DATA ITEM DESCRIPTION

1. DID NUMBER: DID-ENG-SOL-SAD-
2. TITLE: SYSTEM ARCHITECTURE DESCRIPTION
3. Description And Intended Use

The System Architecture Description (SAD) is a collection of information products that document the architecture of a system. The SAD is expected to include the applicable mandated Integration and Interoperability Framework (I2F) views, additional views and supporting information needed to communicate the architecture of a system to the system stakeholders. The SAD is intended to support the system and software architecture activities required by ISO 15288 and ISO 12207 for software-intensive systems as well as to support risk management activities in relation to security and safety.

The Contractor developing the SAD uses it to:

describe the system and its evolution;

communicate aspects of the system among the system stakeholders; and

describe the persistent characteristics and supporting principles of a system to inform those involved in proposing and implementing future changes.

A contractor implementing or modifying the system described by the SAD uses it to:

understand the system, its persistent characteristics and supporting principles; and

confirm that a planned or realised system implementation or modification is compliant with the architecture of the system.

The Commonwealth uses the SAD to:

evaluate the architecture of a system (proposed or realised);

develop business plans for transition from a legacy architecture to a new architecture;

communicate among organisations involved in the acquisition, development, production, fielding, operation and maintenance of the system;

identify criteria that can be used for certifying conformance of a system implementation to the system architecture;

provide input to subsequent system-design and system-development activities;

support the review, analysis and evaluation of the system across the life cycle; and

provide the basis for the specification for a group of systems sharing a common set of features (eg, a product line).

1. INTER-RELATIONSHIPS

The SAD is subordinate to the following data items, where these data items are required under the Contract:

Systems Engineering Management Plan (SEMP); and

Software Management Plan (SWMP).

The SAD inter-relates with the:

Operational Concept Document (OCD); and

Function and Performance Specification (FPS).

The SAD also inter-relates with the following data items, where these data items are required under the Contract:

System Specification (SS) for each Mission System;

Support System Specification (SSSPEC);

Growth Plan (GP); and

the security-related data items required under the Contract.

1. Applicable Documents

The following documents form a part of this DID to the extent specified herein:

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| --- | --- |
| 1. AS/NZS ISO/IEC/IEEE 12207:2019 | 1. Systems and software engineering – Software life cycle processes |
| 1. AS/NZS ISO/IEC/IEEE 15288:2015 | 1. Systems and software engineering - System life cycle processes |
| 1. ISO/IEC/IEEE 42010:2011 | 1. Systems and software engineering – Architecture description |

1. Preparation Instructions
   1. Generic Format and Content

The data item shall comply with the general format, content and preparation instructions contained in the CDRL clause entitled ‘General Requirements for Data Items’.

Terms defined in ISO/IEC/IEEE 42010:2011 retain that meaning in this DID.

The data item shall include a traceability matrix that defines how each specific content requirement, as contained in this DID, is addressed by sections within the data item.

* 1. Specific Content
     1. Overview and Background

The SAD shall explain the overall purpose and scope of the SAD.

The SAD shall describe the function and purpose of the system whose architecture is described in the SAD.

The SAD shall summarise the history of system development, operation, and support.

The SAD shall describe the criteria used to determine which design decisions are architectural (and therefore included in the SAD) and which design decisions are non-architectural (and therefore documented elsewhere).

The SAD shall describe the goals and major contextual factors for the architecture.

* + 1. Stakeholders and Concerns

The SAD shall identify the stakeholders that have been considered in the formulation of the architectural concept for the system, including:

users of the system;

acquirers of the system;

developers of the system; and

maintainers of the system.

Note: A specific list of stakeholders to be considered may be identified in the Statement of Work.

The SAD shall identify the stakeholders’ concerns that have been considered in the formulation of the architectural concept for the system, including:

the purpose or missions of the system;

the appropriateness of the system for use in fulfilling its missions;

the feasibility of constructing the system;

the risks of system development, operation and support to acquirers, developers, users and supporters of the system; and

the maintainability, deployability, evolvability, and security of the system.

Note: A specific list of concerns to be considered may be identified in the Statement of Work.

The SAD should present this information as a matrix, where the rows list stakeholder roles, the columns list concerns, and a cell in the matrix contains an indication of how serious the concern is to a stakeholder in that role.

* + 1. Architectural Viewpoints

The SAD shall identify the viewpoints selected to address the identified stakeholders and their concerns.

Note: Typically these viewpoints would be expected to address:

1. external behaviour (ie, how the system will behave, from a user's point of view and ignoring internal implementation, in response to each input or condition, including actions the system will perform, inputs the system will accept and outputs it will produce, response times and other performance characteristics, selected equations / algorithms / rules, and handling of unallowed inputs or conditions);
2. internal behaviour (ie, how the system components interact during system operation, including, as applicable, flow of execution control, data flow, state transition, priorities among components, handling of interrupts, timing and sequencing relationships, exception handling, concurrent execution, dynamic allocation / deallocation, dynamic creation / deletion of objects, processes, tasks, and other aspects of dynamic behaviour);
3. system criticality (eg, reliability, safety, security, or privacy), flexibility, availability, and maintainability, including the approach to growth capabilities, diagnostic capabilities, and additional hardware capabilities;
4. interfaces among the components and their interfaces with external entities such as other systems and users, including type and priority, data characteristics (eg, type, size, format, units, possible values, accuracy, precision, priority, timing, frequency, volume, and sequencing), and physical compatibility (eg, dimensions, tolerances, loads, voltages, and plug compatibility); and
5. communication techniques / methods (eg, communications / network equipment, data transfer rates / capacities, network topologies, transmission techniques, and protocols, communication links / bands / frequencies / media and their characteristics, message formatting, flow control, routing, addressing, and naming conventions, encryption, user authentication, compartmentalisation, and auditing).

The SAD shall define each viewpoint, either directly or by reference, and describe the rationale for its use in the SAD.

Each stakeholder and each concern identified in the SAD shall be addressed by at least one viewpoint. A stakeholder or concern may be addressed by more than one viewpoint.

Each identified viewpoint shall be specified by:

a unique viewpoint name;

the stakeholders addressed by the viewpoint;

the concerns addressed by the viewpoint;

the rationale for the selection of each viewpoint including the extent to which the viewpoint addresses the identified stakeholders and concerns;

the elements, relations, properties and constraints to be used in constructing a view based on the viewpoint;

the language, modelling techniques, or analytical methods to be used in constructing a view based on the viewpoint;

heuristics, patterns, or other guidelines that assist the synthesis of associated views;

the consistency and completeness tests to be applied to the models making up an associated view;

the evaluation or analysis techniques to be applied to the models; and

the source of the viewpoint.

* + 1. Architectural Views

The SAD shall include the architecture views used to describe the system architecture.

The SAD shall include at least one view for each viewpoint identified in the SAD.

Each view shall correspond and conform to exactly one of the viewpoints identified in the SAD.

Each view shall include:

a unique identifier for the view;

the applicable viewpoint;

the stakeholders addressed by the view;

the concerns addressed by the view; and

any decisions reflected in the view together with the supporting analysis and rationale for the decision.

* + 1. Relationships Among Architectural Views

The SAD shall describe the relationships (eg, mappings) among the presented architectural views that bring the views together to convey additional information about the system architecture.

The SAD shall discuss the consistency among the views and identify any known inconsistencies among the architectural views presented.

For each set of views related to each other, the SAD shall show how the elements in one view are related to elements in another view.

* + 1. Architecture Constraints and Rationale

This section shall contain the rationale for any architectural decisions that either span multiple architectural views or affect the entire architecture, including:

any alternatives that were considered and the reasons why they were rejected;

any constraintsthat directly or indirectly affected the decisions;

Note: Constraints include existing requirements, organisational constraints, funding constraints, political pressures, and vendor associations, etc.

the issues, effects, or constraints that the chosen decision has or imposes on future life-cycle activities; and

any evidence gathered that vindicates the decision taken, including the results of any quantitative or qualitative analyses that have been performed that provide evidence that the system architecture is fit for purpose.

The SAD shall identify the requirements (original or derived) addressed by the architecture and where each of these requirements is addressed in the architecture.

* + 1. System Evolution

The SAD shall detail how the system covered by the SAD is planned or likely to evolve.

The SAD shall include a list of all known planned or likely variants of the system, subsystem or components to be produced, delivered and supported throughout the evolution of the system, including those identified in the GP (if such a plan exists).

Where Materiel System Increments are applicable to the Contract, the SAD shall identify, for each identified variant, the Materiel System Increment(s) in which the variant will be delivered.