

Appendix I

Hardware Development Plan Template

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Title Page
Document Control Panel
Table of Contents
List of Acronyms
Definitions

1. Overview

The Hardware Development Plan (HDP) establishes the hardware development approach, methodologies, tools, and procedures to be used during the analysis, design, development, testing, integration, deployment, and maintenance of the hardware for each FDOT ITS project. This HDP is a dynamic document and shall be updated on a periodic basis to reflect organizational changes, lessons learned, new tools, and advances in methodologies.

1.1 Scope

The HDP provides the means to coordinate schedules, control resources, initiate actions, and monitor progress of the development effort. The purpose of the document is to provide a detailed plan for the use of resources, methodologies, and techniques that assist in the development of all hardware that comprise the product line.

1.2 Identification

This section contains a full identification of the system to which this document applies, including, as applicable, identification number(s), title(s), abbreviation(s), version number(s), and release number(s). The project HDP is managed and controlled in accordance with FDOT configuration management (CM) practices.

1.3 System Overview

This section provides a brief description of the operational concepts and products that will be developed using this HDP.

1.3.1 Operational Concept

1.3.2 Hardware Configuration Items

1.4 Relationship to Other Plans

This section describes the relationship of the HDP to the other project management plans, including:

- Program management plans (PMPs)
- Systems engineering management plans (SEMPs)
- Software development plans (SDPs)
- Configuration and data managements plans (CDMPs)
- Quality management plans (QMPs)
- Quantitative management plans

2. Reference Documents

This section lists the number, title, revision, and date of all documents referenced in this plan.

- FDOT documents
- Project plans
- Operational procedures
- Engineering instructions

3. Overview of Hardware Development Planning

This section establishes the context for the planning described in later sections. Include an overview of:

- Requirements and constraints on the system and software
- Requirements and constraints on project documentation
- Position of the project in the system life cycle
- Selected program/acquisition strategy or any requirement constraints on it
- Requirements and constraints on project schedules and resources
- Training required for project engineers, both initial and ongoing
- Other requirements and constraints, such as project security, privacy, methods, and standards, etc.

3.1 Requirements and Development

System and software requirements will be documented in the requirements database. Hardware requirements will be derived from the system requirements and allocated to hardware configuration items (HWCIs). Any additional system constraints are documented in the project SEMP.

3.2 Project Documentation

This section defines the tool(s) used to produce the project documentation (i.e., Microsoft Word, Microsoft Excel, etc.) and how document configuration will be controlled.

3.3 System Life Cycle

This sections describes the life-cycle model used across FDOT ITS projects. The model encompasses the entire development process from requirements analysis through deployment.

3.4 Schedules and Resources

This section provides the detailed schedule for the project. The schedule depicts the assigned personnel as well as the critical path and any critical dependencies.

3.5 Training Requirements

This section defines the hardware development training requirements for the project software engineers.

4. General Software Development Activities

4.1 Development Process

This section describes the hardware development process to be used. It also identifies planned hardware builds, their objectives, and the hardware development activities to be performed in each build.

4.2 Development Methods

This section identifies the hardware development methods (e.g., modeling tools, firmware, programming tools, special test equipment, etc.) to be used. It includes descriptions of the manual, automated tools, and procedures to be used in support of these methods.

4.3 Product Standards

This section provides reference to the standards to be followed for representing requirements, design, code, test cases, test procedures, and test results.

4.4 Reusable Products

4.4.1 Incorporating Reusable Products

This section describes the approach to be followed for identifying, evaluating, and incorporating reusable hardware products, including the scope of the search for such products and the criteria to be used for their evaluation.

4.4.2 Developing Reusable Products

This section describes the approach to be followed for identifying, evaluating, and reporting opportunities for developing reusable hardware products.

4.5 Critical Requirements

This section describes the approach to be followed for handling requirements designated critical. For example:

- Safety assurance
- Security assurance
- Privacy assurance
- Assurance of other critical requirements

4.6 Computer Hardware Resource Utilization

This section describes the approach to be followed for allocating computer hardware resources and monitoring their utilization.

5. Detailed Hardware Development Activities

This section provides the plans for performing detailed software development activities, including the approach (i.e., methods, procedures, and tools).

5.1 Project Planning and Oversight

This section describes the approach to be followed for project planning and oversight.

- Hardware development planning
- Hardware configuration item test planning
- System test planning
- Hardware installation planning
- Hardware transition planning

5.2 Establishing a Hardware Development Environment

This section describes the approach to be followed for establishing, controlling, and maintaining a hardware development environment.

- Hardware engineering environment
- Hardware test environment
- Hardware development library
- Hardware development folders

5.3 System Requirements Analysis

This section describes the approach to be followed in system requirement analyses. System requirements analysis processes will be performed as described in the project SEMP.

- Analysis of user input
- Operational concept
- System requirements

5.4 System Design

This section describes the approach to be followed for participating in system design.

- Systemwide design decisions
- System architectural design

5.5 Hardware Requirements Analysis

This section describes the approach to be followed for hardware requirements analysis. It also defines the entrance and exit criteria for the hardware development process.

5.6 Hardware Design

This section describes the approach to be followed for hardware design. It also defines the entrance and exit criteria for the hardware design process.

- Hardware architecture/preliminary design
- Hardware detailed design

5.7 Prototype Development

This section describes the approach to be followed for hardware prototyping, including the prototype test plan. It also defines the entrance and exit criteria for the hardware prototype development process. The prototype development phase may begin when the hardware design has been reviewed and approved.

5.8 Hardware Integration and Testing

This section describes the approach to be followed for hardware integration and testing.

- Preparing for HWCI integration and testing
- Performing HWCI integration and testing

5.9 System Integration and Testing

This section describes the approach to be followed for participating in HWCI/HWCI integration and testing. System integration testing (SIT) will be conducted in accordance with the project SEMP.

- Independence in SIT
- Testing on the target computer system
- Preparing for SIT
- Performing SIT dry runs
- Performing SIT
- Revision and retesting
- Analyzing and recording SIT results

5.10 System Acceptance Test

This section describes the approach to be followed for participating in system qualification testing. System acceptance testing will be conducted in accordance with the project SEMP.

- Independence in system acceptance testing
- Testing on the target computer system
- System acceptance test preparation
- Performing system acceptance test dry runs
- Performing system acceptance test
- Revision and retesting
- Analyzing and recording system acceptance test results

5.11 Preparing for Site Deployment

This section describes the approach to be followed for preparing for hardware delivery and site use.

- Preparing user manuals
- Installing at user sites

5.12 Hardware Configuration Management

This section describes the approach to be followed for hardware configuration management (CM). The CM processes and procedures are described in the configuration and data management plan (CDMP).

- Configuration identification
- Configuration control
- Configuration status accounting (CSA)
- Configuration audits
- Packaging, storage, handling, and delivery

5.13 Hardware Product Evaluation

This section describes the approach to be followed for hardware product evaluation. Hardware product evaluation will be accomplished according to the program schedules established for the project.

- In-process and final hardware product evaluations
- Hardware product evaluation records, including item to be recorded
- Independence in hardware product evaluation

5.14 Hardware Quality Assurance

This section describes the approach to be followed for hardware quality assurance (QA).

- Hardware QA process and product evaluations
- Hardware QA records, including items to be recorded
- Independence in hardware QA

5.15 Corrective Action

This section describes the approach to be followed for corrective actions (i.e., problem/change reports, etc.).

5.16 Technical and Management Reviews

This section describes the approach to be followed for technical and management reviews.

5.17 Other Hardware Development Activities

This section describes the approach to be followed for other hardware development activities.

- Risk management, including known risks and corresponding strategies
- Hardware management indicators, including indicators to be used (i.e., metrics)
- Security and privacy
- Subcontractor management
- Interface with hardware independent verification and validation (IV&V) agents
- Improvement of project processes

6. Schedules and Activity Network

This section presents the schedule information or refers to detailed hardware schedules published for the project, including:

- Schedule(s) identifying the activities in each build and showing initiation of each activity
- Availability of draft and final deliverables, and other milestones; and completion of each activity
- An activity network, depicting sequential relationships and dependencies among activities and identifying those activities that impose the greatest time restrictions on the project

7. Program Organization and Resources

This section describes the project organization and resources to be applied in each hardware build, increment, iteration, or prototype.

8. Acronyms and Notes

This section contains any general information that aids in understanding this document. This section will contain an alphabetical listing of all acronyms and abbreviations, and their meanings as used in this document, and a list of any terms and definitions needed to understand this document.