

Appendix T

Human Factors Engineering Project Plan Template

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1. Overview

The Human Factor Engineering Project Plan (HFEPP) describes the management plans for the application of human factors engineering (HFE) design support as it relates to man/machine interfaces (MMIs) in Florida Department of Transportation (FDOT) ITS operations. The HFEPP establishes methods for the HFE engineer to use to actively participate in the development process of various MMIs. The HFE engineer will apply HFE criteria as it affects hardware and software design engineering development; evaluate user/system performance requirements via analytical techniques and simulations; and provide verification of the equipment and software design in the framework of the system operation.

1.1 Human Factors Engineering Program Objectives

The primary objective of the HFE program is to influence ITS product design to yield the highest level of human performance while minimizing burdens on personnel. This section should describe the following:

- Processes for analyzing and assessing equipment; operator and maintenance tasks; designs for HFE requirements; design needs; and application
- Processes for identifying, collecting, and providing HFE design criteria to achieve compatibility of operator-maintenance-equipment interfaces
- Processes for analyzing the operator and maintainer interface so that the operational and maintenance requirements do not exceed expected operator capabilities
- Development of the compatible control/display interface for rapid and accurate operation and display interpretation
- Production of a safe, operable, and maintainable system

- Assist in the design so that trainees, operators, and maintainers are able to use the various controls, displays, and adjustments effectively and efficiently under a variety of conditions
- Provide guidelines for workstation and console designs to include ergonomic considerations in terms of user computer interfaces and ease of maintenance
- Application of lessons learned to optimize design

1.2 Applicable Documents

This section should list standards, regulations, specifications, and drawings that will be used by the HFE program. These may include:

- Government standards
- Government regulations
- Other government documents
- Nongovernment specifications
- Nongovernment standards
- Other Nongovernment documents
- Guidance documents

2. Organization

2.1 Organizational Structure Overview

This section describes the organizational structure of the project. The organization includes FDOT personnel, subcontractors, customers, and users. The description includes the role and involvement of each entity in the project. The program management plan (PMP) explains in more detail how the program is organized and how day-to-day working relationships are maintained.

2.2 Human Factors Engineering Organization

This section describes the HFE program organizations.

2.2.1 Human Factors Engineering

The HFE engineer is responsible for the development, implementation, and maintenance of the HFE program. The HFE engineer's responsibilities should be highlighted and should include:

- Development, implementation, and maintenance of the HFE program
- Identification of the HFE design requirements for implementation in the design
- Preparation of the hardware design checklist/guidelines, safety hazard analyses, and hazard tracking data
- Identification, definition, and analysis of man/machine functions related to the progression of the ITS project design
- Provide project management visibility of the HFE program status, significant HFE problems, and necessary improvements
- Participation in design reviews, working groups, and trade studies to include HFE criteria
- Review and evaluation of engineering and facility drawings, changes, system diagrams, and system test procedures for HFE compliance
- Coordinate HFE test operations.

2.3 Human Factors Engineering Internal Interfaces

Human factors engineering, an integral part of the total project effort, maintains both internal and external interfaces to identify and resolve HFE issues, and avoid duplication of effort among the various project disciplines. Human factors engineering personnel will interface with the following areas, which should be described in detail in subsections to this paragraph:

- Systems engineering
- Hardware engineering
- Software engineering
- Support engineering
- Safety engineering
- Test engineering
- Customer personnel

Also, any special interfaces to support subcontractor relationships should be identified in this section, such as the detail on day-to-day workings of those interfaces that should be provided in the HFEPP.

2.4 Human Factors Engineering Visibility

The FDOT is committed to the HFE program and provides the management mechanisms needed to effectively influence design. This section should describe the HFE engineer's participation in the ITS project meetings and reviews engineering designs for HFE issues. During project quarterly reviews, the HFE engineer will present the HFE program status, HFE influence on the design, actions accomplished, and open issues.

2.5 Human Factors Engineering in Subcontractor Efforts

Subcontractors will report to the FDOT on all HFE issues. Like the FDOT design teams, subcontractor designs are required to comply with all HFE standards. The HFE engineer will reviews FDOT and subcontractor designs for HFE compliance. This process should be described in this section.

3. Human Factors Engineering in Systems Analysis

The HFE systems analysis activities generate quantitative human performance requirements for an ITS project. This section should describe in detail what analyses will be performed using HFE. Typical analyses include:

- Task analysis
- Training needs analysis
- User computer interface (UCI) analysis
- Workload analysis (WA)
- Identification of operator/maintainer processing capabilities
- Manpower analysis
- Ergonomic analysis
- Equipment selection

4. Human Factors Engineering in Equipment Detail Design

4.1 Participation in the Design Process

Human factors engineering participation should be described in this section. The HFE engineer performs an active role in the detailed design of each of the component/subsystem designs through participation with ITS project team members. By attending formal and informal system-level design reviews, reviewing drawing package submittals, and maintaining an open channel of communications, the HFE engineer is able to keep potential HFE design change recommendations highly visible.

The HFE engineer, as required, performs independent studies in the form of dynamic simulations, tests, and reviews of submitted designs. Feedback of analysis results, as well as information gained through the previously mentioned task analyses, are made to the appropriate designers and working group meetings, memorandums, design reviews, or formal direction for design change.

5. Derivation of Personnel / Training Requirements

5.1 Manpower

The primary focus of the manpower analysis is an evaluation of crew sizes and task allocations for control center personnel, operator/controller and analyst workstations, etc.. This section should delineate the extent of manpower analysis to be conducted.

5.2 Training Analysis and Development

The types of training analyses to be conducted and the development of training material should be discussed in this section. Training activities may include:

- Training task analysis
- Training needs analysis
- Training media selection
- Development of training materials

6. Human Factors Engineering Testing and Evaluation

This section should address the process to involve HFE in the system testing and demonstration process. It should describe how HFE provides support to the test plan and procedure preparation, as well as their involvement, if any, in actual testing. Testing techniques should be described and may include:

- Engineering measurements
- Use of subject-matter experts (SME)
- Collection of human performance data
- Human engineering checklists
- User opinion surveys

7. Human Factors Engineering Task Schedule

This section should provide a complete schedule of the entire HFE program.

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, along with their meanings as used in this document, and a list of any terms and definitions needed to understand this document.