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DATA ITEM DESCRIPTION

1. TITLE	2. IDENTIFICATION NUMBER
SYSTEMS REQUIREMENTS SPECIFICATION (SyRS)	PPA-002235-16 30 September 2020

3. DESCRIPTION/PURPOSE OF THE SyRS

3.1 The System Requirements Specification (SyRS), specifies the requirements to be satisfied by a system, subsystem, Hardware Configuration Item (HWCI), component or other physical item, and optionally the requirements for evidence that each requirement has been so satisfied. Requirements pertaining to the system, subsystem or item's external interfaces may be presented in the SyRS, or alternatively in one or more Interface Requirements Specifications (IRSs) and/or Interface Control Documents (ICDs) invoked by reference from the SyRS.

3.2 The SyRS, possibly supplemented by IRSs and/or ICDs, is commonly used as the basis for acquisition, supply, design and development, verification and acceptance of the system, subsystem or other item. Throughout this DID, the term "system" may be interpreted to mean "segment", "subsystem", "element", "HWCI", component or other item, as applicable. The resulting document may be titled System Requirements Specification, Segment Requirements Specification, Component Requirements Specification or similar, as applicable, or a corresponding subject matter – specific name, e.g., "Air Traffic Control System Requirements Specification", "Requirements Specification for a Power Supply Module", etc.

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), within a standard invoked by a SOR or TS, or within a plan, policy document or procedure.

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.

continued next page

6. SOURCE

5. PREPARATION GUIDELINES *continued*

5.2 Acronyms

Acronyms used in this document shall be interpreted as follows:

CC Creative Commons
CDRL Contract Data Requirements List
DID Data Item Description
HWCI Hardware Configuration Item
ICD Interface Control Document
IRS Interface Requirements Specification
OCD Operational Concept Description
SOR Statement of Requirement
SyRS System Requirements Specification.
TS Task Specification
VRS Verification Requirements Specification

5.3 Abbreviations

Abbreviations used in this document shall be interpreted as follows:

CapSysRS Capability System Requirements Specifications
CONUSE Concept of Use
SI International System of Units

5.4 Foreword

This Data Item Description (DID) for a System Requirements Specification (SyRS) is intended to provide guidance and instruction on the preparation of a requirements specification for any required physical item. A SyRS can be used in relation to any product or system whatsoever, from an implantable medical device to an IT or production system for internal use, to a whole military capability system. The system that is the subject of a SyRS may be a new system or a change to an existing system. The subject of a SyRS may be a logistics element, or any other element, except a material, software or a database.

Hereinafter, the word “system” is used to refer to the item that is the subject of the System Requirements Specification.

A SyRS specifies the essentially solution-free requirements to be satisfied by any acceptable system solution. The SyRS may also specify goals to be pursued during system procurement and/or system item development (if applicable).

The SyRS is usually the single most important artefact in the development or acquisition of a system. Creation, capture and specification of the information content of the SyRS should be done with the utmost care, and with appropriate skills applied, to avoid problems such as:

a. systems that do not satisfy the needs of the enterprise at all, or fall significantly short of satisfying the needs;
b. avoidable inaccuracies in cost estimation; and
c. delays due to rework, contractual dispute, or the need to undertake supplementary developments or procurements.

5.5 SyRS Requirements

Content requirements begin on page 3. The numbers shown designate the paragraph numbers to be used in the document.

TABLE OF CONTENTS

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 to which the document applies, including, as applicable, identification number(s), title(s), abbreviation(s), version number(s) and release number(s).

Where the system to which the document applies includes variants of the system, the above information should be provided for each variant. Where variants apply, this paragraph should establish nomenclature for the variants, and any rules for applicability in section 4. of requirements to variants.

Where the system to which the document applies includes incremental builds of the system that are subject to individual specification within the specification, the above information should be provided for each build.

1.2 Intended Use

This paragraph should briefly state the intended users and uses of the system to which the SyRS applies, referring to a Concept of Use (CONUSE)/Operational Concept Description (OCD) or comparable description for more detail, where such a document exists.

1.3 Background

This paragraph, if used, may summarize the history of system development, operation, and redevelopment (if any), and identify, as relevant, the project sponsor, acquirer, user, supplier and support organizations.

1.4 System Overview

This paragraph, if used, should identify, if applicable, any current and planned operating sites of parts of the system, and list any major subsystems which are required by 4., and which have end-use significance.

Where a system is required to be configurable (able to be assembled/reassembled into two or more configurations by the user), this paragraph should state so, and should also state the nature of the configurability. Where configurations apply, this paragraph should establish nomenclature for the configurations, and any rules for applicability in section 4. of requirements to configurations.

1.5 Document Overview and Use

This paragraph, if used, should summarize the purpose and contents of the SyRS and should describe any security or privacy considerations associated with its use.

2. APPLICABLE AND OTHER REFERENCED DOCUMENTS

This section should be divided into the following paragraphs, if applicable, and should list the number, title, revision, and date of each document referenced in the SyRS. This section should also identify the source of each document not available through normal channels, and any security or sensitivity classification.

2.1 Applicable Documents

This paragraph should list each document that is invoked in whole or in part within 4. as containing requirements information. 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 issue number of documents invoked in 4.

2.2 Other Referenced Documents

This paragraph should list each document that is referenced in the requirements specification, but which is not invoked in whole or in part by 4. as containing requirements information.

3. MEANINGS, ACRONYMS AND ABBREVIATIONS

This section should be divided into the following paragraphs.

3.1 Meanings

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

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

a. **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.
b. **Should** expresses a target or goal to be pursued, but not necessarily achieved.
c. **May** expresses permissive guidance.
d. **Will** expresses a declaration of intent on the part of a party, usually the sponsoring or acquiring 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 operating system will be supplied by the Company". 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 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 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 of Units (SI) should not be listed.

4. REQUIREMENTS

This section should be divided into the following paragraphs to specify the system requirements, that is, those characteristics of the system that are required to be present in the final product. In some cases, such requirements will also be conditions for acceptance of the system. Each requirement should be assigned a project-unique identifier to support verification and traceability, and should be stated in such a way that an objective, finite and cost-effective verification activity and pass criterion 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. Alternatively, "Not used." may be inserted under the paragraph heading.

If a given requirement fits into more than one paragraph (this should not normally occur), 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 requirements should be guided by the following principle: include those characteristics of the system that are necessary for the system to satisfy its intended use; defer to design or supply those characteristics that the requirer is willing to leave up to the developer or supplier.

In determining characteristics necessary to satisfy intended use, the criterion which should be used is the level of risk associated with satisfaction of the following ideal: "that any system which is supplied which satisfies the requirements in 4. will satisfy the need". The level of acceptable risk with respect to attainment of this ideal should be determined as a prerequisite to preparation of the system requirements specification. Such a level of acceptable risk will usually be "low".

Typically, for a given acceptable level of risk, lesser rigor of specification will suffice for items which are non-developmental, whilst for developmental items a more rigorous specification is called for. Similarly, where the requirements specification is for internal communication of requirements only then lesser rigor is needed, whilst to satisfy the legal demands and address the financial implications of contracting, greater rigor is called for.

4.1 Identification of External Interfaces

This paragraph should identify required external interfaces of the system. The identification of each interface should include a project-unique identifier for the interface - the name of the interface may serve this purpose. The paragraph may designate the interfacing entities (systems, configuration items, users, etc.), by name, number, version and documentation reference, as applicable.

A diagram that depicts the interfaces may be included for information, with interfaces shown which correspond to the specified interfaces. The context diagram is a suitable form of representation for this purpose. If used, a context diagram should be conceptual in nature.

Note that paragraph 4.5 rather than this paragraph should be used to specify the external interface requirements applicable to each external interface identified in this paragraph.

4.2 Identification of States and Modes (or "Configurations, States and Modes")

If the system is required to be configurable, this paragraph should commence by identifying the required configurations. An example of potential configurations for an aircraft would be a Crop Dusting Configuration and a Fire Bombing Configuration.

If the system is required to exist or operate in more than one state or mode having requirements distinct from those in other states or modes, this paragraph should identify each such state and mode which is permitted or required. Examples of states include: off, on, ready, active, unserviceable. Example of modes include flight, taxi, auto-pilot, post-use analysis, training, backup. A system may be described in terms of states only, modes only, modes within states, or any other schema that is useful. Sub-modes may be defined for a given mode.

A system may be specified without use of states and modes, or at the other extreme, a system may be specified fully as a state machine (not addressed in this DID).

A states and modes schema which has states at the highest level of requirements organization, and normally mutually exclusive of other states, together with modes within states, modes not necessarily being mutually exclusive of other modes and being able to exist in multiple states, has been found to be useful for the specification of systems of many types.

If no states or modes are required, this paragraph should be omitted or should so state, without creating artificial distinctions. If states or modes or both are required, each requirement in the requirements specification that relates to a state or mode should be correlated to that state or mode, but not in this paragraph.

The correlation of a requirement to one or more states and modes (or sub-modes) should be specified by inclusion of such correlation in the specification of the requirement where it appears in the requirements specification (somewhere in 4.3 to 4.10). This may be achieved in the requirement sentence (preferable) or paragraph (if necessary for clarity) in which the requirement is stated.

Any statements about the applicability of requirements in general to the states and modes identified in this paragraph should be included in this paragraph.

4.3 System Function and Performance Requirements

This paragraph should be divided into subparagraphs to specify each function required to be performed by the system, together with associated required performance. Each requirement may reference as necessary any external interfaces, configurations, states or modes (or sub-modes) identified in 4.1 or 4.2.

4.3.1 (System) Function

This paragraph (numbered 4.3.1 to 4.3.x with one function per paragraph) should identify a required system function and should specify the corresponding requirement or requirements. The word "Function" should appear in each leaf subparagraph heading. The requirements should specify required behavior of the system and should include, for each function, applicable initiating and terminating conditions, applicable performance parameters and values, such as response times, throughput times, other timing constraints, sequencing, accuracy, capacities (how much/how many), priorities, continuous operation requirements, and allowable

deviations based on operating conditions. The requirements should include, as applicable, required behavior under unexpected, un-allowed or “out of bounds” conditions, and any requirements for error handling. Each functional requirement should also state the conditions during which the specified function is to be performed, such as configuration, state, mode in state, or requirement-specific environmental conditions.

Functional and performance requirements may be organized in a structure of section, paragraphs, subparagraphs, etc. Requirements should be placed only in the leaf subparagraphs.

The word “Mode” may also be used in a paragraph heading.

If the requirement is a requirement of a subordinate element of the system rather than of the system overall, the requirement should be placed in 4.10.2 and not in this paragraph.

4.4 Relationships Between States and Modes

This paragraph, if states and modes are used, should specify the required relationships between the various states and modes, including default states and modes, temporal relationships, the conditions that are required to cause state and mode transitions and the external response(s) that the system is required to produce as a reflection of each required transition having taken place.

The paragraph should state in the order matching 4.2, as applicable, and for example:

a. Default State (the state in which the system commences)
b. State A<>State B, followed by transition and response requirements, including any prohibitions of transitions and permissive guidance (may) statements
c. State A<>State C, etc.
d. Default Mode(s) in State A (the mode(s) in which the system is to commence upon entering State A, or if there is to be no default mode(s), the corresponding requirement to that effect)
e. Mode A in State A<>Mode A in State B, followed by transition and response requirements, including any prohibitions of transitions and permissive guidance (may) statements
f. Mode A in State A<>Mode A in State C, etc.
g. Mode A in State A<>Mode B in State A, etc.
h. Mode B in State A<>Mode C in State A, etc.
i. Default Sub-mode of Mode A
j. Sub-mode A of Mode A in State A<> Sub-mode B of Mode A in State A
k. Default Mode(s) in State B, etc.

4.5 System External Interface Requirements

This paragraph should be divided into subparagraphs to specify the requirements, if any, for each of the system’s required external interfaces, including user interfaces, listed in 4.1. This paragraph may reference one or more Interface Requirements Specifications (IRSs), Interface Control Documents (ICDs) or other documents containing these requirements, which may be either annexes to the system requirements specification or (more commonly) separate documents.

Subparagraphs should be arranged in alphabetical order in accordance with the names of the interfaces.

Where an interface is inherently simple, its specification may be contained rather than referenced in this paragraph.

4.5.1 (Project-Unique Identifier of Interface)

This paragraph (numbered 4.5.1 to 4.5.x with one interface per paragraph) should identify a required system external interface by name and any additional project-unique identifier and should briefly identify the interfacing entities. Where an interface comprises a lower-level physical structure of sub-interfaces, these 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 paragraph 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 members of each of these classes of item. The paragraph may reference other documents (such as mechanical drawings, item dictionaries, data dictionaries, 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 for data-orientated interfaces may be structured in a manner that adopts an open systems approach. An open system approach is an approach in which interfaces are defined in a series of abstract layers, accessible from the interfacing entity(ies), which progressively and in a structured manner provide the required interface mechanism. The internet's TCP/IP protocol suite is one such schema.

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

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

b. interfacing entity(ies) to exchange items 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);
        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);
    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 systems, 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 Drawings where applicable;

j. dynamic mechanical characteristics such as shock, vibration, acceleration, deceleration;

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

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

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

n. 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 operator 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 operator positions, color, duration of error messages, physical placement of critical indications or controls and use of auditory signals; and

o. 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 4.3 and not in this paragraph, except where ease of use of the SyRS would be enhanced by incorporation of such requirements in this paragraph. 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 4.7 and not in this paragraph.

External interface requirements should be specified only to the degree necessary to bound the design or supply 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 but will eventually be specified at the level of detail suitable for physical fabrication of the interface.

An external interface may also be specified in terms of achieving physical and functional interoperability with the interfacing external system. 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 external systems, characteristics which may not be under the control of the specifier, and which may not be stable with time.

The identification should state as applicable and in note form: which interfacing items impose interface requirements on the system, which interfacing items are to have interface requirements imposed on them by the system and which interfacing items are subject to both influences.

4.6 System Environmental Requirements

This paragraph should specify in the subparagraphs below the requirements, if any, regarding the environment in which the system must meet other requirements as specified in the remainder of the Requirements section.

Examples include the environmental conditions that the system must withstand during transportation, storage, and operation, such as conditions in the natural environment (wind, rain, fog, temperature, humidity, pressure, driven dust, geographic location, magnetic field, ambient light level, ionospheric conditions), the induced environment (motion, shock, noise, electromagnetic radiation, ambient light level) and for military systems environments due to enemy action or threat (explosions, radiation). Constraints on rates of change of environmental parameters should be included where applicable.

This paragraph should also specify the requirements, if any, which limit the effect that the system is to have on the external environment. Examples include limits on the electromagnetic radiation (various wavelengths, tempest), gaseous emissions, heat or acoustic noise that the system is permitted to generate.

If the requirement is a requirement of a subordinate element of the system rather than of the system overall, the requirement should be placed in 4.10.2 and not in this paragraph.

If the requirement is a requirement on an input, e.g. the *type* of fuel oil, the requirement should be incorporated in 4.5 and not in this paragraph.

4.6.1 Classes of Environment

This paragraph, if used, should make an informative statement identifying the classes of environment, with reference to which environmental requirements are specified, e.g., Storage Environment, Transportation Environment, Operational Environment. Classes of environment should be listed in order of the time sequence in which they are encountered, where this applies, otherwise listed alphabetically.

4.6.2 XYZ Environment

This paragraph should specify, in a format appropriate to the information, the external environmental parameters, if any, within which the system is to meet all other requirements, with any stated exceptions. The paragraph must make clear the degree to which the possible parameter environmental combinations apply simultaneously for the class of environment, i.e. environmental envelope(s).

This paragraph should also specify, in a format appropriate to the information, limits on unwanted outputs from the system into the enveloping environment.

Subsequent paragraphs should apply to other classes of environment (if any).

Subject to any formatting needs related to requirements traceability, the requirements information may be presented in text, tables, or other suitable format.

4.7 External Resource Utilization Requirements

This paragraph should specify the requirements, if any, regarding the consumption or utilization by the system of externally provided resources. Examples are constraints on consumption of externally-provided power or fuel.

Paragraphs should be arranged in alphabetical order in accordance with the name of the resource.

If the resource requirement is a requirement on a subordinate element of the system rather than of the system overall, the requirement should be placed in 4.10.2 and not in this paragraph.

4.8 System Physical Requirements

This paragraph should specify the requirements, if any, which represent constraints on the physical (properties of matter) characteristics of the system *as a whole*. Example physical characteristics are mass, dimensions, shape, volume, density and center of gravity.

Paragraphs should be arranged in alphabetical order in accordance with the names of the physical properties.

If a physical requirement is a physical requirement of a subordinate element of the system rather than of the system overall, the requirement should be placed in 4.10.2 and not in this paragraph.

Interface requirements which are physical in nature e.g. geometry of a connection, should be incorporated in 4.5 and not in this paragraph.

4.9 Other System Qualities

This paragraph should specify the requirements, if any, pertaining to other qualities required of the system as a whole. Example other system qualities include:

a. reliability (the ability to perform with correct, consistent results - such as mean-time-between-failure for equipment);
b. maintainability (the ability to be easily serviced and repaired - such as mean-time-to-repair for equipment);
c. availability (the ability to be accessed and operated when needed);
d. reuseability (the ability to be adapted for use in multiple applications);
e. testability (the ability to be easily and thoroughly tested);
f. useability (the ability to be easily learned to use, and easily used);
g. interchangeability of parts (the ability to have parts of the same part number interchanged without necessitating readjustment);
h. transportability (the ability to be transported from one location to another);
i. ease of set-up (the ability to be set up by one, or a given number of, persons);
j. expandability (the ability to be easily modified in response to potential areas of growth in requirements);
k. flexibility (the ability to be easily adapted to changes in mission, threat or technology);
l. interoperability (the ease of interfacing and/or interoperation with external systems in general. Interfacing with specific external systems should be specified in 4.1 and 4.5); and
m. durability (the life of the item when used as intended).

Paragraphs should be arranged in alphabetical order in accordance with the names of the qualities.

Any requirement, related to other system qualities, and which is functional in character, should be incorporated in 4.3 and not in this paragraph.

Any requirement for other system qualities which is a requirement of a subordinate element of the system rather than of the system overall should be placed in 4.10.2 and not in this paragraph.

Note that the information content of the requirement governs whether it is of “Other Qualities” type, not its purpose. For example, a mass limit for reason of safety is a physical requirement and is placed in 4.8.

4.10 Design and Construction Requirements

This paragraph should specify any requirements that *direct* aspects of the design and construction of the system (build it *internally* in this way, or don’t build it *internally* this way). This paragraph, if used, should be divided into the following subparagraphs.

4.10.1 General Design and Construction Requirements

This paragraph should specify any general aspects of design and construction that apply as requirements system-wide. Examples include requirements concerning:

a. use of a particular system architecture, or requirements on the architecture, such as required subsystems;
b. use of customer-furnished property (equipment, information, software or services);
c. use of standard, military or existing components;
d. materials that may and may not be used;
e. use of particular design or construction standards, use of particular internal data standards, use of a particular programming language(s), workmanship requirements and production techniques; and
f. use of specific surface coatings.

Paragraphs should be arranged in alphabetical order in accordance with the names of the aspects or properties.

4.10.2 Characteristics of Subordinate Elements

This paragraph should be divided into subparagraphs that correspond to a simple, flat, alphabetical list of items – organizations, hardware, software, databases, materials, etc., to which requirements apply as requirements on the system, using paragraphing 4.10.2.x where x corresponds to the subordinate element.

Paragraphs should be arranged in alphabetical order in accordance with the names of the subordinate elements.

For physical system elements, each element should be specified, to the extent justified by the reasons for directing design, using the paragraph and subparagraph names and content corresponding to 4.1 to 4.10.1 inclusive, as applicable. For elements of other types, e.g., software, materials, manuals, the corresponding structure of the Requirements section from a sound corresponding DID for that type of element should be used.

This paragraph should also specify any requirements regarding computer software that must be incorporated into the system. Examples include types of operating systems, database management systems, communications/network software, utility software, input and equipment simulators, test software and manufacturing software that are to be an integral part of the system. The correct nomenclature, version and documentation references of each such software item should be provided, where applicable.

If training devices or training materials are required to be included as part of the system, any requirements on such devices or materials should be specified in this paragraph.

If user documentation or maintainer documentation are required to be included as part of the system, any requirements on such documentation should be specified in this paragraph.

If logistics support devices and logistic support materials are required to be included as part of the system, any requirements on such devices or materials should be specified in this paragraph.

If packaging materials are required to be included in the system, any requirements on such materials should be specified in this paragraph.

Only those characteristics that the specifying enterprise *requires* be implemented by the above subordinate elements should be specified in this paragraph. Note that by specifying the existence or characteristics of subordinate elements, the requirer assumes responsibility for aspects of system design. Care should be exercised in taking on this responsibility.

4.11 Precedence of Requirements

This paragraph, if used, should state whether all paragraphs have equal precedence in the event of conflict between requirements. If all requirements are not to be of equal precedence in the event of conflict, this paragraph should state the rules of precedence.

Note that the possibility of conflict between requirements is increased where design requirements are specified. In this case, the paragraph should state rules of precedence between 4.10 and other requirements paragraphs.

5. VERIFICATION REQUIREMENTS (OPTIONAL)

This section, if used, should define for each requirement in 4. the requirement (or otherwise) for qualities of evidence that the system requirement has been met. The section *may* also state the method(s) to be used to evidence that the requirement has been met, although a list of verification methods rarely constitutes an adequate set of verification requirements. Verification methods, if specified, may include:

a. Test - the operation of the system, or a part of the system, using instrumentation or other special test equipment to collect data for later evaluation;
b. Demonstration - the operation of the system, or a part of the system, that relies on observable functional operation not requiring the use of instrumentation, special test equipment, or subsequent analysis;
c. Analysis - the processing of accumulated data, sometimes obtained from other verification methods. Examples are reduction, interpolation, or extrapolation of test results;
d. Inspection - the visual examination of system components, documentation, etc.;
e. Analogy - the use of evidence from verification of an analogous product, for example a prior version;
f. Certification - a declaration by a designated stakeholder, usually the supplier or developer; and
g. Special verification methods - any special verification methods for the system, such as special tools, techniques, procedures, facilities, acceptance limits, use of standard samples, preproduction or periodic production samples, pilot models, or pilot lots.

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

Alternatively, the VERIFICATION REQUIREMENTS may be placed in a separate document or database and (optionally) referred to in 6. NOTES.

A Table format for specification of verification requirements is often suitable, with columns:

a. identifier for system requirement;
b. subject area; and
c. verification requirement;

not necessarily in that order.

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 specification (e.g., background information, rationale).

This section may include the following paragraphs, as applicable.

6.1 Concept of Use (CONUSE)

This paragraph, if used, should contain or reference a description of who the users of the system are intended to be, what it is intended or expected that each user will use the system for, how it is intended or expected that each user will use the system for each intended use, and under what conditions it is intended or expected that the system will be used.

This paragraph will not be applicable if a Concept of Use (CONUSE) as a separate document is referenced out from the SCOPE section of the SyRS.

6.2 Notes to Tenderers or Bidders

This paragraph, if used in a solicitation or tendering application of the requirements specification, should contain any explanatory notes to, or requests for information from, tenderers/bidders. Alternatively, such notes may be contained partially or completely in a separate document that references the requirements specification, or in individual notes to tenderers/bidders incorporated in the body of the requirements specification.

Where a note to tenderers/bidders is included within the body of the requirements specification, the note should be clearly distinguishable from a system requirement. A suitable format is: *"Note to Tenderer: The tenderer is to ...".*

6.3 Requirements Traceability

This paragraph, if used, should contain:

a. data which details traceability from each system requirement in the requirements specification, including each requirement in annexed IRSs or ICDs, to the higher physical level requirement(s) it addresses. Alternatively, this traceability may be provided by annotating each requirement in 4; or alternatively
b. reference to the document which contains corresponding requirements traceability information.

Note: Higher-level requirements are requirements on a larger system for which the system which is the subject of the requirements specification is a part of the solution.

6.4 List of Safety Requirements

This paragraph, if used, should list the system requirements, specified in 4. and concerned with preventing or minimizing unintended hazards to personnel and property. Examples include restricting the use of dangerous materials; abort/escape provisions from enclosures; gas detection and warnings; grounding of electrical systems; decontamination and explosion proofing.

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

Safety requirements are typically listed only if they are subject to special actions, for example, increased verification as to their satisfaction, or regulatory procedure.

6.5 List of Information Security Requirements

This paragraph, if used, should list the system requirements, specified in 4. and concerned with maintaining information security, viz. confidentiality and integrity of information.

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

Information security requirements are typically listed only if they are subject to special actions, for example, increased verification as to their satisfaction.

6.6 Summary of Adaptation Requirements

This paragraph, if used, should identify the requirements, 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).

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

6.7 Ordering Details

This paragraph, if needed, should provide any information necessary for identification of the system and any variants of the system for ordering purposes.

6.8 Criticality of Requirements

This paragraph, if applicable, should specify the criticality, or assigned weights, indicating the relative importance of the requirements in this specification. 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.

6.9 Value Model

Where goals (design goals) are expressed as goals above a specified minimum standard, this paragraph should state the relative importance of the difference between the minimum standard and the goal, for each design goal, as related to the value perceptions of the relevant stakeholders in the system, together with how the value changes between the minimum standard and the goal. Alternatively, this paragraph may reference an external value model, typically a data file accessed via value modeling computer software.

A. ANNEXES

Annexes may be used to provide information published separately for convenience in document maintenance or use (e.g., charts, databases, interface specifications). 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.).