

System Analysis & Design

CSCI 2783

Planning Phase

- Initial System Request (Your Project)
- Feasibility Study
- Project Plan

Planning Phase

The Planning Phase is the fundamental two-step process of understanding why an information system should be developed and creating a plan for how the project team will develop it.

The deliverables from both steps are combined into the project plan, which is presented to the project sponsor and approval committee at the end of the Planning Phase. The Planning Phase allows you to determine whether it is advisable to proceed with the system development project.

Planning Phase

The systems development life cycle (SDLC) is the process of determining how an information system (IS) can support business needs, designing the system, building it, and delivering it to users. If you have taken a programming class or have programmed on your own, this probably sounds pretty simple. In the real world, however, it is not so easy.

Planning Phase

Today, both businesses and governments experience embarrassing and costly errors in their information systems. Here is a sample of just a few notable software glitches that occurred in 2010:

- A software error resulted in Toys R Us double billing some shoppers for purchases made on Black Friday.
- Verizon Wireless had to refund \$50 million to customers due to billing system errors.
- Chase banking customers were unable to access their online banking accounts for over 24 hours due to a computer glitch.
- McAfee's anti-virus software product caused its users' computers to lock up. McAfee offered affected customers a free 2-year subscription and reimbursement for costs incurred to repair the machines.
- A U.S. Navy drone (unmanned aerial vehicle) reportedly flew into restricted air space near Washington D.C. when operators lost control for about 20 minutes due to a software issue.

Planning Phase

The key person in the SDLC is the systems analyst, who analyzes the business situation, identifies opportunities for improvements, and designs an information system to implement the improvements. Many systems analysts view their profession as one of the most interesting, exciting, and challenging jobs around. As a systems analyst, you will work as a team with a variety of people, including business and technical experts. You will feel the satisfaction of seeing systems that you designed and developed make a significant positive business impact, while knowing that your unique skills helped make that happen.

Planning Phase

It is important to remember that the primary objective of the systems analyst is not to create a wonderful system. The primary goal is to create value for the organization, which for most companies means increasing profits. Many failed systems were abandoned because the analysts tried to build a wonderful system without clearly understanding how the system would support the organization's goals, improve business processes, and integrate with other information systems to provide value. An investment in an information system is like any other investment, such as a new machine tool. The goal is not to acquire the tool, because the tool is simply a means to an end; the goal is to enable the organization to perform work better so that it can earn greater profits or serve its constituents more effectively.

The System Analyst

The systems analyst plays a key role in information systems development projects. The systems analyst works closely with all project team members so that the team develops the right system in an effective way. Systems analysts must understand how to apply technology to solve business problems. In addition, systems analysts may serve as change agents who identify the organizational improvements needed, design systems to implement those changes, and train and motivate others to use the systems.

System Analyst Skills

Analysts must have the technical skills to understand the organization's existing technical environment, the new system's technology foundation, and the way in which both can be fit into an integrated technical solution. Business skills are required to understand how IT can be applied to business situations and to ensure that the IT delivers real business value. Analysts are continuous problem solvers at both the project and the organizational level, and they put their analytical skills to the test regularly.

System Analyst Skills

Often, analysts need to communicate effectively, one-on-one with users and business managers (who often have little experience with technology) and with programmers (who often have more technical expertise than the analyst does). They must be able to give presentations to large and small groups and to write reports. Not only do they need to have strong interpersonal abilities, but they also need to manage people with whom they work, and they must manage the pressure and risks associated with unclear situations.

System Analyst Skills

Finally, analysts must deal fairly, honestly, and ethically with other project team members, managers, and system users.

Analysts often deal with confidential information or information that, if shared with others, could cause harm (e.g., dissent among employees); it is important for analysts to maintain confidence and trust with all people.

System Analyst Role

The systems analyst role focuses on the IS issues surrounding the system. This person develops ideas and suggestions for ways that IT can support and improve business processes, helps design new business processes supported by IT, designs the new information system, and ensures that all IS standards are maintained. The systems analyst will have significant training and experience in analysis and design and in programming.

System Analyst Role

The business analyst role focuses on the business issues surrounding the system. This person helps to identify the business value that the system will create, develops ideas for improving the business processes, and helps design new business processes and policies. The business analyst will have business training and experience, plus knowledge of analysis and design.

System Analyst Role

The requirements analyst role focuses on eliciting the requirements from the stakeholders associated with the new system. As more organizations recognize the critical role that complete and accurate requirements play in the ultimate success of the system, this specialty has gradually evolved. Requirements analysts understand the business well, are excellent communicators, and are highly skilled in an array of requirements elicitation techniques.

System Analyst Role

The infrastructure analyst role focuses on technical issues surrounding the ways the system will interact with the organization's technical infrastructure (hardware, software, networks, and databases). This person ensures that the new information system conforms to organizational standards and helps to identify infrastructure changes that will be needed to support the system. The infrastructure analyst will have significant training and experience in networking, database administration, and various hardware and software products. Over time, an experienced infrastructure analyst may assume the role of software architect, who takes a holistic view of the organization's entire IT environment and guides application design decision within that context.

System Analyst Role

The change management analyst role focuses on the people and management issues surrounding the system installation. This person ensures that adequate documentation and support are available to users, provides user training on the new system, and develops strategies to overcome resistance to change. The change management analyst will have significant training and experience in organizational behavior and specific expertise in change management.

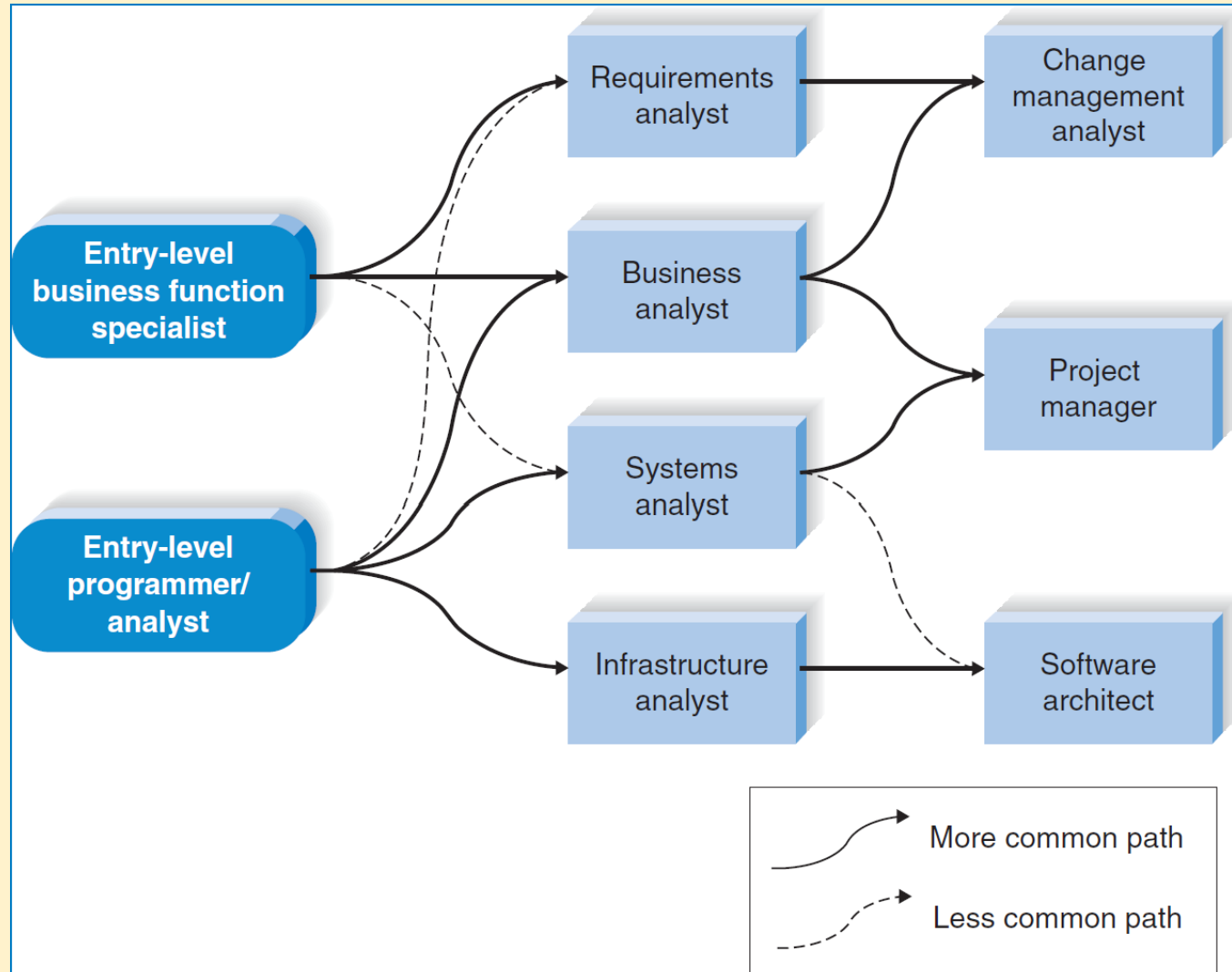
System Analyst Role

The project manager role ensures that the project is completed on time and within budget and that the system delivers the expected value to the organization. The project manager is often a seasoned systems analyst who, through training and experience, has acquired specialized project management knowledge and skills.

The System Development Life Cycle

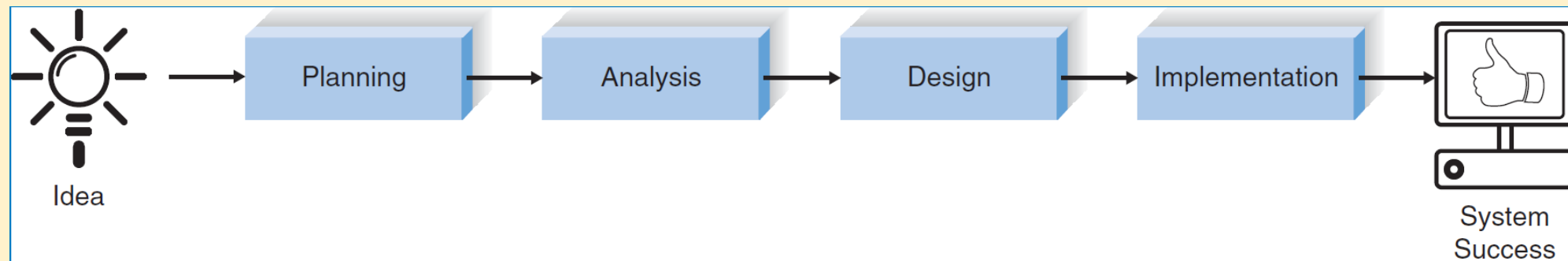
In many ways, building an information system is similar to building a house. First, the owner describes the vision for the house to the developer. Second, this idea is transformed into sketches and drawings that are shown to the owner and refined (often, through several drawings, each improving on the other) until the owner agrees that the pictures depict what he or she wants. Third, a set of detailed blueprints is developed that presents much more specific information about the house (e.g., the layout of rooms, placement of plumbing fixtures and electrical outlets, and so on). Finally, the house is built following the blueprints—and often with some changes and decisions made by the owner as the house is erected.

The System Development Life Cycle



The System Development Life Cycle

Building an information system using the SDLC follows a similar set of four fundamental phases: planning, analysis, design, and implementation (Figure below). Each phase is itself composed of a series of steps, which rely on techniques that produce deliverables (specific documents and files that explain various elements of the system).



The System Development Life Cycle

The following figures provide more detail on the steps, techniques, and deliverables that are included in each phase of the SDLC.

Phase	Chapter	Step	Technique	Deliverable
Planning Focus: Why build this system? How to structure the project? Primary outputs: — System Request with feasibility study — Project plan	1	Identify opportunity	Project identification	System request
	1	Analyze feasibility	Technical feasibility Economic feasibility Organizational feasibility	Feasibility study
	2	Develop workplan	Time estimation Task identification Work breakdown structure PERT chart Gantt chart	Project plan — work plan
	2	Staff project	Scope management Project staffing Project charter	— Staffing plan
	2	Control and direct project	CASE repository Standards Documentation Timeboxing Risk management	— Standards list — Risk assessment

The System Development Life Cycle

The following figures provide more detail on the steps, techniques, and deliverables that are included in each phase of the SDLC.

Analysis Focus: Who, what, where, and when for this system? Primary output — System proposal	3	Develop analysis strategy	Business process automation Business process improvement Business process reengineering	System proposal
	3	Determine business requirements	Interview JAD session Questionnaire Document analysis Observation	— Requirements definition
	4	Create use cases	Use case analysis	— Use cases
	5	Model processes	Data flow diagramming	— Process models
	6	Model data	Entity relationship modeling Normalization	— Data model

The System Development Life Cycle

The following figures provide more detail on the steps, techniques, and deliverables that are included in each phase of the SDLC.

Design Focus: How will this system work? Primary output: — System specification	7	Design physical system	Design strategy	Alternative matrix System specification
	8	Design architecture	Architecture design Hardware & software selection	— Architecture report — Hardware & software specification
	9	Design interface	Use scenario Interface structure Interface standards Interface prototype Interface evaluation	— Interface design
	10	Design programs	Data flow diagramming Program structure chart Program specification	— Physical process model — Program design
	11	Design databases and files	Data format selection Entity relationship modeling Denormalization Performance tuning Size estimation	— Database & file specification — Physical data model

The System Development Life Cycle

The following figures provide more detail on the steps, techniques, and deliverables that are included in each phase of the SDLC.

Implementation	12	Construct system	Programming Software testing Performance testing	Test plan Programs Documentation Migration plan
Focus: delivery and support of completed system				
Primary output: — Installed system	13	Install system	Conversion strategy selection	— Conversion plan — Business contingency plan — Training plan
	13	Maintain system	Training Support selection System maintenance Project assessment	Support plan Problem report Change request
	13	Post-implementation	Post-implementation audit	Post-implementation audit report

The System Development Life Cycle

There are two important points to understand about the SDLC. First, you should have a general sense of the phases and steps that IS projects move through and some of the techniques that produce certain deliverables. In this section, we provide an overview of the phases, steps, and some of the techniques that are used to accomplish the steps. Second, it is important to understand that the SDLC is a process of gradual refinement. The deliverables produced in the analysis phase provide a general idea what the new system will do. These deliverables are used as input to the design phase, which then refines them to produce a set of deliverables that describes in much more detailed terms exactly how the system should be built. These deliverables in turn are used in the implementation phase to guide the creation of the actual system. Each phase refines and elaborates on the work done previously.

Planning Phase

The planning phase is the fundamental process of understanding why an information system should be built and determining how the project team will go about building it. It has two steps:

- The system's business value to the organization is identified
(How will it lower costs or increase revenues?) Most ideas for new systems come from outside the IS area (from the marketing department, accounting department, etc.) in the form of a system request.

A system request provides a brief summary of a business need, and it explains how a system that supports the need will create business value.

Planning Phase (System Request)

The IS department works together with the person or department generating the request (called the project sponsor) to conduct a feasibility analysis. The feasibility analysis examines key aspects of the proposed project:

- The technical feasibility (Can we build it?)
- The economic feasibility (Will it provide business value?)
- The organizational feasibility (If we build it, will it be used?)

The system request and feasibility analysis are presented to an information systems approval committee (sometimes called a steering committee), which decides whether the project should be undertaken.

Note: The class will act as the Information Systems Approval Committee for each project proposal. Each group will be present their plan to the class.

Planning Phase

Once the project is approved, it enters project management.

During project management, the **project manager, (your group)**, creates a work plan, **staffs the project (your group)**, and puts techniques in place to help the project team control and direct the project through the entire SDLC. The deliverable for project management is a project plan that describes how the project team will go about developing the system.

PROJECT IDENTIFICATION AND INITIATION

Where do project ideas come from? A project is identified when someone in the organization identifies a business need to build a system. Examples of business needs include supporting a new marketing campaign, reaching out to a new type of customer, or improving interactions with suppliers. Sometimes, needs arise from some kind of “pain” within the organization, such as a drop in market share, poor customer service levels, unacceptable product defect rates, or increased competition. New business initiatives and strategies may be created and a system to support them is required, or a merger or acquisition may require systems to be integrated.

PROJECT IDENTIFICATION AND INITIATION

Business needs also can surface when the organization identifies unique and competitive ways of using IT. Many organizations keep an eye on emerging technology, which is technology that is still being developed and not yet viable for widespread business use. For example, if companies stay abreast of technological advances such as cloud computing, RFID (radio frequency identification), or Web 2.0, they can develop business strategies that leverage the capabilities of these technologies and introduce them into the marketplace as a first mover. Ideally, companies can take advantage of this first mover position by making money and continuing to innovate while competitors trail behind.

PROJECT IDENTIFICATION AND INITIATION

Today, many new information system projects grow out of business process management (BPM) initiatives. BPM is a methodology used by organizations to continuously improve end-to-end business processes. Business process management can be applied to internal organizational processes and to processes spanning multiple business partners.

PROJECT IDENTIFICATION AND INITIATION

By studying and improving their underlying business processes, organizations can achieve several important benefits, including:

- enhanced process agility, giving the organization the ability to adapt more rapidly and effectively to a changing business environment;
- improved process alignment with industry “best practices”; and
- increased process efficiencies as costs are identified and eliminated from process workflows.

PROJECT IDENTIFICATION AND INITIATION

BPM generally follows a continuous cycle of systematically creating, assessing, and altering business processes. Business analysts, with their in-depth business knowledge, play a particularly important role in business process management by:

1. defining and mapping the steps in a business process,
2. creating ways to improve on steps in the process that add value,
3. finding ways to eliminate or consolidate steps in the process that don't add value,
4. creating or adjusting electronic workflows to match the improved process maps.

PROJECT IDENTIFICATION AND INITIATION

Step 4 is particularly relevant to our discussion since the need for information systems projects is frequently identified here. In fact, the automation of business processes (termed Business Process Automation), is the foundation of many information technology systems. In these situations, technology components are used to complement or substitute for manual information management processes with the intent of gaining cost efficiencies.

PROJECT IDENTIFICATION AND INITIATION

BPM practitioners recognize, however, that it is not always advisable to just “pave the cow paths” by simply adding automation to speed up existing processes (step 4 above). In many situations, Business Process Improvement results from studying the business processes, creating new, redesigned processes to improve the process workflows, and/or utilizing new technologies enabling new process structures (steps 2, 3, and 4 above). For example, could a retail store’s checkout process be redesigned along the lines of the EZPass toll collection system on highways? Could customers check out and pay with their mobile devices while clerks simply review the contents of the customer’s shopping bag?

PROJECT IDENTIFICATION AND INITIATION

Projects with a goal of business process improvement make moderate changes to the organization's operations, and can improve efficiency (i.e., doing things right) and improve effectiveness (i.e., doing the right things). These types of projects involve more risk than business process automation projects since more significant changes are made to the organization's operations.

System Request

A system request is a document that describes the business reasons for building a system and the value that the system is expected to provide. The project sponsor usually completes this form as part of a formal system project selection process within the organization. Most system requests include five elements: project sponsor, business need, business requirements, business value, and special issues.

Elements of a System Request

Element	Description	Examples
Project Sponsor	The person who initiates the project and who serves as the primary point of contact for the project on the business side	Several members of the finance department Vice president of marketing IT manager Steering committee CIO CEO
Business Need	The business-related reason for initiating the system	Increase sales Improve market share Improve access to information Improve customer service Decrease product defects Streamline supply acquisition processes
Business Requirements	The business capabilities that the system will provide	Provide online access to information Capture customer demographic information Include product search capabilities Produce management reports Include online user support

Elements of a System Request (cont.)

Business Value

The benefits that the system will create for the organization

- 3% increase in sales
- 1% increase in market share
- Reduction in headcount by 5*FTEs
- \$200,000 cost savings from decreased supply costs
- \$150,000 savings from removal of existing system

Special Issues or Constraints

Issues that are relevant to the implementation of the system that need to be known by the approval committee

- Government-mandated deadline for May 30
- System needed in time for the Christmas holiday season
- Top-level security clearance needed by project team to work with data

Planning Phase Checkpoints

1. Identify Project
2. Develop System Request
3. Analyze Technical Feasibility
4. Analyze Economical Feasibility
5. Analyze Organizational Feasibility

Assignment: Submit all supporting documentation for each of the listed checkpoints. Create five separate document and submit all in as one assignment. Use Microsoft Word. Include all supporting charts, graphs, etc.