## DATA ITEM DESCRIPTION

<table>
<thead>
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<th>1. TITLE</th>
<th>2. Identification Number</th>
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<td>INTERFACE REQUIREMENTS SPECIFICATION (IRS) Version B</td>
<td>PPA-002234-5 25 May 2012</td>
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### 3. DESCRIPTION/PURPOSE OF THE IRS

3.1 The Interface Requirements Specification (IRS) specifies the requirements to be satisfied at an interface between two systems and the methods to be used to ensure that each requirement has been so satisfied. Throughout this DID, the term "system" may be interpreted to mean "segment", "subsystem", "element", “Hardware Configuration Item (HWCI)”, “Software Configuration Item (CSCI)”, "component" or other item, as applicable.

3.2 The IRS is used in support of procurement, design, qualification testing and acceptance testing of the system.

### 4. APPLICATION/INTERRELATIONSHIP

This Data Item Description (DID) may be cited in a Statement of Requirement (SOR), Task Specification (TS), a Contract Data Requirements List (CDRL), or within a standard invoked by a SOR or TS. The external interface requirements pertaining to a system and specified in one or more Interface Requirements Specifications may be invoked by reference from a System Specification, a Software Requirements Specification or similar document.

### 5. PREPARATION INSTRUCTIONS

5.1 General Instructions

The term “document” in this DID means data and its medium, regardless of the manner in which the data are recorded.

5.2 Content Requirements

Content requirements begin on the following page. The numbers shown designate the paragraph numbers to be used in the document. Each such number is understood to have a prefix “5.2” within this DID. For example, the paragraph numbered 1.1 is understood to be paragraph 5.2.1.1 within this DID.

### 6. SOURCE

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This section should be divided into the following paragraphs.

1.1 Identification

This paragraph should contain a full identification of the systems and of the system-to-system interface(s) to which the interface specification applies, including, as applicable, identification number(s), title(s), abbreviation(s) and version number(s). Where the system(s) to which the document applies includes variants of the system(s), the above information should be provided for each variant. Where the system to which the document applies includes incremental builds of the system which are subject to individual specification, the above information should be provided for, or related to, each such build.

1.2 Background and Intended Use of the Interface

This paragraph should briefly describe the intended use of the interface to which the document applies. The paragraph should also describe the general nature of the interface and, where applicable to the intended use of the IRS, identify the project sponsor, acquirer, user and/or support organizations having an interest in the interface.

1.3 Document Overview and Use

This paragraph should summarize the purpose and contents of the document and should describe any security considerations associated with its use.

2. Applicable Documents

This section should list the number, title, revision, and date of each document referenced in this specification. This section should also identify the source of each document not available through the sponsor of the IRS. The section should identify the security classification of each security classified document listed.

2.1 Applicable Documents

This paragraph should list each document which is invoked in whole or in part within 4. The paragraph should contain any applicable rules for establishing precedence in the event of conflict of requirements between 4 and the applicable documents, and between applicable documents. The paragraph should also contain, where applicable, rules for establishing the applicable version or issue of documents invoked in 4.

2.2 Other Referenced Documents

This paragraph should list each document which is referenced in the specification but which is not invoked in whole or in part by 4 as a part of the requirement.

3. Definitions, Acronyms and Abbreviations

This section should be divided into the following paragraphs.

3.1 Definitions

This paragraph should list alphabetically and define each word or term used in 4 for which reliance on dictionary definitions is not appropriate. As a guide, terms which are not likely to be in the vocabulary of the intended users of the specification, terms which have multiple dictionary meanings but only a single specification meaning, technical terms and terms which are used with special meanings should be defined in this paragraph.

The following definitions, or similar, should be incorporated into this section:

**Shall** expresses a characteristic which is to be present in the item which is the subject of the specification, i.e. "shall" expresses a binding requirement.
5. PREPARATION INSTRUCTIONS - 5.2 Content Requirements (continued)

**Should** expresses a non-binding preference.

**May** expresses permissive guidance.

**Will** may be used to express a declaration of intent on the part of a party, usually the sponsoring or contracting organization. "Will" does not express a binding requirement. "Will" may also be used in cases where the simple future tense is required, for example, "The interface will be used to pass voice traffic between FAA and TAAATS." Any statement which employs the term "will", if used in 4, should be present as a note so as to be clearly distinguishable from requirements.

This paragraph should also identify by name and specific issue the dictionary to be used in the interpretation of terms used in 4. The usual dictionaries which apply are:

**Australia** Macquarie Dictionary;

**New Zealand** Concise Oxford Dictionary; and

**United States of America** Websters Dictionary

3.2 **Acronyms**

This section should list alphabetically each acronym used in the document, together with the acronym’s expanded meaning.

3.3 **Abbreviations**

This section should list alphabetically each abbreviation used in the document, together with the abbreviation’s expanded meaning, except that abbreviations within the International System (SI) system of units should not be listed.

4. **REQUIREMENTS**

This section should be divided into the following paragraphs to specify the systems’ external interface requirements, that is, those characteristics of the external interface that are to be present at the interface, and which correspondingly are to be present in the interfacing systems or other entities. Requirements which apply to a specific variant of one or other interfacing system should be clearly distinguishable from requirements which apply to other variants. Requirements which apply to a specific build of one or other system should be clearly distinguishable from requirements which apply to the final build(s). Each requirement should be assigned a project-unique identifier to support testing and traceability and should be stated in such a way that an objective, finite and cost-effective test can be defined for it.

If there are no requirements corresponding to a given paragraph of the DID, the DID paragraph may be deleted in the specification and other paragraph numbers adjusted accordingly. If a given requirement fits into more than one paragraph, the requirement should be stated once and referenced from the other paragraph(s). Duplication of requirements should be avoided.

The degree of detail to be incorporated in specifying external interface requirements should be guided by the following principle: include those characteristics of the external interface that are necessary for the interfacing system(s) to satisfy its (their) intended use; do not include as requirements external interface characteristics which do not need to be constrained in order for the system to successfully connect to and interoperate with external entities.

In determining characteristics necessary to satisfy intended use, the criterion recommended is the level of risk associated with satisfaction of the following ideal: "that any interface which is supplied which satisfies the requirements in 4 will satisfy the need, with an acceptable level of risk". The level of risk acceptable to the sponsor (of the IRS) with respect to this ideal should be determined as a prerequisite to development of the IRS.
5. PREPARATION INSTRUCTIONS - 5.2 Content Requirements (continued)

The paragraph should be divided into subparagraphs to specify the requirements for each of the system’s external interfaces, including user interfaces, if any, which are the subject of the IRS. This paragraph may reference one or more existing Interface Requirements Specifications (IRs), Interface Control Documents (ICDs) or other documents containing these requirements, which may be either annexes to the specification or separate documents.

For interfaces between hardware systems, interfaces via the natural environment between elements internal to the system need not necessarily be regarded as system external interfaces for the purpose of this DID. The way in which any such interface has been handled should be explained in Section 1 (Scope).

4.x (Name and Project-Unique Identifier of Interface)

This paragraph (beginning with 4.1) should identify a system external interface by name and project-unique identifier and should briefly identify the interfacing entities. Where an interface comprises a lower level physical structure of sub-interfaces, this structure should be reflected in a subparagraphing structure. Requirements may be defined for interfaces and sub-interfaces at any level or levels in the structure.

Each subparagraph should be divided into subparagraphs as needed to state the requirements which the interface must satisfy. The interface should be specified from the viewpoint of the interface as a surface through which inputs and outputs pass. The paragraph should specify all required characteristics of the surface, of the inputs, and of the outputs, including relationships between these items. The paragraph may reference other documents (such as data dictionaries, existing public standards for communication protocols, and standards for user interfaces) in place of stating the information here. Requirements should note any differences in these characteristics from the point of view of the interfacing entities (such as different expectations about the size, frequency, or other characteristics of data elements).

Requirements should be structured in a manner which adopts an open systems approach. An open system is a system in which interfaces are defined in a series of layers, accessible from the interfacing entity(ies), which progressively and in a structured manner provide the required interface mechanism. The ISO Reference Model for Open Systems Interconnection is one such schema.

The requirements should include the following, as applicable to the nature of and requirements for the interface, presented for each interface in any order suited to the requirements (subject to the open systems guidance contained above):

a. requirements which identify the interfacing entities and requirements on the types of interface (such as real-time data transfer, storage-and-retrieval of data, software/software interface, software/hardware interface, human/machine interface, mechanical interface, physical interface, facilities interface, etc.), to be implemented;

b. required characteristics of data elements used to form data element assemblies which present information that the interfacing entity(ies) must receive, store, send, access, output, etc., such as:

   (1) sources (setting/sending entities) and recipients (using/receiving entities);

   (2) names/identifiers;

      (a) project-unique identifier;

      (b) non-technical (natural-language) name;

      (c) standard data element name;

      (d) technical name (e.g. variable or field name in code or database);

      (e) abbreviation or synonymous names;
5. **PREPARATION INSTRUCTIONS - 5.2 Content Requirements (continued)**

(3) data type (alphanumeric, integer, etc.);

(4) size and format (such as length and punctuation of a character string);

(5) units of measurement (such as metres, dollars, nanoseconds);

(6) range or enumeration of possible values (such as 0-99);

(7) accuracy (how correct) and precision (number of significant digits);

(8) priority, timing, frequency, volume, sequencing, and other constraints;

(9) security and privacy constraints; and

c. required characteristics of data element assemblies (records, messages, files, arrays, displays, reports, etc.) used to present information that the interfacing entity(ies) must receive, store, send, access, output, etc., such as:

(1) names/identifiers:
   
   (a) project-unique identifier;

   (b) non-technical (natural language) name;

   (c) technical name (e.g. record or data structure name in code or database);

   (d) abbreviations or synonymous names;

(2) data elements in the assembly and their structure (number, order, grouping);

(3) medium (such as disk) and structure of data elements/assemblies on the medium;

(4) visual and auditory characteristics of displays and other outputs (such as colours, layouts, fonts, icons and other display elements, beeps, lights;

(5) relationships among assemblies, such as sorting/access characteristics;

(6) priority, timing, frequency, volume, sequencing, and other constraints;

(7) security and privacy constraints;

(8) message formatting; and

(9) sources (setting/sending entities) and recipients (using/receiving entities).

d. required characteristics which the interface must satisfy to enable organization and synchronization of connections between interfacing entity(ies), such as:

(1) project-unique identifier(s);

(2) session-connection establishment—creation of an exchange between interfacing entity(ies);

(3) session-connection release;

(4) session-connection synchronization;
5. PREPARATION INSTRUCTIONS - 5.2 Content Requirements (continued)

(5) exception reporting—permitting the interfacing entity(ies) to be notified of exceptional situations;

(6) data transfer rate, whether periodic/aperiodic, and interval between transfers;

(7) message formatting; and

(8) safety/security/privacy considerations, such as user authentication and auditing inputs/outputs.

e. required characteristics of data flow methods that the interfacing entity(ies) must use for the interface, enabling the interfacing entity(ies) to assume cost-effective and reliable data exchange such as:

(1) project-unique identifier(s);

(2) transmission services, including priority and grade;

(3) message formatting; and

(4) safety/security/privacy considerations, such as auditing inputs/outputs.

f. required characteristics of communication methods that the interfacing entity(ies) must use to establish, maintain and terminate connections between systems, such as:

(1) project-unique identifier(s);

(2) communication links/bands/frequencies/media, communication end points and their characteristics;

(3) message formatting;

(4) flow control (such as sequence numbering and buffer allocation);

(5) routing, addressing, and naming conventions;

(6) synchronization, including connection establishment, maintenance, termination; and

(7) safety/security/privacy considerations, such as auditing inputs/outputs.

g. required characteristics of protocols the interfacing entity(ies) must use for the interface, such as:

(1) project unique identifier(s);

(2) priority/layer of the protocol;

(3) packeting, including fragmentation and reassembly, routing, and addressing;

(4) legality checks, error control, and recovery procedures; and

(5) status, identification, and any other reporting features.

h. required physical compatibility such as interface pin assignments;

i. static mechanical characteristics, such as physical compatibility of the interfacing entities (dimensions, tolerances, loads, plug compatibility, alignment, etc.). Reference may be made to Interface Control Drawings where applicable;

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5. PREPARATION INSTRUCTIONS - 5.2 Content Requirements (continued)

j. dynamic mechanical characteristics such as shock, vibration, acceleration, deceleration, which are characteristics of the interface as distinct from characteristics of the overall environment within which an interfacing system must exist;

k. electrical power interface: type, voltage, frequency, phases, power factor;

l. hydraulic/pneumatic interface: type, flow rate, temperature of fluid, pressure;

m. for software systems, the required interface characteristics of the computer hardware that must be used by the system;

n. use of nameplates, part marking, serial and lot number marking and other identifying markings;

o. the system human/machine external interface requirements, included to accommodate the number, skill levels, duty cycles, training needs, and other system requirements related to the personnel who will use or support the system. An example is the requirement for the number of workstations to be provided. Also included should be the human factors engineering requirements, if any, imposed on the system. These requirements should include, as applicable, considerations for the capabilities and limitations of humans, foreseeable human errors under both normal and extreme conditions, and specific areas where the effects of human error would be particularly serious. Examples include requirements for adjustable-height workstations, colour, duration of error messages, physical placement of critical indicators or controls and use of auditory signals; and

p. facility interface requirements, including floor loads, heat loads, in-out temperatures, axle or wheel loads, load surface inclination, load surface flatness, facility access constraints, special water requirements, special air requirements, fire protection environmental constraints, earthing connections, minimum clearances.

Any requirements related to the interface which are functional in character should be incorporated in the System Specification and not in this paragraph, except where incorporation of functional requirements would improve the suitability of the IRS for its intended use.

Any requirements which specify the consumption or usage of externally supplied resources should be incorporated in the System Specification and not in the IRS.

External interface requirements should be specified only to the degree necessary to bound the design of the external interface. For a developmental project, this degree will often increase throughout the course of the project, i.e. external interfaces will be initially specified at a high level of abstraction and will eventually be specified at the level suitable for physical fabrication of the interface.

An external interface may also be specified in terms of achieving physical and functional interoperability between interfacing systems. Great care should be taken if using this form of specification, as it relies on the specifier defining required system characteristics in terms which include the characteristics of interfacing systems, characteristics which may not be under the control of the specifier, and which may not be stable with time.

5. VERIFICATION REQUIREMENTS

This section should define a set of verification requirements, each verification requirement being a statement of the extent and nature of the evidence required to evidence that the requirement has been met. Verification requirements may be expressed in statistical terms, e.g. confidence level to be accomplished by the verification activity, or may direct how a verification activity is to be conducted. This section may also specify, for each requirement in 4, the generic method(s) to be used to evidence that the requirement has been met. A table may be used to present this information, or each requirement in 4. may be annotated with the method(s) to be used.

Verification methods may include:

a. test. Measurement of a characteristic of the interface, or a part of the interface, using instrumentation or other special test equipment to collect data for later evaluation;
5. PREPARATION INSTRUCTIONS - 5.2 Content Requirements (continued)

b. **demonstration.** Demonstration of a characteristic of the interface, or a part of the interface, that relies on observation of functional operation without the use of instrumentation, special test equipment, or subsequent analysis;

c. **analysis.** The processing of accumulated data obtained from other qualification methods. Examples are reduction, interpolation, or extrapolation of test results, or prediction of an interface characteristic based on theory;

d. **inspection.** The visual examination of the interface; and

e. **special test methods.** Any special test methods for the interface, such as special tools, techniques, procedures, facilities, acceptance limits, use of standard samples, preproduction or periodic production samples, pilot models, or pilot lots, as relevant to test of the interface.

Where sampling is to be used, this section should define the rules for selection of test articles.

6. NOTES

This section should contain any general information that aids in understanding or using the specification (e.g. background information, rationale).

This section should include the following paragraphs, as applicable.

6.1 Requirements Traceability

This paragraph should contain, if applicable:

a. data which details traceability from each requirement in the IRS, to the higher level requirement(s) which the subject requirement implements in full or in part. Alternatively this traceability may be provided by annotating each requirement in 4. Each IRS requirement should trace to one or more higher level requirements, as applicable; or alternatively

b. reference to the document, e.g. the System Specification or System/Subsystem Design Document, which contains requirements traceability information.

Note: A higher level requirement is a requirement of an entity higher in the system breakdown structure (system hierarchy) of which an item subject to the IRS forms a part. The source document containing the higher level requirement should be identified by name and document number. Source documents may include operational requirements documents, policy documents, standards, legislation or the specification (including applicable IRSs/ICDs) of the higher level element of which the item is a part, e.g. a system, subsystem, HWCI or hardware component.

Where the set of requirements contained in the IRS has been derived from the analysis of an earlier set of requirements of the same interface, requirements traceability information should, in addition, relate each requirement in the IRS explicitly to source in terms of source document and source requirement statement or other data in that document, as applicable. Source documents could include, for example, operational requirements documents, policy documents, standards, legislation, requirements clarification records, etc., and the previous version of the IRS.

6.2 List of Safety-Related Requirements

This paragraph should list the interface requirements, if any, specified in 4. and concerned with preventing or minimizing unintended hazards to personnel, property and the physical environment.

Alternatively, safety-related requirements may be annotated as such in 4.
5. PREPARATION INSTRUCTIONS - 5.2 Content Requirements (continued)

6.3 List of Information Security-Related Requirements

This paragraph should list the interface requirements, if any, specified in 4. and concerned with maintaining information security, viz confidentiality and integrity of information. The requirements identified should include, as applicable, the security/privacy environment in which one or both interfacing items must be operable, the type and degree of security to be provided at the interface, the safeguards required at the interface to reduce security risks, the security/privacy policy that must be met by the interface, the security/privacy accountability the interface must provide, and the criteria that must be met by the interface for security/privacy certification/accreditation.

Alternatively, information security requirements may be annotated as such in 4.

6.4 Summary of Adaptation Requirements

This paragraph should identify the requirements, if any, specified in 4. and concerning installation-dependent data that the system is required to use (such as site-dependent latitude and longitude or site-dependent post codes) and operational parameters that the system is required to use that may vary according to operational needs (such as parameters indicating operation-dependent targeting constants or data recording). The paragraph should also identify any installation-dependent requirements regarding configuration of configurable aspects of an external interface.

Alternatively, adaptation requirements may be annotated as such in 4.

6.5 Criticality of Requirements

This paragraph should specify, if applicable, the criticality, or assigned weights, indicating the relative importance of the requirements in this specification, or both. An example is identification of those requirements deemed critical to mission, or to safety, or to security, for purposes of singling them out for special treatment, e.g. a higher level of independent verification and validation.

6.6 Priority of Design Goals

Where requirements are expressed as design goals above a specified minimum standard, this paragraph should state the relative importance of each design goal as related to the priorities of the sponsors of the interfacing items. Where priority of a design goals is stated, the priority should refer to the priority of the difference between the minimum standard and the design goal for the parameter subject to the design goal.

A. ANNEXES

Annexes may be used to provide information published separately for convenience in document maintenance or use (e.g. charts, classified data). As applicable, each annex should be referenced in the main body of the document where the data would normally have been provided. Annexes may be bound as separate documents for ease in handling. Annexes should be lettered alphabetically (A, B, etc.).

Appendices may be used to annexes. Appendices should be numbered numerically (1, 2, etc.).