Chapter 5 - Systems Analysis

Define systems analysis and relate the term to the scope definition, problem analysis, requirements analysis, logical design, and decision analysis phases of this book's systems development methodology.

Describe a number of systems analysis approaches for solving business system problems.

Describe the scope definition, problem analysis, requirements analysis, logical design, and decision analysis phases in terms of your information system building blocks.

Describe the scope definition, problem analysis, requirements analysis, logical design, and decision analysis phases in terms of purpose, participants, inputs, outputs, techniques, and steps.

Identify those chapters and modules in this textbook that can help you learn specific systems analysis tools and techniques.

Systems analysis – a problem-solving technique that decomposes a system into its component pieces for the purpose of studying how well those component parts work and interact to accomplish their purpose.

Systems design – a complementary problem-solving technique (to systems analysis) that reassembles a system’s component pieces back into a complete system—hopefully, an improved system. This may involves adding, deleting, and changing pieces relative to the original system.

Information systems analysis – those development phases in an information systems development project the primarily focus on the business problem and requirements, independent of any technology that can or will be used to implement a solution to that problem.

Repository – a location (or set of locations) where systems analysts, systems designers, and system builders keep all of the documentation associated with one or more systems or projects.

- A network directory of computer-generated files that contain project correspondence, reports, and data
- A CASE tool dictionary or encyclopedia (Chapter 3)
- Printed documentation (binders and system libraries)
- An intranet website interface to the above components
Model-driven analysis – a problem-solving approach that emphasizes the drawing of pictorial system models to document and validate both existing and/or proposed systems. Ultimately, the system model becomes the blueprint for designing and constructing an improved system.

Model – a representation of either reality or vision. Since “a picture is worth a thousand words,” most models use pictures to represent the reality or vision.

Structured analysis – a model-driven, process-centered technique used to either analyze an existing system, define business requirements for a new system, or both. The models are pictures that illustrate the system’s component pieces, processes and their associated inputs, outputs, and files.

Information engineering (IE) – a model-driven and data-centered, but process-sensitive technique for planning, analyzing, and designing information systems. IE models are pictures that illustrate and synchronize the system’s data and processes.

Object-oriented analysis (OOA) – a model-driven technique that integrates data and process concerns into constructs called objects. OOA models are pictures that illustrate the system’s objects from various perspectives such as structure and behavior, and interactions of the objects.

Object – the encapsulation of the data (called properties) that describes a discrete person, object, place, event, or thing, with all the processes (called methods) that are allowed to use or update the data and properties. The only way to access or update the object’s data is to use the object’s predefined processes.

Accelerated systems analysis approaches emphasize the construction of prototypes to more rapidly identify business and user requirements for a new system.

Prototype – a small-scale, incomplete, but working sample of a desired system.

• Accelerated systems analysis approaches
  – Discovery Prototyping
  – Rapid Architected Analysis
Discovery prototyping – a technique used to identify the users’ business requirements by having them react to a quick-and-dirty implementation of those requirements.

- Advantages
  - Prototypes cater to the “I'll know what I want when I see it” way of thinking that is characteristic of many users and managers.
- Disadvantages
  - Can become preoccupied with final “look and feel” prematurely
  - Can encourage a premature focus on, and commitment to, design
  - Users can be misled to believe that the completed system can be built rapidly using prototyping tools

Rapid architected analysis – an approach that attempts to derive system models (as described earlier in this section) from existing systems or discovery prototypes.

- Reverse engineering – the use of technology that reads the program code for an existing database, application program, and/or user interface and automatically generates the equivalent system model.

Requirements discovery – the process, used by systems analysts of identifying or extracting system problems and solution requirements from the user community. Approaches include:

- Fact-finding – the process of collecting information about system problems, opportunities, solution requirements, and priorities.
  - Sampling of existing documentation, reports, forms, databases, etc
  - Research of relevant literature
  - Observation of the current system
  - Questionnaires and surveys
  - Interviews
- Joint requirements planning (JRP) – the use of facilitated workshops to bring together all of the system owners, users, and analysts, and some systems designer and builders to jointly perform systems analysis.
  - JRP is generally considered a part of a larger method called joint application development (JAD), a more comprehensive application of the JRP techniques to the entire systems development process.

Business process redesign (BPR) – the application of systems analysis methods to the goal of dramatically changing and improving the fundamental business processes of an organization, independent of information technology.

Agile method – the integration of various approaches of systems analysis and design for applications as deemed appropriate to the problem being solved and the system being developed.

- Most commercial methodologies do not impose a single approach (structured analysis, IE, OOA) on systems analysts.
- Instead, they integrate all popular approaches into a collection of agile methods.
- System developers are given the flexibility to select from a variety of tools and techniques to best accomplish the tasks at hand.
- The hypothetical FAST methodology operates this way.
Context of Scope Definition Phase

Tasks for the Scope Definition Phase of Systems Analysis

Sample Request for System Services

Sample Problem Statements

Scope Definition Phase

Steering body – a committee of executive business and system managers that studies and prioritizes competing project proposals to determine which projects will return the most value to the organization and thus should be approved for continues systems development.

– Also called a steering committee.

Project charter – the final deliverable for the preliminary investigation phase. A project charter defines the project scope, plan, methodology, standards, and so on.

– Preliminary master plan includes preliminary schedule and resource assignments (also called a baseline plan).

– Detailed plan and schedule for completing the next phase of the project.
Tasks for Problem Analysis Phase of Systems Analysis

**Cause-and-Effect Analysis**

- a technique in which problems are studied to determine their causes and effects.

In practice, effects can be symptomatic of more deeply rooted or basic problems which, in turn, must be analyzed for causes and effects until such a time as the causes and effects do not yield symptoms of other problems.

**System Improvement Objectives**

- **Objective** – a measure of success. It is something that you expect to achieve, if given sufficient resources.
  - Reduce the number of uncollectible customer accounts by 50 percent within the next year.
  - Increase by 25 percent the number of loan applications that can be processed during an eight-hour shift.
  - Decrease by 50 percent the time required to reschedule a production lot when a workstation malfunctions.

- **Constraint** – something that will limit your flexibility in defining a solution to your objectives. Essentially, constraints cannot be changed.
  - The new system must be operational by April 15.
  - The new system cannot cost more than $350,000.
  - The new system must be web-enabled.
  - The new system must bill customers every 15 days.
Tasks for Requirements Analysis Phase

Functional vs. Nonfunctional Requirements

**Functional requirement** – a description of activities and services a system must provide.
  - inputs, outputs, processes, stored data

**Nonfunctional requirement** – a description of other features, characteristics, and constraints that define a satisfactory system.
  - Performance, ease of learning and use, budgets, deadlines, documentation, security, internal auditing controls

Expressing System Requirements

- Draft Functional and Nonfunctional Requirements
  - Could use simple list of system improvement objectives
  - Increasingly systems analysts express functional requirements using Use Cases

**Use case** – a business scenario or event for which the system must provide a defined response. Use cases evolved out of object-oriented analysis; however, their use has become common in many other methodologies for systems analysis and design.

Prioritize System Requirements

- Prioritization of requirements can be facilitated using timeboxing.

**Timeboxing** – a technique that delivers information systems functionality and requirements through versioning.
1. The development team selects the smallest subset of the system that, if fully implemented, will return immediate value to the systems owners and users.
2. That subset is developed, ideally with a time frame of six to nine months or less.
3. Subsequently, value-added versions of the system are developed in similar time frames.
  - A mandatory requirement is one that must be fulfilled by the minimal system, version 1.0
  - A desirable requirement is one that is not absolutely essential to version 1.0. It may be essential to the vision of a future version.
Chapter 5 - Systems Analysis

Context of Decision Analysis Phase of Systems Analysis

Tasks for Decision Analysis Phase of Systems Analysis

Feasibility

- Technical feasibility – Is the solution technically practical? Does our staff have the technical expertise to design and build this solution?

- Operational feasibility – Will the solution fulfill the users’ requirements? To what degree? How well will the solution change the users’ work environment? How do users feel about such a solution?

- Economic feasibility – Is the solution cost-effective?

- Schedule feasibility – Can the solution be designed and implemented within an acceptable time period?
Outline for a Typical System Proposal

I. Introduction
   A. Purpose of the report
   B. Background of the project leading to this report
   C. Scope of the report
   D. Structure of the report

II. Tools and techniques used
    A. Solution generated
    B. Feasibility analysis (cost-benefit)

III. Information systems requirements

IV. Alternative solutions and feasibility analysis

V. Recommendations

VI. Appendices