



DATA ITEM DESCRIPTION	
1. TITLE INTERFACE REQUIREMENTS SPECIFICATION (IRS)	2. IDENTIFICATION NUMBER PPA-002234-12 15 October 2020
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 or software items and, optionally, requirements defining the quality or strength of evidence that each such 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 design and verification of the system or software.	
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 Statement of Requirement (SOR), Task Specification (TS) or Statement of Work (SOW). 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 Requirements Specification (SyRS), a Software Requirements Specification (SRS) or similar document.	
5. PREPARATION GUIDELINES 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 page 4. The numbers shown designate the paragraph numbers to be used in the document. Each such number is understood to have the 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. <i>continued next page</i>	
6. SOURCE © Copyright Project Performance International. This document may be reproduced and distributed without restriction except as below provided that all reproductions contain the original copyright statement in the original form and location. Derivative works may be produced provided each derivative work contains a copyright statement referring to the content in which PPI holds copyright, in a form and in a location no less prominent than the copyright statement on the original. Copies and derivative works may not be used for the delivery of training for profit. Creative Commons license CC BY-ND as modified above.	

5. PREPARATION GUIDELINES *continued*

5.3 Acronyms

Acronyms used in this DID shall be interpreted as follows:

CC	Creative Commons
CDRL	Contract Data Requirements List
CSCI	Software Configuration Item
DID	Data Item Description
HWCI	Hardware Configuration Item
ICD	Interface Control Document
IDD	Interface Design Description
IRS	Interface Requirements Specification
ISO	International Standardisation Organisation
OSI	Open Systems Interconnection
SOR	Statement of Requirement
SOW	Statement of Work
SRS	Software Requirements Specification
SyRS	System Requirements Specification
TS	Task Specification
VRS	Verification Requirements Specification

5.4 Abbreviations

Abbreviations used in this DID shall be interpreted as follows:

SI	International System of Units
-----------	-------------------------------

5.5 Foreword

This Data Item Description (DID) for an Interface Requirements Specification (IRS) is intended to provide guidance and instruction on the preparation of a requirements specification for any required interface. An interface is a point or region of connection and may be “technology item to technology item” (including software), “human to technology item”, or between capability/business systems.

In a technology item procurement context, the IRS specifies the essentially solution-free interface requirements, for a given interface, to be satisfied by any acceptable technology item solution. The IRS may also specify goals to be pursued during technology item procurement and/or technology item development with respect to the interface.

Although an IRS may be prepared with focus entirely on one end of the interface, an IRS is often most valuable when the IRS addresses requirements on both ends of the interface simultaneously in its framing of interface requirements (except for user or operator interfaces).

The benefits of the use of an IRS in the right circumstances include:

- a. a reduction in the risk arising from the possibility of interfacing items being developed or acquired that do not correctly connect and interoperate;
- b. a reduction in the net amount of work in developing and specifying interface requirements where the enterprise will be specifying itself both interfacing items;
- c. a reduction in the net amount of work in implementing requirements traceability where the enterprise will be specifying both interfacing items; and
- d. a reduction in the net amount of work in developing and specifying corresponding verification requirements where the enterprise will be specifying both interfacing items.

In that the SyRS or SRS is usually the single most important artefact in development or procurement of a system or software, and an IRS, if used, contains a subset of SyRS or SRS requirements, the creation, capture and specification of the information content of an IRS should be done with the utmost care, and with appropriate skills applied, to avoid problems such as:

- a. items that do not satisfy the needs of the enterprise at all, or fall significantly short of satisfying the needs;
or
- b. delays due to contractual dispute, rework, or the need to undertake supplementary procurements or development.

An IRS is equally applicable to the abstractions of software-software and software-hardware interfaces, for the same reasons and with the same benefits.

5.6 IRS Requirements

Content requirements begin on page 4. The numbers shown designate the paragraph numbers to be used in the document.

TABLE OF CONTENTS

1.	INTRODUCTION AND SCOPE	5
1.1	Identification	5
1.2	Background and Intended Use of the Interface	5
1.3	Document Overview and Use	5
2.	APPLICABLE DOCUMENTS	5
2.1	Applicable Documents	5
2.2	Other Referenced Documents	5
3.	DEFINITIONS, ACRONYMS AND ABBREVIATIONS	5
3.1	Definitions	5
3.2	Acronyms	6
3.3	Abbreviations	6
4.	REQUIREMENTS	6
4.1	(Name and Project-Unique Identifier of Interface)	6
5.	VERIFICATION REQUIREMENTS (Optional)	9
6.	NOTES	9
6.1	Requirements Traceability	9
6.2	List of Safety-Related Requirements	9
6.3	List of Information Security-Related Requirements	10
6.4	Summary of Adaptation Requirements	10
6.5	Relative Importance of Requirements	10
A.	ANNEXES	10

1. INTRODUCTION AND SCOPE

This section may be divided into the following paragraphs where the volume and content of relevant information justify sub-paragraphing.

1.1 Identification

This paragraph should contain a full identification of the system or of the system-to-system interface(s) to which the Interface Requirements Specification (IRS) applies, including, as applicable, identification number(s), title(s), abbreviation(s) and version number(s). Where the system(s) to which the IRS applies includes variants of the system(s), the above information should be provided for each variant. Where the system to which the IRS applies includes incremental builds of the system that 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 IRS 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 IRS and should describe any security or privacy considerations associated with its use.

2. APPLICABLE DOCUMENTS

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

2.1 Applicable Documents

This paragraph should list each document that 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 IRS but which is not invoked in whole or in part by 4. as a part of a 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 interface, which is the subject of the IRS, i.e. "shall" expresses a binding requirement.

Should expresses a goal to be pursued but not necessarily achieved.

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 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 that 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.

3.2 Acronyms

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

3.3 Abbreviations

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

4. REQUIREMENTS

Where the term "system" is used below, the term "software" may be substituted as applicable.

This section should be divided into the following paragraphs to specify the capabilities/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 that apply to a specific variant of one or other interfacing system should be clearly distinguishable from requirements that apply to other variants. Requirements that apply to a specific build of one or other system should be clearly distinguishable from requirements that 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 means of verification 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 in the circumstances need to be formally 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 is the level of risk associated with satisfaction of the following ideal: "that any interface which is implemented which satisfies the requirements in 4. will satisfy the need, with an acceptable level of risk".

The paragraph should be divided into subparagraphs to specify the requirements for a system external interface, including a user interface, which is the subject of the IRS. This paragraph may reference one or more existing Interface Requirements Specifications (IRSs), Interface Design Descriptions (IDDs), Interface Control Documents (ICDs) or other documents containing these requirements, which may be either annexes to the specification or be separate documents.

For physical systems, an interface via the natural environment to an element internal to the system should be regarded as a system external interfaces for the purpose of this DID.

An IRS may specify more than one external interface, however, the practical implications of doing so should be considered.

4.1 (Name and Project-Unique Identifier of Interface)

This paragraph (numbered 4.1 to 4.x with one interface per paragraph if the scope of the IRS is for more than one interface) 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 sub-paragraphing 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 that 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, or different tolerances).

Requirements should be structured in a manner that 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 (OSI), although now dated, is an example of one such schema. There are many others.

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 (and 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:
 - i. sources (setting/sending entities) and recipients (using/receiving entities);
 - ii. names/identifiers;
 1. project-unique identifier;
 2. non-technical (natural-language) name;
 3. standard data element name;
 4. technical name (e.g. variable or field name in code or database); and
 5. abbreviation or synonymous names.
 - iii. data type (alphanumeric, integer, etc.);
 - iv. size and format (such as length and punctuation of a character string);
 - v. units of measurement (such as meters, dollars, nanoseconds);
 - vi. range or enumeration of possible values (such as 0-99 inclusive);
 - vii. accuracy (how correct) and precision (number of significant digits);
 - viii. priority, timing, frequency, volume, sequencing, and other constraints; and
 - ix. security and privacy constraints.
- 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:
 - i. names/identifiers;
 1. project-unique identifier;
 2. non-technical (natural language) name;
 3. technical name (e.g. record or data structure name in code or database); and
 4. abbreviations or synonymous names.
 - ii. data elements in the assembly and their structure (number, order, grouping);
 - iii. medium (such as disk) and structure of data elements/assemblies on the medium;
 - iv. visual and auditory characteristics of displays and other outputs (such as colors, layouts, fonts, icons and other display elements, beeps, lights);
 - v. relationships among assemblies, such as sorting/access characteristics;
 - vi. priority, timing, frequency, volume, sequencing, and other constraints;
 - vii. security and privacy constraints;
 - viii. message formatting; and
 - ix. 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:
 - i. project-unique identifier(s);
 - ii. session-connection establishment-creation of an exchange between interfacing entity(ies);
 - iii. session-connection release;
 - iv. session-connection synchronization;
 - v. exception reporting-permitting the interfacing entity(ies) to be notified of exceptional situations;
 - vi. data transfer rate, whether periodic/aperiodic, and interval between transfers;
 - vii. message formatting; and
 - viii. 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:
 - i. project-unique identifier(s);
 - ii. transmission services, including priority and grade;
 - iii. message formatting; and
 - iv. 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 interfacing entity(ies), such as:
 - i. project-unique identifier(s);
 - ii. communication links/bands/frequencies/media, communication end points and their characteristics;
 - iii. message formatting;
 - iv. flow control (such as sequence numbering and buffer allocation);
 - v. routing, addressing, and naming conventions;
 - vi. synchronization, including connection establishment, maintenance, termination; and
 - vii. 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:
 - i. project unique identifier(s);
 - ii. priority/layer of the protocol;
 - iii. packeting, including fragmentation and reassembly, routing, and addressing;
 - iv. legality checks, error control, and recovery procedures; and
 - v. 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 Documents or Interface Control Drawings where applicable;
 - ii. 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;
 - iii. electrical power interface: type, voltage, frequency, phases, power factor;
 - iv. hydraulic/pneumatic interface: type, flow rate, temperature of fluid, pressure;
 - v. for software systems, the required interface characteristics of the computer hardware with which the software is intended to be used;
 - vi. use of name marking, part marking, serial and lot number marking and other identifying markings;
 - vii. 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, operate or support the capability/system. An example is the requirement for the number of user positions 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 work positions, color, duration of error messages, physical placement of critical indications or controls and use of auditory signals; and
 - viii. 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 that are of the nature of system functionality should be incorporated in the System Requirements Specification and not in this paragraph, except where incorporation of required functions of the system would improve the suitability of the IRS for its intended use. This can occur when, for example, a particular communications protocol is required to be used across an interface. If such requirements regarding functionality of the interfacing systems are included in the IRS, a pointer to the required functionality should be included in the Section 4.3 "Functional and Performance Requirements" of the system (or software) requirements specification for each of the interfacing systems.

Any requirements that specify the consumption or usage of externally supplied resources should be incorporated in the System Requirements Specification and not in the IRS. However, requirements on the interface to be able to pass defined levels of externally supplied resources are placed 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 capabilities/systems. Considerable 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 capabilities/systems, characteristics which may not be under the control of the specifier, which may not be presently defined, and which may not be stable with time.

5. VERIFICATION REQUIREMENTS (OPTIONAL)

This section if used should specify a set of verification requirements, each verification requirement stating the extent and nature of the evidence required that the corresponding interface requirement has been met.

The guidance and instruction in Verification Requirements Specification (VRS) DID applies.

6. NOTES

This section, if used, should contain any general information that aids in understanding or using the IRS (for example, background information, rationale).

This section may include the following paragraphs, as applicable.

6.1 Requirements Traceability

This paragraph if used 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 which contains this requirements traceability information.

Note: A higher-level requirement is a requirement of an entity higher in the system breakdown structure (system physical 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.

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 if used should list the interface requirements specified in 4. and concerned with preventing or minimizing unintended hazards to personnel and property.

Alternatively, safety-related requirements may be annotated as such in 4.

6.3 List of Information Security-Related Requirements

This paragraph if used 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 if used 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 Relative Importance of Requirements

This paragraph if used should specify the relative importance of the requirements in the IRS. 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 degree of independent verification and validation.

Alternatively, the relative importance of requirements may be annotated as such in 4.

A. ANNEXES

Annexes may be used to provide information published separately for convenience in document maintenance or use (e.g., charts, databases). 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 or prepared digitally as separate documents for ease in use. Annexes should be lettered alphabetically (A, B, etc.).

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