Identifying and Selecting Systems Development Project

Introduction

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.

Identifying and Selecting Systems Development Project

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.

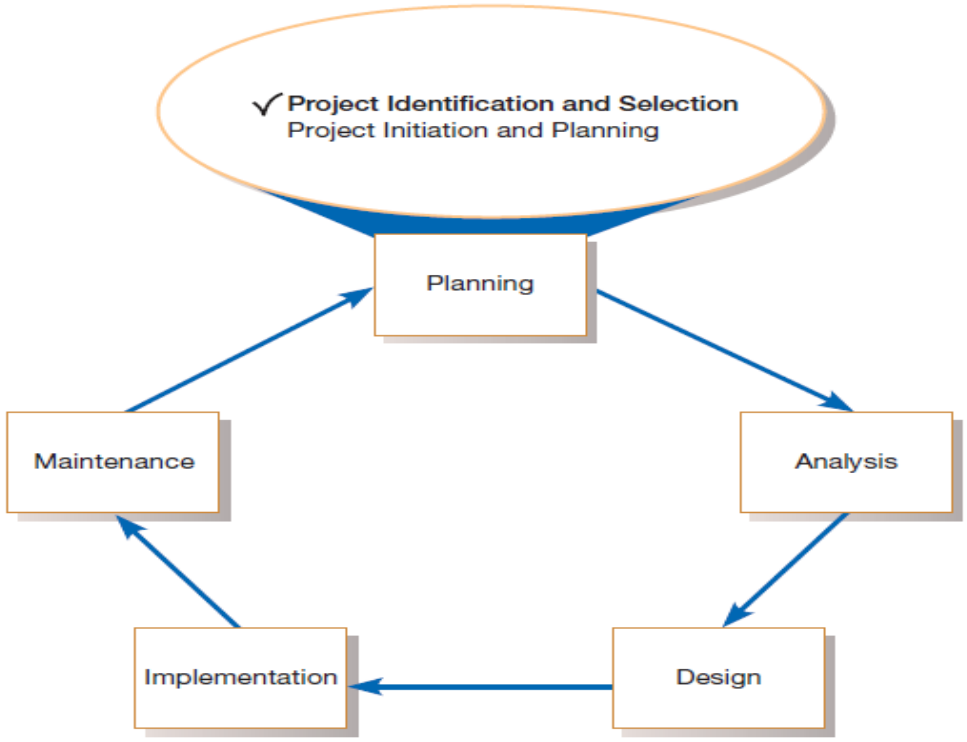

Fig: Systems development life cycle with project identification and selection highlighted

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. Alternatively, a small organization may use informal project selection processes that allow the highest-ranking IS manager to independently select projects or allow individual business units to decide on projects after agreeing to provide project funding. Regardless of how a given organization actually executes the project identification and selection process, a common sequence of activities occurs.

The Process of Identifying and Selecting IS Development Projects

Project identification and selection consists of three primary activities: *identifying potential development projects*, *classifying and ranking IS development projects*, and *selecting IS development projects*.

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 mediumsized 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 head of the requesting unit or a committee from the requesting department decides which projects to submit; or
    - the development group or a senior IS manager.

   Characteristics of alternative Methods for Making Information Systems Identification and Selection Decisions are given in the table below.

Selection Method	**Characteristics**
Top Management	Greater strategic focus; Largest project size; Longest project duration; Enterprise-wide consideration
Steering Committee	Cross-functional focus; Greater organizational change; Formal cost–benefit analysis; Larger and riskier projects
Functional Area	Narrow, nonstrategic focus; Faster development; Fewer users, management layers, and business functions involved
Development Group	Integration with existing systems focus; Fewer development delays; Less concern with cost–benefit analysis

   Projects identified by top management and steering committees most often reflect the broader needs of the organization. This occurs because top management and steering committees are likely to have a broader understanding of overall business objectives and constraints. Projects identified by top management or by a diverse steering committee are therefore referred to as coming from a *top-down source.*

   Projects identified by a functional manager, business unit, or by the information systems development group are often designed for a particular business need within a given business unit. Project initiatives stemming from managers, business units, or the development group are generally referred to as coming from a *bottom-up source.*

2. **Classifying and ranking IS development projects:** This activity 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. One or several evaluation criteria might be used during the classifying and ranking process as given below.

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

Table: Possible evaluation Criteria When Classifying and Ranking Projects

An important project evaluation method that is widely used for assessing information systems development projects is called **value chain** analysis. Value chain analysis is the process of analyzing an organization's activities for making products and/or services to determine where value is added and costs are incurred. 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. Numerous outcomes can occur from this decision process.

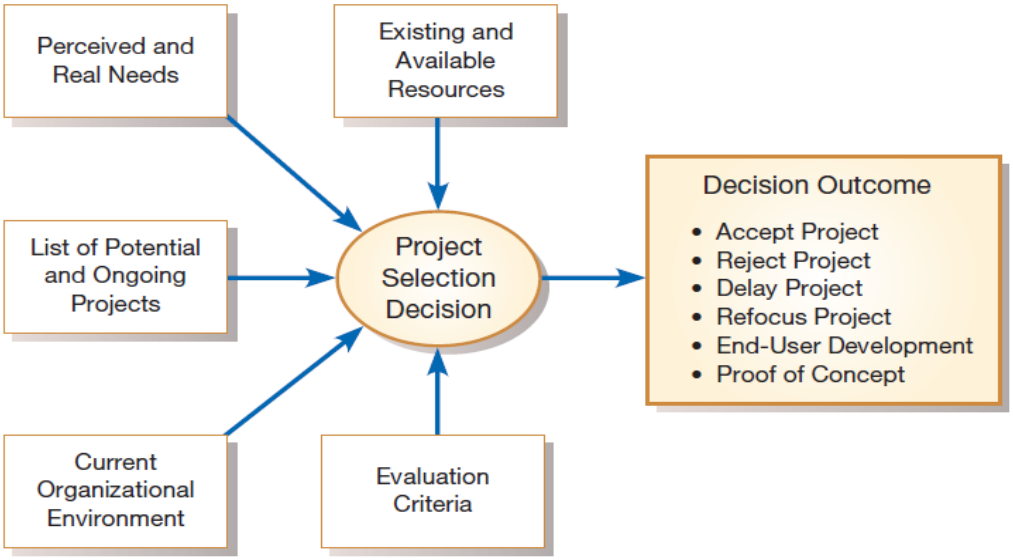

Fig: Project selection decisions must consider numerous factors and can have numerous outcomes

Deliverables and Outcomes:

The primary deliverable from the *project identification and selection* phase is a **schedule** of specific IS development projects to move into the next part of the planning phase – *project initiation and planning*. An outcome of this phase is the assurance that careful consideration was given to project selection, with a clear understanding of how each project can help the organization reach its objectives. After each subsequent SDLC phase the project will be reassessed to re-justify the continuation of the project. This strategy is called **incremental commitment**.

Many organizations have found that in order to make good project selection decisions, a clear understanding of overall organizational business strategy and objectives is required. This means that a clear understanding of the business and the desired role of information systems in achieving organizational goals is a precondition to improving the identification and selection process.

Corporate and Information Systems Planning

Corporate strategic planning and information systems planning can significantly improve the quality of project identification and selection decisions.

Corporate Strategic Planning:

A prerequisite for making effective project selection decisions is to gain a clear idea of where an organization is, its vision of where it wants to be in the future, and how to make the transition to its desired future state. Corporate strategic planning is a three-step process. The first step focuses on gaining an understanding of the current enterprise. Next, top management must determine where it wants the enterprise to be in the future. Finally, after gaining an understanding of the current and future enterprise, a strategic plan can be developed to guide this transition. The process of developing and refining models of the current and future enterprise as well as a transition strategy is often referred to as **corporate strategic planning**. During corporate strategic planning, executives typically develop a mission statement, statements of future corporate objectives, and strategies designed to help the organization reach its objectives.

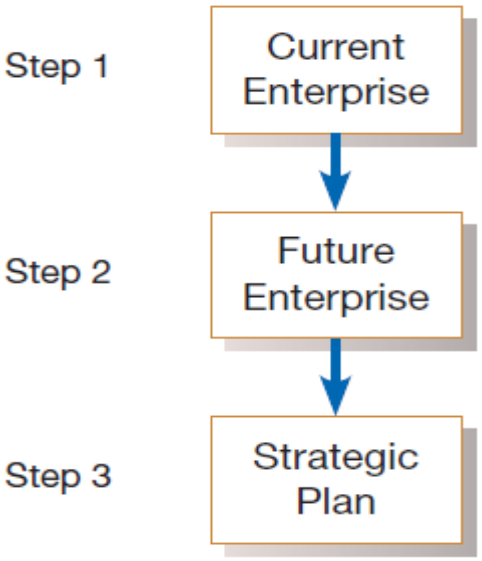

Fig: Corporate strategic planning is a three-step process

All successful organizations have a mission. The **mission statement** of a company typically states in very simple terms what business the company is in.

After defining its mission, an organization can then define its objectives. **Objective statements** refer to "broad and timeless" goals for the organization. These goals can be expressed as a series of statements that are either qualitative or quantitative but that typically do not contain details likely to change substantially over time. Objectives are often referred to as *critical success factors.* Here, we will simply use the term *objectives.* Once a company has defined its mission and objectives, a competitive strategy can be formulated.

A **competitive strategy** is the method by which an organization attempts to achieve its mission and objectives. In essence, the strategy is an organization's game plan for playing in the competitive business world. The three generic competitive strategies are

- **Low-cost producer** – This strategy reflects competing in an industry on the basis of product or service cost to the consumer.
- **Product differentiation** – This competitive strategy reflects capitalizing on a key product criterion requested by the market.
- **Product focus or niche** – This strategy is similar to both the low-cost and differentiation strategies but with a much narrower market focus.

It is only through the clear understanding of the organizational mission, objectives, and strategies, IS development projects should be identified and selected.

Information Systems Planning:

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 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 must be done in accordance with the organization's mission, objectives, and competitive strategy.

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.

The methodologies such as Business Systems Planning (BSP) and Information Engineering (IE) that have developed to support the ISP process contain the following three key activities:

1. Describe the current situation
2. Describing the target situation, trends, and constraint
3. Developing a transition strategy and plans

Initiating and Planning Systems Development Project

Introduction

Regardless of how a project is identified and selected, the next step is to conduct a more detailed assessment during project initiating and planning. This assessment does not focus on how the proposed system will operate but rather on understanding the *scope* of a proposed project and its *feasibility* of completion given the available resources. Project initiation and planning is where projects are accepted for development, rejected, or redirected. This is also where you, as a systems analyst, begin to play a major role in the systems development process.

Initiating and Planning Systems Development Project

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. Three important questions that must be considered when making this decision on the division between PIP and analysis are:

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?

For the first question, 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.

For the second question, 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.

For 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. 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.

The 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. As discussed in previous unit, the types of activities performed when initiating a project are:

- 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

Depending upon the size, scope, and complexity of the project, some project initiation activities may be unnecessary or may be very involved.

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 discussed in previous unit, the activities performed during project planning are:

- Describing the Project Scope, Alternatives, and Feasibility
- Dividing the Project into Manageable Tasks
- Estimating Resources and Creating a Resource Plan
- Developing a Preliminary Schedule
- Developing a Communication Plan
- Determining Project Standards and Procedures
- Identifying and Assessing Risk
- Creating a Preliminary Budget
- Developing the Project Scope Statement
- Setting a Baseline Project Plan

Deliverables and Outcomes:

The major outcomes and deliverables from the project initiation and planning phase are the **Baseline Project Plan** and the **Project Scope Statement**.

The **Baseline Project Plan (BPP)** contains all information collected and analyzed during project initiation and planning. The plan reflects the best estimate of the project's scope, benefits, costs, risks, and resource requirements given the current understanding of the project. The BPP specifies detailed project activities for the next life cycle phase – analysis. The BPP is used by the project selection committee to help decide whether the project should be accepted, redirected, or cancelled. If selected, the BPP becomes the foundation document for all subsequent SDLC activities; however, it is also expected to evolve as the project evolves. That is, as new information is learned during subsequent SDLC phases, the baseline plan will be updated.

The **Project Scope Statement (PSS)** is a short document prepared for the customer that describes what the project will deliver and outlines all work required to complete the project. The PSS ensures that both you and your customer gain a common understanding of the project. It is also a very useful communication tool. The PSS is a very easy document to create because it typically consists of a high-level summary of the BPP information.

Assessing Project Feasibility

All projects are feasible given unlimited resources and infinite time. Unfortunately, most projects must be developed within tight budgetary and time constraints. This means that assessing project feasibility is a required activity for all information systems projects and is a potentially large undertaking. It requires that you, as a systems analyst, evaluate a wide range of factors. Typically, the relative importance of these factors will vary from project to project. Most feasibility factors are represented by the following categories:

- Economic
- Technical
- Operational
- Scheduling
- Legal and contractual
- Political

1. 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. So, after each SDLC phase economic feasibility is reviewed 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. 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. It is important to note that not all tangible benefits can be easily quantified. 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

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. Some intangible benefits are:

- Competitive necessity
- More timely information
- Improved organizational planning
- Increased organizational flexibility
- Promotion of organizational learning and understanding
- Availability of new, better, or more information
- Ability to investigate more alternatives
- Faster decision making
- More confidence in decision quality
- Improved processing efficiency
- Improved asset utilization
- Improved resource control
- Increased accuracy in clerical operations
- Improved work process that can improve employee morale or customer satisfaction
- Positive impacts on society
- Improved social responsibility
- Better usage of resources

After determining project benefits, project costs must be identified.

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.
Some common costs associated with the development and operation of an information system are given below.

- **Procurement** – Hardware, software, facilities infrastructure; Management and staff; Consulting and services
- **Project** – Infrastructure replacement / improvements; Project personnel; Training; Development activities; Services and procurement; Organizational disruptions; Management and staff
- **Start-Up** – Initial operating costs; Management and staff; Personnel recruiting
- **Operating** – Infrastructure replacement / improvements; System maintenance; Management and staff; User training and support

Predicting the costs associated with the development of an information system is an inexact science. Both underestimating and overestimating costs are problems you must avoid. Underestimation results in cost overruns, whereas overestimation results in unnecessary allocation of resources that might be better utilized. There are several guidelines for improving the cost-estimating process as given below.

- Have clear guidelines for creating estimates.
- Use experienced developers and/or project managers for making estimates.
- Develop a culture where all project participants are responsible for defining accurate estimates.
- Use historical data to help in establishing better estimates of costs, risks, schedules, and resources.
- Update estimates as the project progresses.
- Monitor progress and record discrepancies to improve future estimates.

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.
Besides tangible and intangible costs, you can distinguish IS-related development costs as either one-time or recurring (the same is true for benefits). **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. **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)

Both one-time and recurring costs can consist of items that are **fixed** or **variable** in nature. Fixed costs are costs that are billed or incurred at a regular interval and usually at a fixed rate (a facility lease payment). Variable costs are items that vary in relation to usage (long-distance phone charges).

The Time Value of Money:
Most techniques used to determine economic feasibility encompass the concept of the **time value of money (TVM)**, which reflects the notion that money available today is worth more than the same amount tomorrow. A simple formula can be used when figuring out the present value.

$$PV_n = Y \times \frac{1}{(1 + i)^n}$$

Here, PV_n is the *present value* of *Y* dollars *n* years from now when *i* is the *discount rate*. **Discount rate** is the rate of return used to compute the present value of future cash flows. **Present value is t**he current value of a future cash flow.

Commonly used Cost-Benefit Techniques:

You can use many techniques to compute a project's economic feasibility. Because most information systems have a useful life of more than one year and will provide benefits and incur expenses for more than one year, most techniques for analyzing economic feasibility employ the concept of the TVM. Some commonly used techniques are described below:

- **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.

Question No 1:

Assuming monetary benefits of an information system at $85,000 per year, one-time costs of $75,000, recurring costs of $35,000 per year, a discount rate of 12 percent, and a five-year time horizon, calculate the net present value of these costs and benefits of an information system. Also calculate the overall return on investment of the project and then present a break-even analysis. At what point does breakeven occur?

Question No 2:

Assume monetary benefits of an information system of $40,000 the first year and increasing benefits of $10,000 a year for the next five years. One-time development costs were $80,000 and recurring costs were $45,000 over the duration of the system's life. The discount rate for the company was 11 percent. Using a six-year time horizon, calculate the net present value of these costs and benefits. Also calculate the overall return on investment and then present a break-even analysis. At what point does breakeven occur?

2. Assessing Technical Feasibility

The purpose of assessing **technical feasibility** is to gain an understanding of the organization's ability to construct the proposed system. This analysis should include an assessment of the development group's understanding of the possible target hardware, software, and operating environments to be used, as well as system size, complexity, and the group's experience with similar systems. For assessing technical feasibility, a level of project risk can be determined. Understanding the sources and types of technical risks proves to be a valuable tool when you assess a project.

The amount of technical risk associated with a given project is contingent on four primary factors: ***project size***, ***project structure***, ***the development group's experience with the application and technology area***, and ***the user group's experience with systems development projects and the application area***.

When using these factors for conducting a technical risk assessment, four general rules emerge:

- *Large projects are riskier than small projects*
- *A system in which the requirements are easily obtained and highly structured will be less risky than one in which requirements are messy, ill-structured, ill-defined, or subject to the judgment of an individual*

- *The development of a system employing commonly used or standard technology will be less risky than one employing novel or nonstandard technology*
- *A project is less risky when the user group is familiar with the systems development process and application area than if the user group is unfamiliar with them*

3. Assessing Operational Feasibility

Operational feasibility is the process of assessing the degree to which a proposed system solves business problems or takes advantage of business opportunities. It is the process of examining the likelihood that the project will attain its desired objectives.

Operational feasibility also includes justifying the project on the basis of being consistent with or necessary for accomplishing the information systems plan.

Operational feasibility should also include an analysis of how the proposed system will affect organizational structures and procedures. Systems that have substantial and widespread impact on an organization's structure or procedures are typically riskier projects to undertake. Thus, it is important for you to have a clear understanding of how an information system will fit into the current day-to-day operations of the organization.

4. Assessing Schedule Feasibility

Schedule feasibility is related with the project duration. It is the process of assessing the degree to which the potential time frame and completion dates for all major activities within a project meet organizational deadlines and constraints for affecting change.

Assessing schedule feasibility during project initiation and planning is more of a "rough-cut" analysis of whether the system can be completed within the constraints of the business opportunity or the desires of the users. As with all forms of feasibility, schedule feasibility will be reassessed after each phase when you can specify with greater certainty the details of each step for the next phase.

5. Assessing Legal and Contractual Feasibility

It is the process of assessing potential legal and contractual ramifications due to the construction of a system. Possible considerations might include copyright or nondisclosure infringements, labor laws, antitrust legislation, foreign trade regulations, and financial reporting standards, as well as current or pending contractual obligations. Contractual obligations may involve ownership of software used in joint ventures, license agreements for use of hardware or software, nondisclosure agreements with partners, or elements of a labor agreement.

6. Assessing Political Feasibility

Political feasibility is the process of evaluating how key stakeholders within the organization view the proposed system. Because an information system may affect the distribution of information within the organization, and thus the distribution of power, the construction of an information system can have political ramifications. Those stakeholders not supporting the project may take steps to block, disrupt, or change the intended focus of the project.

Building and Reviewing Baseline Project Plan

All the information collected during project initiation and planning is collected and organized into a document called the **Baseline Project Plan**. Once the BPP is completed, a formal review of the project can be conducted with project clients and other interested parties. The focus of this review is to verify all information and assumptions in the baseline plan before moving ahead with the project.

Building the baseline Project Plan:

Baseline Project Plan (BPP) is a document intended primarily to guide the development team. This plan provides an estimate of the project's tasks and resource requirements and is used to guide the remaining phases. An outline of a BPP is given below:

1.0 Introduction
   A. Project Overview – Provides an executive summary that specifies the project's scope, feasibility, justification, resource requirements, and schedules. Additionally, a brief statement of the problem, the environment in which the system is to be implemented, and constraints that affect the project are provided.
   B. Recommendation – Provides a summary of important findings from the planning process and recommendations for subsequent activities.

2.0 System Description
   A. Alternatives – Provides a brief presentation of alternative system configurations in addition to the one deemed most appropriate for the given situation.
   B. System Description – Provides a description of the selected configuration and a narrative of input information, tasks performed, and resultant information.

3.0 Feasibility Assessment
   A. Economic Analysis – Provides an economic justification for the system using cost-benefit analysis.
   B. Technical Analysis – Provides a discussion of relevant technical risk factors and an overall risk rating of the project.
   C. Operational Analysis – Provides an analysis of how the proposed system solves business problems or takes advantage of business opportunities in addition to an assessment of how current day-to-day activities will be changed by the system.
   D. Legal and Contractual Analysis – Provides a description of any legal or contractual risks related to the project (e.g., copyright or nondisclosure issues, data capture or transferring, and so on).
   E. Political Analysis – Provides a description of how key stakeholders within the organization view the proposed system.
   F. Schedules, Time Line, and Resource Analysis – Provides a description of potential time frame and completion date scenarios using various resource allocation schemes.

4.0 Management Issues
   A. Team Configuration and Management – Provides a description of the team member roles and reporting relationships.
   B. Communication Plan – Provides a description of the communication procedures to be followed by management, team members, and the customer.
   C. Project Standards and Procedures – Provides a description of how deliverables will be evaluated and accepted by the customer.
   D. Other Project-Specific Topics – Provides a description of any other relevant issues related to the project uncovered during planning.

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 is called a *structured walk-through*. **Walk-throughs** are peer group reviews of any product created during the systems development process and are widely used by professional development organizations. 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. At walk-through meetings, there is a need to have individuals play specific roles. These roles are as follows:

- *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.