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Chapter 8: Evaluating Alternatives for Requirements, Environment, and Implementation

Systems Analysis and Design in a Changing World, 3rd Edition

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Learning Objectives

- Prioritize the system requirements based on the desired scope and level of automation for the new system
- Describe the strategic decisions that integrate the application deployment environment and the design approach for the new system
- Determine alternative approaches for system development

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Learning Objectives (continued)

- Evaluate and select a development approach based on the needs and resources of the organization
- Describe key elements of a request for proposal and evaluate vendors' proposals for outsourced alternatives
- Develop a professional presentation of findings to management

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Overview

- Chapter explains last three activities of analysis
  - Prioritize systems requirements
  - Generate and evaluate alternatives
  - Review recommendation with management
- Refocus project direction
- Transition from discovery and analysis to solutions and design
- Set direction for design and implementation of solution system

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Project Management Perspective

- Project manager and senior technical members of project team work together
- Eight areas of project management
  - Scope
  - Time
  - Cost
  - Quality
  - Human resources
  - Procurement
  - Communications
  - Risk

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Deciding on Scope and Level of Automation

- Scope determines which business functions will be included in system
- Level of automation is how much computer support exists for functions included in level
- Scope creep
  - Requests for addition of system functions after requirements defined and decision has been made
- Users typically request more business functions than budget allows

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Determining the Level of Automation

- Low level
  - Simple computer records keeping
- Medium level
  - Midrange point which combines features from low and high alternatives
- High level
  - System takes over processing of business function

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Selecting Alternatives

- Entire group of alternatives is evaluated together to provide “big picture” view of proposed system
- Key criteria that are used:
  - Strategic plan
  - Economic feasibility
  - Schedule and resource feasibility
  - Technological feasibility
  - Operational, organizational, and cultural feasibility

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Defining the Application Deployment Environment

- Configuration of:
  - Computer hardware
  - System software
  - Networks
  - Development Tools
- Existing environment generally considered and compared with proposed environment

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Hardware, System Software, and Networks

- Older batch-mode applications on centralized mainframe
- Stand-alone applications on mini- and personal computers
- On-line interactive applications
- Distributed applications
- Web-based applications

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Deployment Environment Characteristics

- Compatibility with system requirements
- Compatibility among hardware and system software
- Required interfaces to external systems
- Conformity with IT strategic plan and architecture plans
- Cost and schedule

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Development Tools

- Programming languages, CASE tools, software used to develop application software
- Java and Visual Studio.NET are examples
- Application deployment environment decisions limit development tool choices
  - Operating system environment
  - Database management system (DBMS)
  - Distributed software standard

Existing Processing Environment at RMO

FIGURE 8-3
The existing processing environment at RMO.

Location and facility	Equipment	Connection
Park City—Data Center	Mainframe	
Park City—Retail	Client-server	Daily dial-up
Salt Lake City—Manufacturing	Local LAN	Daily dial-up
Salt Lake City—Warehouse	Midrange computer	Dedicated line to Data Center
Salt Lake City—Phone Order	Client-server	Daily dial-up
Provo—Mail Order Center	Client-server	Dedicated line to Data Center
Portland—Warehouse	Midrange computer	Dedicated line to Data Center
Portland—Manufacturing	Local LAN	Daily dial-up
Denver—Retail	Client-server	Daily dial-up
Albuquerque—Warehouse	Midrange computer	Dedicated line to Data Center

Processing Environment Alternatives

FIGURE 8-4
Processing environment alternatives.

Alternative	Description
1. Move all functionality to be browser based (intranet/Internet)	Make both the internal and external applications Web-based with browser interface. This solution would provide a consistent interface and facilitate e-commerce growth.
2. Use internal LAN/WAN technology	Internal transactions cans be faster. The database would not need an interface to the Web. Put only the catalog on the Web.
3. Use a mix of alternatives 1 and 2	Use the Web for customer interactions, but use internal LAN/WAN technology for back-end processing and an interface to SCM and other internal systems.
4. Use the mainframe as the central database server	Support for high-volume transactions. It will serve as a centralized database for all systems. It provides high security, control, and consistency.
5. Use a distributed database on multiple servers	Distributed data provides rapid response and load leveling. Growth can be done incrementally. Updating is more complex.
6. Use complete OO components such as Common Object Request Broker Architecture (COBRA) objects	This solution would make seamless interfaces between applications—SCM, CSS, and other systems—with object brokers. It would position RMO for future OO migration. This solution requires middleware integration software.
7. Use OO for the user interface with a back-end relational database	Use Visual Basic or Java to develop the applications. Use DB2 or relational Oracle for database processing. This solution would be very efficient for high volumes.
8. Use OO for the user interface plus CORBA objects for communication between systems	This alternative would position RMO for a move to a complete OO environment. Middleware software is required for integration of systems.

Strategic Directions for RMO

FIGURE 8-5
Strategic directions for the processing environment at RMO.

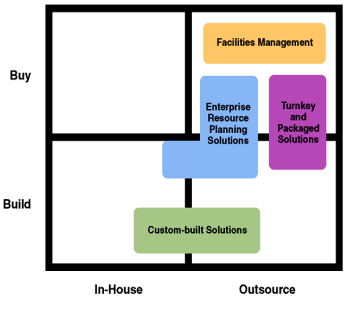
Issue	Direction(s)
Required interfaces to other systems	1. Automatic feed to SCM system 2. Interface to feed the accounting general ledger 3. Interface to provide automatic feed to external systems—credit card verification and package shipping 4. Potential move to XML for a common interface language
Equipment configuration	1. Servers with multiple CPU configuration for front-end applications 2. Database support provided with mainframe central processor
Operating system	1. Windows Server 2003 front-end servers 2. MVS for mainframe
Network configuration	1. Windows network 2. IIS for Web servers
Language environment	1. Visual Basic, Java, and PHP for application and Web development
Database environment	1. Maintain DB2 database on mainframe 2. Reevaluate long-term strategy for the OO database
CASE tools	1. Use only diagramming portions; various alternatives available

Choosing Implementation Alternatives

- Variations on obtaining system
  - Facilities management outsource all IS support
  - Packaged software, Turnkey system, ERP system
  - Custom-built software systems
  - In-house development
- Selection dimensions
  - Buy vs. build
  - In-house vs. outsource

Implementation Alternatives

FIGURE 8-6
Implementation alternatives.



Selecting an Implementation Alternative

- Identifying Criteria for Selection
  - Comparisons can be difficult
  - Different proposed systems have strengths in different areas
- Three major areas to consider
  - General requirements
  - Technical requirements
  - Functional requirements

Partial Matrix of General Requirements

FIGURE 8-7
A matrix showing a partial list of general requirements.

General requirements criteria	Weight (5=high, 1=low)	Alternative 1 In-house		Alternative 2 Package #1 + modify		Alternative 3 Package #2 + modify		Alternative 4 Custom development	
		Raw	Extended	Raw	Extended	Raw	Extended	Raw	Extended
Availability of experienced staff	4	3	12	3	12	3	12	5	20
Developmental cost	3	5	15	5	15	3	9	1	3
Expected value of benefits	5	5	25	3	15	4	20	3	15
Length of time until deployment	4	2	8	5	20	4	16	2	8
Low impact on internal resources	2	2	4	4	8	5	10	4	8
Requirements for internal expertise	2	2	4	4	8	5	10	4	8
Minimal organizational impacts	3	4	12	3	9	4	12	4	12
Performance record of the provider	5	5	25	4	20	4	20	4	20
Level of technical support provided	4	5	20	3	12	3	12	3	12
Warranties and support services provided	4	5	20	4	16	4	16	4	16
Total			**145**		**135**		**137**		**122**

Partial Matrix of Functional Requirements

FIGURE 8-8
A matrix showing a partial list of functional requirements.

Functional requirements criteria	Weight (5=high, 1=low)	Alternative 1 In-house		Alternative 2 Package #1 + modify		Alternative 3 Package #2 + modify		Alternative 4 Custom development	
		Raw	Extended	Raw	Extended	Raw	Extended	Raw	Extended
Make inquiry on items	4	5	20	4	16	5	20	5	20
Create customer order	5	5	25	5	25	5	25	5	25
Change order	4	5	20	5	20	5	20	5	20
Make inquiry on orders	4	5	20	5	20	4	16	5	20
Package order	5	5	25	5	25	5	25	5	25
Ship order	5	5	25	5	25	5	25	5	25
Create back order	4	5	20	5	20	5	20	5	20
Accept return	4	5	20	5	20	4	16	5	20
Correct customer account	4	5	20	3	12	4	16	5	20
Update catalog	5	5	25	2	10	3	15	5	25
Create special promotions	3	5	15	0	0	2	6	5	15
Initiate a promotion mailing	3	5	15	0	0	2	6	5	15
Create sales summaries	3	5	15	3	9	3	9	5	15
Create order summaries	2	5	10	3	6	3	6	5	10
Create shipment summaries	2	5	10	2	4	5	10	5	10
Total			**285**		**212**		**235**		**285**

Partial Matrix of Technical Requirements

FIGURE 8-9
A matrix showing a partial list of technical requirements.

Technical requirements criteria	Weight (5=high, 1=low)	Alternative 1 In-house		Alternative 2 Package #1 + modify		Alternative 3 Package #2 + modify		Alternative 4 Custom development	
		Raw	Extended	Raw	Extended	Raw	Extended	Raw	Extended
Robustness	5	?	*18	3	15	4	20	?	*18
Programming errors	4	?	*16	4	16	4	16	?	*16
Quality of code	4	?	*18	4	16	5	20	?	*18
Documentation	3	5	15	3	9	4	12	4	12
Easy installation	3	5	15	5	15	4	12	4	12
Flexibility	3	4	12	3	9	4	12	5	15
Structure	3	4	12	4	12	4	12	4	12
User-friendliness	4	5	20	3	12	4	16	5	20
Total			**126**		**104**		**120**		**123**

Making the Selection

- First, rate each alternative with raw score
- Weighted scores are then tabulated and compared to make a choice
- RMO decided on in-house development for most CSS development to keep expertise within RMO
- RMO wants to hire some new technical specialists
- RMO feasibility review showed no serious problems – once specialists are added

Contracting with Vendors

- Generating Request for Proposal (RFP)
  - Formal document sent to vendors if in-house development not selected
  - States requirements and solicits proposed solutions
  - Considered a competitive contract offer
  - Bid on supplying hardware, software, and/or support services

Sample RFP Table of Contents

I. Introduction and Background

II. Overview of Need

III. Description of Technical Requirements

IV. Description of Functional Requirements

Sample RFP Table of Contents (continued)

V. Description of General Requirements

VI. Requested Provider and Project Information

VII. Details for Submitting Proposal

IV. Evaluation Criteria and Process

Sample RFP Table of Contents (continued)

FIGURE 8-10
A sample RFP table of contents.

Request for Proposal
Table of Contents

I. Introduction and background
A. Background on company
B. Overview of industry/business

II. Overview of need
A. Description of business need
B. Expected business benefits
C. Overview of system requirements

III. Description of technical requirements
A. Operating environment
B. Performance requirements
C. Integration, interfaces, and compatibility
D. Hardware specifications
E. Expansion and growth requirements
F. Maintainability requirements

IV. Description of functional requirements
A. Specification of primary functions
B. Specification of information outputs
C. Specification of the user interface
D. Identification of optional functions and enhancements

V. Description of general requirements
A. Maintenance and support
B. Documentation and training
C. Future releases
D. Other contractual requirements

VI. Requested provider and project information
A. Request for statement of work and project schedule
B. Request for reference list of provider
C. Request for project personnel information

VII. Details for submitting the proposal
A. Time requirements
B. Format requirements

VIII. Evaluation criteria and process
A. Expected timetable of evaluation
B. Method of evaluation of technical, functional, and general requirements

Benchmarking and Choosing a Vendor

- Observe in use or install trial version
- Benchmark – evaluate the system against a standard
- Visit another company using particular system
- Developing a contract
  - Fixed-dollar contracts: Risk is on vendor
  - Cost-plus-percentage: Risk is on purchaser
  - Cost-plus-fixed-fee: Risk shared by both

Presenting Results and Making Decisions

- Compile and organize documentation
- Present alternatives and critical issues in easy-to-understand but complete manner
- Final choice generally made by executive steering committee
- Format of documentation and presentation style varies with organization

Summary

- These activities are primarily project manager responsibilities with support from project team
- Focus of project changes from discovering requirements to developing solution system
- Prioritize requirements based on scope and level of automation
  - Scope of new system determines functions it will support
  - Level of automation is measure of how automated selected functions will be

Summary (continued)

- Application deployment environment
  - Computer hardware, systems software, and networks in which new system will operate
  - Determines constraints imposed on system development alternatives
- Analyst must define environment to match:
  - Application requirements
  - Organization's strategic application plans
  - Organization's technology architecture plans

Summary (continued)

- Determine what alternatives are possible for developing solution
- Implementation alternatives include:
  - Building system in-house
  - Buying packaged or turnkey solution
  - Contracting with developer to build it (outsource)
- Develop recommendations and present to management to make funding decisions