Building and Maintaining Information Systems

Chapter 12

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Opening Case: Yahoo! Store

- Allows small businesses to create their own online store
  - No programming needed
- The standardized store structure allows Yahoo! to provide store management information

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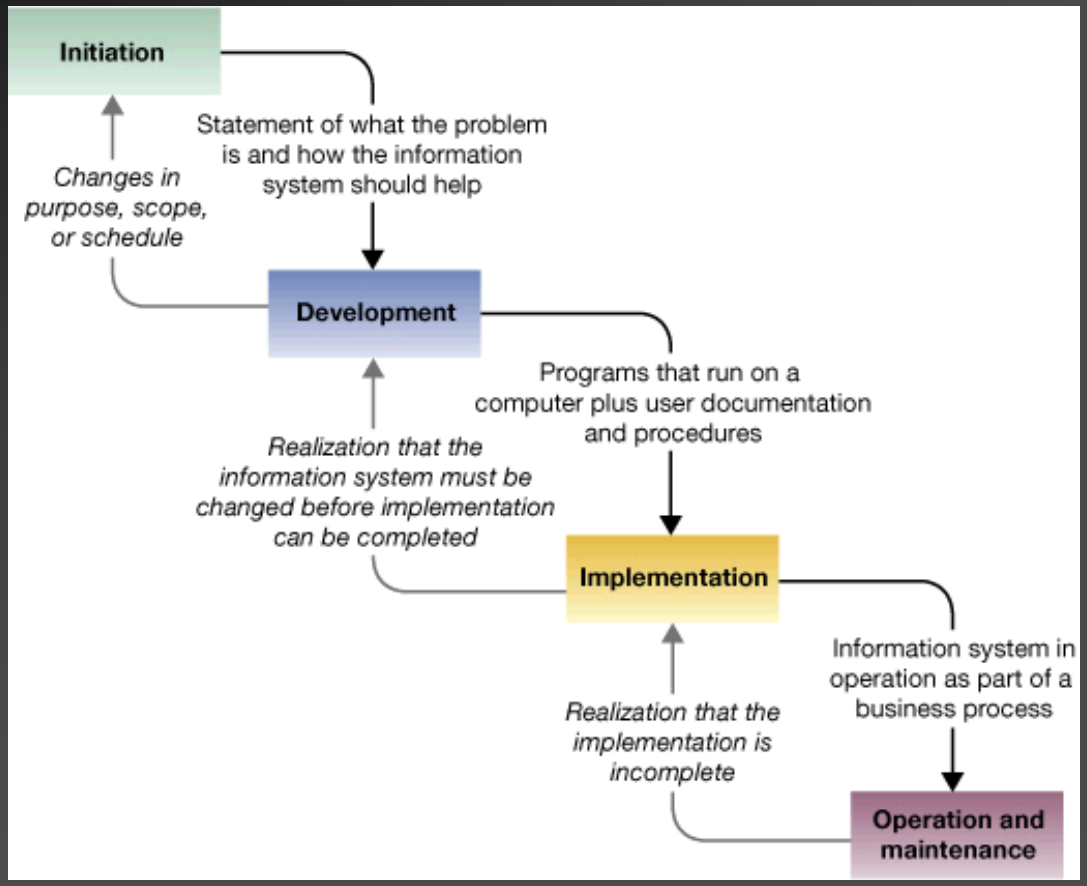
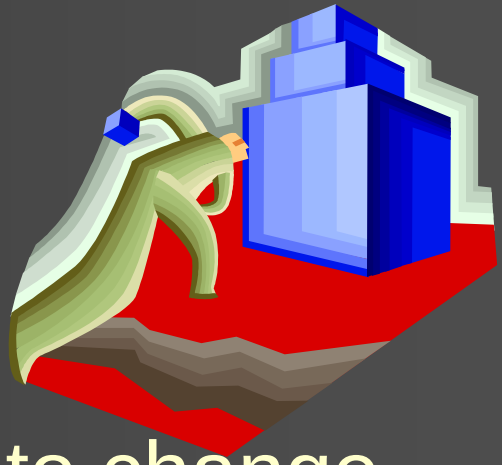
Phases of an Information System

Figure 12.1


Initiation
Statement of what the problem is and how the information system should help
Changes in purpose, scope, or schedule
Development
Programs that run on a computer plus user documentation and procedures
Realization that the information system must be changed before implementation can be completed
Implementation
Information system in operation as part of a business process
Realization that the implementation is incomplete
Operation and maintenance

Initiation



- The process of defining the need to change an existing work system, who should be involved, and describing in general terms the features of the new system
- Understand the proposed system purposes and goals
- Some projects never go beyond this phase

Development

- The process of building or acquiring and configuring the needed resources
- Must make sure that the system features really solve the user needs
  - Problem with inconsistencies and ambiguities in user requirements

Implementation

- The process of making the new system operational
- Activities include:
  - Planning
  - User training
  - Conversion to the new system
  - Follow-up to make sure that the system is operating effectively

Operation and Maintenance

- The ongoing operation of the system + efforts to enhance the system and correct bugs
- The importance of this phase is often overlooked

Overview of Alternative Approaches for Building Information Systems

- The **traditional life cycle** uses a prescribed sequence of steps and deliverables
  - The **capability maturity model (CMM)** tracks the extent to which an IT organization uses this type of life cycle in its development work
- A **prototype** IS is a working model built to learn about the true requirements of the system

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- An **application package** consists of commercially available software that addresses a specific type of business application
  - Installed and operated by the IS department
- **End-user development** is the development of ISs by work system participants

Traditional System Life Cycle

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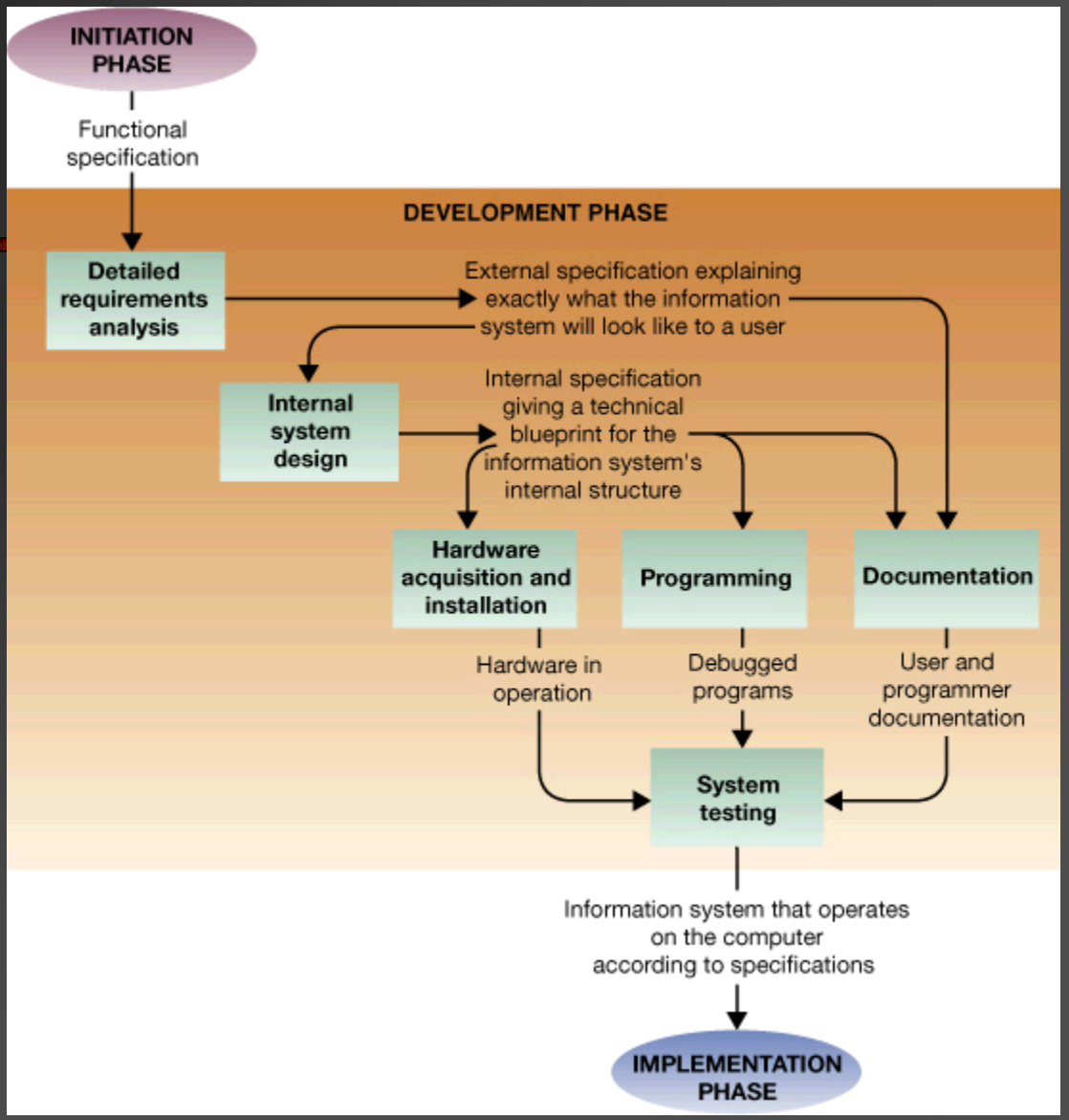
- Goal: keep the project under control and assure that the IS produces satisfies well-formulated requirements
- Divides the project into a number of **steps**, each with distinct **deliverables**

Figure 12.3


INITIATION PHASE
Functional specification
DEVELOPMENT PHASE
Detailed requirements analysis
External specification explaining exactly what the information system will look like to a user
Internal system design
Internal specification giving a technical blueprint for the information system's internal structure
Hardware acquisition and installation
Programming
Documentation
Hardware in operation
Debugged programs
User and programmer documentation
System testing
Information system that operates on the computer according to specifications
IMPLEMENTATION PHASE

Initiation

- Feasibility study – a user-oriented view of the proposed system's purpose
  - Economic feasibility
  - Technical feasibility
  - Organizational feasibility
- If the IS appears to be feasible, functional specifications are produced
  - Must be approved by both users and IS personnel

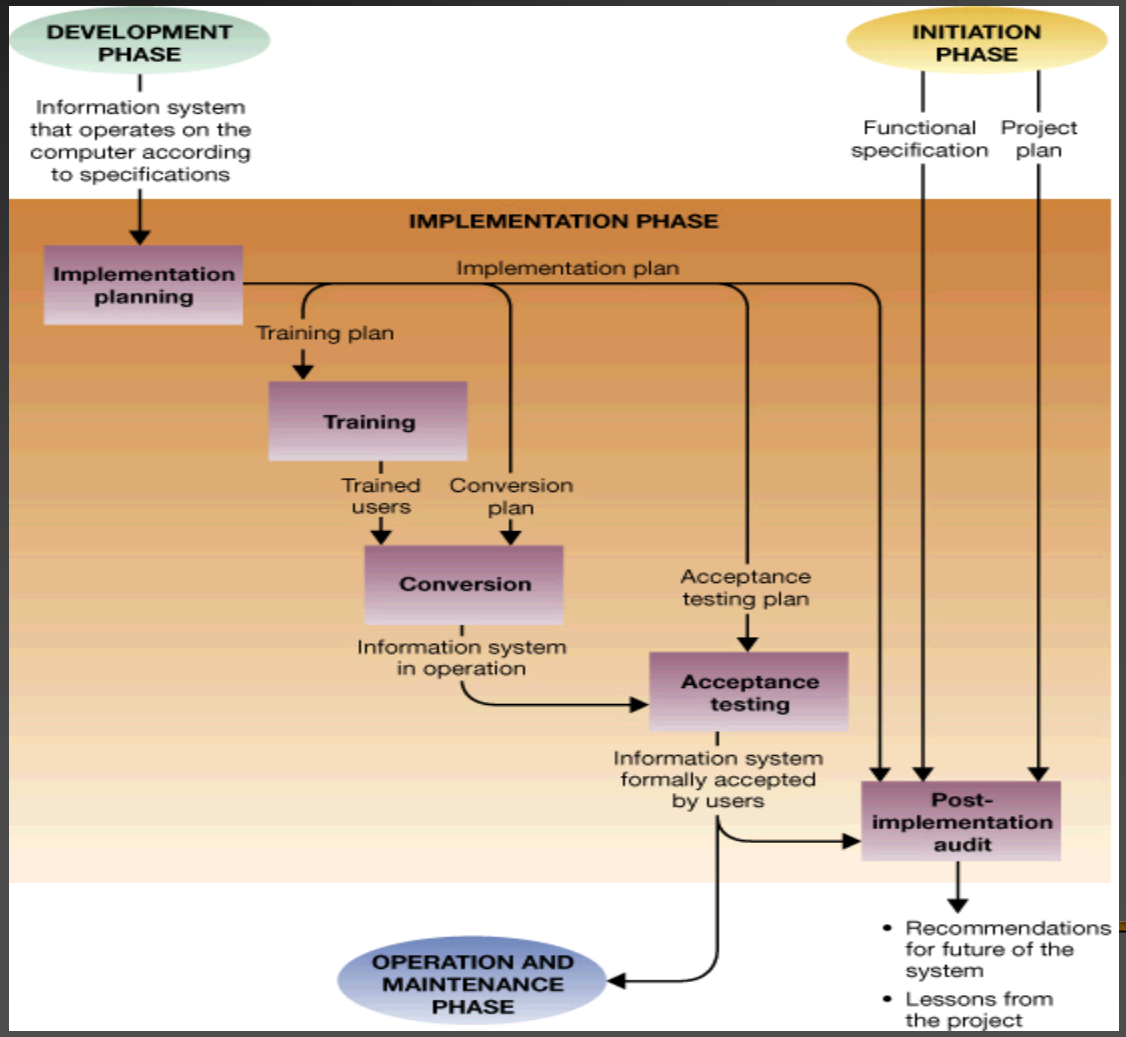
Development

- Creates the programs and the installed hardware necessary for the data processing specified in the functional specifications
- *Detailed requirement analysis*
  - Results in a document called **external specification** – shows the data input screens and major reports, and explains the calculations that will be automated

- *Internal system design*
  - Produces the **internal specification** – the computer environment for the IS, the database content, and the inputs and outputs for all programs and subsystems
- *Hardware acquisition and installation*
- *Programming*
  - **Unit testing** – treats the programs in isolation

- *Documentation*
  - User and technical documentation
- *System testing* (or *integration testing*)
  - **Testing plan** – a precise statement of how exactly the IS is going to be tested
  - Alpha Testing
  - Beta Testing
  - Debugging

Implementation: Figure 12.4



- **Implementation planning**
  - Creating plans for training, conversion, and acceptance testing
- **Training**
- **Conversion**
  - Turn on the new system at a chosen date
  - Phased approach
  - Parallel Implementation
  - Pilot implementation

- **Acceptance testing**
  - Testing of the IS by the users as it goes into operation
- **Post-implementation audit**
  - Determine whether the project has met its objectives + make recommendations for the future

Operation & Maintenance

- Ongoing operation and support
  - Ensuring that the technical system components continue to operate correctly, and that the users use the system effectively
- Maintenance
  - The process of modifying the IS over time

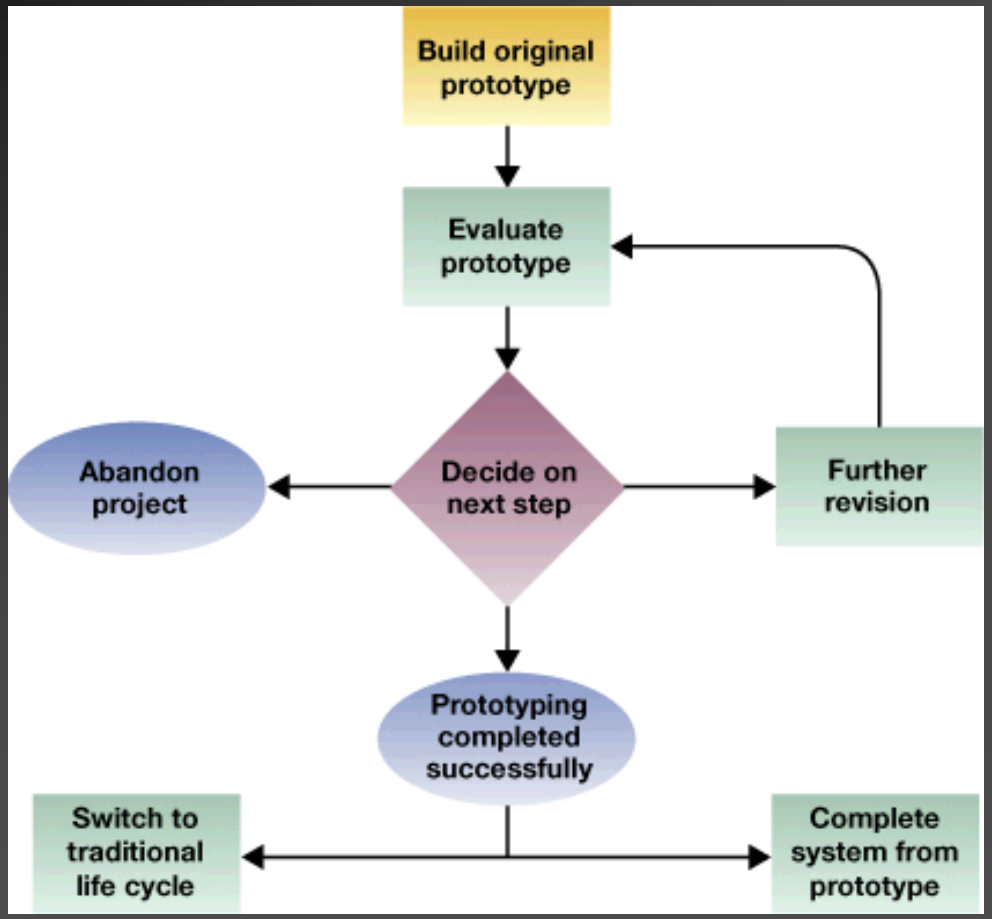
- Pros and cons of the traditional life cycle:
  - Adherence to fixed deliverables improves control but also guarantees a lengthy process
  - Having specific deliverables makes it easier to monitor the work and take corrective actions early
- The traditional life cycle is the standard against which other approaches are compared

Prototypes

A working model built to learn how an improved work system could operate if it included an improved IS

- **Throwaway prototype** – designed to be discarded
  - Useful for comparing alternatives
- **Evolutionary prototype** – designed to be adapted for permanent use
  - Should be built using the system tools that will be used for the final IS

Phases: Figure 12.5



- Initiation
  - The problem is not well understood and/or the users are unable to say exactly what they want
- Development
  - Emphasizes speed and rapid feedback

- Implementation
  - Part of the implementation is done in parallel with development
- Operation and maintenance

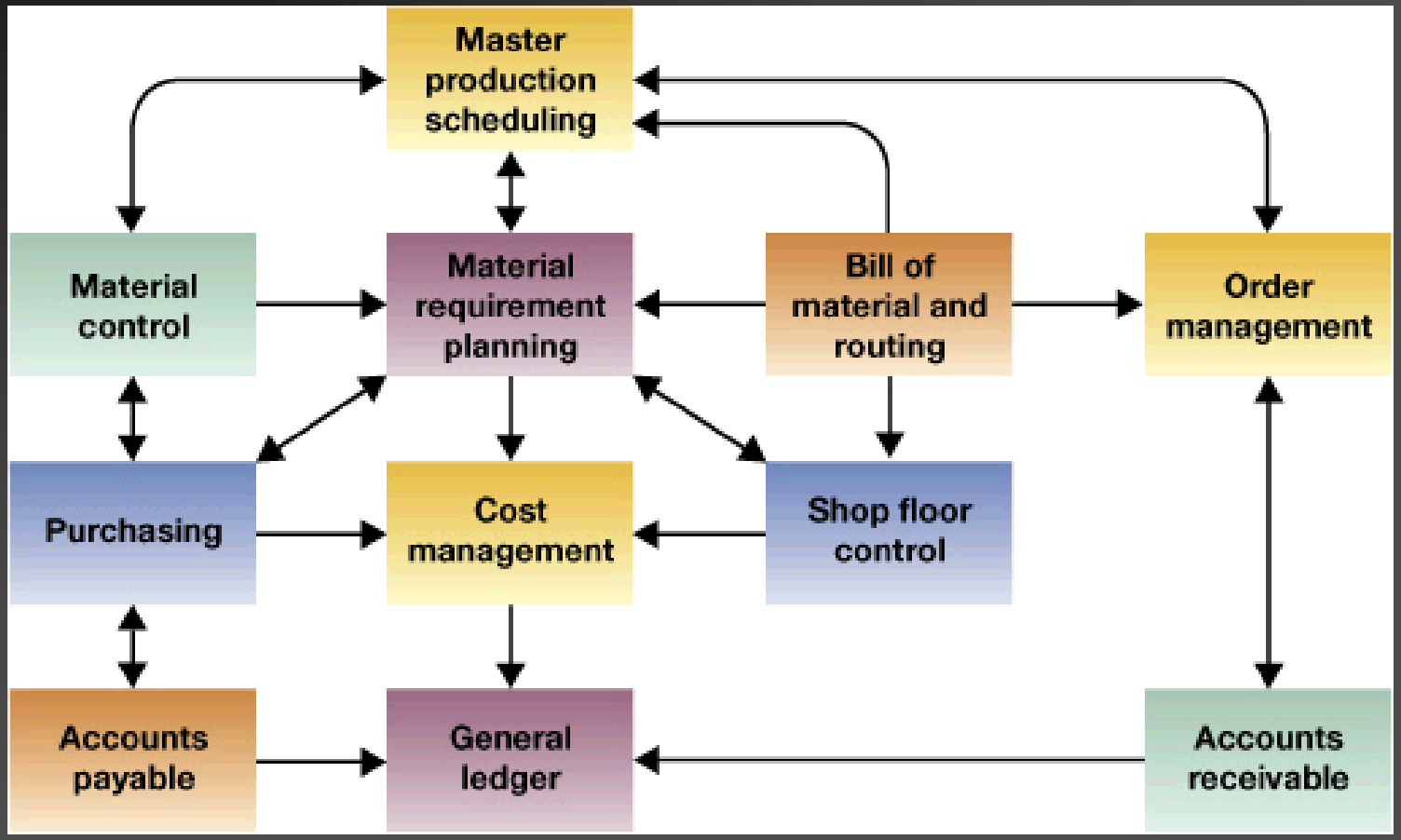
Advantages & Disadvantages

- Advantages:
  - Users have a tangible IS to work with during development
  - Early user involvement may reduce skepticism
  - Building prototypes is becoming easier

- Disadvantages:
  - Too much user involvement
  - Many changes
  - Frequent deadlines are stressful

Application Packages

Figure 12.7


Master production scheduling
Material control
Material requirement planning
Bill of material and routing
Order management
Purchasing
Cost management
Shop floor control
Accounts payable
General ledger
Accounts receivable

Phases

- Initiation
- Development
  - Benchmarking – running a test application similar to the final application
  - Request for proposal (RFP) – converts the ideas in the functional specifications into a checklist of required features

- Implementation
  - Deciding how the package will be set up and used
  - The system documentation may have to be extended with a training manual
- Operation and maintenance
  - Release – an upgraded version of the software
  - License agreements

Advantages and Disadvantages

- Advantages:
  - Benefits accrue sooner
  - Risks are reduced
- Disadvantages:
  - The features may not fit the business process
  - No control over the term direction of the software
  - Rarely provide sustainable competitive advantage

End–User Development

End-user Computing (EUC)

- Applies when:
  - Requirements are not stringent
  - The project is limited to a department and is not on a critical path for other projects
  - Proven technology is used

Phases

- Initiation
- Development
  - IS staff to support the user development
- Implementation
  - No training
- Operation and maintenance
  - The responsibility of the end users

Supporting the Users

- ***Site license*** – blanket contracts covering the use of a particular software product at the site by a certain number of users
- Data availability issues

Advantages and Disadvantages

- Advantages:
  - Reduces the need for programmers
  - Minimizes training
  - Eliminates delays and political negotiations
- Disadvantages:
  - Applies only in a limited number of situations
  - The systems are often less well designed and constructed, and more prone to bugs
  - Long-term maintenance often a problem

Deciding Which Combination of Methods to Use

- Comparing advantages & disadvantages
- Combining system development approaches
  - Some alternatives:
    - Use a prototype as part of the traditional life cycle
    - Use a small application package as a prototype
    - Adopt aspect of a traditional life cycle to purchasing an application package
    - Add a user development component to the traditional life cycle

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