

c h a p t e r

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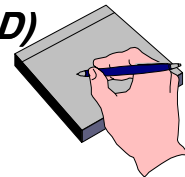
**REDESIGNING THE
ORGANIZATION
WITH
INFORMATION
SYSTEMS**

10.1

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LEARNING OBJECTIVES

- Demonstrate how *building* new systems can produce organizational *change*
- Explain information system *development* to fit business plan
- Identify core activities in systems *development process*
- Appraise *alternatives* for building systems
- Evaluate *object-oriented* development & rapid application development (*RAD*)



10.2

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MANAGEMENT CHALLENGES

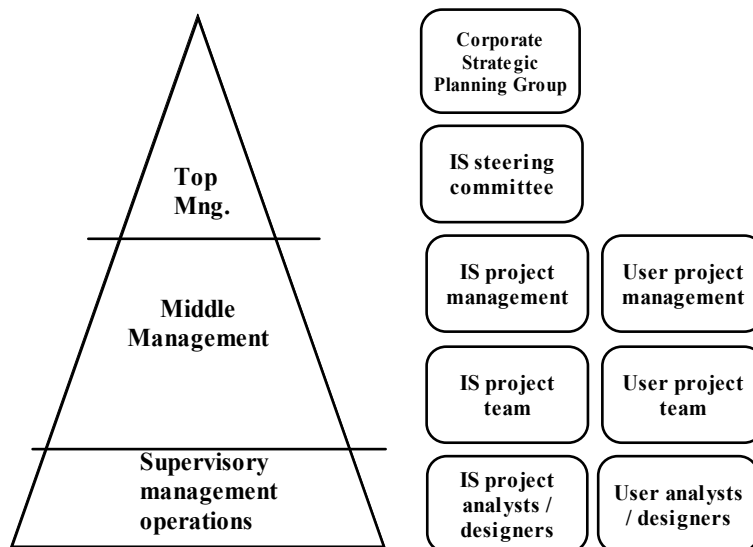
- **SYSTEMS AS *PLANNED***
ORGANIZATIONAL CHANGES
- **PROCESS *REENGINEERING* & TOTAL
QUALITY *CONTROL***
- ***OVERVIEW* OF SYSTEMS
DEVELOPMENT**
- ***ALTERNATIVE* APPROACHES
(Enhancements vs. Reengineering?)**

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MANAGING IS DEVELOPMENT



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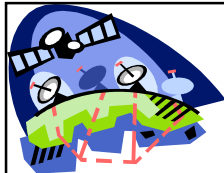
INFORMATION SYSTEMS PLAN

- **A *road map* indicating the *direction* of systems development, the rationale, the *current* situation, the management *strategy*, the implementation plan and the budget**

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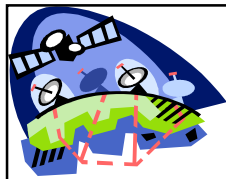
INFORMATION SYSTEMS PLAN 1/3 (The seven elements)

- 1. PURPOSE OF THE PLAN:** Overview of plan contents, changes in current situation, firm's strategic plan, current organization, key business processes, management strategy
- 2. STRATEGIC BUSINESS PLAN:** Current situation, current organization, changing environments, major goals of plan

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INFORMATION SYSTEMS PLAN 2/3

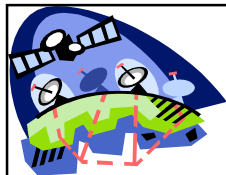
3. CURRENT SYSTEMS: Major systems supporting business functions & processes, major current capabilities (hardware, software, database, telecommunications), difficulties meeting requirements, anticipated future demands

4. NEW DEVELOPMENTS: New system projects (project descriptions, business rationale), new capabilities required (hardware, software, database, telecommunications, internet)

>>

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INFORMATION SYSTEMS PLAN 3/3

5. MANAGEMENT STRATEGY: Acquisition plans, milestones & timing, organizational realignment, internal reorganization, management controls, major training initiatives, personnel strategy

6. IMPLEMENTATION PLAN: Anticipated difficulties, progress reports

7. BUDGET REQUIREMENTS: Requirements, potential savings, financing, acquisition

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ENTERPRISE ANALYSIS

(BUSINESS SYSTEMS PLANNING)

- **Organization-wide information needs in terms of:**
 - Organizational units
 - Functions
 - Processes
 - Data elements
- **Helps identify key entities & attributes in organization's data**

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ENTERPRISE ANALYSIS

CRITICAL SUCCESS FACTORS (CSFs)

- **Small number, easily identifiable operational goals**
- **Shaped by industry, manager, environment**
- **Believed to assure firm's success**
- **Used to determine organization's information requirements**

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CRITICAL SUCCESS FACTORS

Example: PROFIT CONCERN

- **GOALS (AUTOMOBILE INDUSTRY):** Earnings per share, return on investment (ROI), market share (%), new product
- **CSF:** Styling, quality dealer system, cost control, energy standards

*

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CRITICAL SUCCESS FACTORS

Example: NONPROFIT CONCERN

- **GOALS (HOSPITAL):** Excellent health care, meeting government regulations, meeting international standards, future health needs
- **CSF:** Regional integration with other hospitals, efficient use of resources, improved monitoring of regulations

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CRITICAL SUCCESS FACTORS AND ORGANIZATIONAL GOALS (Table 11.2)

Example	Goals	CSF
Profit concern	Earnings / share Returns on investment Market share New product	Automotive industry
Nonprofit	Excellent healthcare Meeting government regulations Future health needs	Regional integration with other hospitals Efficient use of resources Improved monitoring of regulations

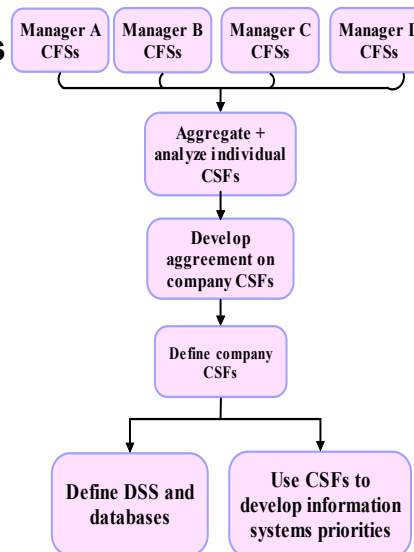
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USING CSFs TO DEVELOP SYSTEMS


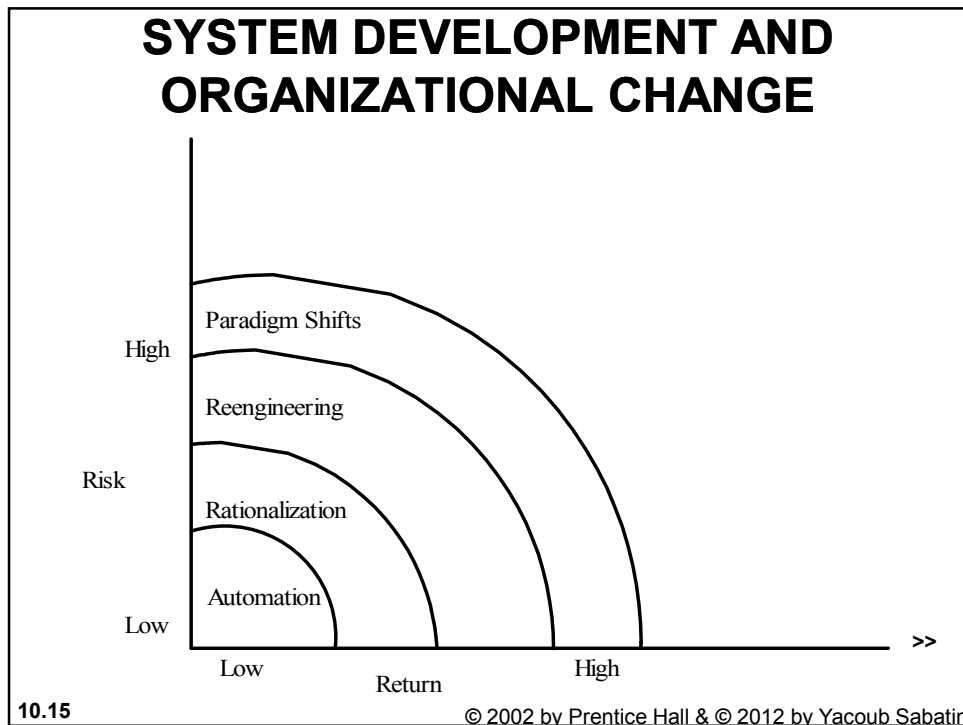
- **Collect managers' CSFs**
- **Aggregate, analyze individuals' CSFs**
- **Develop agreement on company CSFs**
- **Define company CSFs**
- **Use CSFs to develop information system priorities**
- **Define DSS & databases**

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SPECTRUM OF ORGANIZATIONAL CHANGE

- **AUTOMATION:** Using technology to perform tasks efficiently / effectively, to speed up existing tasks
- **RATIONALIZATION OF PROCEDURES:** Streamline SOPs; eliminate bottlenecks
- **PARADIGM SHIFT:** Radical reconceptualization of the nature of the business and organization >>
- **BUSINESS REENGINEERING:** Radical redesign of processes to improve cost, quality, service; maximize benefits of technology >>

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PARADIGM SHIFT

- **PARADIGM:** A complete mental model of how a complex system functions
- **A PARADIGM SHIFT:** Involves rethinking the nature of the business, the organization; a complete reconception of how the system should function

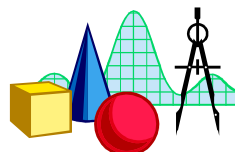
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BUSINESS PROCESS REENGINEERING (BPR)

- **REENGINEERING:** Redesigning business processes to lower cost, speed development
- **WORK-FLOW MANAGEMENT:** Streamlining process to move documents easily, efficiently



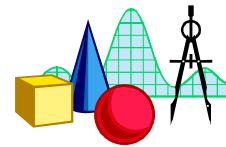
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STEPS IN BUSINESS REENGINEERING

1. **Develop the business vision and process objectives**
2. **Identify the process to be redesigned**
3. **Understand and measure the performance of existing processes**
4. **Identify the opportunities for applying information technologies**
5. **Build a prototype of the new process**



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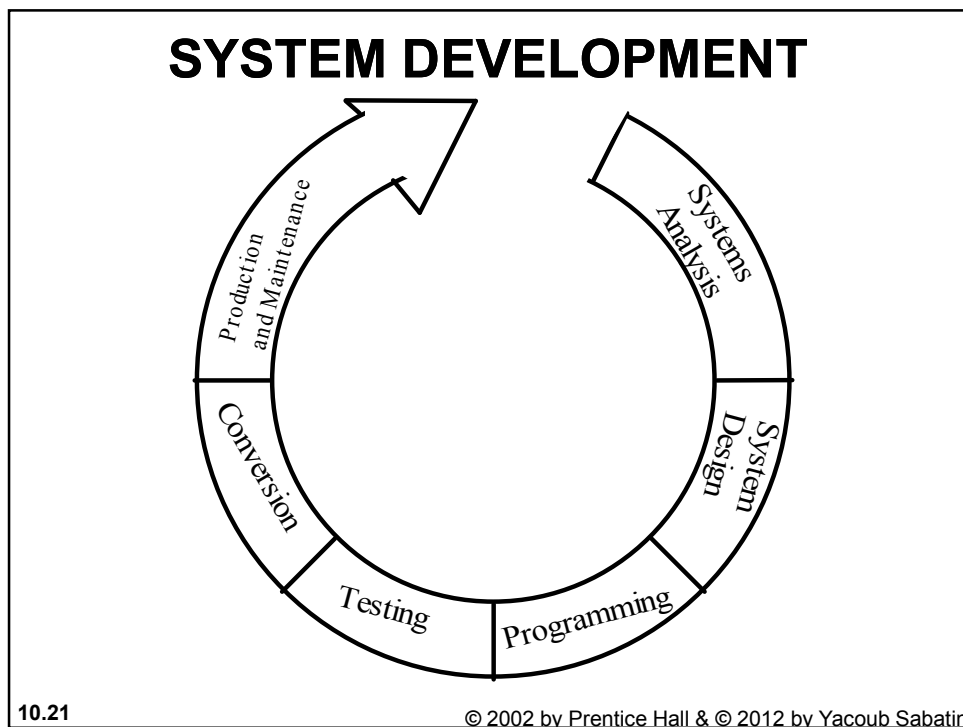
FEASIBILITY

- **Determining whether a solution is achievable given the organizational resources & constraints**
 - Technical: **Available technical resources**
 - Economic: **costs vs. benefits ?**
 - Operational: **fits the organization ?**

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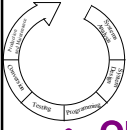
SYSTEM DESIGN

DETAILS HOW SYSTEM WILL MEET NEEDS:

- **LOGICAL DESIGN:** Components, data as needed by applications, models
- **PHYSICAL DESIGN:** Physical location/allocation of components and data

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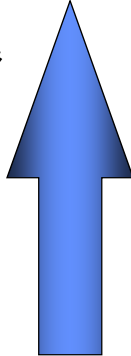
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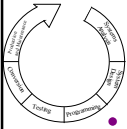
DESIGN SPECIFICATIONS 1/3

- **OUTPUT:** Medium, content, timing
- **INPUT:** Origins (source), flow, data entry
- **USER INTERFACE:** Simplicity, efficiency, logic, feedback, errors
- **DATABASE DESIGN:** Logical data relations, volume, speed requirements, file organization & design, record specifications, relations
- **PROCESSING:** Computations, program modules, required reports, timing of outputs
- **MANUAL PROCEDURES:** What activities, who performs them, how, where

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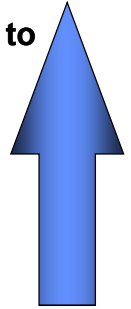
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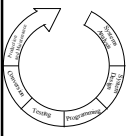
DESIGN SPECIFICATIONS 2/3

- **CONTROLS:** Input, processing, output, procedural
- **SECURITY:** Access controls, catastrophe plans, audit trails
- **DOCUMENTATION:** Operations, systems, user
- **CONVERSION:** Transfer files, initiate new procedures, select testing modules, cut over to new system
- **TRAINING:** Select training techniques, develop training modules, identify training facilities

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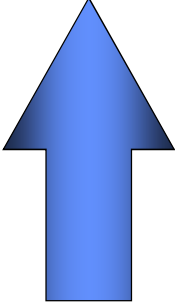
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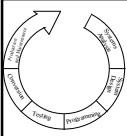
DESIGN SPECIFICATIONS 3/3

- **ORGANIZATIONAL CHANGES:** Task redesign, job design, process design, organization structure design, reporting relationships

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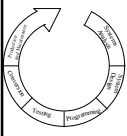
COMPLETING SYSTEM DEVELOPMENT PROCESS

- **PROGRAMMING:** Translating needs to program code
- **TESTING:** Does system produce desired results?
- **CONVERSION:** Changing from the old to the new

*




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TESTING

- **TEST PLAN:** Preparations for tests to be performed
 - **UNIT TESTING:** Tests each unit separately
 - **SYSTEM TESTING:** Do modules function as planned?
 - **ACCEPTANCE TESTING:** Final certification

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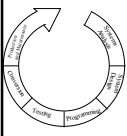
CONVERSION

- **PARALLEL:** Old & new run same problems. Give same results?
- **DIRECT CUTOVER:** Risky conversion to new system
- **PILOT:** Introduce into one area. Does it work?
Yes: introduce into other area
- **PHASED:** Introduce in stages
- **CONVERSION PLAN:** Schedule for conversion
- **DOCUMENTATION:** Description of how system works

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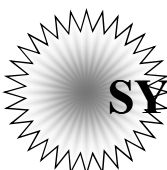
PRODUCTION & MAINTENANCE

- **PRODUCTION:** Constant review by users & operators. Does it meet goals?
- **MAINTENANCE:** Upkeep, update, corrections over time

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SYSTEMS DEVELOPMENT

CORE ACTIVITY	DESCRIPTION
SYSTEMS ANALYSIS	IDENTIFY PROBLEM(S) SPECIFY SOLUTIONS ESTABLISH INFORMATION REQUIREMENTS
SYSTEMS DESIGN	CREATE LOGICAL DESIGN SPECS CREATE PHYSICAL DESIGN SPECS MANAGE TECHNICAL REALIZATION OF SYSTEM
PROGRAMMING	TRANSLATE DESIGN SPECS INTO PROGRAM CODE


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SYSTEMS DEVELOPMENT

CORE ACTIVITY	DESCRIPTION
TESTING	UNIT TEST SYSTEMS TEST ACCEPTANCE TEST
CONVERSION	PLAN CONVERSION PREPARE DOCUMENTATION TRAIN USERS & TECHNICAL STAFF
PRODUCTION & MAINTENANCE	OPERATE SYSTEM EVALUATE SYSTEM MODIFY SYSTEM

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SYSTEM LIFECYCLE

- **PROJECT DEFINITION:** Is there a problem? Can it be solved with a project?
- **SYSTEM STUDY:** Analyze problems in existing systems; define objectives evaluate alternatives
- **DESIGN:** Logical & physical specifications for systems solution
- **PROGRAMMING:** Develop software code
- **INSTALLATION:** Construct, test, train, convert to new system
- **POSTINSTALLATION/POSTIMPLEMENTATION:** On-going evaluation, modifications for improvement to meet new requirements

NECESSARY FOR LARGE, COMPLEX SYSTEMS & PROJECTS

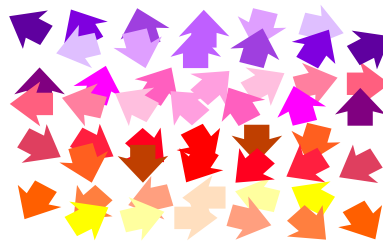
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ALTERNATIVE SYSTEM-BUILDING APPROACHES

- **PROTOTYPING**
- **APPLICATION SOFTWARE PACKAGES**
- **END-USER DEVELOPMENT**
- **OUTSOURCING**

>>>



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PROTOTYPING

PROCESS OF BUILDING EXPERIMENTAL SYSTEM TO DEMONSTRATE, EVALUATE APPROACH; USERS REFINE NEEDS

- **PROTOTYPE:** Preliminary working version of information system for demonstration, evaluation purposes
- **ITERATIVE PROCESS**

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STEPS IN PROTOTYPING

1. IDENTIFY USER'S REQUIREMENTS
2. DEVELOP PROTOTYPE
3. USE PROTOTYPE
4. REVISE & ENHANCE PROTOTYPE

BEST FOR DESIGN OF END-USER INTERFACE: How end-user interacts with system

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APPLICATION SOFTWARE PACKAGES

PREWRITTEN, PRECODED APPLICATION SOFTWARE, COMMERCIALY AVAILABLE FOR SALE OR LEASE

- GEARED TO COMMON REQUIREMENTS
- **CUSTOMIZATION:** Modification of software to meet organization's needs, without destroying integrity of package raises development costs
- MUST WEIGH **COSTS / BENEFITS**
- **REQUEST FOR PROPOSAL (RFP):** Detailed questions sent to vendors

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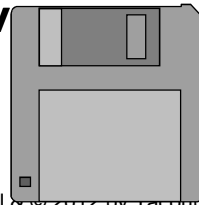
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END-USER DEVELOPMENT 1/2

**END-USERS DEVELOP
INFORMATION SYSTEM WITH
LITTLE HELP FROM TECHNICAL
SPECIALISTS USING 4th
GENERATION TOOLS**

**(Drawing/AI/OO/Rapid Dev
Tools/Mockups)**

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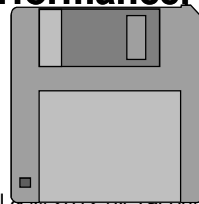
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END-USER DEVELOPMENT 2/2

STRENGTHS: Improved requirements determination, increased user involvement & satisfaction, reduced application backlog

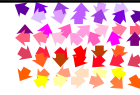
WEAKNESSES: Relatively inefficient, slow transaction processing, may carry high cost, large files can degrade performance, nonprocedural approach may hamper logic & updating requirements



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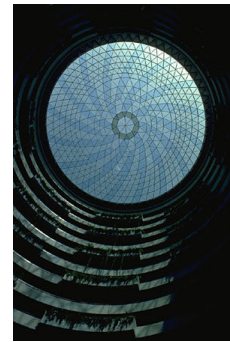
OUTSOURCING 1/2



CONTRACTING:

- **COMPUTER CENTER OPERATIONS**
 - **TELECOMMUNICATIONS NETWORKS**
 - **APPLICATION DEVELOPMENT**
- TO EXTERNAL VENDORS**

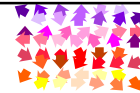
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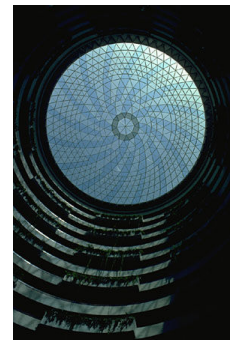
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OUTSOURCING 2/2



WHEN TO OUTSOURCE:

- **If firm won't distinguish itself by developing application**
- **If predictability of uninterrupted service not important**
- **If existing system is limited, ineffective, inferior**

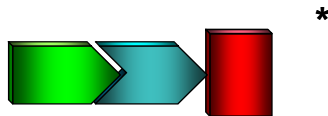


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OBJECT - ORIENTED SOFTWARE DEVELOPMENT

- De-emphasizes procedures
 - Shifts focus from models & data
 - To objects, which combine data & procedures
 - Objects reusable
 - **System:** classes, objects, relationships
- Reduces development time & cost**



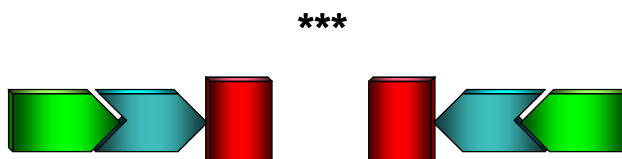
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RAPID APPLICATION DEVELOPMENT (RAD)

Develop system rapidly:

- Prototyping
- 4th generation tools
- Close teamwork among users & specialists



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Managing Change

- **Portfolio Analysis:** An analysis of the portfolio of potential applications within a firm to determine the risks and benefits and select among alternatives for information systems
- **Scoring Model:** A quick method for deciding among alternative systems based on a system of ratings for selected objectives

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Scoring Model

Criterion	Weight	Alternative 1	Alternative 2	Alternative 3
User needs met	0.40	2	3	4
Cost of initial purchase	0.20	1	3	4
Financing	0.10	1	3	4
Ease of maintenance	0.10	2	3	4
Chances of success	0.20	3	4	4
Total score		1.9	3.2	4.0
Scale 1=low, 5=high				

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Cost and Benefit Analysis (Figure 11.7)						
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
	1999	2000	2001	2002	2003	2004
Total Cost	1,210,500	491,500	491,500	506,500	491,500	491,500
Total Benefits	595,000	880,000	1,150,000	1,150,000	1,150,000	1,150,000
Net Cashflow	(615,000) (-ve)	388,500	658,500	643,500	658,500	658,500

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Cost and Benefit Analysis (Figure 11.7)

- **The Payback Method: A measure of the time required to pay back the initial investment of a project/to 'break-even'** ↓

$$\frac{\text{Original Investment}}{\text{Annual net cash inflow}} = \text{Number of years to pay back} = 2.3 \text{ years}$$

- **Accounting Rate of Return on Investment (ROI): Calculation of the rate of return from an investment by adjusting cash inflows** ↑

$$\frac{(\text{Total Benefits} - \text{Total Cost} - \text{Depreciation})}{\text{Useful Life}} = \text{Net Benefit}$$

$$ROI = \frac{\text{Net Benefit}}{\text{Total Initial Investment}} = \frac{1,181,500/6}{1,210,500} = 16.27\%$$

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Cost and Benefit Analysis (Figure 11.7)

- Present Value: The value, in current dollars, of a payment or stream of payments to be received in the future

$$\text{Payment} \times \frac{1 - (1 + \text{interest})^{-n}}{\text{Interest}} = \text{Present Value} = 1,871,771$$

- Cost-Benefit Ratio: A method for calculating the returns from a capital expenditure by dividing total benefits by total costs (1.65)

$$\frac{\text{Total benefits}}{\text{Total costs}} = \text{Cost - benefit ratio} = \frac{\$6,075,000}{3,683,000} = 1.65$$

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Cost and Benefit Analysis (Figure 11.7)

- Profitability Index: Used to compare the profitability of alternative investments

$$\frac{\text{Present value of cash inflows}}{\text{Investment}} = \text{Profitability Index}$$

$$\frac{1,871,771}{1,210,500} = \text{Profitability Index} = 1.55$$

- Internal Rate of Return (IRR): The rate of return or profit that an investment is expected to earn

$$\text{IRR} \Rightarrow \text{Discount rate that makes cash inflows - initial cost} = 0$$

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