Chapter 6

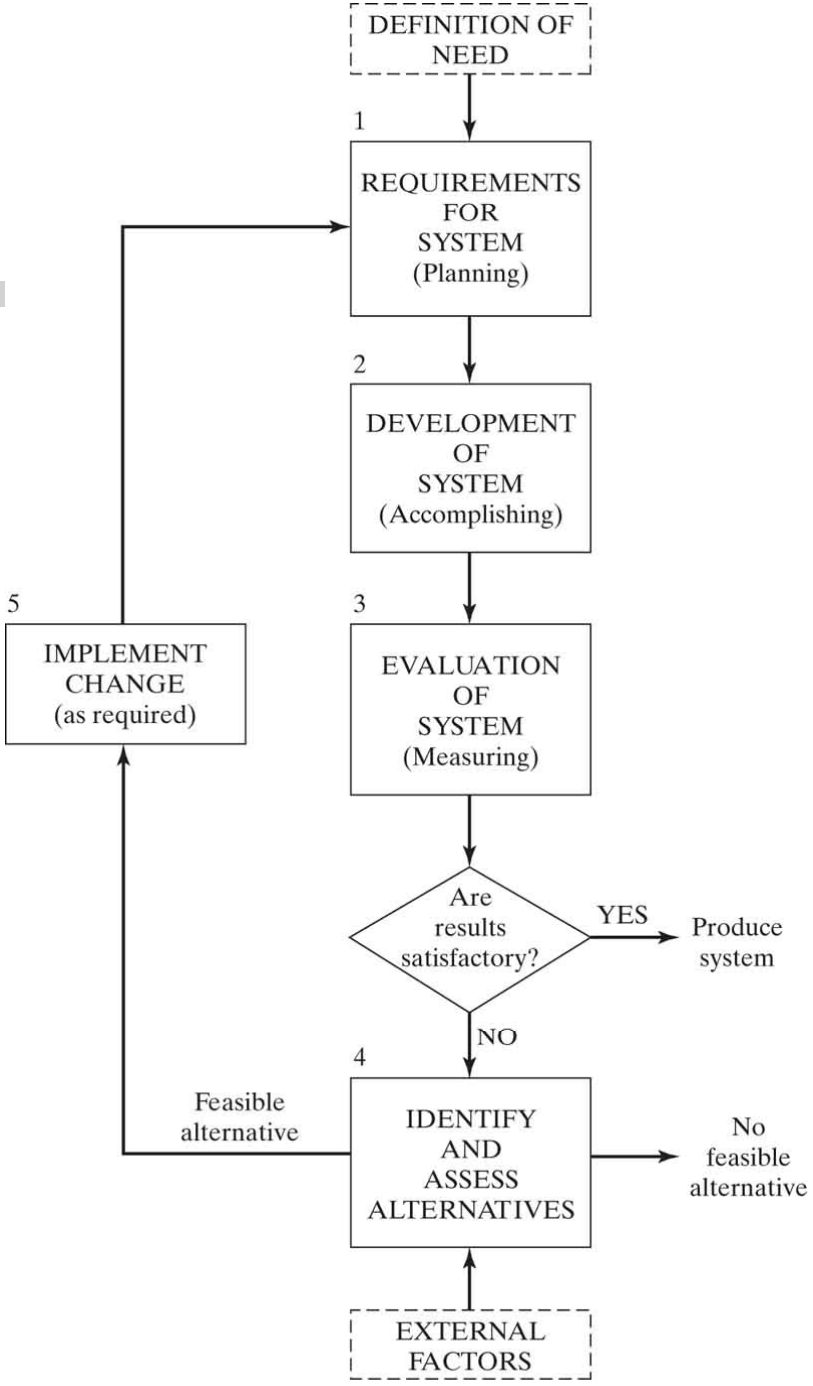
System Test, Evaluation, and Validation

What is it?

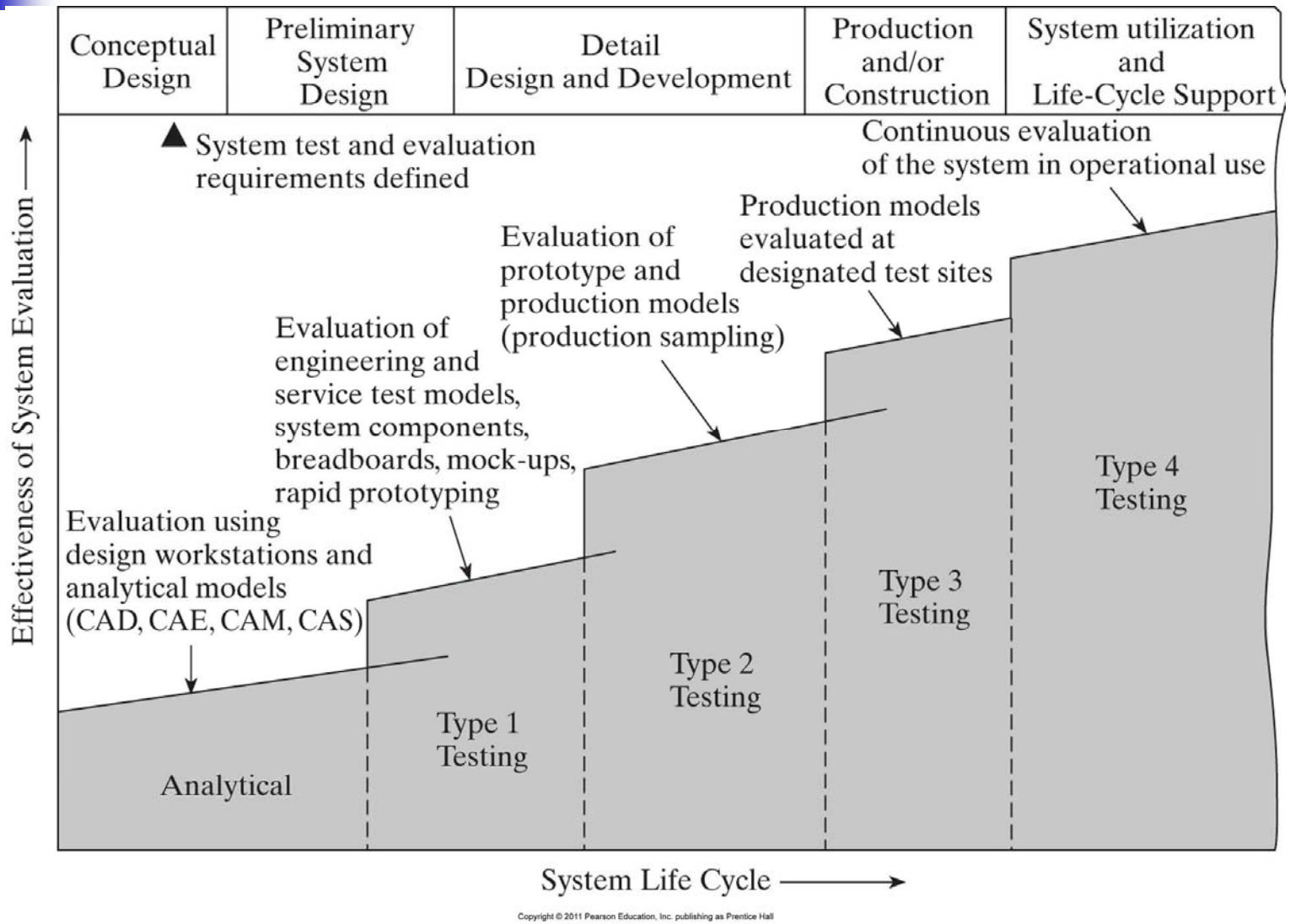
- Determining the requirements for system test, evaluation, and validation
- Describing the categories of system test and evaluation
- Planning for system test and evaluation
- Preparing for system test and evaluation
- Conducting the system test, collecting the test data, and preparing a test report
- Incorporating system modifications as required

System Test, Evaluation, and Validation

System Requirements and Evaluation Relationships



Stages of System Evaluation During the Life Cycle



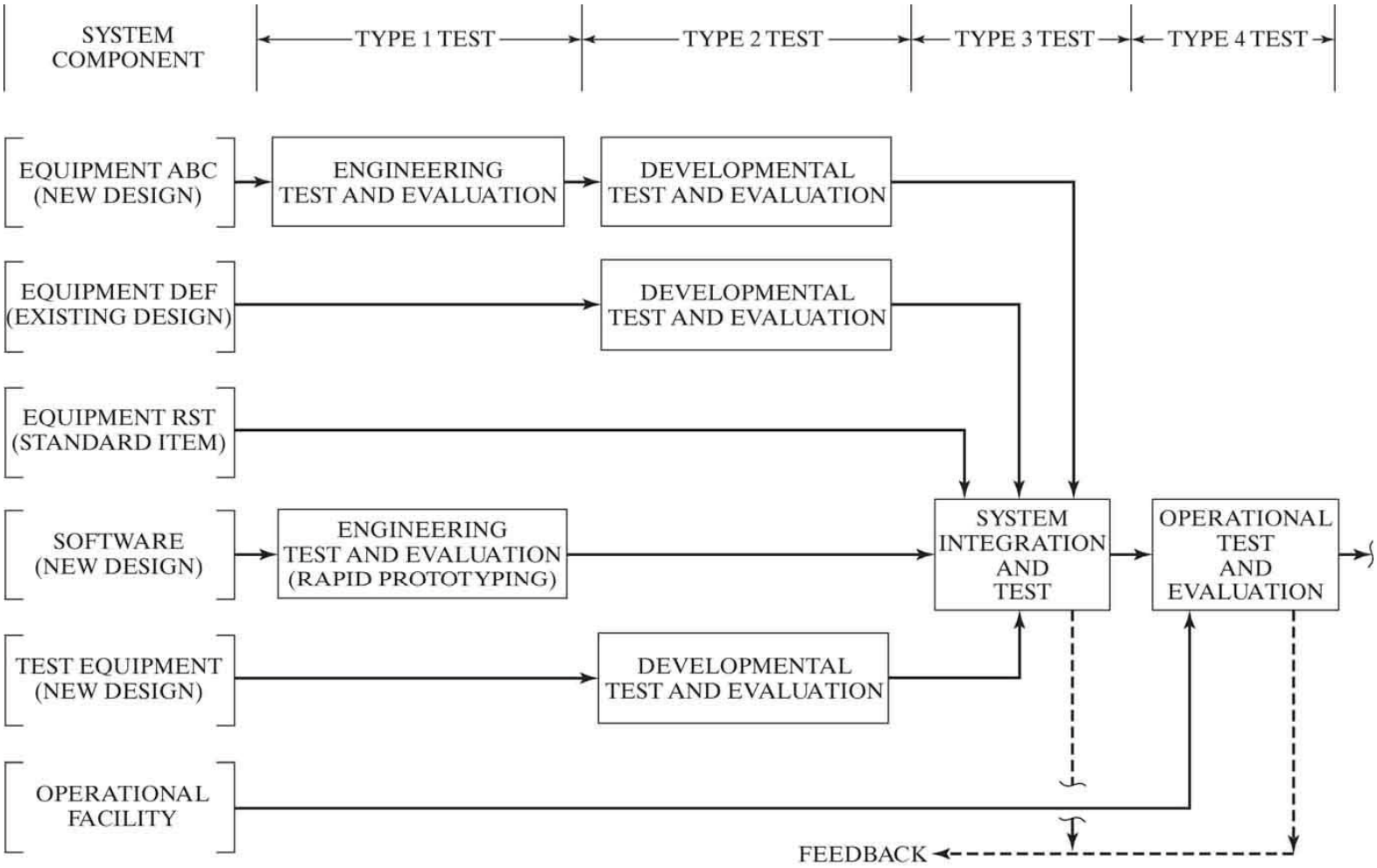
Categories of System Test and Evaluation

- Analytical Evaluation
- Type 1 Testing
- Type 2 Testing
  - Performance Tests
  - Environmental Qualification
  - Structural Tests
  - Reliability Qualification
  - Maintainability Demonstration
  - Support Equipment Compatibility Tests
  - Personnel Test and Evaluation
  - Technical Data Verification
  - Software Verification
- Type 3 Testing
- Type 4 Testing
- Exercise ...

Planning for System Test and Evaluation

- An identification of all the tests to be accomplished
- An identification of the organizations responsible for the administration
- A description of test locations
- A description of test preparation
- A description of the formal test phase
- A plan and associated provisions for testing
- A description of the final test report
- Exercise ...

Evolution of Test Requirements



Preparation for System Test and Evaluation

- Selection of test items
- Test and Evaluation Procedures
- Test site selection
- Test personnel and training
- Test facilities and resources
- Test and support equipment
- Test supply support
  - Initial and sustaining requirements for spares, repair parts, and consumables
    - System level
    - Logistics support
  - Facilities and warehousing requirements
  - Personnel requirements
  - Technical data requirements

Conducting System Test, Data Collection, and Test Reporting

- *What is the "true" performance and effectiveness of the system?*
- *What is the "true" performance and effectiveness of the logistics and maintenance support infrastructure?*
- *Are all the initially specified TPM and related requirements being met?*
- SUCCESS: Need to ...
  - Identify requirements and their applications
  - Design, develop, and implement capabilities that are responsive to those requirements

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1. *General System Operational and support Factors*
   - (a) Evaluation of mission requirements (operational scenarios, times, frequencies).
   - (b) Evaluation of system performance factors (capacity, output, size, weight, mobility, etc.).
   - (c) Verification of cost and system effectiveness factors (TPMs—operational availability, reliability MTBF, maintainability MTBM/MDT, human factors, safety, life-cycle cost).
   - (d) Verification of the logistics and maintenance support infrastructure (levels and locations of maintenance, repair policies, logistics and supply chain effectiveness, response times).
   - (e) Evaluation of system security (protection against personnel-induced faults, terrorism).
   - (f) Verification of system compatibility with other systems within the same SOS structure.
2. *Operational and Maintenance Software*
   - (a) Verification of the compatibility of operational software with other system elements.
   - (b) Verification of the compatibility of maintenances software with other system elements.
   - (c) Verification of software reliability and maintainability characteristics.
3. *Operational and Maintenance Facilities*
   - (a) Verification of operational facility adequacy, utilization, and maintenances support.
   - (b) Verification of maintenance facility adequacy, utilization, and support.
   - (c) Verification of warehousing facilities adequacy, utilization, and support.
   - (d) Verification of training facility adequacy, utilization, and support.

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4. *Transportation and Handling*
   (a) Verification of the transportation and handling capabilities for system operation and maintenance activities (adequacy, capacity, transportation times, response times).
   (b) Evaluation of the reliability, maintainability, human factors, safety, security, and related characteristics of transportation and handling equipment.
5. *Personnel and Training*
   (a) Verification of operational personnel quantities and skill levels by location.
   (b) verification of maintenance and support personnel quantities and skill levels by location.
   (c) Evaluation of personnel training policies and requirements (adequacy, throughput, etc.).
6. *Supply Support (Spares and Repair Parts)*
   (a) Verification of spare and repair part types and quantities by maintenance level/location.
   (b) Evaluation of supply responsiveness (spare part availability when required).
   (c) Evaluation of item replacement rates, condemnation rates, attrition rates, etc.
   (d) Evaluation of spare and repair part replacement and inventory policies.

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7. *Test and Support Equipment*
- (a) Verification of support equipment type and quantity by operational/maintenance level.
- (b) Verification of support equipment availability, reliability, maintainability, safety, etc.
- (c) Evaluation of maintenance requirements for the support equipment (required resources).

8. *Technical Data and Information Handling*
- (a) Verification of technical data coverage (level, accuracy, availability, and method of information presentation for operating and maintenance manuals).
- (b) Verification of the adequacy of the management and technical information capability (accuracy, speed of processing, reliability, etc.).
- (c) Verification of adequacy of the field data collection, analysis, corrective-action, and reporting capability.

9. *Consumer (User) Response*
- (a) Evaluation of the degree of consumer (user) satisfaction.
- (b) Verification that the consumer (customer/user) needs are met.

System Evaluation and Corrective Action Loop