Chapter 10: Information Systems Development

❖ **Structural organizational change enabled by IT**
  ◆ **Automation =** replace manual tasks increase efficiency
  ◆ **Rationalization**= Streamline operating procedures
❖ **Business process reengineering (BPR)**
  ◆ Analyze, simplify, and redesign business processes
  ◆ Benefits result from redesigning business processes
  ◆ **Work flow management** - Process of streamlining business procedures documents for efficiently
  ◆ Understand how improving the right processes will help the firm execute its business strategy
  ◆ Measure performance of current processes
  ◆ **Paradigm shifts**
    ◆ Rethink nature of business, define new business model, change nature of organization

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Business Process Management (BPM)

❖ **Helps firms manage incremental process changes that are less disruptive BPR**
❖ **Uses process-mapping tools to:**
  ◆ **Identify and document existing processes**
  ◆ **Create models of improved processes that can be translated into software systems**
  ◆ **Measure impact of process changes on key business performance indicators**
❖ **Includes:**
  ◆ **Work flow management**
  ◆ **Quality measurement and management**
  ◆ **Change management**
  ◆ **Process monitoring and analysis**
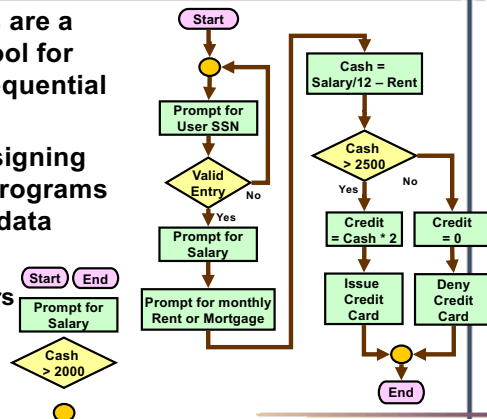
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Business Process Modeling

❖ **Used to document Business Processes**
❖ **Modeling methodologies**
  ◆ **Entity Relationship Diagrams**
  ◆ **Data dictionary:** Contents of data tables
  ◆ **Flow Charts** – describes sequential processes that branch based on decisions or repeat
  ◆ **Data flow diagram –** models processes and data flow
  ◆ **Process specifications:** Describes transformation occurring within lowest level of data flow diagrams
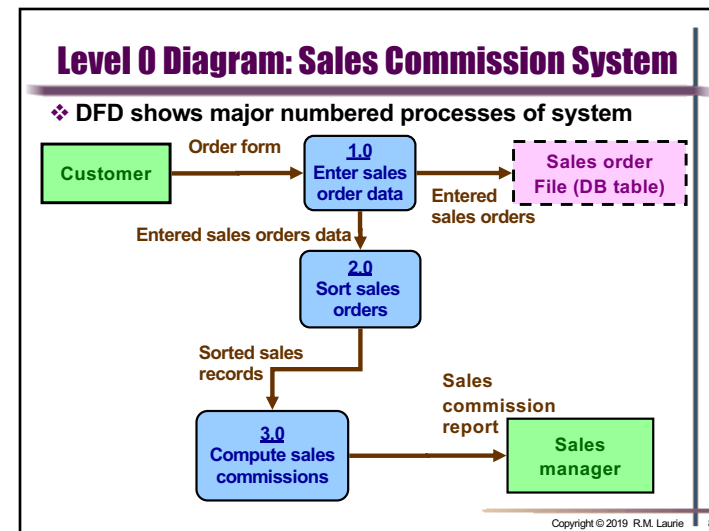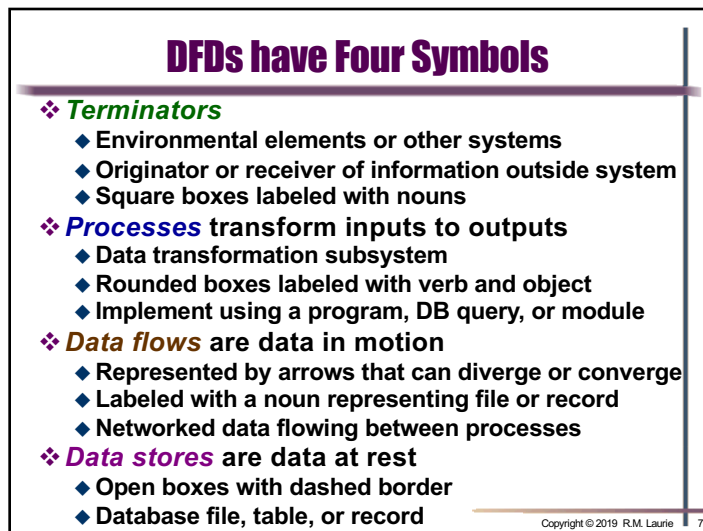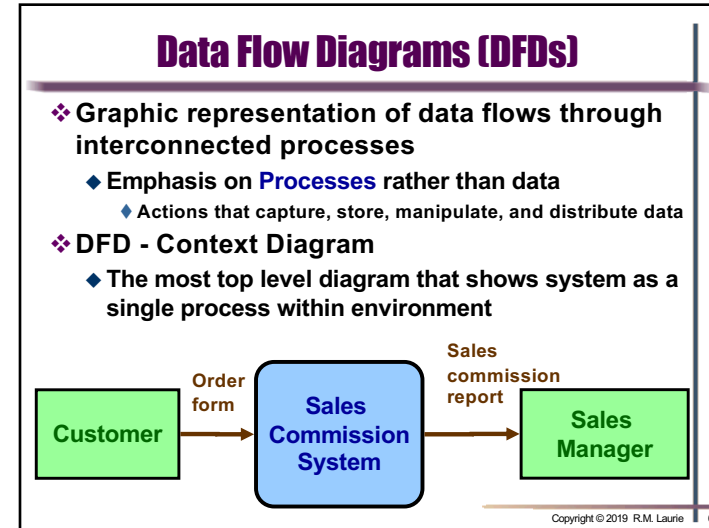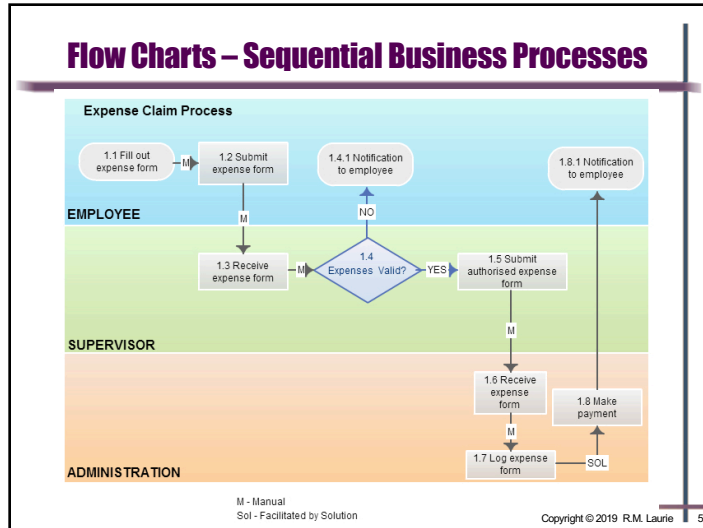
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Flow Charts

❖ **Flow charts are a modeling tool for mapping sequential processes**
❖ **Tool for designing computer programs to process data**
❖ **Symbols**
  ◆ **Terminators**
  ◆ **Processes**
  ◆ **Selection**
  ◆ **Junction**

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Flow Charts – Sequential Business Processes

Expense Claim Process

- 1.1 Fill out expense form
- 1.2 Submit expense form
- 1.4.1 Notification to employee
- 1.8.1 Notification to employee

EMPLOYEE

- 1.3 Receive expense form
- 1.4 Expenses Valid?
- 1.5 Submit authorised expense form

SUPERVISOR

- 1.6 Receive expense form
- 1.8 Make payment

ADMINISTRATION

- 1.7 Log expense form

M - Manual
Sol - Facilitated by Solution

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Data Flow Diagrams (DFDs)

- ❖ **Graphic representation of data flows through interconnected processes**
  - ◆ **Emphasis on Processes rather than data**
    - ♦ Actions that capture, store, manipulate, and distribute data
- ❖ **DFD - Context Diagram**
  - ◆ **The most top level diagram that shows system as a single process within environment**

Customer → Order form → **Sales Commission System** → Sales commission report → **Sales Manager**

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DFDs have Four Symbols

- ❖ *Terminators*
  - ◆ **Environmental elements or other systems**
  - ◆ **Originator or receiver of information outside system**
  - ◆ **Square boxes labeled with nouns**
- ❖ *Processes* **transform inputs to outputs**
  - ◆ **Data transformation subsystem**
  - ◆ **Rounded boxes labeled with verb and object**
  - ◆ **Implement using a program, DB query, or module**
- ❖ *Data flows* **are data in motion**
  - ◆ **Represented by arrows that can diverge or converge**
  - ◆ **Labeled with a noun representing file or record**
  - ◆ **Networked data flowing between processes**
- ❖ *Data stores* **are data at rest**
  - ◆ **Open boxes with dashed border**
  - ◆ **Database file, table, or record**

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Level 0 Diagram: Sales Commission System

- ❖ **DFD shows major numbered processes of system**

Customer → Order form → **1.0 Enter sales order data** → Entered sales orders → **Sales order File (DB table)**

Entered sales orders data → **2.0 Sort sales orders**

Sorted sales records → **3.0 Compute sales commissions** → Sales commission report → **Sales manager**
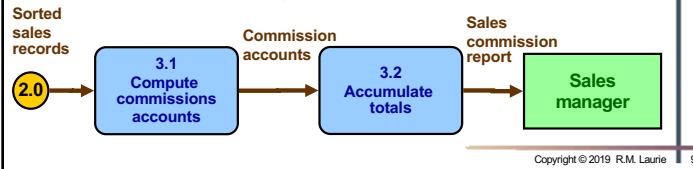
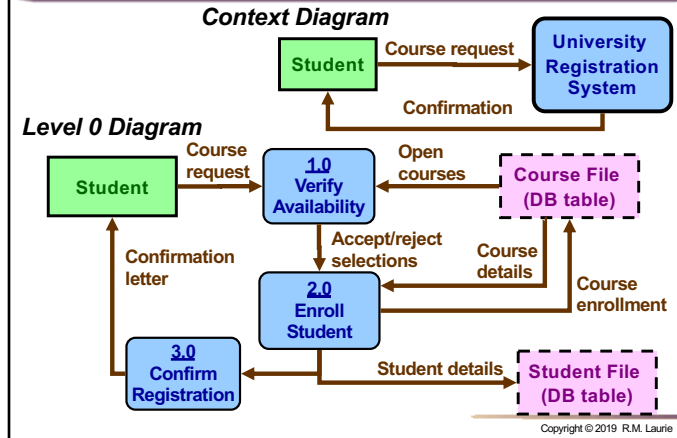Copyright © 2019 R.M. Laurie   8

Level n Diagrams

❖ **Documents a single process of a DFD in a greater amount of detail**

❖ **n represents the number of the process on the next higher level that is being documented**
- ◆ This DFD is the Level 3 diagram with sub-processes 3.1 and 3.2
- ◆ Note that the input is from process **2.0**
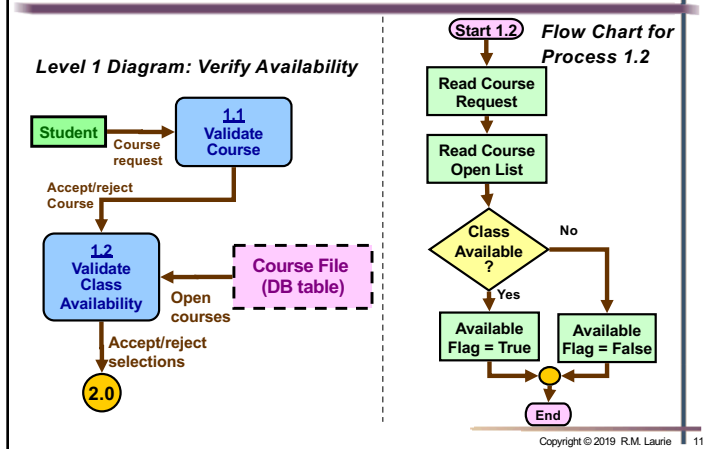- ◆ Restrict each diagram to 8 processes maximum

Sorted sales records **2.0** → **3.1 Compute commissions accounts** — Commission accounts → **3.2 Accumulate totals** — Sales commission report → **Sales manager**

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DFDs: Mail-in University Registration System

Context Diagram

Student — Course request → **University Registration System**

Confirmation ← University Registration System

Level 0 Diagram

Student — Course request → **1.0 Verify Availability** — Open courses → **Course File (DB table)**

1.0 Verify Availability → Accept/reject selections → **2.0 Enroll Student**

Course details ← 2.0 Enroll Student — Course enrollment ← Course File (DB table)

Student ← Confirmation letter — **3.0 Confirm Registration** ← 2.0 Enroll Student

Student details → **Student File (DB table)**

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DFDs: Mail-in University Registration System

Level 1 Diagram: Verify Availability

Student — Course request → **1.1 Validate Course**

Accept/reject Course → **1.2 Validate Class Availability** ← **Course File (DB table)**

Open courses

Accept/reject selections → **2.0**

Flow Chart for Process 1.2

Start 1.2 →
Read Course Request →
Read Course Open List →
Class Available ?
- No → **Available Flag = False**
- Yes → **Available Flag = True**
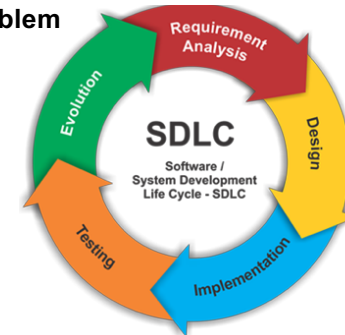
→ End

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Systems Development

❖ **Core activities that go into producing an information system solution to an organizational problem or opportunity**

1. **Systems analysis**
2. **Systems design**
3. **Programming**
4. **Testing**
5. **Conversion**
6. **Production and maintenance**

SDLC — Software / System Development Life Cycle - SDLC
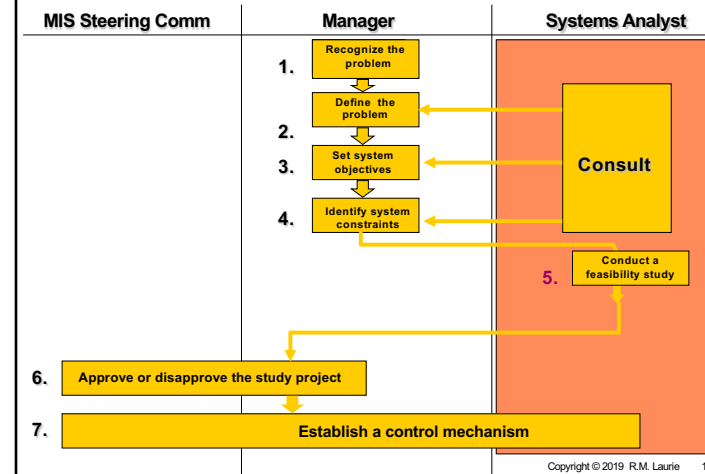
Requirement Analysis, Design, Implementation, Testing, Evolution

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1. Systems Analysis

- ❖ Analysis of problem that will be solved by system
  - ◆ Defining the problem and identifying causes
  - ◆ Identifies and examines alternative solutions
  - ◆ Identifying **information requirements**
- ❖ **Feasibility Study (Final Project)**
  - ◆ Is solution feasible based on technical, organizational constraints
  - ◆ Is solution a good financial investment?
  - ◆ Is required technology, skill available?
  - ◆ Establishing information requirements
    - ♦ Who needs what information, where, when, and how?
    - ♦ Define objectives of new/modified system
    - ♦ Detail the functions new system must perform
- ❖ Faulty requirements analysis is leading cause of systems failure and high systems development cost

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System Analysis Phase

MIS Steering Comm	Manager	Systems Analyst
	1. Recognize the problem	
	2. Define the problem	Consult
	3. Set system objectives	
	4. Identify system constraints	
	5.	Conduct a feasibility study
6. Approve or disapprove the study project		
7.	Establish a control mechanism	

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Outline of Feasibility Study

1. **Introduction**
2. **Description of current systems**
   2.1 System objectives and constraints
   2.2 Problems with current system
3. **Expected impact of a new system**
   3.1 Impact on firm's organization structure 3.2 Impact on the firm's operations
   3.3 Impact on the firms resources
   3.4 Economic and Noneconomic return
4. **The scope of recommended system design project**
   4.1 Tasks to be performed
   4.2 Human resource requirements
   4.3 Schedule of work
   4.4 Estimated cost
5. **Identify end-user information needs**
6. **Summary**

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2. Systems Design

- ❖ **Describe system specifications that will deliver functions identified during systems analysis**
- ❖ **Should address all managerial, organizational, and technological components of system solution**
- ❖ **Role of end users**
  - ◆ User information requirements drive system building
  - ◆ Users must have sufficient control over design process to ensure that system reflects their business priorities and information needs
  - ◆ Insufficient user involvement in design effort is major cause of system failure

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Design Specifications

OUTPUT
Medium
Content
Timing

INPUT
Origins
Flow
Data entry

USER INTERFACE
Simplicity
Efficiency
Logic
Feedback
Errors

DATABASE DESIGN
Logical data model
Volume and speed requirements
File organization and design
Record specifications

PROCESSING
Computations
Program modules
Required reports
Timing of outputs

MANUAL PROCEDURES
What activities
Who performs them
When
How
Where

CONTROLS
Input controls (characters, limit, reasonableness)
Processing controls (consistency, record counts)
Output controls (totals, samples of output)
Procedural controls (passwords, special forms)

SECURITY
Access controls
Catastrophe plans
Audit trails

DOCUMENTATION
Operations documentation
Systems documents
User documentation

CONVERSION
Transfer files
Initiate new procedures
Select testing method
Cut over to new system

TRAINING
Select training techniques
Develop training modules
Identify training facilities

ORGANIZATIONAL CHANGES
Task redesign
Job redesign
Process design
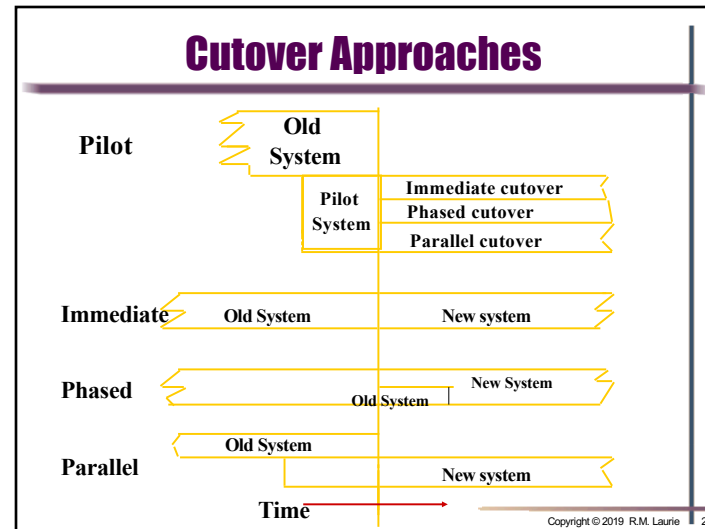Organization structure design
Reporting relationships

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Outline of System Design Document

1. Introduction \
2. System objectives and constraints
3. Possible system alternatives
4. The recommended design project
   4.1 Tasks to be performed
   4.2 System Specifications
   4.3 System Design to include: DFD's, ERD's, Flowcharts
   4.4 Human resource requirements
   4.5 Schedule of work
   4.6 Estimated cost - Create Excel spreadsheet evaluating costs
5. Expected impact of the system
   5.1 Impact on the firm's organization structure
   5.2 Impact on the firm's operations
   5.3 Impact on the firms resources
6. Summary

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3. 4. 5. Implementation Activities

❖ **3. Programming**
  ◆ System specifications from design stage are translated into software program code
  ◆ Software may be purchased, leased, or outsourced
❖ **4. Testing**
  ◆ **Unit testing:** Tests each program in system separately
  ◆ **System testing:** Tests functioning within whole system
  ◆ **Acceptance testing:** Ready for production setting
❖ **5. Conversion =** Changing from old to new system
  ◆ Parallel strategy = old system phased out
  ◆ Direct cutover = plug in new, pull plug on old system
  ◆ Pilot study = new system installed for subset of firm
  ◆ Phased approach = new system introduce in units
  ◆ **Requires end-user training**
❖ **6. Production and maintenance**

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Cutover Approaches

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