Chapter 12 Developing Business/IT Solutions

James A. O'Brien, and George Marakas. Management Information Systems with MISource 2007, 8th ed. Boston, MA: McGraw-Hill, Inc., 2007. ISBN: 13 9780073323091

Learning Objectives

- Use the systems development process outlined in this chapter and the model of IS components from Chapter 1 as problem-solving frameworks to help you propose IS solutions to simple business problems
- Describe and give examples to illustrate how you might use each of the steps of the IS development cycle to develop and implement a business IS
- Explain how prototyping can be used as an effective technique to improve the process of systems development for end users and IS specialists

Learning Objectives

- Understand the basics of project management and their importance to a successful system development effort
- Identify the activities involved in the implementation of new IS
- Compare and contrast the four basic system conversation strategies
- Describe several evaluation factors that should be considered in evaluating the acquisition of hardware, software, and IS services

IS Development

- When the **systems approach** is applied to the development of an information systems solution to business problems, it is called **information systems development** or **application development**

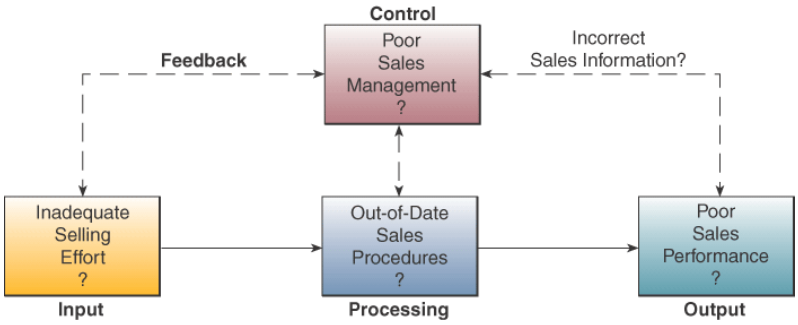
The Systems Approach

- A problem solving technique that uses a systems orientation to define problems and opportunities and develop appropriate and feasible solutions
- Analyzing a problem and formulating a solution involves these interrelated activities:
  - Recognize and define a problem or opportunity using systems thinking
  - Develop and evaluate alternative system solutions
  - Select the solution that best meets your requirements
  - Design the selected system solution
  - Implement and evaluate the success of the system

What is Systems Thinking?

- Seeing the forest *and* the trees in any situation
  - Seeing *interrelationships* among *systems* rather than linear cause-and-effect chains
  - Seeing *processes* of change among *systems* rather than discrete snapshots of change
- See the *system* in any situation
  - Find the input, processing, output, feedback and control components

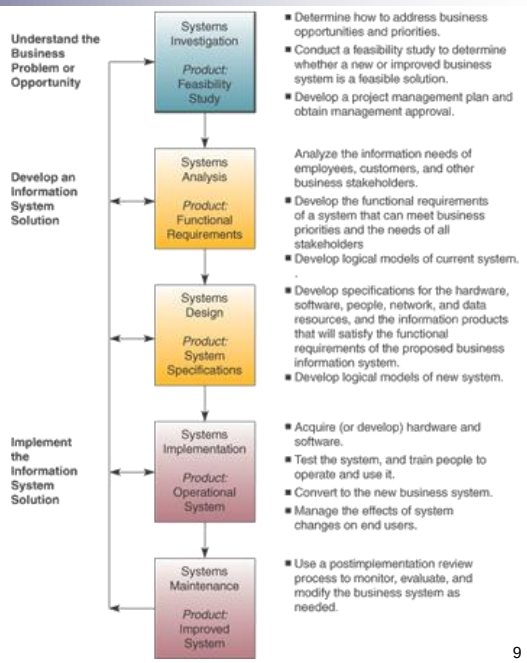
Systems Thinking Example



Systems Analysis and Design

- SA&D is the overall process by which IS are designed and implemented
  - Includes identification of business problems
- Two most common approaches
  - Object-oriented analysis and design
  - Life cycle

Systems Development Lifecycle (SDLC)



Systems Development Process

- Systems Investigation
  - The first step in the systems development process
  - May involve consideration of proposals generated by a business/IT planning process
  - Also includes the preliminary feasibility study of proposed information system solutions

Systems Development Process

- **Feasibility Studies**: a preliminary study to determine the
  - Information needs of prospective users
  - Resource requirements
  - Costs
  - Benefits
  - Feasibility
- In some cases, a feasibility study is unnecessary

Operational Feasibility

- How well the proposed system will
  - Support the business priorities of the organization
  - Solve the identified problem
  - Fit with the existing organizational structure

Economic Feasibility

- An assessment of
  - Cost savings
  - Increased revenue
  - Decreased investment requirements
  - Increased profits
  - Cost/benefit analysis

Technical Feasibility

- Determine the following can meet the needs of a proposed system and can be acquired or developed in the required time
  - Hardware
  - Software
  - Network

Human Factors Feasibility

- Assess the acceptance level of
  - Employees
  - Customers
  - Suppliers
  - Management support
- Determine the right people for the various new or revised roles

Legal/Political Feasibility

- Assess
  - Possible patent or copyright violations
  - Software licensing for developer side only
  - Governmental restrictions
  - Changes to existing reporting structure

Systems Analysis

- An in-depth study of end user information needs
  - It produces the functional requirements used as the basis for the design of an IS
- It typically involves a detailed study of the
  - Information needs of a company and end users
  - Activities, resources, and products of one or more of the information systems currently being used
  - Information system capabilities required to meet the information needs of business stakeholders

Organizational Analysis

- Study of the organization, including…
  - Management structure
  - People
  - Business activities
  - Environmental systems
  - Current information systems
    - Input, processing, output, storage, and control

Analysis of the Present System

- Before designing a new system, it is important to study the system to be improved or replaced
  - Hardware and software
  - Network
  - People resources used to convert data resources into information products
  - System activities of input, processing, output, storage, and control

Logical Analysis

- A logical model is a blueprint of the current system
  - It displays what the current system does, without regard to how it does it
  - It allows an analyst to understand the processes, functions, and data associated with a system without getting bogged down with hardware and software

Functional Requirements

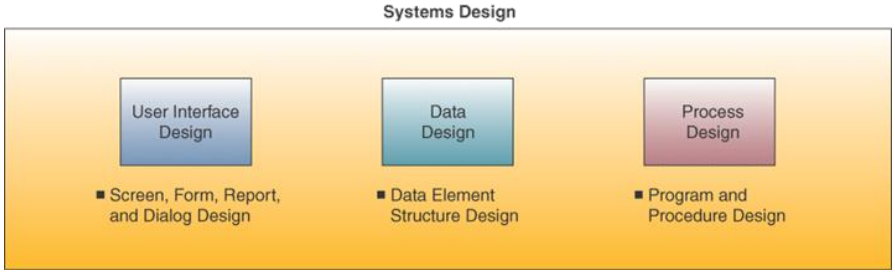
- This step of systems analysis is one of the most difficult
  - Determine what type of information each business activity requires
  - Try to determine the information processing capabilities required for each system activity
  - The goal is to identify what should be done, not how to do it

Examples of Functional Requirements

- User Interface: automatic entry of product data and easy-to-use data entry screens for Web customers
- Processing: fast, automatic calculation of sales totals and shipping costs
- Storage: fast retrieval and update of data from product, pricing, and customer databases
- Control: signals for data entry errors and quick e-mail confirmation for customers

Systems Design

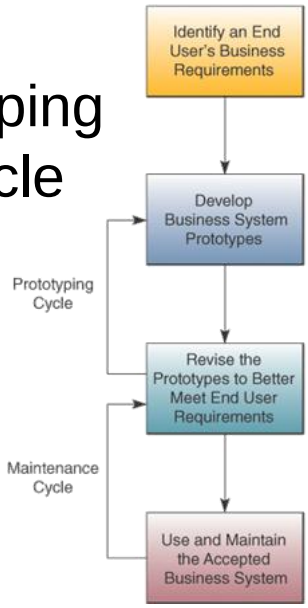
- Systems design focuses on three areas



Prototyping

- Prototyping is the rapid development and testing of working models
  - An interactive, iterative process used during the design phase
  - Makes development faster and easier, especially when end user requirements are hard to define
  - Has enlarged the role of business stakeholders

Prototyping Life Cycle



- **Investigation/Analysis.** End users identify their business needs and assess the feasibility of several alternative information system solutions.
- **Analysis/Design.** End users and/or IS specialists use application development tools to interactively design and test prototypes of information system components that meet end user business needs.
- **Design/Implementation.** The business system prototypes are tested, evaluated, and modified repeatedly until end users find them acceptable.
- **Implementation/Maintenance.** The accepted business system can be modified easily since most system documentation is stored on disk.

User Interface Design

- Focuses on supporting the interactions between end users and their computer-based applications
  - Designers concentrate on the design of attractive and efficient forms of user input and output
  - Frequently a prototyping process
  - Produces detailed design specifications for information products, such as display screens

Checklist for Corporate Websites

- Remember the customer
- Aesthetics
- Broadband content
- Easy to navigate
- Searchability
- Incompatibilities
- Registration forms
- Dead links

System Specifications

- Formalizing the design of
  - User interface methods and products
  - Database structures
  - Processing procedures
  - Control procedures

Examples of System Specifications

User interface specifications	Use personalized screens that welcome repeat Web customers and that make product recommendations
Database specifications	Develop databases that use object/relational database management software to organize access to all customer and inventory data and to multimedia product information
Software specifications	Acquire an e-commerce software engine to process all e-commerce transactions with fast responses, i.e., retrieve necessary product data and compute all sales amounts in less than one second
Hardware and network specifications	Install redundant networked Web servers and sufficient high-bandwidth telecommunications lines to host the company e-commerce website
Personnel specifications	Hire an e-commerce manager and specialists and a webmaster and Web designer to plan, develop, and manage e-commerce operations

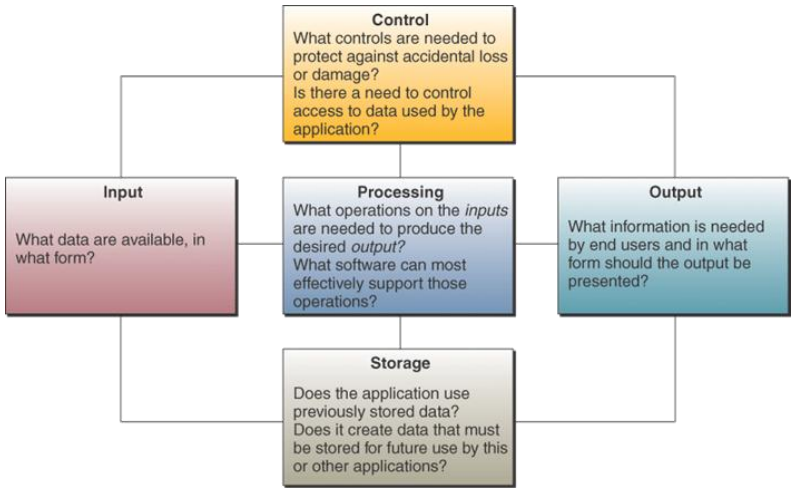
End User Development

- IS professionals play a consulting role, while uses do their own application development
  - A staff of user consultants may be available to help with analysis, design, and installation
- Other support
  - Application package training
  - Hardware and software advice
  - Help gaining access to organization databases

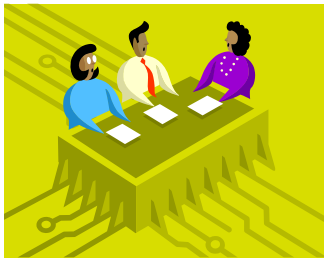
Focus on IS Activities

- End user development should focus on the fundamental activities of an IS
  - Input
  - Processing
  - Output
  - Storage
  - Control

Focus of End User Development



Doing End User Development



- Application development capabilities built into software packages make it easier for end users to develop their own solutions

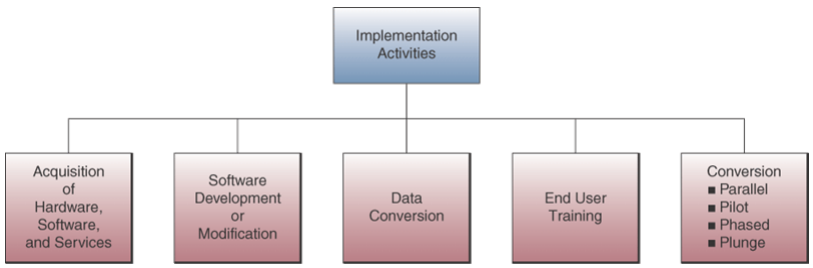
Encouraging End User Web Development

- Look for tools that make sense
  - Some are more powerful or costly than needed
- Spur creativity
  - Consider a competition among departments
- Set some limits
  - Limit what parts of a web page or site can be changed and who can do it
- Give managers responsibility
  - Make them personally responsible for content
- Make users comfortable
  - Training will make users more confident
  - It can save the IT department the trouble of fixing problems later on
  - It can limit the need for continuous support

Implementing New Systems

- The systems implementation stage involves
  - Hardware and software acquisition
  - Software development
  - Testing of programs and procedures
  - Conversion of data resources
  - Conversion alternatives
  - Education/training of end users and specialists who will operate the new system

Implementation Process



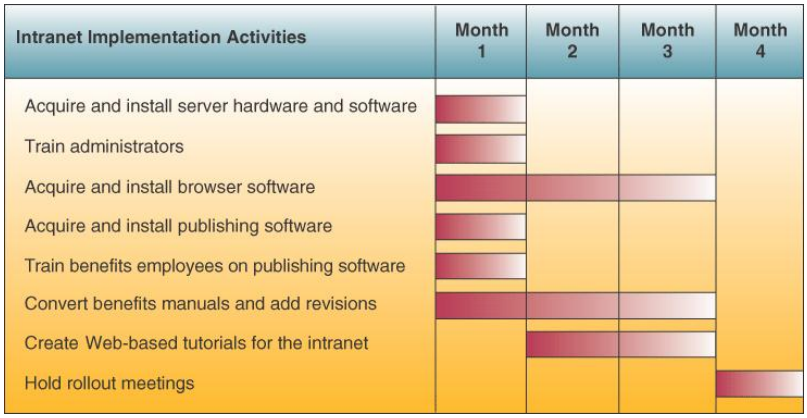
Project Management

- The skills and knowledge necessary to be a good project manager will translate into virtually any project environment
  - The people who have acquired them are sought after by most organizations

What is a Project?

- Every project has
  - A set of activities with a clear beginning and end
  - Goals
  - Objectives
  - Tasks
  - Limitations or constraints
  - A series of steps or phases
- Managing a project effectively requires
  - Process
  - Tools
  - Techniques

Sample Implementation Process



Phases of Project Management

- There are five phases in most projects
  - Initiating/Defining
  - Planning
  - Executing
  - Controlling
  - Closing

Initiating/Defining Phase

- Example activities
  - State the problem(s) and/or goal(s)
  - Identify the objectives
  - Secure resources
  - Explore the costs/benefits in the feasibility study

Planning Phase

- Example activities
  - Identify and sequence activities
  - Identify the “critical path”
  - Estimate the time and resources needed for project completion
  - Write a detailed project plan

Execution Phase

- Example activities
  - Commit resources to specific tasks
  - Add additional resources and/or personnel if necessary
  - Initiate work on the project

Controlling Phase

- Example activities
  - Establish reporting obligations
  - Create reporting tools
  - Compare actual progress with baseline
  - Initiate control interventions, if necessary

Closing Phase

- Example activities
  - Install all deliverables
  - Finalize all obligations and commitments
  - Meet with stakeholders
  - Release project resources
  - Document the project
  - Issue a final report

Evaluating Hardware, Software, Services

- Establish minimum physical and performance characteristics for all hardware and software
  - Formalize these requirements in an RFP/RFP
- Send RFQ to appropriate vendors
- Evaluate bids when received
  - All claims must be demonstrated
  - Obtain recommendations from other users
  - Search independent sources for evaluations
  - Benchmark test programs and test data

Hardware Evaluation Factors

- Major evaluation factors
  - Performance
  - Cost
  - Reliability
  - Compatibility
  - Technology
  - Ergonomics
  - Connectivity
  - Scalability
  - Software
  - Support

Software Evaluation Factors

- Hardware evaluation factors apply to software, as do these
  - Quality
  - Efficiency
  - Flexibility
  - Security
  - Connectivity
  - Maintenance
  - Documentation
  - Hardware

Software that is slow, hard to use, bug-filled, or poorly documented is not a good choice at any price

Evaluating IS Services

- Examples of IS services
  - Developing a company website
  - Installation or conversion of hardware/software
  - Employee training
  - Hardware maintenance
  - System design and/or integration
  - Contract programming
  - Consulting services

IS Service Evaluation Factors

- IS evaluation factors include
  - Performance
  - Systems development
  - Maintenance
  - Conversion
  - Training
  - Backup facilities and services
  - Accessibility to sales and support
  - Business position and financial strength
  - Hardware selection and compatibility
  - Software packages offered

Other Implementation Activities

- The keys to successful implementation of a new business system
  - Testing
  - Data conversion
  - Documentation
  - Training

System Testing

- System testing may involve
  - Testing and debugging software
  - Testing website performance
  - Testing new hardware
  - Review of prototypes

Data Conversion

- Data conversion includes
  - Converting data elements from the old database to the new database
  - Correcting data errors
  - Filtering out unwanted data
  - Consolidating data from several databases
  - Organizing data into new data subsets
- Improperly organized and formatted data is a major cause of implementation failures

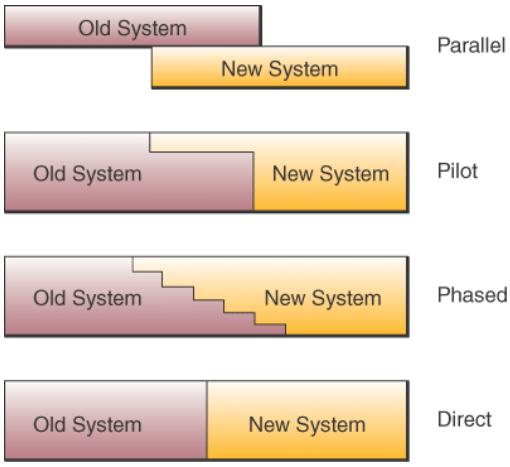
Documentation

- User Documentation
  - Sample data entry screens, forms, reports
  - System operating instructions
- Systems Documentation
  - Method of communication among those developing, implementing, and maintaining a computer-based system
  - Detailed record of the system design
  - Extremely important when diagnosing problems and making system changes

Training

- End users must be trained to operate a new business system or its implementation will fail
  - May involve only activities, such as data entry, or all aspects of system use
  - Managers and end users must understand how the new technology impacts business operations
- System training should be supplemented with training related to
  - Hardware devices
  - Software packages

Major System Conversion Strategies



Direct Conversion

- Direct conversion
  - The simplest conversion strategy
  - The most disruptive to the organization
  - Sometimes referred to as the slam dunk or cold-turkey strategy
  - May be the only viable solution in cases of emergency implementation or if the old and new system cannot coexist
  - Has the highest risk of failure
  - Involves turning off the old system and turning on the new one

Parallel Conversion

- Old and new systems are run simultaneously until everyone is satisfied that
  - The new system functions correctly
  - The old system is no longer needed
- Conversion to new system can be single cutover or phased cutover
- Has the lowest risk, but the highest cost
  - Can cost 4 times more than using the old system
- Best choice where an automated system is replacing a manual one

Pilot Conversion

- Scenarios best suited to a pilot conversion
  - Multiple business locations
  - Geographically diverse locations
- Advantages of single location conversion
  - Can select a location that best represents the conditions across the organization
  - Less risky in terms of loss of time or delays in processing
  - Can be evaluated and changed before further installations

Phased Conversion

- A phased or gradual conversion
  - Takes advantage of both the direct and parallel approaches
  - Minimizes the risks involved
  - Allows the new system to be brought online as logically ordered functional components
- Disadvantages
  - Takes the most time
  - Created the most disruption to the organization over time

Post-Implementation Activities

- The single most costly activity
  - Correcting errors or faults in the system
  - Improving system performance
  - Adapting the system to changes in the operating or business environment
  - Requires more programmers than does application development
  - May exist for years

Systems Maintenance

- There are four basic categories of system maintenance
  - **Corrective**: fix bugs and logical errors
  - **Adaptive**: add new functionality
  - **Perfective**: improve performance
  - **Preventive**: reduce chances of failure

Post-Implementation Review

- Ensures that the newly implemented system meets the established business objectives
  - Errors must be corrected by the maintenance process
  - Includes a periodic review/audit of the system as well as continuous monitoring