



Chapter 13



Building Systems



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Systems as Planned Organizational Change

Four kinds of structural organizational change enabled by IT

1. Automation

- Increase efficiency, replace manual tasks

2. Rationalization

- Streamline standard operating procedures

3. Business process reengineering

- Analyze, simplify, and redesign business processes

4. Paradigm shifts

- Rethink nature of business, define new business model, change nature of organization

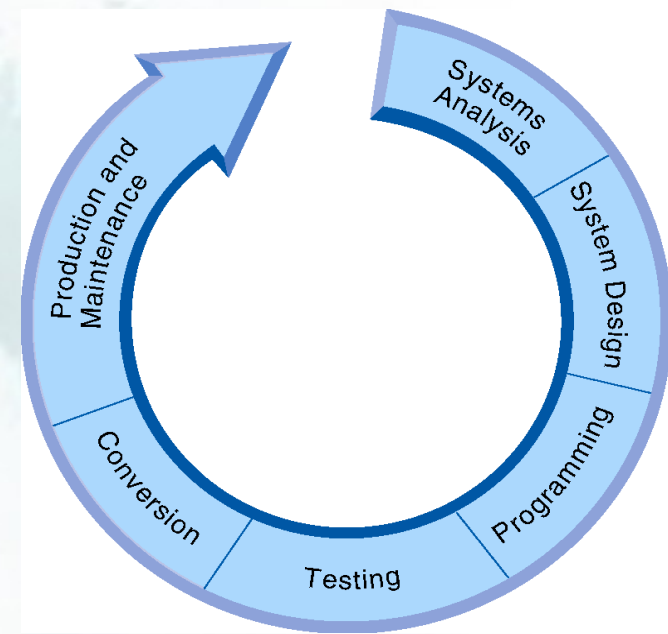


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Overview of Systems Development

- **Systems development:** Activities that go into producing an information system solution to an organizational problem or opportunity
 - Systems analysis
 - Systems design
 - Programming
 - Testing
 - Conversion
 - Production and maintenance





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Overview of Systems Development

Summary of Systems Development Activities

THE ACTIVITY	DESCRIPTION
Systems analysis	Identify problem(s) Specify solutions Establish information requirements
Systems design	Create design specifications
Programming	Translate design specifications into code
Testing	Unit test Systems test Acceptance test
Conversion	Plan conversion Prepare documentation Train users and technical staff
Production and maintenance	Operate the system Evaluate the system Modify the system



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Overview of Systems Development

- **Most prominent methodologies for modeling and designing systems:**
 - Structured methodologies
 - Object-oriented development
- **Structured methodologies**
 - **Structured:** Techniques are step-by-step, progressive
 - **Process-oriented:** Focusing on modeling processes or actions that manipulate data
 - Separate data from processes



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Overview of Systems Development

- **Object-oriented development**
 - Uses **object** as basic unit of systems analysis and design
 - **Object:**
 - Combines data and the specific processes that operate on those data
 - Data encapsulated in object can be accessed and modified only by operations, or methods, associated with that object
 - Object-oriented modeling based on concepts of class and inheritance
 - Objects belong to a certain class and have features of that class
 - May inherit structures and behaviors of a more general, ancestor class



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Overview of Systems Development

- **Object-oriented development**
 - More **iterative and incremental** than **traditional structured development**
 - **Systems analysis:** Interactions between system and users analyzed to identify objects
 - **Design phase:** Describes how objects will behave and interact; grouped into classes, subclasses and hierarchies
 - **Implementation:** Some classes may be reused from existing library of classes, others created or inherited
 - Because objects **reusable**, object-oriented development can potentially **reduce time and cost of development**



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Overview of Systems Development

- **Computer-aided software engineering (CASE)**
 - Software tools to automate development and reduce repetitive work, including
 - Graphics facilities for producing charts and diagrams
 - Screen and report generators, reporting facilities
 - Analysis and checking tools
 - Data dictionaries
 - Code and documentation generators
 - May be front-end or back-end tools
 - Support iterative design by automating revisions and changes and providing prototyping facilities



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Alternative Systems-Building Approaches

- **Traditional systems lifecycle:**
 - Oldest method for building information systems
 - Phased approach - divides development into formal stages
 - Follows “waterfall” approach: Tasks in one stage finish before another stage begins
 - Maintains formal division of labor between end users and information systems specialists
 - Emphasizes formal specifications and paperwork
 - Still used for building large complex systems
 - Can be **costly, time-consuming, and inflexible**



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Alternative Systems-Building Approaches

- **Prototyping**
 - Building experimental system rapidly and inexpensively for end users to evaluate
 - **Prototype:** Working but preliminary version of information system
 - Approved prototype serves as template for final system
 - **Steps in prototyping**
 1. Identify user requirements
 2. Develop initial prototype
 3. Use prototype
 4. Revise and enhance prototype



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Alternative Systems-Building Approaches

- **Advantages of prototyping**
 - Useful if some uncertainty in requirements or design solutions
 - Often used for end-user interface design
 - More likely to fulfill end-user requirements
- **Disadvantages**
 - May gloss over essential steps
 - May not accommodate large quantities of data or large number of users
 - May not undergo full testing or documentation



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Alternative Systems-Building Approaches

- **End-user development:**
 - Uses **fourth-generation languages** to allow end-users to develop systems with **little or no help from technical specialists**
 - **Fourth generation languages:**
 - Less procedural than conventional programming languages
 - 7 categories: PC software tools, query languages, report generators, graphics languages, application generators, application software packages, and very high-level programming languages
 - **Advantages:**
 - More rapid completion of projects, high-level of user satisfaction
 - **Disadvantages:**
 - Not designed for processing-intensive applications, inadequate control, testing, documentation, or adherence to standards



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Alternative Systems-Building Approaches

- **Application software packages**
 - Save time and money
 - Many packages offer customization features:
 - Allow software package to be modified to meet unique requirements without destroying integrity of package software
 - Evaluation criteria for systems analysis include:
 - Functions provided by the package, flexibility, user friendliness, hardware and software resources, database requirements, installation and maintenance efforts, documentation, vendor quality, and cost



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Alternative Systems-Building Approaches

- **Outsourcing**
 - **Several types**
 - **Application service providers (ASPs)**
 - Subscribing companies use software and computer hardware provided by ASP as technical platform for systems
 - **Domestic or foreign external vendors**
 - Hired to design, create software
 - **Allows organization flexibility in IT needs**
 - **Allows vendors:**
 - Economies of scale
 - Enhance core competencies
 - **Disadvantages**
 - Hidden costs, loss of control



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Application Development for the Digital Firm

- **Component-based development**
 - Groups of objects that provide software for common functions such as online ordering capability and can be combined to create large-scale business applications
- **Web services**
 - Reusable software components that use open, Internet standards (platform independent)
 - Enable applications to communicate with no custom programming required to share data and services
 - Software components deliverable over Internet
 - Can engage other Web services for more complex transactions, such as checking credit, procurement, or ordering products