mission, objectives, and strategy and determining the information requirements needed to meet each objective.
- In contrast to the top-down planning approach, **a bottom-up planning** approach requires the identification of business problems and opportunities that are used to define projects. Using the bottom-up approach for creating IS plans can be faster and less costly than using the top-down approach; it also has the advantage of identifying pressing organizational problems.
- Yet, the bottom-up approach often fails to view the informational needs of the entire organization. This can result in the creation of disparate information systems and databases that are redundant or not easily integrated without substantial rework.

2. Describing the target situation, trends, and constraints

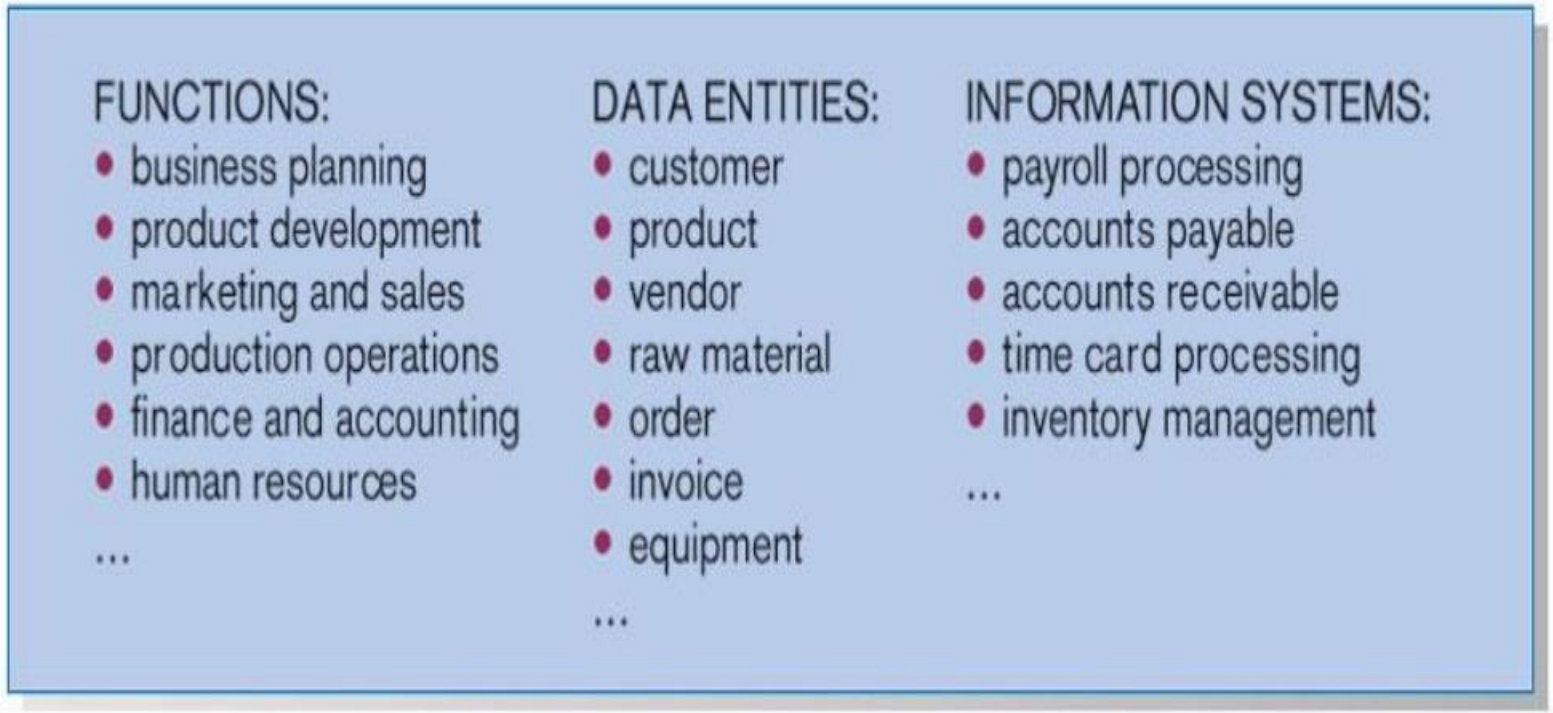
- After describing the current situation, the next step in the ISP (information system planning) process is to define the target situation that reflects the desired future state of the organization.
- This means that the target situation consists of the desired state of the locations, units, functions, processes, data, and IS.
- For example, if a desired future state of the organization is to have several new branch offices or a new product line that requires several new employee positions, functions, processes, and data, then most lists and matrices will need to be updated to reflect this vision. The target situation must be developed in light of technology and business trends, in addition to organizational constraints (something which controls what you do by keeping you within particular limits)

3. Developing a transition strategy and plans

- Once the creation of the current and target situations is complete, a detailed transition strategy and plan are developed by the IS planning team. This plan should be very comprehensive, reflecting broad, long range issues in addition to providing sufficient detail to guide all levels of management concerning what needs to be done, how, when, and by whom in the organization.
- The IS plan is typically a very comprehensive document that looks at both short- and long-term organizational development needs. The short- and long-term developmental needs identified in the plan are typically expressed as a series of projects.
- Projects from the long-term plan tend to build a foundation for later projects (such as transforming databases from old technology into newer technology). Projects from the short-term plan consist of specific steps to fill the gap between current and desired systems or respond to dynamic business conditions.
- The top-down (or plan-driven) projects join a set of bottom up or needs driven projects submitted as system service requests from managers to form the short-term systems development plan.

Identifying Functions, Processes, and Data Entities

Figure 4-11 Information systems planning information (Pine Valley Furniture)



IS Plan Components

1. Briefly describe mission, objectives, and strategy of the organization.
2. Provide summary of current and future processes, functions, data entities, and information needs of the enterprise
3. Describe primary role IS will play in the organization to transform enterprise from current to future state
4. Describe limitations imposed by technology and current levels of financial, technical, and personnel resources
5. Summarize overall information systems needs in the company and set long-term strategies for filling the needs
6. Show detailed inventory of present projects and systems and detailed plan for the current year
7. Describe unknown but likely events that can affect the plan, presently known business change elements, and description of their impact on the plan

FIGURE
Systems development projects flow from the information systems plan

2.2.2 INITIATING AND PLANNING SYSTEMS DEVELOPMENT PROJECTS

- A key consideration when conducting project initiation and planning (PIP) is deciding when PIP ends and when analysis, the next phase of the SDLC, begins.
- This is a concern because many activities performed during PIP could also be completed during analysis.
- Pressman (2014) speaks of three important questions that must be considered when making this decision on the division between PIP and analysis:

1. How much effort should be expended on the project initiation and planning process?

2. Who is responsible for performing the project initiation and planning process?

3. Why is project initiation and planning such a challenging activity?

1. How much effort should be expended on the project initiation and planning process?

- Finding an answer to the first question, how much effort should be expended on the PIP process, is often difficult.
- Practical experience has found, however, that the time and effort spent on initiation and planning activities easily pay for themselves later in the project.
- Proper and insightful project planning, including determining project scope as well as identifying project activities, can easily reduce time in later project phases.
- For example, a careful feasibility analysis that leads to deciding that a project is not worth pursuing can save a considerable expenditure of resources.
- The actual amount of time expended will be affected by the size and complexity of the project as well as by the experience of your organization in building similar systems.
- A rule of thumb is that between 10 and 20 percent of the entire development effort should be expended on the PIP study.
- Thus, you should not be reluctant to spend considerable time in PIP in order to fully understand the motivation for the requested system.

2. Who is responsible for performing the project initiation and planning process?

- For the second question, who is responsible for performing PIP, most organizations assign an experienced systems analyst, or a team of analysts for large projects, to perform PIP.
- The analyst will work with the proposed customers (managers and users) of the system and other technical development staff in preparing the final plan.
- Experienced analysts working with customers who fully understand their information services needs should be able to perform PIP without the detailed analysis typical of the analysis phase of the life cycle.
- Less-experienced analysts with customers who only vaguely understand their needs will likely expend more effort during PIP in order to be certain that the project scope and work plan are feasible.

3. Why is project initiation and planning such a challenging activity?

- As to the third question, PIP is viewed as a challenging activity because the objective of the PIP study is to transform a vague system request document into a tangible project description. This is an open-ended process.
- The analyst must clearly understand the motivation for and objectives of the proposed system. Therefore, effective communication among the systems analyst, users, and management is crucial to the creation of a meaningful project plan.
- Getting all parties to agree on the direction of a project may be difficult for cross-department projects where different parties have different business objectives.
- Thus, more complex organizational settings for projects will result in more time required for analysis of the current and proposed systems during PIP.

2.2.3 Process of initiating and planning IS development projects

- Project initiation focuses on activities designed to assist in organizing a team to conduct project planning.
- During initiation, one or more analysts are assigned to work with a customer—that is, a member of the business group that requested or will be affected by the project—to establish work standards and communication procedures.
- Depending upon the size, scope, and complexity of the project, some project initiation activities may be unnecessary or may be very involved.
- Also, many organizations have established procedures for assisting with common initiation activities. One key activity of project initiation is the development of the project charter.

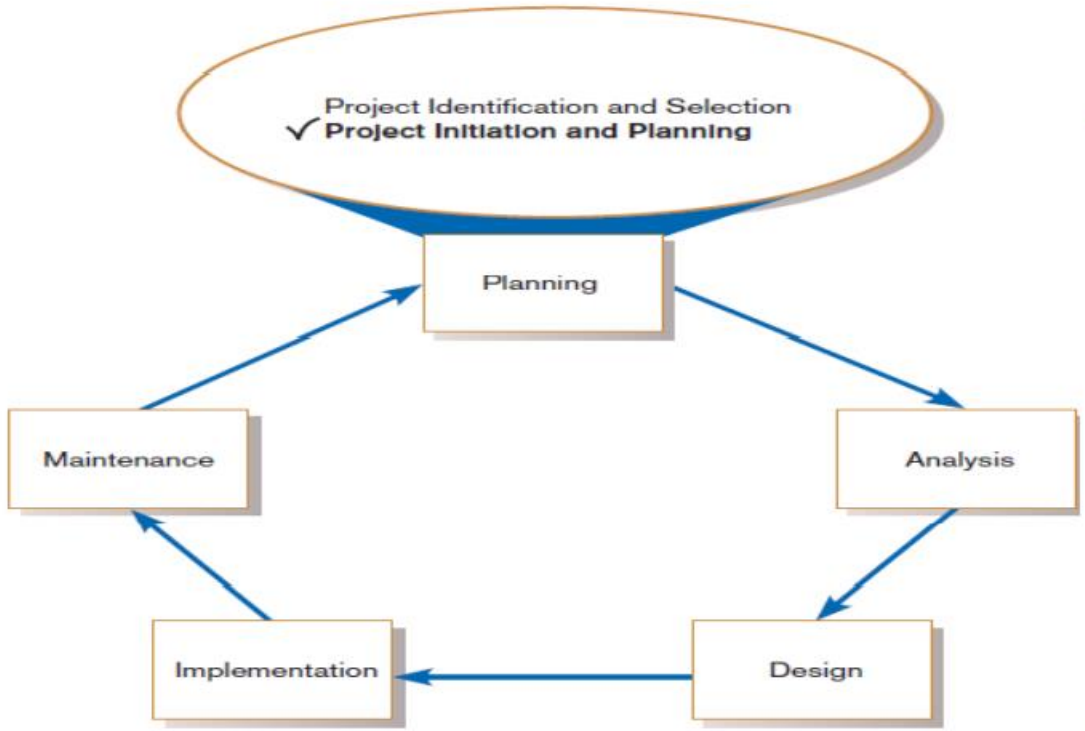


TABLE 5-1 Elements of Project Initiation

- Establishing the Project Initiation Team
- Establishing a Relationship with the Customer
- Establishing the Project Initiation Plan
- Establishing Management Procedures
- Establishing the Project Management Environment and Project Workbook
- Developing the Project Charter

FIGURE
Systems development life cycle with project initiation and planning highlighted

- Project planning, the second activity within PIP, is distinct from general information systems planning, which focuses on assessing the information systems needs of the entire organization.
- Project planning is the process of defining clear, discrete activities and the work needed to complete each activity within a single project.
- The objective of the project planning process is the development of a **Baseline Project Plan (BPP) and the Project Scope Statement (PSS).**
- The **BPP** becomes the foundation for the remainder of the development project.
- The **PSS** produced by the team clearly outlines the objectives and constraints of the project for the customer.

- As with the project initiation process, the size, scope, and complexity of a project will dictate the comprehensiveness of the project planning process and resulting documents.
- Further, numerous assumptions about resource availability and potential problems will have to be made.
- Analysis of these assumptions and system costs and benefits forms a business case.
- *Business case is the justification for an information system, presented in terms of the tangible and intangible economic benefits and costs and the technical and organizational feasibility of the proposed system.*
- *Baseline Project Plan (BPP) is a major outcome and deliverable from the project initiation and planning phase that contains the best estimate of a project's scope, benefits, costs, risks, and resource requirements.*

Feasibility Analysis

- Feasibility: The measure of how beneficial or practical an information system will be to an organization.
- **Feasibility analysis:** A feasibility analysis is the process by which feasibility is measured
- The scope and complexity of an apparently feasible project can change after the initial problems and opportunities are fully analyzed or after the system has been designed.
- A project that is feasible at one point in time may become infeasible at a later point in time
- A feasibility study assesses the operational, technical, and economic merits of the proposed project

Types of Feasibility Analysis

- **Operational feasibility** is a measure of how well the solution of problems or a specific solution will work in the organization. It is also a measure of how people feel about the system/project.
- **Technical feasibility** is a measure of the practicality of a specific technical solution and the availability of technical resources and expertise.
- **Schedule feasibility** is a measure of how reasonable the project timetable is.
- **Economic feasibility** is a measure of the cost-effectiveness of a project or solution. This is often called a *cost-benefit analysis*.

Assessing Economic Feasibility

- The purpose of assessing economic feasibility is to identify the financial benefits and costs associated with the development project
- Economic feasibility is often referred to as **cost–benefit analysis.**
- During project initiation and planning, it will be impossible for you to precisely define all benefits and costs related to a particular project.
- Yet it is important that you spend adequate time identifying and quantifying these items or it will be impossible for you to conduct an adequate economic analysis and make meaningful comparisons between rival projects.
- Here we will describe typical benefits and costs resulting from the development of an information system and provide several useful worksheets for recording costs and benefits. Additionally, several common techniques for making cost–benefit calculations are presented.
- These worksheets and techniques are used after each SDLC phase as the project is reviewed in order to decide whether to continue, redirect, or kill a project.

Determining Project Benefits

- An information system can provide many benefits to an organization.
- For example, a new or renovated information system can automate monotonous jobs and reduce errors; provide innovative services to customers and suppliers; and improve organizational efficiency, speed, flexibility, and morale.
- In general, the benefits can be viewed as being both tangible and intangible.
- **Tangible** benefits refer to items that can be measured in dollars and with certainty. Examples of tangible benefits might include reduced personnel expenses, lower transaction costs, or higher profit margins.

- Most tangible benefits will fit within the following categories:
    - Cost reduction and avoidance
    - Error reduction
    - Increased flexibility
    - Increased speed of activity
    - Improvement of management planning and control
    - Opening new markets and increasing sales opportunities
- *Tangible benefit A benefit derived from the creation of an information system that can be measured in dollars and with certainty*

- **Intangible** benefits refer to items that cannot be easily measured in dollars or with certainty.
- Intangible benefits may have direct organizational benefits, such as the improvement of employee morale, or they may have broader societal implications, such as the reduction of waste creation or resource consumption.
- Potential tangible benefits may have to be considered intangible during project initiation and planning because you may not be able to quantify them in dollars or with certainty at this stage in the life cycle.
- During later stages, such intangibles can become tangible benefits as you better understand the ramifications of the system you are designing.
- In this case, the BPP is updated and the business case revised to justify continuation of the project to the next phase.
- *Intangible benefit A benefit derived from the creation of an information system that cannot be easily measured in dollars or with certainty*

Determining Project Costs

- Similar to benefits, an information system can have both tangible and intangible costs.
- **Tangible** costs refer to items that you can easily measure in dollars and with certainty.
- From an IS development perspective, tangible costs include items such as hardware costs, labor costs, and operational costs including employee training and building renovations.
- Alternatively, **intangible** costs are items that you cannot easily measure in terms of dollars or with certainty.
- Intangible costs can include loss of customer goodwill, employee morale, or operational inefficiency.
- One goal of a cost–benefit analysis is to accurately determine the total cost of ownership (TCO) for an investment.
- TCO is focused on understanding not only the total cost of acquisition but also all costs associated with ongoing use and maintenance of a system.
- *Total cost of ownership (TCO) The cost of owning and operating a system, including the total cost of acquisition, as well as all costs associated with its ongoing use and maintenance.*

- **One-time costs** refer to those associated with project initiation and development and the start-up of the system. These costs typically encompass activities such as systems development, new hardware and software purchases, user training, site preparation, and data or system conversion.
- When conducting an economic cost–benefit analysis, a worksheet should be created for capturing these expenses. For very large projects, one-time costs may be staged over one or more years. In these cases, a separate onetime cost worksheet should be created for each year. This separation will make it easier to perform present value calculations.
- **Recurring costs** refer to those costs resulting from the ongoing evolution and use of the system. Examples of these costs typically include the following:

  - Application software maintenance
  - Incremental data storage expenses
  - Incremental communications
  - New software and hardware leases
  - Supplies and other expenses (e.g., paper, forms, data center personnel)

Definitions of Terms

- **Time value of money** (**TVM**): the concept that money available today is worth more than the same amount tomorrow
- **Discount rate**: the rate of return used to compute the present value of future cash flows (*the cost of capital*)
- **Present value**: the current value of a future cash flow
- **Net Present Value**
  - PVn = *present value* of Y dollars n years from now based on a *discount rate* of i.
  - NPV = sum of PVs across years.
  - Calculates *time value of money*

$$\mathrm{PV}_n = Y \times \frac{1}{(1+i)^n}$$

Break-even analysis

- The objective of the break-even analysis is to discover at what point (if ever) benefits equal costs (i.e., when breakeven occurs)
- To conduct this analysis, the NPV of the yearly cash flows are determined.
- Here, the yearly cash flows are calculated by subtracting both the one-time cost and the present values of the recurring costs from the present value of the yearly benefits.
- The overall NPV of the cash flow reflects the total cash flows for all preceding years.

$$\text{Break-Even Ratio} = \frac{\text{Yearly NPV Cash Flow} - \text{Overall NPV Cash Flow}}{\text{Yearly NPV Cash Flow}}$$

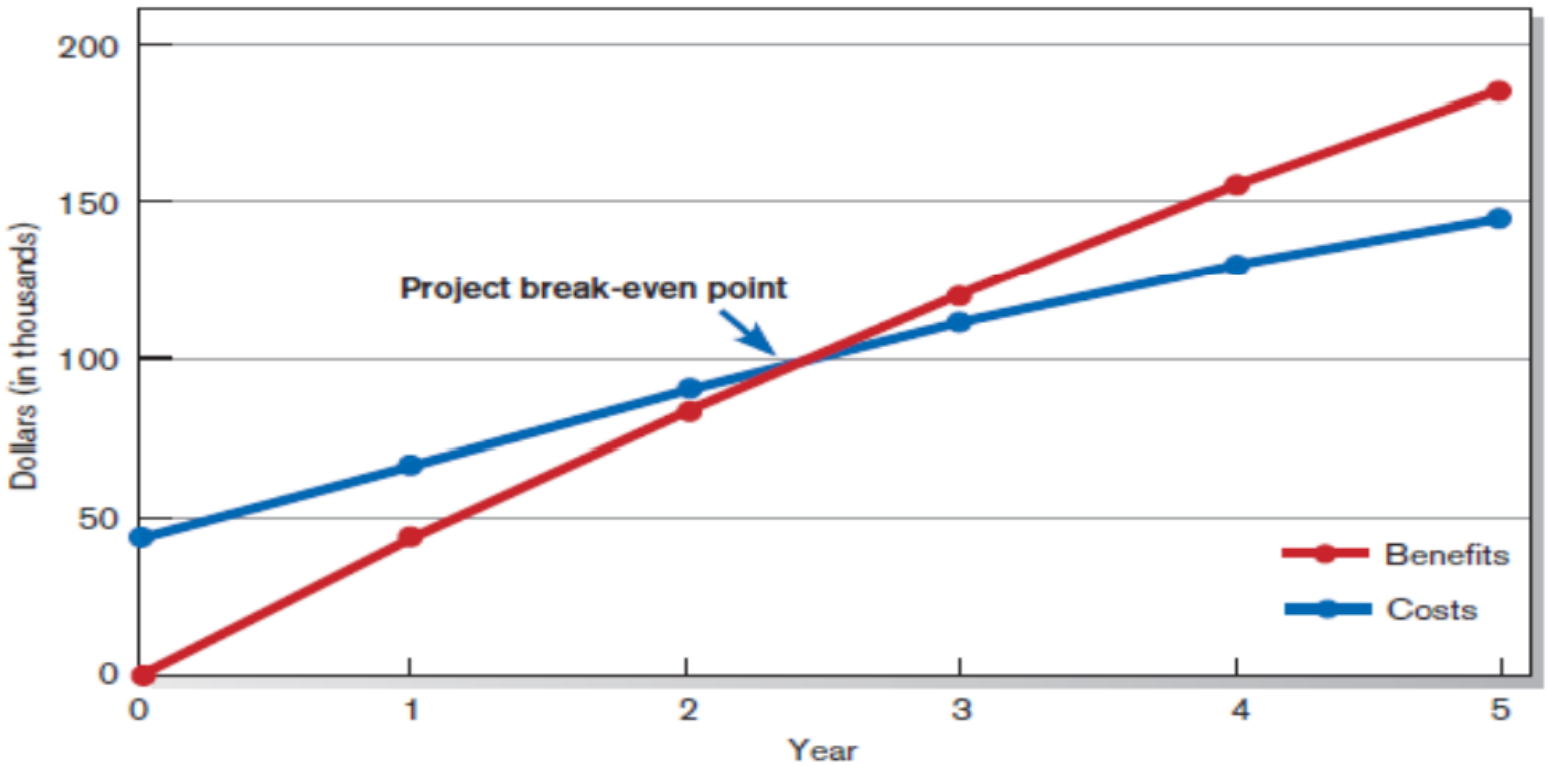


Figure
Break-even analysis for Customer Tracking System (Pine Valley Furniture)

Three Financial Measurements for Economic Feasibility

- **Net Present Value (NPV):** Use discount rate to determine present value of cash outlays and receipts
- **Return on Investment (ROI):** Ratio of cash receipts to cash outlays
- **Break-Even Analysis (BEA):** Amount of time required for cumulative cash flow to equal initial and ongoing investment

TABLE 5-6 Commonly Used Economic Cost–Benefit Analysis Techniques

Analysis Technique	Description
Net Present Value (NPV)	NPV uses a discount rate determined from the company's cost of capital to establish the present value of a project. The discount rate is used to determine the present value of both cash receipts and outlays.
Return on Investment (ROI)	ROI is the ratio of the net cash receipts of the project divided by the cash outlays of the project. Trade-off analysis can be made among projects competing for investment by comparing their representative ROI ratios.
Break-Even Analysis (BEA)	BEA finds the amount of time required for the cumulative cash flow from a project to equal its initial and ongoing investment.

Reviewing the Baseline Project Plan

- Before the next phase of the SDLC can begin, the users, management, and development group must review the BPP in order to verify that it makes sense. This review takes place before the BPP is submitted or presented to a project approval body, such as an IS steering committee or the person who must fund the project.
- The objective of this review is to ensure that the proposed system conforms to organizational standards and that all relevant parties understand and agree with the information contained in the BPP. A common method for performing this review (as well as reviews during subsequent life cycle phases) is called a **structured walk-through.**

Structured Walkthroughs

- A peer-group review of any product created during the system development process
- Experience has shown that walk-throughs are a very effective way to ensure the quality of an information system and have become a common day-to-day activity for many systems analysts
- Roles: coordinator, presenter, user, secretary, standard-bearer, maintenance oracle
- Can be applied to BPP, system specifications, logical and physical designs, program code, test procedures, manuals and documentation

Roles

- **Coordinator.** This person plans the meeting and facilitates a smooth meeting process. This person may be the project leader or a lead analyst responsible for the current life cycle step.
- **Presenter.** This person describes the work product to the group. The presenter is usually an analyst who has done all or some of the work being presented.
- **User**. This person (or group) makes sure that the work product meets the needs of the project's customers. This user would usually be someone not on the project team.
- **Secretary.** This person takes notes and records decisions or recommendations made by the group. This may be a clerk assigned to the project team or it may be one of the analysts on the team.

- **Standards bearer.** The role of this person is to ensure that the work product adheres to organizational technical standards. Many larger organizations have staff groups within the unit responsible for establishing standard procedures, methods, and documentation formats. These standards bearers validate the work so that it can be used by others in the development organization.
- **Maintenance oracle.** This person reviews the work product in terms of future maintenance activities. The goal is to make the system and its documentation easy to maintain.