8. Master Test Plan (MTP)

The purpose of the Master Test Plan (MTP) is to provide an overall test planning and test management document for multiple levels of test (either within one project or across multiple projects). In view of the software requirements and the project's (umbrella) quality assurance planning, master test planning as an activity comprises selecting the constituent parts of the project's test effort; setting the objectives for each part; setting the division of labor (time, resources) and the interrelationships between the parts; identifying the risks, assumptions, and standards of workmanship to be considered and accounted for by the parts; defining the test effort's controls; and confirming the applicable objectives set by quality assurance planning. It identifies the integrity level schema and the integrity level selected, the number of levels of test, the overall tasks to be performed, and the documentation requirements.

Clause 7 specifies how to address the content topics shown in the outline example below. Details on the content for each topic are contained in 8.1 through 8.3. A full example of an MTP outline is shown in the boxed text.

Master Test Plan Outline (full example)

1. Introduction

1.1. Document identifier

1.2. Scope

1.3. References

1.4. System overview and key features

1.5. Test overview

1.5.1 Organization

1.5.2 Master test schedule

1.5.3 Integrity level schema

1.5.4 Resources summary

1.5.5 Responsibilities

1.5.6 Tools, techniques, methods, and metrics

2. Details of the Master Test Plan

2.1. Test processes including definition of test levels

2.1.1 Process: Management

2.1.1.1 Activity: Management of test effort

2.1.2 Process: Acquisition

2.1.2.1: Activity: Acquisition support test

2.1.3 Process: Supply

2.1.3.1 Activity: Planning test

2.1.4 Process: Development

2.1.4.1 Activity: Concept

2.1.4.2 Activity: Requirements

2.1.4.3 Activity: Design

2.1.4.4 Activity: Implementation

2.1.4.5 Activity: Test

2.1.4.6 Activity: Installation/checkout

2.1.5 Process: Operation

2.1.5.1 Activity: Operational test

2.1.6 Process: Maintenance

2.1.6.1 Activity: Maintenance test

2.2. Test documentation requirements

2.3. Test administration requirements

2.4. Test reporting requirements

3. General

3.1. Glossary

3.2. Document change procedures and history

8.1 (MTP Section 1) Introduction

Introduce the following subordinate sections. This section identifies the document and places it in context of the project-specific lifecycle. It is in this section that the entire test effort is described, including the test organization, the test schedule, and the integrity schema. A summary of required resources, responsibilities, and tools and techniques may also be included in this section.

8.1.1 (MTP Section 1.1) Document identifier

Uniquely identify a version of the document by including information such as the date of issue, the issuing organization, the author(s), the approval signatures (possibly electronic), and the status/version (e.g., draft, reviewed, corrected, or final). Identifying information may also include the reviewers and pertinent managers. This information is commonly put on an early page in the document, such as the cover page or the pages immediately following it. Some organizations put this information at the end of the document. This information may also be kept in a place other than in the text of the document (e.g., in the configuration management system or in the header or footer of the document).

8.1.2 (MTP Section 1.2) Scope

Describe the purpose, goals, and scope of the system/software test effort. Include a description of any tailoring of this standard that has been implemented. Identify the project(s) for which the Plan is being written and the specific processes and products covered by the test effort. Describe the inclusions, exclusions, and assumptions/limitations. It is important to define clearly the limits of the test effort for any test plan. This is most clearly done by specifying what is being included (inclusions) and equally important, what is being excluded (exclusions) from the test effort. For example, only the current new version of a product might be included and prior versions might be excluded from a specific test effort. In addition, there may be gray areas for the test effort (assumptions and/or limitations) where management discretion or technical assumptions are being used to direct or influence the test effort. For example, system subcomponents purchased from other suppliers might be assumed to have been tested by their originators, and thus, their testing in this effort would be limited to only test the features used as subcomponents in the new system.

It is implied that the test tasks will reflect the overall test approach and the development methodology. If the development is based on a "waterfall" methodology, then each level of the test will be executed only one time. However, if the development is based on an iterative methodology, then there will be multiple iterations of each level of test. For example, component testing may be taking place on the most recent iteration at the same time that acceptance testing is taking place on products that were developed during an earlier iteration.

The test approach identifies what will be tested and in what order for the entire gamut of testing levels (component, component integration, system, and acceptance). The test approach identifies the rationale for testing or not testing, and it identifies the rationale for the selected order of testing. The test approach describes the relationship to the development methodology. The test approach may identify the types of testing done at the different levels. For example, "thread testing" may be executed at a system level, whereas "requirements testing" may take place at the component integration as well as at a systems integration level.

The documentation (LTP, LTD, LTC, LTPr, LTR, and LITSR) required is dependent on the selection of the test approach(es).

8.1.3 (MTP Section 1.3) References

List all of the applicable reference documents. The references are separated into "external" references that are imposed external to the project and "internal" references that are imposed from within to the project. This may also be at the end of the document.

8.1.3.1 (MTP Section 1.3.1) External references

List references to the relevant policies or laws that give rise to the need for this plan, e.g.:

a) Laws

b) Government regulations

c) Standards (e.g., governmental and/or consensus)

d) Policies

The reference to this standard includes how and if it has been tailored for this project, an overview of the level(s) of documentation expected, and their contents (or a reference to an organizational standard or document that delineates the expected test documentation details).

8.1.3.2 (MTP Section 1.3.2) Internal references

List references to documents such as other plans or task descriptions that supplement this plan, e.g.:

a) Project authorization

b) Project plan (or project management plan)

c) Quality assurance plan

d) Configuration management plan

8.1.4 (MTP Section 1.4) System overview and key features

Describe the mission or business purpose of the system or software product under test (or reference where the information can be found, e.g., in a system definition document, such as a Concept of Operations). Describe the key features of the system or software under test [or reference where the information can be found, e.g., in a requirements document or COTS documentation].

8.1.5 (MTP Section 1.5) Test overview

Describe the test organization, test schedule, integrity level scheme, test resources, responsibilities, tools, techniques, and methods necessary to perform the testing.

8.1.5.1 (MTP Section 1.5.1) Organization

Describe the relationship of the test processes to other processes such as development, project management, quality assurance, and configuration management. Include the lines of communication within the testing organization(s), the authority for resolving issues raised by the testing tasks, and the authority for approving test products and processes. This may include (but should not be limited to) a visual representation, e.g., an organization chart.

8.1.5.2 (MTP Section 1.5.2) Master test schedule

Describe the test activities within the project life cycle and milestones. Summarize the overall schedule of the testing tasks, identifying where task results feed back to the development, organizational, and supporting processes (e.g., quality assurance and configuration management). Describe the task iteration policy for the re-execution of test tasks and any dependencies.

8.1.5.3 (MTP Section 1.5.3) Integrity level scheme

Describe the identified integrity level scheme for the software-based system or software product, and the mapping of the selected scheme to the integrity level scheme used in this standard. If the selected integrity level scheme is the example presented in this standard, it may be referenced and does not need to be repeated in the MTP. The MTP documents the assignment of integrity levels to individual components (e.g., requirements, functions, software modules, subsystems, non-functional characteristics, or other partitions), where there are differing integrity levels assigned within the system. At the beginning of each process, the assignment of integrity levels is reassessed with respect to changes that may need to be made in the integrity levels as a result of architecture selection, design choices, code construction, or other development activities.

8.1.5.4 (MTP Section 1.5.4) Resources summary

Summarize the test resources, including staffing, facilities, tools, and special procedural requirements (e.g., security, access rights, and documentation control).

8.1.5.5 (MTP Section 1.5.5) Responsibilities

Provide an overview of the organizational content topic(s) and responsibilities for testing tasks. Identify organizational components and their primary (they are the task leader) and secondary (they are not the leader, but providing support) test-related responsibilities.

8.1.5.6 (MTP Section 1.5.6) Tools, techniques, methods, and metrics

Describe documents, hardware and software, test tools, techniques, methods, and test environment to be used in the test process. Describe the techniques that will be used to identify and capture reusable testware. Include information regarding acquisition, training, support, and qualification for each tool, technology, and method.

Document the metrics to be used by the test effort, and describe how these metrics support the test objectives. Metrics appropriate to the Level Test Plans (e.g., component, component integration, system, and acceptance) may be included in those documents (see Annex E).

8.2 (MTP Section 2) Details of the Master Test Plan

Introduce the following subordinate sections. This section describes the test processes, test documentation requirements, and test reporting requirements for the entire test effort.

8.2.1 (MTP Section 2.1) Test processes including definition of test levels

Identify test activities and tasks to be performed for each of the test processes described in Clause 5 of this standard (or the alternative test processes defined by the user of this standard), and document those test activities and tasks. Provide an overview of the test activities and tasks for all development life cycle processes. Identify the number and sequence of levels of test. There may be a different number of levels than the example used in this standard (component, component integration, system, and acceptance). Integration is often accomplished through a series of test levels, for both component integration and systems integration. Examples of possible additional test levels include security, usability, performance, stress, recovery, and regression. Small systems may have fewer levels of test, e.g., combining system and acceptance. If the test processes are already defined by an organization's standards, a reference to those standards could be substituted for the contents of this subclause.

8.2.1.1 (MTP Sections 2.1.1 through 2.1.6) "Life cycle"[4] processes

Describe how all requirements of the standard are satisfied (e.g., by cross referencing to this standard) if the life cycle used in the MTP differs from the life cycle model in this standard. Testing requires advance planning that spans several development activities. An example of test documentation and its occurrence during the life cycle is shown in Figure 4. Include sections 2.1.1 through 2.1.6 (or sections for each life cycle, if different from the example used in this standard) for test activities and tasks as shown in the MTP Outline (Clause 8).

Address the following eight topics for each test activity (as in the example in Table 4).

a) *Test tasks:* Identify the test tasks to be performed. Table 3 provides example minimum test tasks, task criteria, and required inputs and outputs. Table C.1 provides example minimum test tasks that will be performed for each system/software integrity level. Optional test tasks may also be performed to augment the test effort to satisfy project needs. Some possible optional tasks are described in Annex D. The standard allows for optional test tasks to be used as appropriate, and/or additional test tasks not identified by this standard.
   Some test tasks are applicable to more than one integrity level. The degree of intensity and rigor in performing and documenting the task should be commensurate with the integrity level. As the integrity level increases or decreases, so do the required scope, intensity, and degree of rigor associated with the test task.

b) *Methods:* Describe the methods and procedures for each test task, including tools. Define the criteria for evaluating the test task results.

c) *Inputs:* Identify the required inputs for the test task. Specify the source of each input. For any test activity and task, any of the inputs or outputs of the preceding activities and tasks may be used.

d) *Outputs:* Identify the required outputs from the test task. The outputs of the management of test and of the test tasks will become inputs to subsequent processes and activities, as appropriate.

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[4] "Life Cycle" sections are 6.1 Process: Management, 6.2 Process: Acquisition, 6.3 Process: Supply, 6.4 Process: Development, 6.5 Process: Operation, and 6.6 Process: Maintenance; see Clause 5.

e) *Schedule:* Describe the schedule for the test tasks. Establish specific milestones for initiating and completing each task, for the receipt of each input, and for the delivery of each output.

f) *Resources:* Identify the resources for the performance of the test tasks. Specify resources by category (e.g., staffing, tools, equipment, facilities, travel budget, and training).

g) *Risks and Assumptions:* Identify the risk(s) (e.g., schedule, resources, technical approach, or for going into production) and assumptions associated with the test tasks. Provide recommendations to eliminate, reduce, or mitigate risk(s).

h) *Roles and responsibilities:* Identify for each test task the organizational elements that have the primary and secondary responsibilities for the execution of the tas k, and the nature of the roles they will play.

Table 4—Example task description (for one task)

Task	**Generate system test design**
Methods	Ensure that test design correctly emanates from the system test plan and conforms to IEEE Std 829-2008 regarding purpose, format, and content.
Inputs	System Test Plan, IEEE Std 829-2008
Outputs	System Test Design, provide input to Master Test Report
Schedule	Initiate (with all inputs received) 30 days after the start of the project. Must be completed and approved 120 days after start of project.
Resources	Refer to MTP clause 1.5.4.
Risk(s) and assumptions	Risk: adequacy and timeliness of the test plans Assumption: Timeliness is a primary concern because the team writing the test cases is dependent on the receipt of this the test plans
Roles and responsibilities	Refer to MTP clause 1.5.5.

8.2.2 (MTP Section 2.2) Test documentation requirements

Define the purpose, format, and content of all other testing documents that are to be used (in addition to those that are defined in MTP Section 2.4). A description of these documents may be found in Clause 9 through Clause 16. If the test effort uses test documentation or test levels different from those in this standard (i.e., component, component integration, system, and acceptance), this section needs to map the documentation and process requirements to the test documentation contents defined in this standard.

8.2.3 (MTP Section 2.3) Test administration requirements

Describe the anomaly resolution and reporting processes, task iteration policy, deviation policy, control procedures and standards, practices, and conventions. These activities are needed to administer the tests during execution.

8.2.3.1 (MTP Section 2.3.1) Anomaly resolution and reporting

Describe the method of reporting and resolving anomalies, including the standards for reporting an anomaly, the Anomaly Report distribution list, and the authority and time line for resolving anomalies. This section of the plan defines the anomaly criticality levels. Classification for software anomalies may be found in IEEE Std 1044™-1993 [B13].

8.2.3.2 (MTP Section 2.3.2) Task iteration policy

Describe the criteria used to determine the extent to which a testing task is repeated when its input is changed or task procedure is changed (e.g., reexecuting tests after anomalies have been fixed). These criteria may include assessments of change, integrity level, and effects on budget, schedule, and quality.

8.2.3.3 (MTP Section 2.3.3) Deviation policy

Describe the procedures and criteria used to deviate from the MTP and level test documentation after they are developed. The information required for deviations includes task identification, rationale, and effect on system/software quality. Identify the authorities responsible for approving deviations.

8.2.3.4 (MTP Section 2.3.4) Control procedures

Identify control procedures applied to the test activities. These procedures describe how the software-based system and software products and test results will be configured, protected, and stored.

These procedures may describe quality assurance, configuration management, data management, or other activities if they are not addressed by other efforts. Describe how the test activities comply with existing security provisions and how the test results are to be protected from unauthorized alterations.

8.2.3.5 (MTP Section 2.3.5) Standards, practices, and conventions

Identify the standards, practices, and conventions that govern the performance of testing tasks including, but not limited to, internal organizational standards, practices, and policies.

8.2.4 (MTP Section 2.4) Test reporting requirements

Specify the purpose, content, format, recipients, and timing of all test reports. Test reporting consists of Test Logs (Clause 13), Anomaly Reports (Clause 14), Level Interim Test Status Report(s) (Clause 15), Level Test Report(s) (Clause 16), and the Master Test Report (Clause 17). Test reporting may also include optional reports defined by the user of this standard. The format and grouping of the optional reports are user defined and will vary according to subject matter.

8.3 (MTP Section 3) General

Introduce the following subordinate sections. This section includes the glossary of terms and acronyms. It also describes the frequency and the process by which the MTP is changed and baselined. It may also contain a change-page containing the history of the changes (date, reason for change, and who initiated the change).

8.3.1 (MTP section 3.1) Glossary

Provide an alphabetical list of terms that may require definition for the users of the MTP with their corresponding definitions. This includes acronyms. There may also be a reference to a project glossary, possibly posted online.

8.3.2 (MTP section 3.2) Document change procedures and history

Specify the means for identifying, approving, implementing, and recording changes to the MTP. This may be recorded in an overall configuration management system that is documented in a Configuration Management Plan that is referenced here. The change procedures need to include a log of all of the changes that have occurred since the inception of the MTP. This may include a Document ID (every testing document should have a unique ID connected to the system project), version number (sequential starting with first approved version), description of document changes, reason for changes (e.g., audit comments, team review, system changes), name of person making changes, and role of person to document (e.g., document author, project manager, system owner). This information is commonly put on an early page in the document (after the title page and before Section 1). Some organizations put this information at the end of the document.

9. Level Test Plan(s)

Specify for each LTP the scope, approach, resources, and schedule of the testing activities for its specified level of testing. Identify the items being tested, the features to be tested, the testing tasks to be performed, the personnel responsible for each task, and the associated risk(s). In the title of the plan, the word "Level" is replaced by the organization's name for the particular level being documented by the plan (e.g., Component Test Plan, Component Integration Test Plan, System Test Plan, and Acceptance Test Plan).

In most projects, there are different test levels requiring different resources, methods, and environments. As a result, each level is best described in a separate plan. Different Level Test Plans may require different usage of the documentation content topics listed below. Some examples of test levels for the development activity to undertake (from IEEE/EIA Std 12207.0-1996 [B21]) are as follows:

- Each software unit (IEEE Std 1008™-1987 [B9]) and database.
- Integrated units (IEEE Std 1008-1987 [B9]) and components.
- Tests for each software requirement.
- Software qualification testing for all requirements.
- Systems integration: aggregates of other software configuration items, hardware, manual operations, and other systems. It is not unusual for large systems to have multiple levels of integration testing.
- System qualification testing for system requirements.

Other possible examples of levels include operations, installation, maintenance, regression, and nonfunctional levels such as security, usability, performance, stress, and recovery. Any one of the example levels may be more than one level for an organization; e.g., Acceptance testing may be two levels: Supplier's System and User's Acceptance test levels.

Clause 7 specifies how to address the content topics shown in the outline example below. Details on the content for each topic are contained in 9.1 through 9.4. A full example of an LTP outline is shown in the boxed text.

Level Test Plan Outline (full example)

1. Introduction

1.1. Document identifier

1.2. Scope

1.3. References

1.4. Level in the overall sequence

1.5. Test classes and overall test conditions

2. Details for this level of test plan

2.1 Test items and their identifiers

2.2 Test Traceability Matrix

2.3 Features to be tested

2.4 Features not to be tested

2.5 Approach

2.6 Item pass/fail criteria

2.7 Suspension criteria and resumption requirements

2.8 Test deliverables

3. Test management

3.1 Planned activities and tasks; test progression

3.2 Environment/infrastructure

3.3 Responsibilities and authority

3.4 Interfaces among the parties involved

3.5 Resources and their allocation

3.6 Training

3.7 Schedules, estimates, and costs

3.8 Risk(s) and contingency(s)

4. General

4.1 Quality assurance procedures

4.2 Metrics

4.3 Test coverage

4.4 Glossary

4.5 Document change procedures and history

9.1 (LTP Section 1) Introduction

Introduce the following subordinate sections. This section identifies the document and puts it in context of the test effort and the project-specific lifecycle. This section also identifies the types of tests and test conditions for the specific level of testing.

9.1.1 (LTP Section 1.1) Document identifier

See 8.1.1.

9.1.2 (LTP Section 1.2) Scope

Summarize the software product or system items and features to be tested by this particular level of test. The need for each item and its history may be included. This section may be a reference to a portion of the MTP, be an addition to the MTP, or reflect changes from the MTP.

9.1.3 (LTP Section 1.3) References

See 8.1.3.

9.1.4 (LTP Section 1.4) Level in the overall sequence

Show this level's context in the overall test hierarchy or sequence. This is best supported by an illustration. It may be combined with LTP Section 1.2, Scope (see 9.1.2).

9.1.5 (LTP Section 1.5) Test classes and overall test conditions

Summarize the unique nature of this particular level of test. This is additional detail within the basic scope defined in Section 9.1.2. For example, provide descriptions for the particular level such as follows:

a) Component test would focus on the desired attributes (e.g., logic) of each (one at a time, in groups, or for all) component

b) Each level of integration test would have an inventory of interfaces to exercise

c) System test would focus on meeting the system's requirements

d) Acceptance test would focus on the attributes of fitness for use

Some examples of possible classes within one or more levels are as follows:

— Positive (or valid) testing of input values that should be processed successfully

— Negative (or invalid) values that should NOT process but do provide an appropriate error processing, such as an error notification message to a user

— All boundary values, including those just above, just below, and just on each limit

— Normal values based on usage profiles

— Exploratory tests based on compatibility requirements with prior version

9.2 (LTP Section 2) Details for this level of test plan

Introduce the following subordinate sections. This section describes the specific items to be tested at the designated level and provides a Test Traceability Matrix that links the items to be tested with the requirements. It is in this section that the approach is described along with the pass/fail criteria and suspension/resumption criteria, and test deliverables are identified.

9.2.1 (LTP Section 2.1) Test items and their identifiers

Identify the test items (software or system) that are the object of testing, e.g., specific attributes of the software, the installation instructions, the user instructions, interfacing hardware, database conversion software that is not a part of the operational system) including their version/revision level. Also identify any procedures for their transfer from other environments to the test environment.

Supply references to the test item documentation relevant to an individual level of test, if it exists, such as follows:

- Requirements
- Design
- User's guide
- Operations guide
- Installation guide

Reference any Anomaly Reports relating to the test items.

Identify any items that are to be specifically excluded from testing.

9.2.2 (LTP Section 2.2) Test Traceability Matrix

Provide a list of the requirements (software and/or system; may be a table or a database) that are being exercised by this level of test and show the corresponding test cases or procedures. The requirements may be software product or software-based system functions or nonfunctional requirements for the higher levels of test, or design or coding standards for the lower levels of test. This matrix may be part of a larger Requirements Traceability Matrix (RTM) referenced by this plan that includes requirements for all levels of test and traces to multiple levels of life cycle documentation products. It may include both forward and backward tracing. The RTM may be referenced by Section 4.3 coverage.

9.2.3 (LTP Section 2.3) Features to be tested

Identify all software product or software-based system features and combinations of software or system features to be tested.

9.2.4 (LTP Section 2.4) Features not to be tested

Identify all features and known significant combinations of features that will not be tested and the rationale for exclusion.

9.2.5 (LTP Section 2.5) Approach

Describe the overall approach for the level of testing. For each major feature or group of features, specify the approach that will ensure that they are adequately tested. The approach may be described in sufficient detail to permit identification of the major testing tasks and estimation of the time required to do each one.

Features to be tested (LTP Section 2.3), features not to be tested (LTP Section 2.4), and approaches (LTP Section 2.5) are commonly combined in a table called a Test Matrix. It contains a unique identifier for each requirement for the test (e.g., system and/or software requirements, design, or code), an indication of the source of the requirement (e.g., a paragraph number in the source document), and a summary of the requirement and an identification of one or more generic method(s) of test. Some examples of possible methods are as follows:

— Black box: The test inputs can be generated and the outputs captured and completely evaluated from the outside of a test item; i.e., test cases are developed from the test item specification, only without looking at the code or design.

— White box: Considers the internal structure of the software (e.g., attempts to reach all of the code). Commonly requires some kind of test support software.

— Analysis: Just viewing the outputs cannot confirm that the test executed successfully; some kind of additional computations, simulations, studies, and so on will be required.

— Inspection: This is a static test; the code or documentation is read and examined without being executed.

The Test Matrix may be combined with the Test Traceability Matrix. The Test Traceability Matrix links each requirement with one or more test cases. The test coverage requirements (LTP Section 4.4) may reference or be combined with this section.

9.2.6 (LTP Section 2.6) Item pass/fail criteria

Specify the criteria to be used to determine whether each test item has passed or failed testing. This is commonly based on the number of anomalies found in specific severity category(s). For example, require that there are no category 1 or 2 anomalies remaining.

9.2.7 (LTP Section 2.7) Suspension criteria and resumption requirements

Specify the criteria used to suspend all or a portion of the testing activity on the test items associated with this plan. Specify the testing activities that must be repeated when testing is resumed.

9.2.8 (LTP Section 2.8) Test deliverables

Identify all information that is to be delivered by the test activity (documents, data, etc.). The following documents may be included:

- Level Test Plan(s)
- Level Test Design(s)
- Level Test Cases
- Level Test Procedures
- Level Test Logs
- Anomaly Reports
- Level Interim Test Status Report(s)
- Level Test Report(s)
- Master Test Report

Test input data and test output data may be identified as deliverables. Test tools may also be included. If documents have been combined or eliminated, then this list will be modified accordingly.

Describe the process of delivering the completed information to the individuals (preferably by position, not name) and organizational entities that will need it. This may be a reference to a Configuration Management Plan. This delivery process description is not required if it is covered by the MTP and there are no changes.

9.3 (LTP Section 3) Test management

Introduce the following subordinate sections. This section describes the test activities and tasks for the specified level and the progression of these. It is here that the infrastructure, responsibilities and authority, organizational interfaces, resources, training, schedules, and risk(s) are identified if they are not identified or described in a higher level document such as the MTP.

9.3.1 (LTP Section 3.1) Planned activities and tasks; test progression

Identify the set of tasks necessary to prepare for and perform testing. Identify all inter-task dependencies. Identify any significant constraints such as test item availability, testing resource availability, and deadlines. It may be desirable to combine all of the documentation content topics about resources (LTP Sections 3.1 through 3.8) into one section. This content topic and the next one (LTP Sections 3.1 and 3.2) could be combined in a chart showing entry criteria, person responsible, task, and exit criteria.

9.3.2 (LTP Section 3.2) Environment/infrastructure

Specify both the necessary and the desired properties of the test environment and any relevant test data. This may include the physical characteristics of the facilities, including the hardware, the off-the-shelf software, the test support tools and databases, personnel (identifying their organizations as appropriate), and anything else needed to support the test. It includes the environment for setup before the testing, execution during the testing (including data capture), and any post-testing activities (e.g., data reduction and analysis). Also specify the level of security that must be provided for, and any safety issues related to, the testing facilities, software, and any proprietary components. It may include externally provided content topics (possibly provided by third parties) including systems and/or subsystems. Identify the source(s) for all of these needs.

9.3.3 (LTP Section 3.3) Responsibilities and authority

Identify the individuals or groups responsible for managing, designing, preparing, executing, witnessing, and checking results of this level of testing, and for resolving the anomalies found. In addition, identify those persons responsible for providing the test items identified in LTP Section 2 and the environmental needs identified in LTP Section 3.2.

The responsible parties may include the developers, testers, operations staff, user representatives, technical support staff, data administration staff, and quality support staff. They may be participating either full or part time. They may have primary or secondary responsibilities.

9.3.4 (LTP Section 3.4) Interfaces among the parties involved

Describe the means and the contents of communication between the individuals and groups identified in LTP Section 3.5. A figure that illustrates the flow of information and data may be included.

9.3.5 (LTP Section 3.5) Resources and their allocation

Delineate any additional required resources that are not already documented by other parts of the plan (test environment needs are in LTP Section 3.2, personnel resources are in LTP Section 3.5, and schedule needs are in LTP Section 3.7). This includes both internal and external resources (such as outside test resources, e.g., test labs, outsourcing, etc.).

9.3.6 (LTP Section 3.6) Training

Specify test training needs by skill level. Identify training options for providing necessary skills. Training can be varied, including options such as traditional classroom training, self-paced computer-based training, training over the Internet, visiting the future user site, and mentoring by more knowledgeable staff members.

9.3.7 (LTP Section 3.7) Schedules, estimates, and costs

Include test milestones identified in the software or system project schedule as well as all test item transmittal events.

Define any additional test milestones needed. Estimate the time required to do each testing task. Specify the schedule for each testing task and test milestone. For each testing resource (i.e., facilities, tools, and staff), specify its periods of use.

9.3.8 (LTP Section 3.8) Risk(s) and contingency(s)

Identify the risk issues that may adversely impact successful completion of the planned level testing activities. Specify potential impact(s) of each risk, with contingency plan(s) for mitigating or avoiding the risk. The risk(s) and contingency(s) that are current at the time of signoff of the first document release may change as the project continues, and then the risk(s) and contingency(s) can be tracked in a separate document (risk register) that is not under signoff control.

LTP Section 3.8 may be a reference to a master project plan, or it may supplement it with a greater level of detail. LTP Section 3.8 may be combined with LTP Section 3.1, planned activities, and tasks.

9.4 (LTP Section 4) General

Introduce the following subordinate sections. This section describes the QA procedures and metrics. It also contains the glossary and a description of the frequency and process by which the document is revised and re-baselined. It may also contain a change-page containing the history of the changes (date, reason for change, and who initiated the change).

9.4.1 (LTP Section 4.1) Quality assurance procedures

Identify the means by which the quality of testing processes and products will be assured. Include or reference anomaly tracking and resolution procedures. The quality assurance information may be described in a Quality Assurance Plan or Standard Procedure that can be referenced.

9.4.2 (LTP Section 4.2) Metrics

Identify the specific measures that will be collected, analyzed, and reported. The metrics specified here are those that only apply to this particular test level (the global metrics are described in MTP Section 1.5.6). This may be a reference to where it is documented in a Quality Assurance Plan or as a part of documentation in an overall measurement program.

9.4.3 (LTP Section 4.3) Test coverage

Specify the requirement(s) for test coverage. Test coverage is an indication of the degree to which the test item has been reached or “covered” by the test cases, including both the breadth and depth. The type of coverage that is relevant varies by the level of test. For example, unit (IEEE Std 1008-1987 [B9]) test coverage is often expressed in terms of percentage of code tested, and software or system validation test coverage can be a percentage of requirements tested. There is a need for specification of coverage or some other method for ensuring sufficiency of testing.

9.4.4 (LTP Section 4.4) Glossary

See 8.3.1.

9.4.5 (LTP Section 4.5) Document change procedures and history

See 8.3.2.

10. Level Test Design

The purpose of the LTD is to specify any refinements of the test approach (LTP Section 2.5) and to identify the features to be tested by this design and its associated tests.

Clause 7 specifies how to address the content topics shown in the outline example below. Details on the content for each topic are contained in 10.1 through 10.3. A full example of an LTD outline is shown in the boxed text.

Level Test Design Outline (full example)

1. Introduction

1.1. Document identifier

1.2. Scope

1.3. References

2. Details of the Level Test Design

2.1. Features to be tested

2.2. Approach refinements

2.3. Test identification

2.4. Feature pass/fail criteria

2.5 Test deliverables

3. General

3.1. Glossary

3.2. Document change procedures and history

10.1 (LTD Section 1) Introduction

Introduce the following subordinate sections. This section identifies the issuing organization and the details of issuance. It includes required approvals and status (DRAFT/FINAL) of the document. It is here that the scope is described and references identified.

10.1.1 (LTD Section 1.1) Document identifier

See 8.1.1.