CHAPTER 14

THE SYSTEMS DEVELOPMENT PROCESS, PART II:
SYSTEM SELECTION, DETAILED DESIGN, AND SYSTEM IMPLEMENTATION

This chapter examines the fourth through sixth stages of the SDLC. Stage four, system selection, evaluates the alternatives by comparing costs and benefits. This is followed by detailed system design and system implementation. The amount of work required to develop a detailed design is extensive. But the quality of the resulting system reflects this effort.

The objectives of this chapter are:

- to understand the role of accountants in systems design;
- to be able to identify the range of factors that should be considered in a detailed feasibility study;
- to be able to identify and discuss the three major steps involved in a cost-benefit analysis of proposed information systems;
- to understand the advantages and disadvantages of the commercial software option and to be able to discuss the decision process used to elect commercial software;
- to be able to identify the sequence of events that comprise the detailed design phase of the system development life cycle;
- to understand the design procedure for both hard-copy and electronic input and output media;
- to understand how the process component of a system is designed;
- to understand the principal features of system implementation, including the use of PERT and Gantt charts to create an implementation schedule;
- to be familiar with the different types of system documentation and the purposes they serve; and
- to understand the procedures employed in database and system conversion.
I. System Evaluation and Selection

The result of the conceptual design phase is a set of proposals that will satisfy the needs of the organization. The proposed systems must be evaluated and the best selected. This is an optimization process—a management call. There are two related steps: another, more detailed, feasibility study and a cost-benefit analysis.

A. Perform a Detailed Feasibility Study

The feasibility study expands on the different concepts of feasibility discussed in Chapter 13. Pay particular attention to the issues to be addressed and how one aspect of feasibility can affect another. Note the importance of the evaluation being done by skilled, but independent, evaluators.

B. Perform a Cost-Benefit Study

Cost-benefit analysis is not new to you. As is always the case, identifying the costs and benefits is difficult. Comparing the two is not.

1. Identify Costs

Note, in particular, the breakdown between one-time and recurring costs. It is easy and dangerous to mis-estimate the recurring costs. As accountants you want a good understanding of both types of costs. See Table 14-1, on page 690.

2. Identify Benefits

The distinction between tangible benefits and intangible is important. Tangible benefits are easy to grasp: revenues up, costs down. Obviously, the intangible are hard to quantify and are, therefore, subject to “gamesmanship.” See Table 14-3, on page 694, for a list of intangible benefits. Note how hard to define most of them are.

3. Compare Costs and Benefits

The discussion of the two methods of comparison should not be new. The net present value method and the payback method are standards.
C. Prepare System Selection Report

The result of this selection process is the system selection report that goes to the steering committee for final choice.

II. Commercial Systems Packages

Many organizations choose to purchase commercial systems rather than try to develop their own.

A. Trends in Commercial Software

Your text discusses three trends in commercial systems:

- turnkey systems,
- backbone systems,
- vendor-supported systems, and
- ERP systems.

The differences are important. Focus on the advantages and disadvantages of commercial software. Both exist.

A. Bypassing the SDLC

This may be realistic, but the situation should be carefully evaluated.

B. Choosing a Package

Your text outlines a four-step procedure to selecting commercial software:

- Needs analysis,
- Request for proposal,
- Fact gathering, and
- Analyze and pick.

This is more elaborate than you might consider for small personal software decisions but can be of some benefit for you as well as your employer or client.

III. The Role of Accountants in Evaluation and Selection

Don’t spend what you don’t have. Conduct a good cost/benefit analysis. Watch both data integrity and control.
IV. Detailed System Design

A. The Design Sequence

The design process is not linear, but iterative—things learned in later steps will often require revisions to parts already “done.” The process is discussed in six stages:

• data model the business process and design the conceptual views;
• design normalized base tables;
• design physical user views;
• design the system process;
• design system controls; and
• perform a system design walkthrough.

Each stage is discussed in detail. Read and study carefully.

B. Data Modeling, Conceptual Views, and Normalized Tables

Data modeling is the process of specifying the data requirements of a business process. This is documented using entity relationship diagrams, which were introduced in Chapter 2. Once modeled, the data attributes that define an entity can be described—this is a conceptual view which is the basis for the database tables. Refer back to the discussion in Chapter 9 of normalized database tables and why normalization is an issue.

C. Design Physical User Views

Table 14-5, on page 706, gives some examples of outputs from the various sub-systems. Attention must be paid to the difference between discretionary and nondiscretionary reporting. Every desired report must be planned and the format, timing, frequency and elements (and ultimately the inputs and required processing) specified.

The attributes of desired output deserve close attention. You may wish to refer to your intermediate or advanced texts for discussion of the characteristics of accounting information as presented in Statement of Financial Accounting Concepts #2. There is often a tradeoff between various characteristics or attributes, and you should understand the implications of such tradeoffs.
Output can be either paper or electronic, or a combination of the two. Section 1 of the chapter Appendix looks at the relevant output issues.

There are two basic forms of input: hard-copy and electronic. There are many factors to be considered in designing hard-copy: storage, handling, number of copies, size, format, etc. Read the discussion of form design carefully. Good forms help the input process, and bad forms can cause real problems. The use of zones and embedded instructions are very simple concepts, yet are very beneficial.

There are two ways to approach electronic input: from source documents and directly.

D. Designing the System Process

This section will be most informative to those of you who have had some programming experience. Each step that has been represented on a DFD must be decomposed into its most elementary parts. The example of a purchase system is given, and the accounts payable process is decomposed (see Figs. 14-9, 14-10 and 14-11, on page 713-715). Watch how the steps are broken down, and don’t get lost.

**Pseudocoding** is a technique used to describe what must happen without using the programming language itself. It can aid understanding by non-programmers. Section 2 of the Appendix provides an excellent example of pseudocode for Fig. 14-11. [If you have studied a foreign language, you know that reading ability is easier to achieve than writing or speaking.]

E. Designing System Controls

Although most of the controls will be designed as the parts of the system are assembled, this stage permits a review to be sure there are no voids in the control systems.

F. Perform a System Design Walkthrough

Before the final OK is given to implement the newly designed system, a **walkthrough** is conducted. This is a process whereby independent systems professionals examine the processing “line-by-line” to evaluate the logic, etc. At this time, a thorough review of the system documentation to this point is also conducted. The detailed design report is quite thorough. Note what is included. If judged
V. System Implementation

“Make it so!” When all the design work is complete and approved, the work begins to put the system in place. This is a major project and is treated as such.

A. Managing the System Implementation

You are familiar with the project management tools discussed in the text: PERT charts and Gantt charts.

B. Developing Application Software

Obviously, the work of programming a new system must be done by experienced and skilled programmers, not accountants. The discussion of language choice is important but will not be made by you. However, the importance of testing the software has implications for auditing.

C. Documenting the System

There are many types of documentation that must be completed during implementation. There are four groups of people for whom documentation is very important: designers and programmers, operators, end users, and accountants (auditors). Focus on the latter two in your reading. Note, however, the impact of internal control on what is and is not in the documentation for different groups. For example, operators do not need program code, flowcharts, etc. Also note the discussion of the different levels of users.

D. Converting the Databases

Converting the data in the old system to the new system can be very cumbersome. It is critical to successful system implementation. If the data is already in machine readable form, some of the conversion can be automated. Note in particular the three precautions.
E. Converting to the New System

Moving from the old system to the new can be a nerve wracking experience. Your book discusses three approaches: cold turkey cutover, phased cutover, and parallel operation. Although the latter is the safest, it involves doing everything twice for at least one, if not more, cycle. This is costly and stressful for personnel.

F. Postimplementation Review

After the new system is in place, the entire process is evaluated. The best time to assess the system development process is right after completion of a system project. Not only is the new system evaluated, so is the whole system development process. By carefully documenting what took place, better planning can occur the next time a system project is undertaken.

Two main areas of concern are presented: design adequacy and accuracy of time, cost, and benefit estimates. This information can keep the next project from making the same mistakes.

G. The Role of Accountants

Pay close attention to the three roles played by accountants. You will play some, or all, of these roles some day.

APPENDIX

Read this material carefully.


Discussion Questions for Chapter 14: 4, 5, 9-11, 15, 19-21