

Software Evolution and Maintenance

A Practitioner's Approach

Chapter 3

Evolution and Maintenance Models

The standard focuses on a seven-phases:

- Problem Identification.
- Analysis.
- Design.
- Implementation.
- System Test.
- Acceptance Test.
- Delivery.

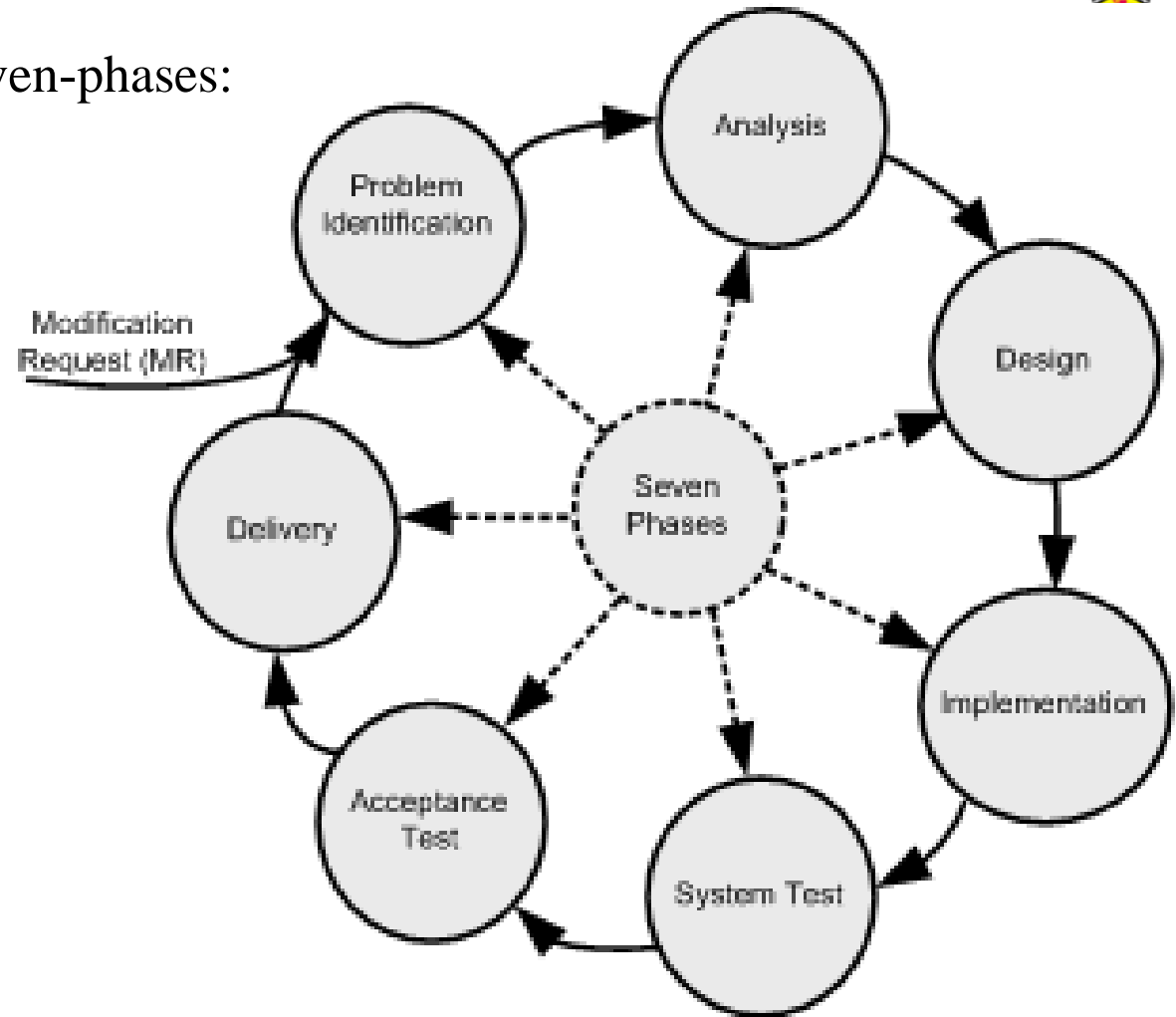


Figure 3.9 Seven phases of IEEE maintenance process ©IEEE, 2004

3.6 IEEE/EIA 1219 Maintenance Process

Each of the seven activities has five associated attributes as follows:

- **Activity definition:** This refers to the implementation process of the activity.
- **Input:** This refers to the items that are required as input to the activity.
- **Output:** This refers to the items that are produced by the activity.
- **Control:** This refers to those items that provide control over the activity.
- **Metrics:** This refers to the items that are measured during the execution of the activity.

3.6 IEEE/EIA 1219 Maintenance Process

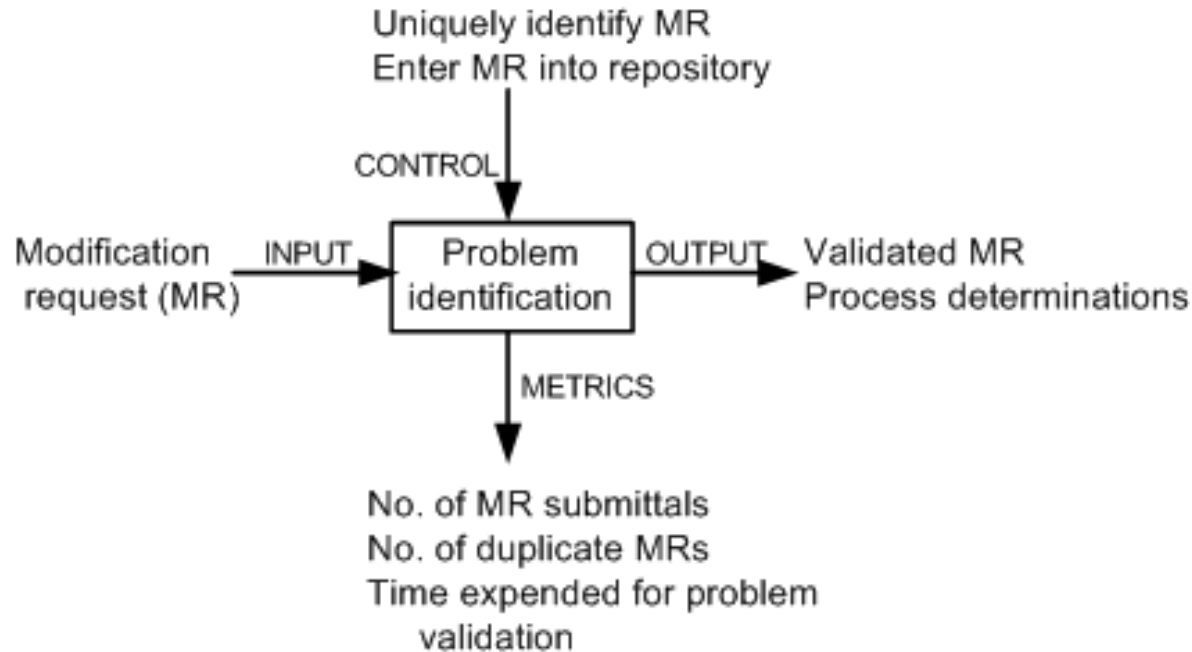


Figure 3.10 Problem identification phase

- A request for change to the software is normally made by the users of the software system or the customers, and it starts the maintenance process.
- The request for change (CR) is submitted in the form of a modification request (MR) for a correction or for an enhancement. MR & CR are used interchangeably.
- Activities included in this phase are as follows:
 - (i) reject or accept the MR,
 - (ii) identify and estimate the resources needed to change the system; and
 - (iii) put the MR in a batch of changes scheduled for implementation.

The process is viewed to have two major components:

- (i) feasibility analysis.
- (ii) detailed analysis.

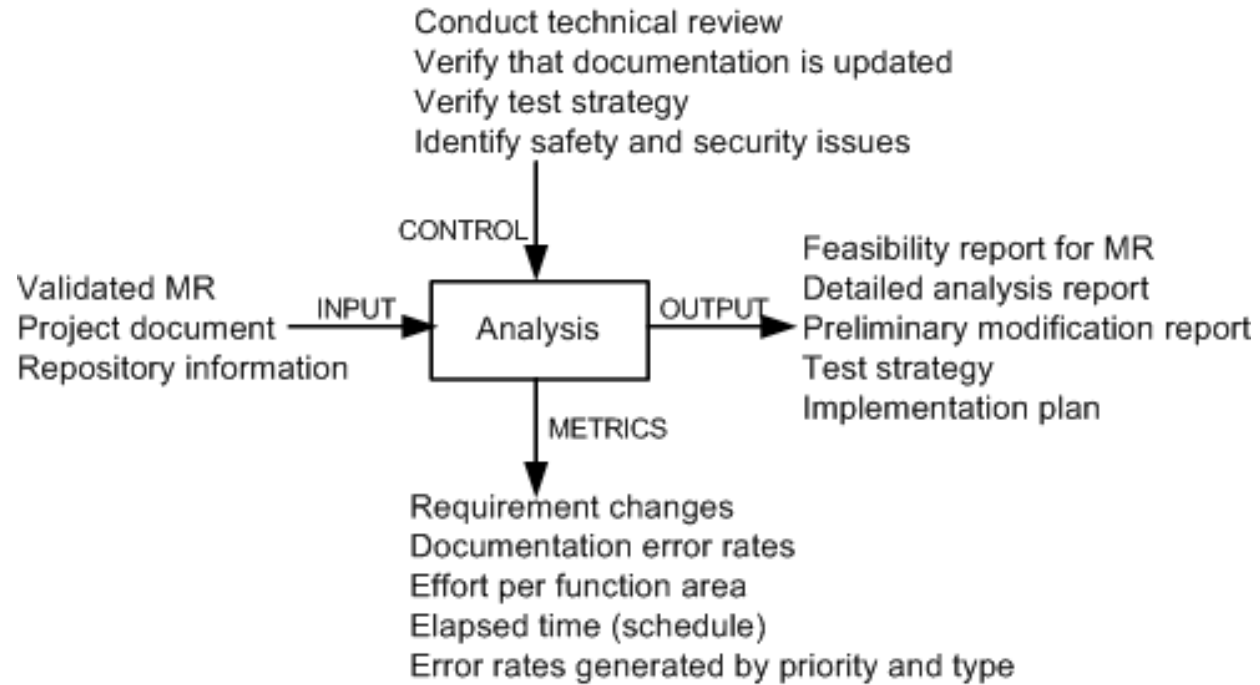


Figure 3.11 Analysis phase

- First, feasibility analysis is performed to: (i) determine the impact of the change; (ii) investigate other possible solutions including prototyping; (iii) assess both short-term and long-term costs; and (iv) determine the benefits of making the change.
- The second phase identifies: (i) firm modification requirements; (ii) the software components involved; (iii) an overall test strategy; and (iv) an implementation plan.

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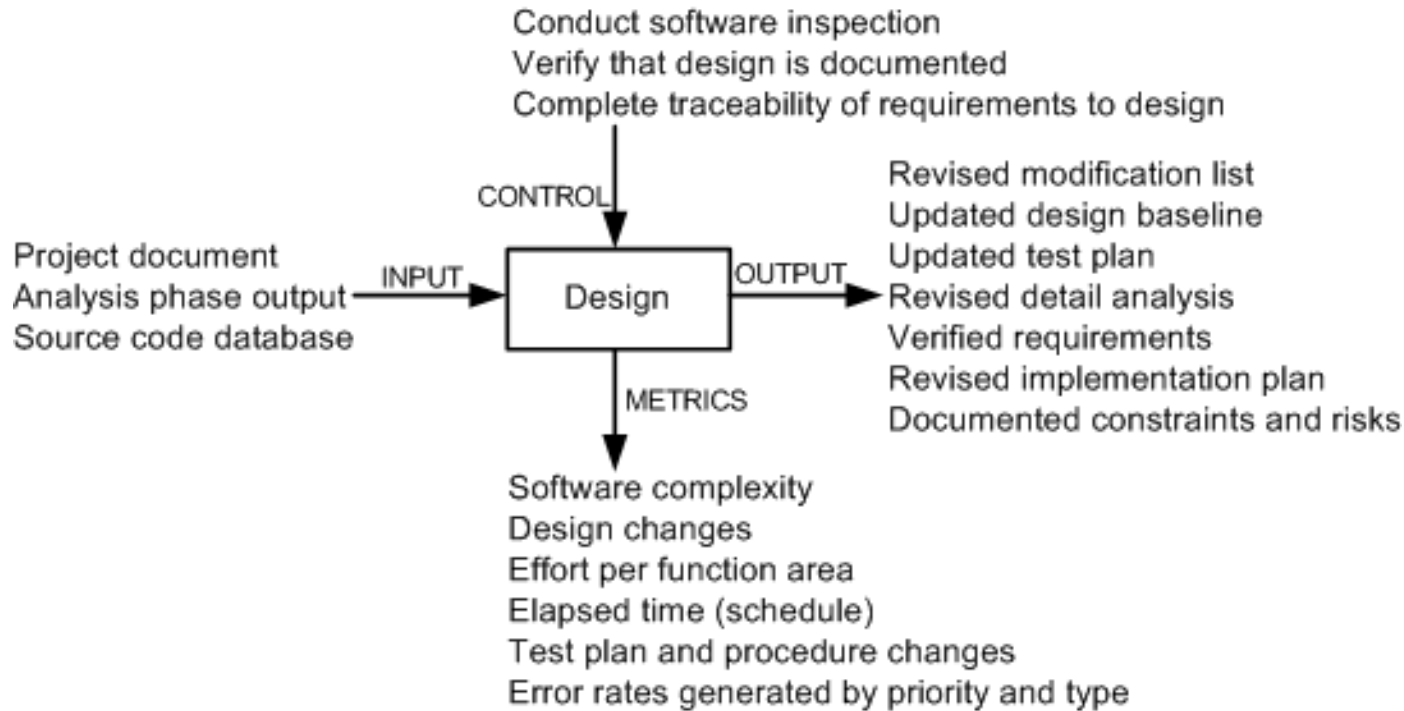


Figure 3.12 Design phase

Activities of this phase are as follows:

- (i) identify the affected software components.
- (ii) modify the software components.
- (iii) document the changes.
- (iv) create a test suite for the new design.
- (v) select test cases for regression testing.

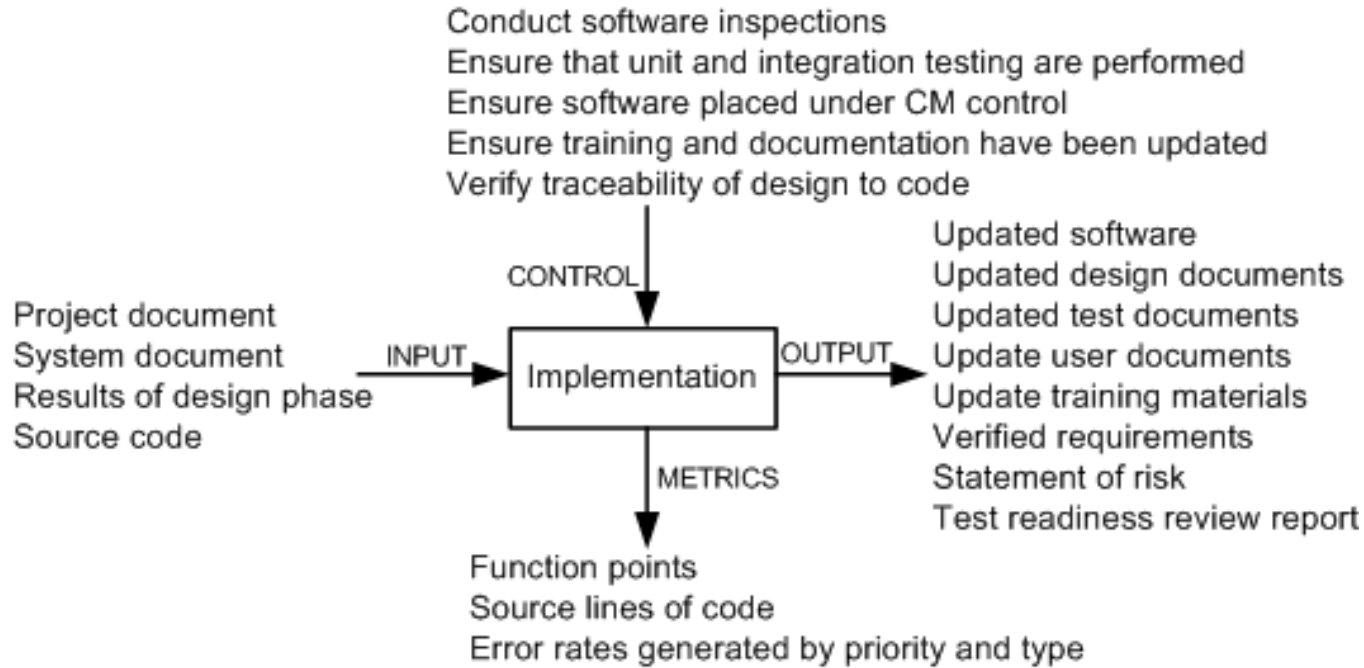


Figure 3.13 Implementation phase

The activities executed in this phase are:

- writing new code and performing unit testing,
- integrating changed code,
- conducting integration and regression testing,
- performing risk analysis, and
- reviewing the system for test-readiness.

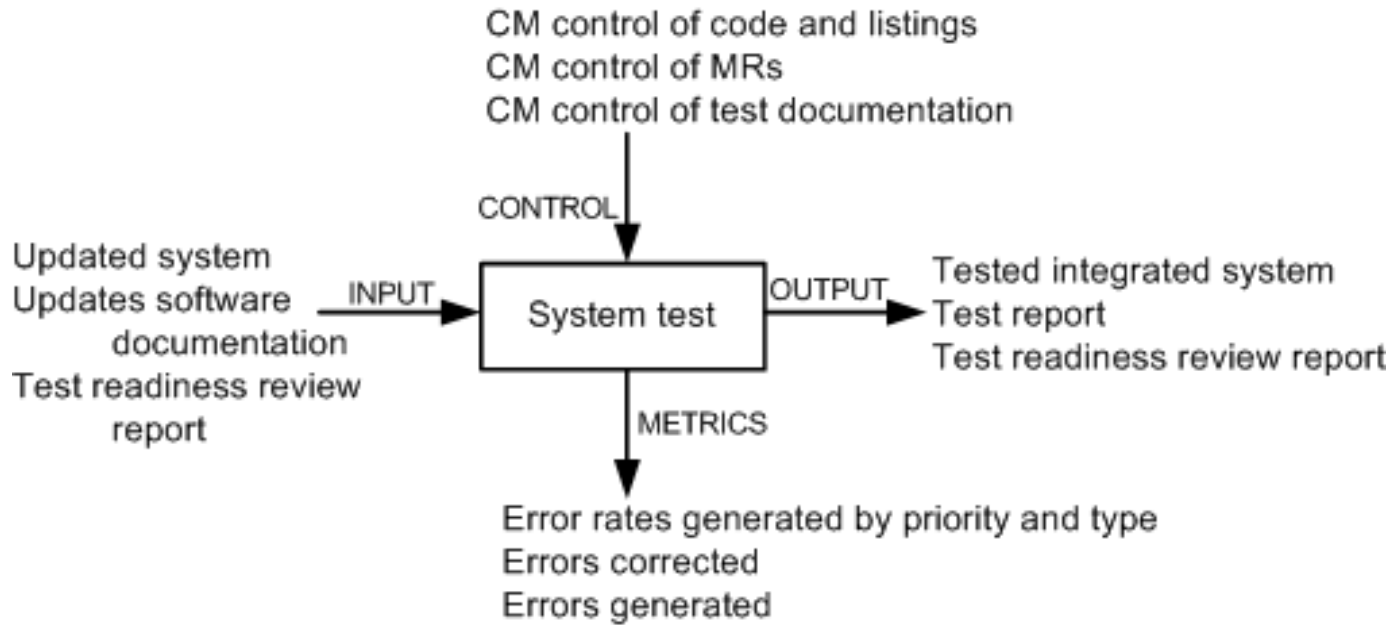


Figure 3.14 System test phase

In this phase tests are performed on the full system to ensure that the modified system complies with the original requirements as well as the new modifications.

System-level testing comprises a broad spectrum of testing activities: functionality testing, robustness testing, stability testing, load testing, performance testing, security testing, and regression testing.

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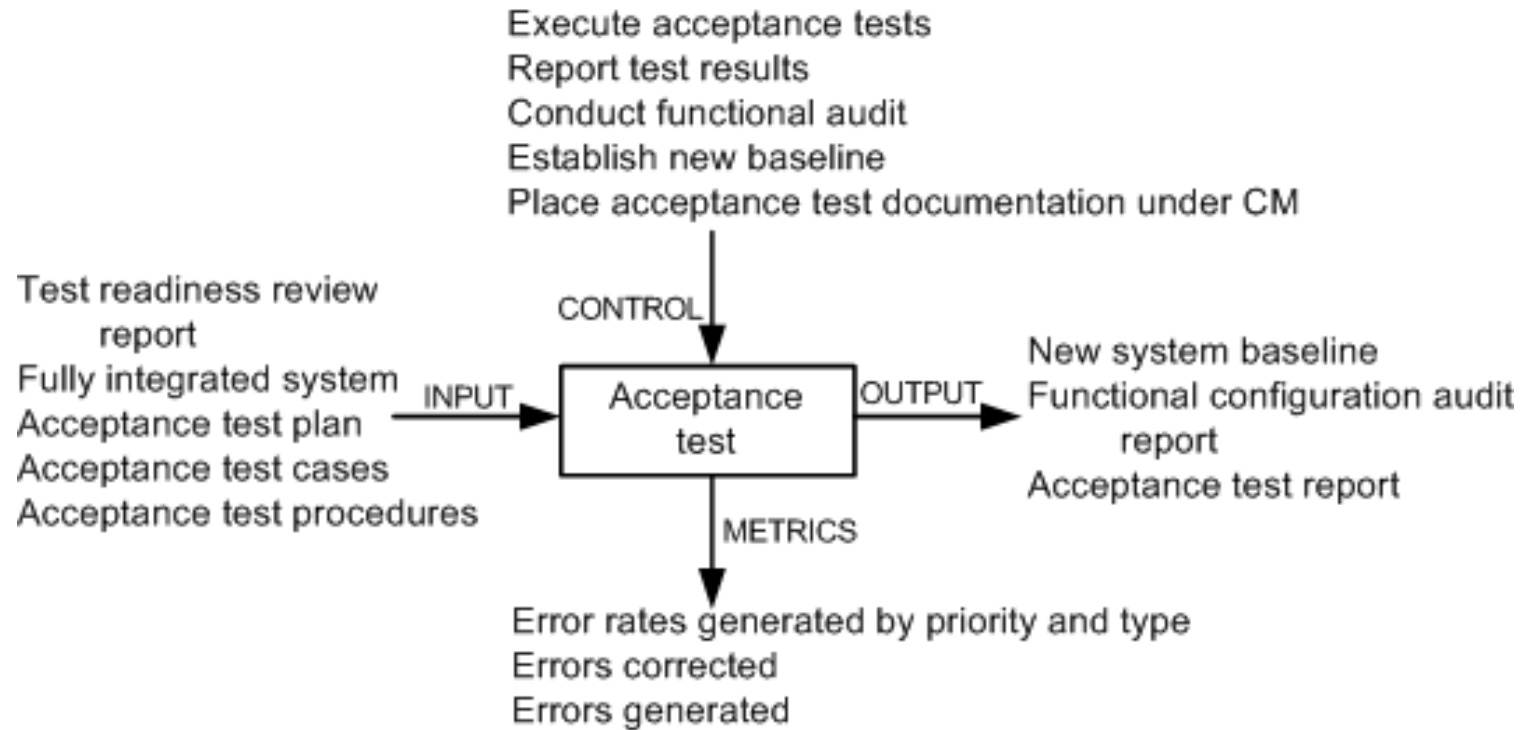


Figure 3.15 Acceptance test phase

- Acceptance testing is performed on a completely integrated system, and it involves customers, users, or their representatives.
- The main objective of acceptance testing is to assess the overall quality of the system, rather than actively identify defects.
- An important concept in acceptance testing is the customer's expectation from the system.

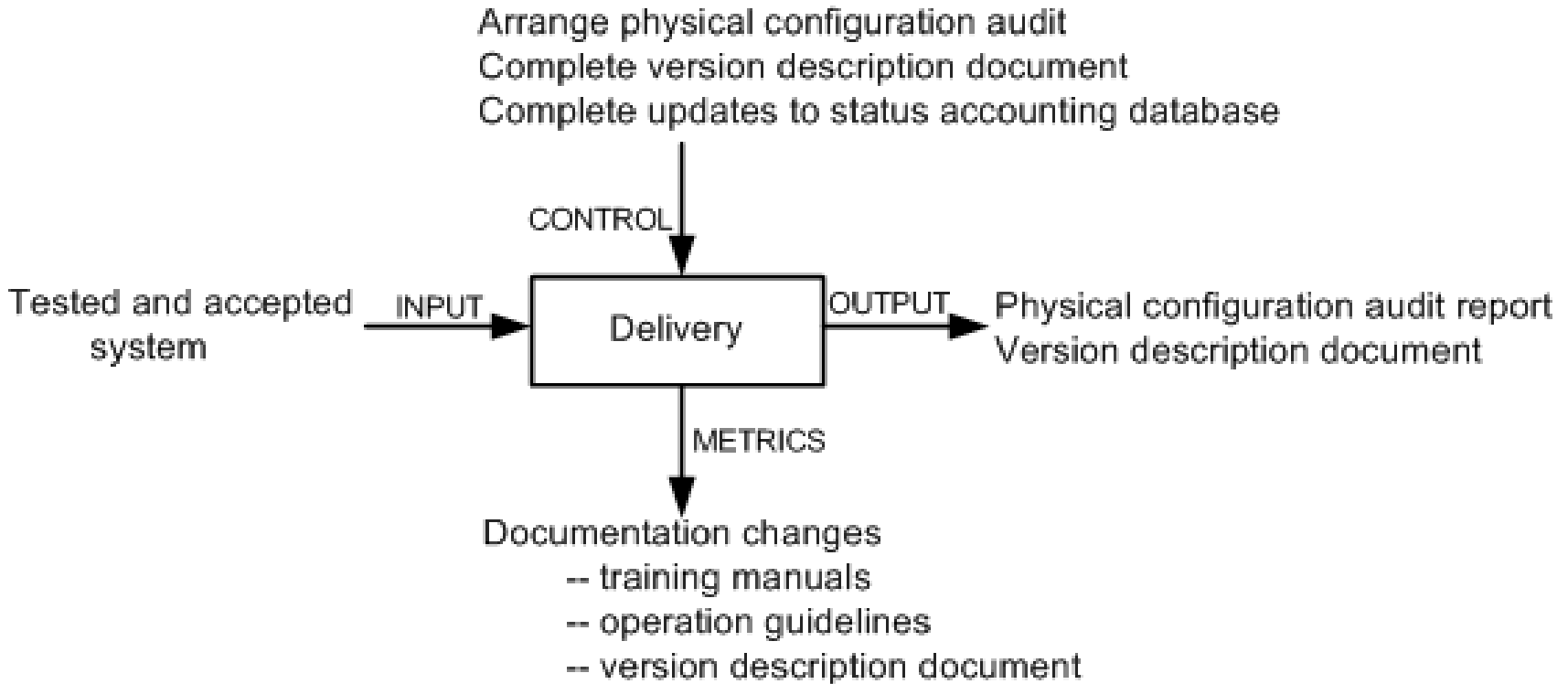


Figure 3.16 Delivery phase

- In this phase, the changed system is released to customers for installation and operation.
- Included in this phase are the following activities: notify the user community, perform installation and training, and develop an archival version of the system for backup.