Modern Systems Analysis and Design

Eighth Edition, Global Edition

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Maintaining Information Systems

Learning Objectives

- ✔ Explain and contrast four types of system maintenance.
- ✔ Describe several factors that influence the cost of maintaining an information system and apply these factors to the design of maintainable systems.
- ✔ Describe maintenance management issues, including alternative organizational structures, quality measurement, processes for handling change requests, and configuration management.

Maintaining Information Systems

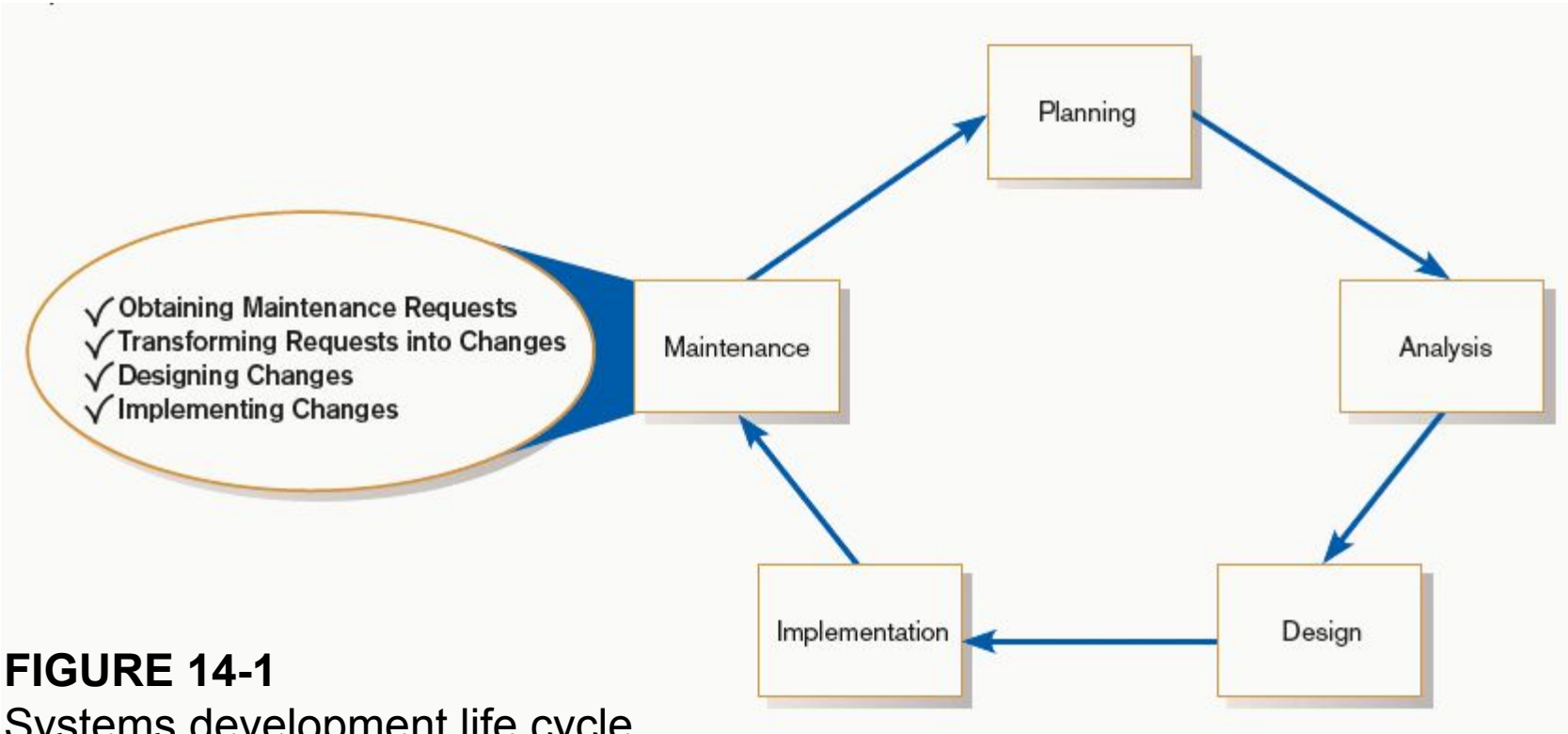


FIGURE 14-1
Systems development life cycle

The Process of Maintaining Information Systems

- Process of returning to the beginning of the SDLC and repeating development steps focusing on system change until the change is implemented
- Maintenance is the longest phase in the SDLC.

The Process of Maintaining Information Systems (Cont.)

- Four major activities:
  - Obtaining maintenance requests
  - Transforming requests into changes
  - Designing changes
  - Implementing changes

Pine Valley Furniture
System Service Request

REQUESTED BY Juanita Lopez DATE November 5, 2017

DEPARTMENT Purchasing, Manufacturing Support

LOCATION Headquarters, 1-322

CONTACT Tel: 4-3267 FAX: 4-3270 e-mail: jlopez

TYPE OF REQUEST

[X] New System
[ ] System Enhancement
[ ] System Error Correction

URGENCY

[ ] Immediate—Operations are impaired or opportunity lost
[ ] Problems exist, but can be worked around
[X] Business losses can be tolerated until new system is installed

PROBLEM STATEMENT

Sales growth at PVF has caused greater volume of work for the manufacturing support unit within Purchasing. Further, more concentration on customer service has reduced manufacturing lead times, which puts more pressure on purchasing activities. In addition, cost-cutting measures force Purchasing to be more aggressive in negotiating terms with vendors, improving delivery times, and lowering our investments in inventory. The current modest systems support for manufacturing purchasing is not responsive to these new business conditions. Data are not available, information cannot be summarized, supplier orders cannot be adequately tracked, and commodity buying is not well supported. PVF is spending too much on raw materials and not being responsive to manufacturing needs.

SERVICE REQUEST

I request a thorough analysis of our current operations with the intent to design and build a completely new information system. This system should handle all purchasing transactions, support display and reporting of critical purchasing data, and assist purchasing agents in commodity buying.

IS LIAISON Chris Martin (Tel: 4-6204 FAX: 4-6200 e-mail: cmartin)

SPONSOR Sal Divario, Director, Purchasing

---------- TO BE COMPLETED BY SYSTEMS PRIORITY BOARD ----------

[ ] Request approved Assigned to
Start date
[ ] Recommend revision
[ ] Suggest user development
[ ] Reject for reason

FIGURE 14-2
System Service Request for purchasing fulfillment system (Pine Valley Furniture)

Deliverables and Outcome

- SDLC maintenance phase is a subset of the activities of the entire development process
- Development of a new version of the software and new versions of all design documents created or modified during maintenance

Deliverables and Outcome (Cont.)

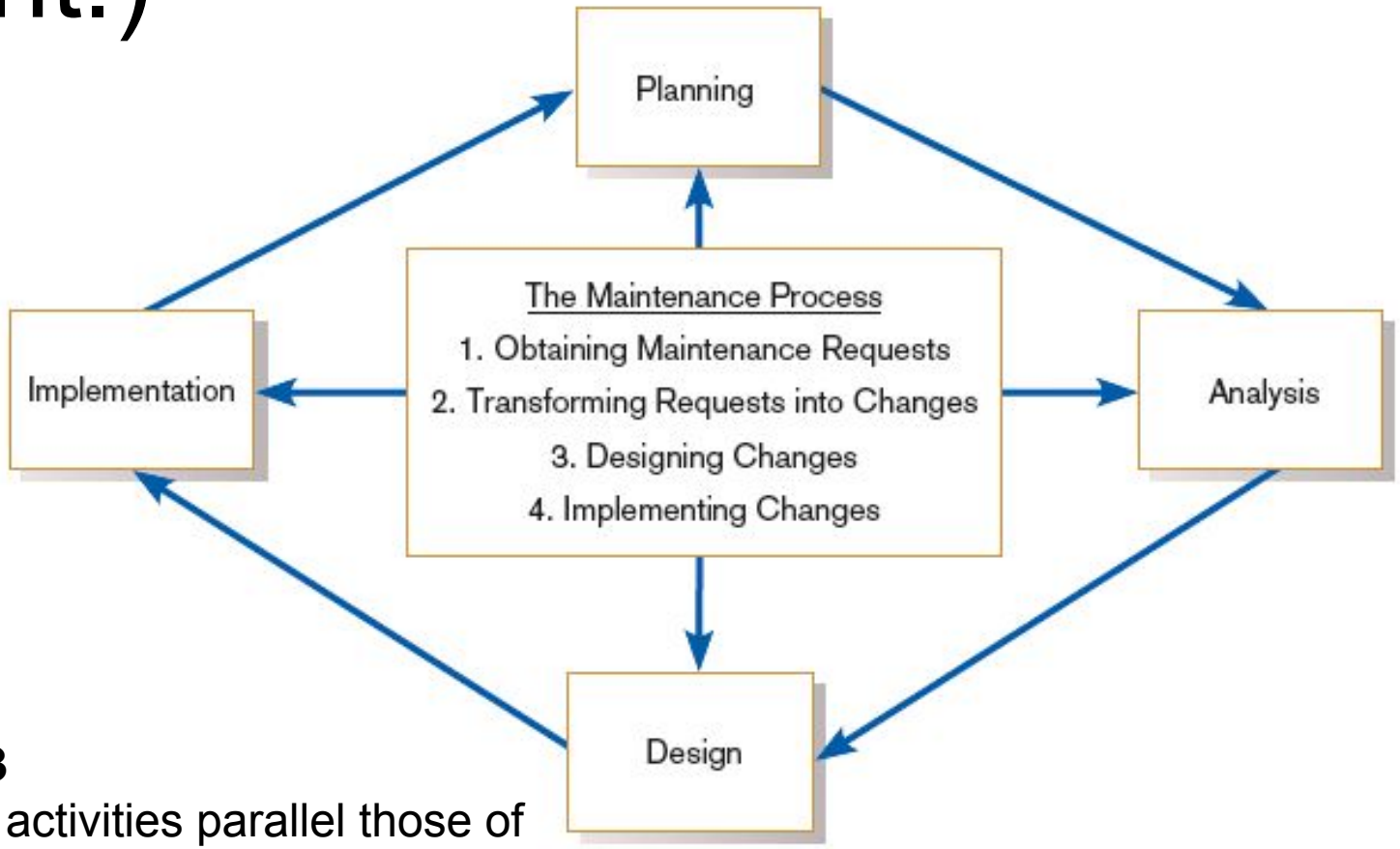


FIGURE 14-3
Maintenance activities parallel those of the SDLC

Types of System Maintenance

- **Maintenance**: changes made to a system to fix or enhance its functionality

Types of System Maintenance (Cont.)

- **Corrective maintenance**: changes made to a system to repair flaws in its design, coding, or implementation

Types of System Maintenance (Cont.)

- **Adaptive maintenance**: changes made to a system to evolve its functionality to changing business needs or technologies

Types of System Maintenance (Cont.)

- **Perfective maintenance**: changes made to a system to add new features or to improve performance

Types of System Maintenance (Cont.)

- **Preventive maintenance**: changes made to a system to avoid possible future problems

Types of System Maintenance (Cont.)

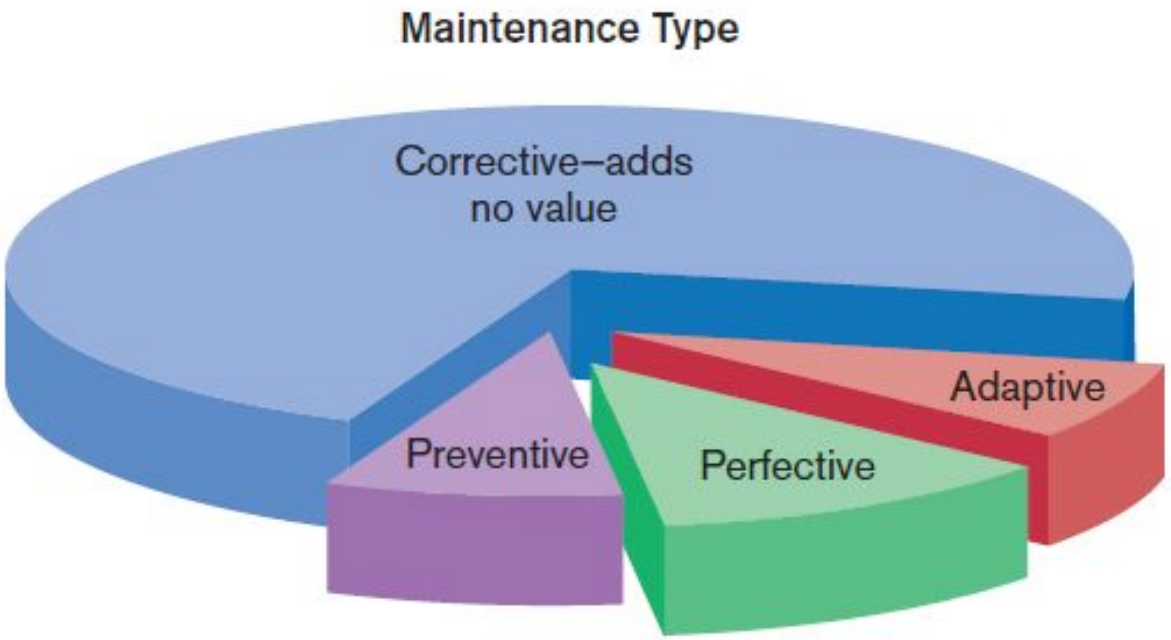


Figure 14-4
Value and non-value adding of different types of maintenance (*Sources:* Based on Andrews and Leventhal,1993; Pressman, 2005.)

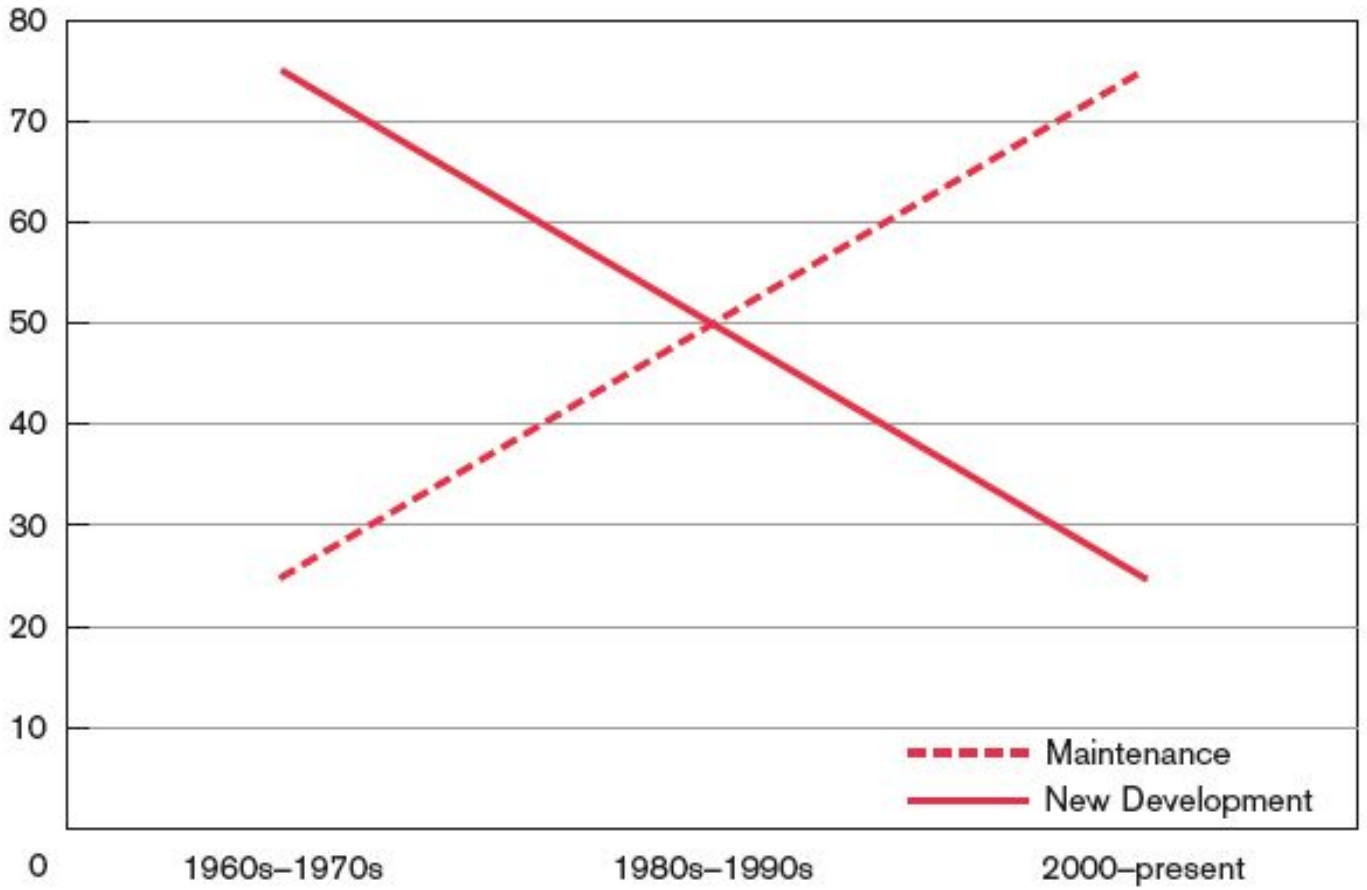
The Cost of Maintenance

- Many organizations allocate 60-80% of information systems budget to maintenance.
- **Maintainability**: the ease with which software can be understood, corrected, adapted, and enhanced

The Cost of Maintenance (Cont.)

FIGURE 14-5
New development versus maintenance as a percentage of the software budget over the years

(*Source:* Based on Pressman, 2005.)



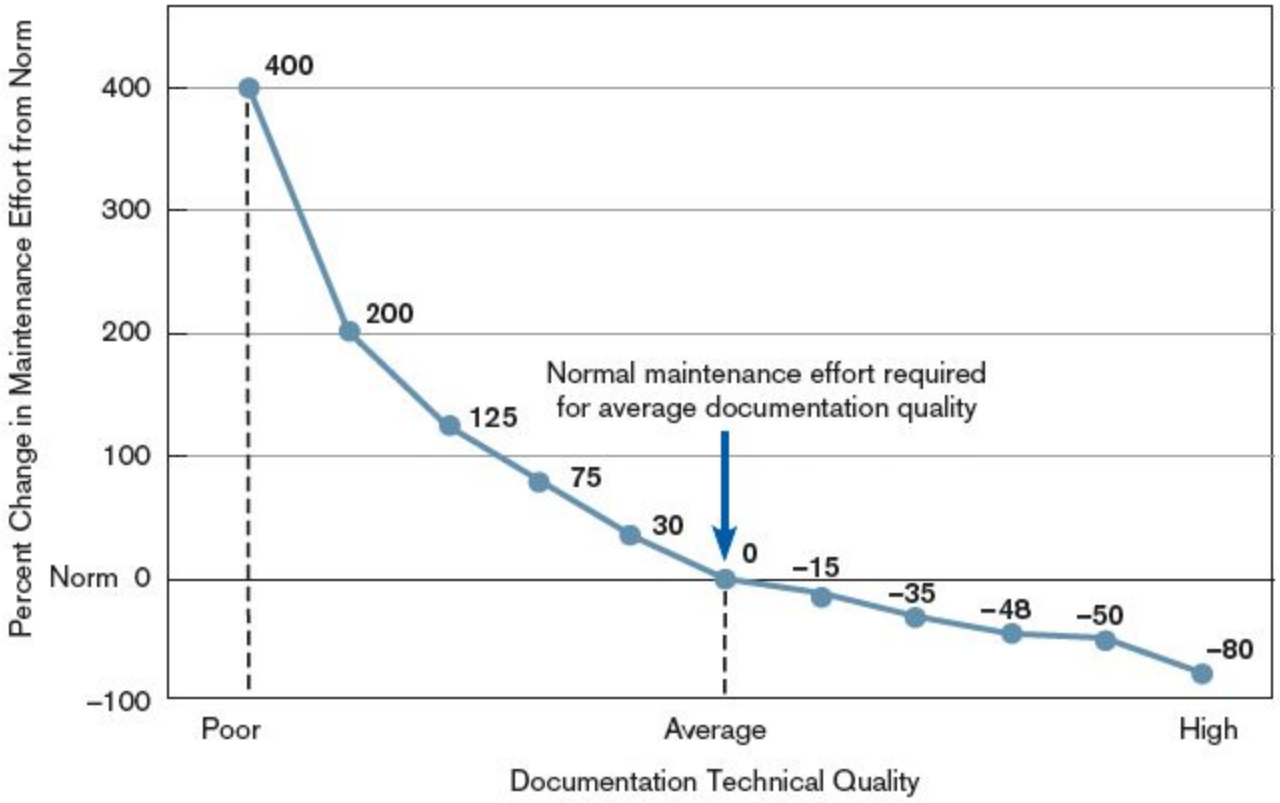
The Cost of Maintenance (Cont.)

- Factors influencing maintainability
  - **Latent defects:** unknown errors after installation (increases corrective maintenance).
  - **Nbr. of system customers:** more customers more (and conflicting) maintenance requests
  - **Quality of system documentation:** lack of documentation makes maintenance harder
  - **Maintenance personnel:** high quality programmers required for maintenance
  - **Tools:** automated documentation and code tools
  - **Well-structured programs:** good quality of code makes maintenance easier

The Cost of Maintenance (Cont.)

FIGURE 14-6
Quality documentation eases Maintenance

(*Source: Based on Hanna, M. 1992.* "Using Documentation as a Life-Cycle Tool." *Software Magazine [December]:* 41–46.)



Managing Maintenance Personnel

- Traditionally, maintenance and development were separately staffed.
- Organizations are rethinking this. Maybe combine development and maintenance into one role?
- Another possibility: spread maintenance personnel in different functional units (marketing, accounting, human resources, etc.)

Managing Maintenance Personnel (Cont.)

- Three possible organizational structures:
  - *Separate* — maintenance group consists of different personnel than development group
  - *Combined* — developers also maintain systems
  - *Functional* — maintenance personnel work within the functional business unit

Managing Maintenance Personnel (Cont.)

Maintenance Organization Type	Advantages	Disadvantages
Separate	Improved system and documentation quality	Ignorance of critical undocumented information
Combined	Maintenance group knows all about system	Less emphasis on good documentation
Functional	Personnel have vested interest	Limited job mobility and human or technical resources

Measuring Maintenance Effectiveness

- Must measure the following factors:
  - Number of failures
  - Time between each failure
  - Type of failure

Measuring Maintenance Effectiveness (Cont.)

- **Mean time between failures** (**MTBF**): a measurement of error occurrences that can be tracked over time to indicate the quality of a system

Measuring Maintenance Effectiveness (Cont.)

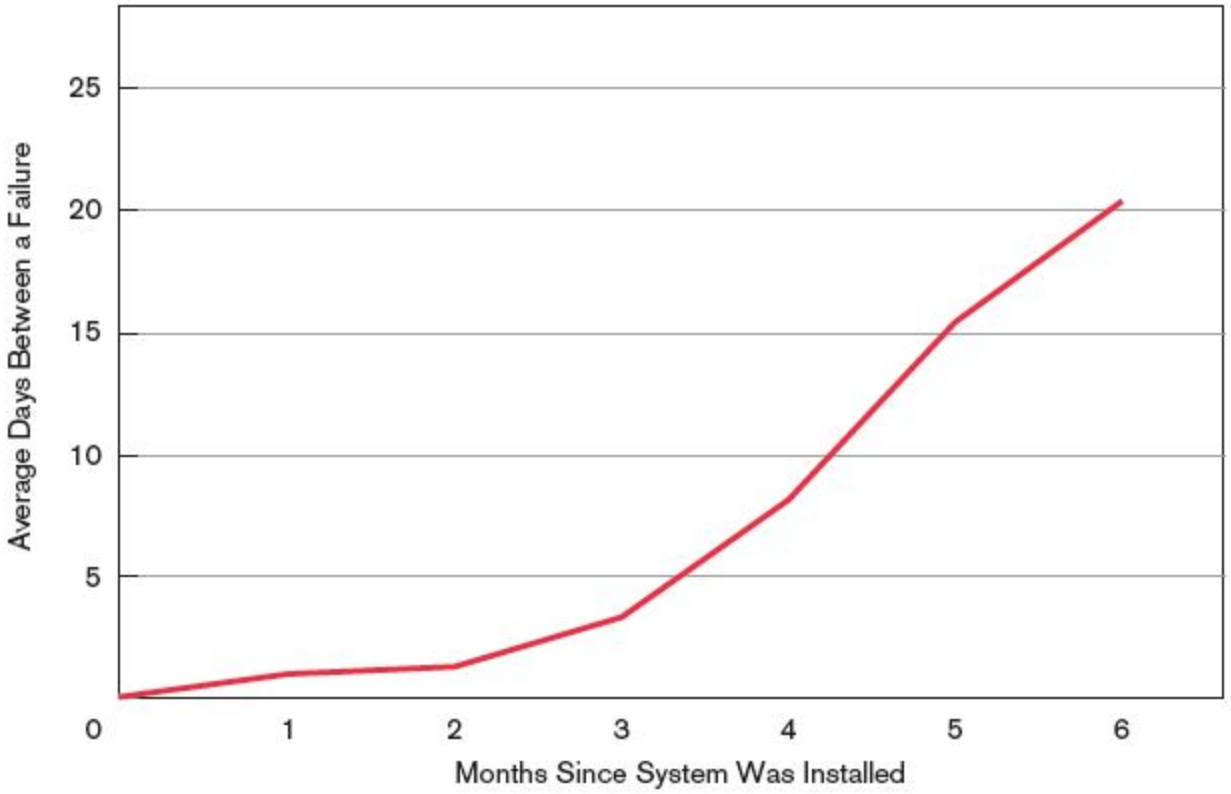


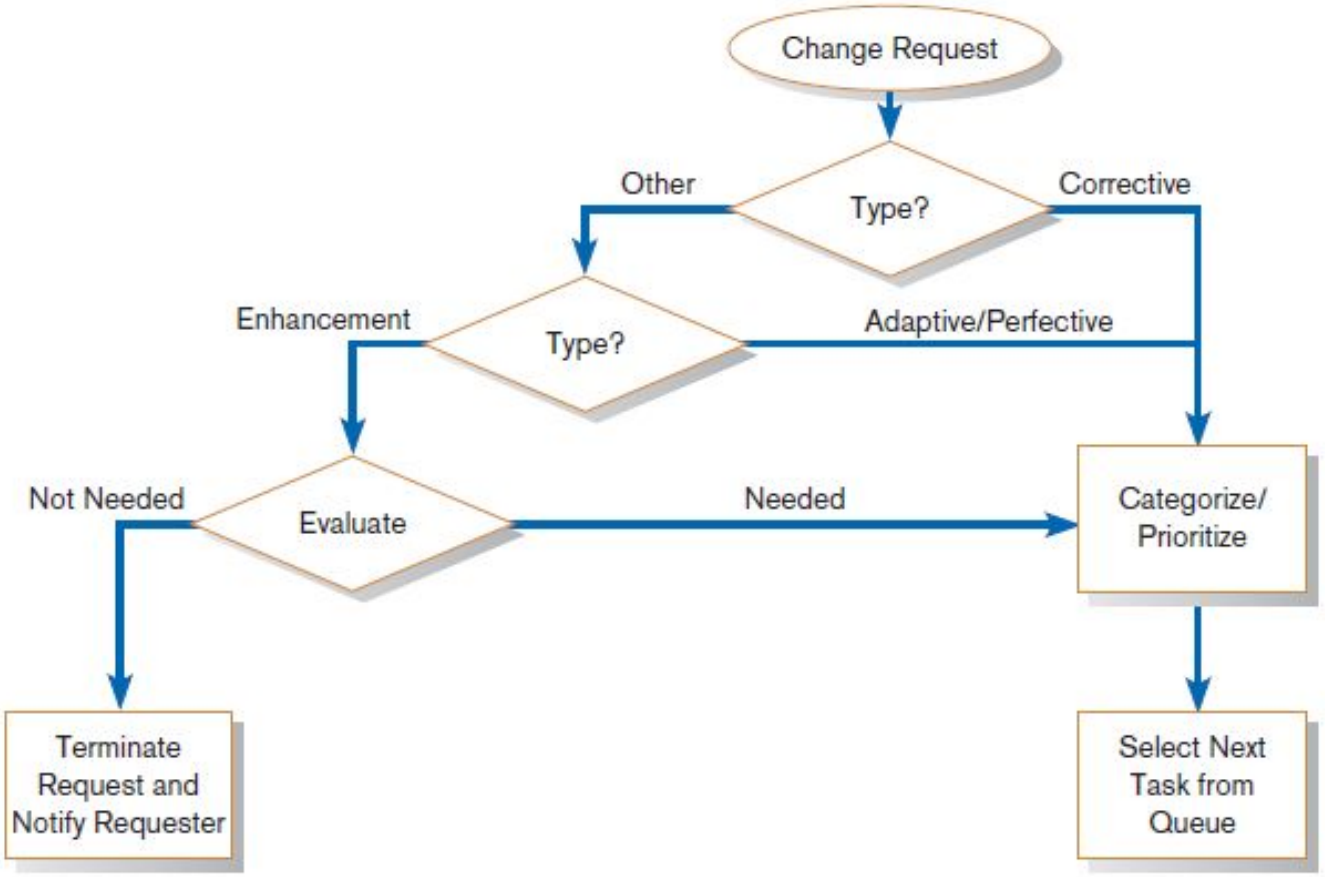
FIGURE 14-7
How the mean time between failures should change over time

Controlling Maintenance Requests

- Maintenance requests can be frequent.
- Prioritize based on type and urgency of request.
- Evaluations are based on feasibility analysis.

Controlling Maintenance Requests (Cont.)

FIGURE 14-8
How to prioritize maintenance requests



Controlling Maintenance Requests (Cont.)

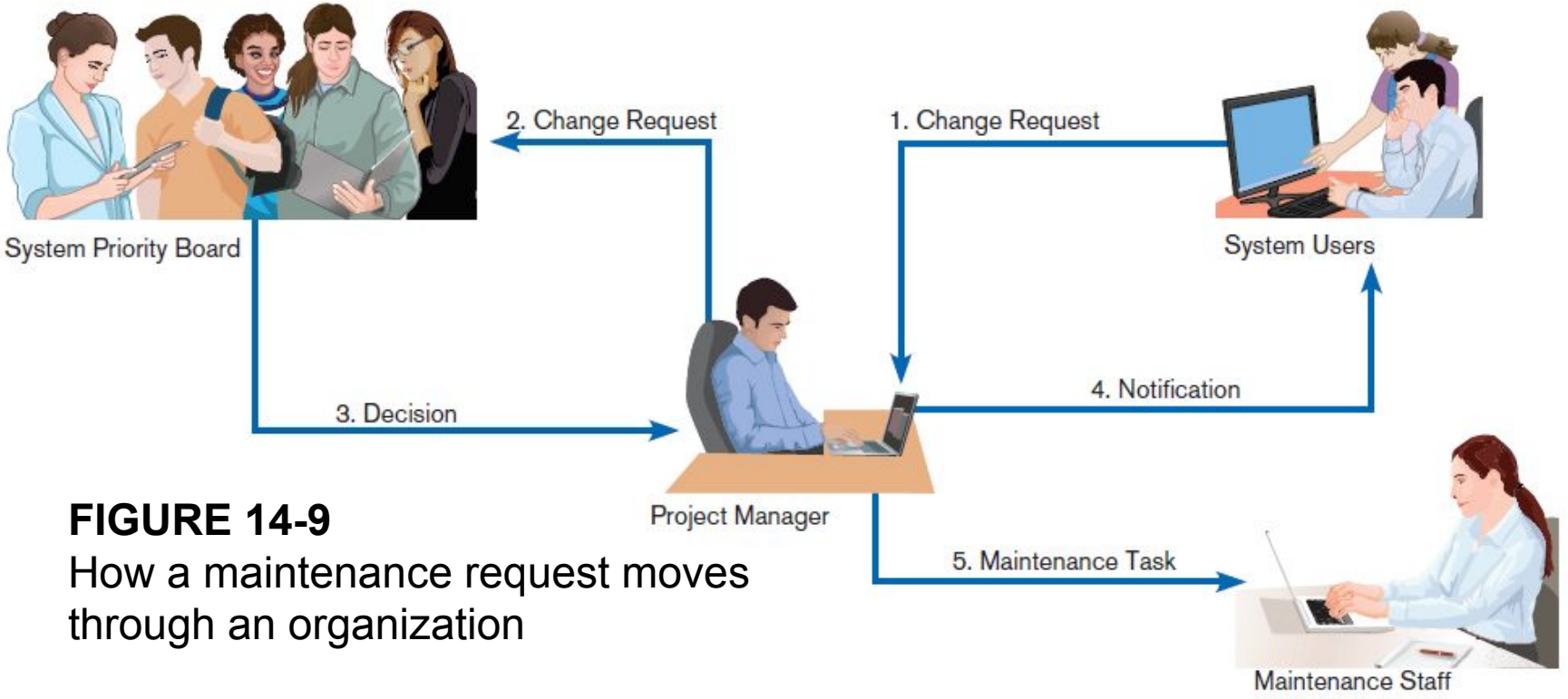


FIGURE 14-9
How a maintenance request moves through an organization

Web Site Maintenance

- Special considerations:
  - 24 X 7 X 365
    - Nature of continuous availability makes maintenance challenging.
    - Pages under maintenance can be locked.
      - Consider using date and time stamps to indicate when changes are made instead.

Web Site Maintenance (Cont.)

- Check for broken links
- HTML Validation
  - Pages should be processed by a code validation routine before publication.
- Reregistration
  - When content significantly changes, site may need to be reregistered with search engines.

Web Site Maintenance (Cont.)

- Future Editions
  - Consistency is important to users.
  - Post indications of future changes to the site.
  - Batch changes.

Summary

- In this chapter you learned how to:

✔ Explain and contrast four types of system maintenance.

✔ Describe several facts that influence the cost of maintaining an information system and apply these factors to the design of maintainable systems.

✔ Describe maintenance management issues, including alternative organizational structures, quality measurement, processes for handling change requests, and configuration management.