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 **IV&V RECOMMENDATION**

 **for <LRU/SYSTEM Name>**

**for**

 **<Platform Name>**

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| **IV&V RECOMMENDATION****for** **<LRU/SYSTEM Name>for <Platform name>** | < Project/System Name> |
| **LRU/System Part No.**  |
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**Disclaimer:**

This document is a guidance document. Applicable section / table rows may be considered. Any additional details may be added. Any not applicable section/ table rows may be deleted. The template is very general and vary with process to process followed by Development Agency. The document may be fine-tuned with the TAA for finalization.

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# Purpose& Scope

This document describes the IV&V activities carried out for <*System name*>, <*CSCI Name*>, <*Software version*> at each phase and provides recommendations for scope of clearance of the software and limitations, if any.

*Details about the Software for which IV&V is carried out.*

1. *New software*

 *OR*

1. *Incremental software*

## Identification

1. System Identification:
2. Software Identification:
3. Application Software Version:
4. RTOS Version
5. BSP version

## System Overview

*A brief description of top level functions of the system including all its CSCIs.*

## Software Overview

*A brief description of top level functions of the current CSCI in the scope of this report.*

## Documents Referred

*List of documents, MoMs, Technical notes, Reports that were used to generate this IV&V report.*

*PSAC/ SCP, SVP/ IVVP, SCMP, SQAP, SRD, FRS, ICD, SARAD, SDD, System integration/ HSI/ CSCI/ Unit level test procedures and Test results, VDD etc.*

# Software Criticality Level

*Software criticality Details with allocation of criticality to components.*

*Note : In case the complete CSCI is verified with same criticality level, the following table is not necessary.*

|  |  |  |  |
| --- | --- | --- | --- |
| Level A | Level B | Level C | Level D |
| *<List of Software Components that implement safety Critical functions>* | *<List of Software Components that implement Mission Critical functions>* | *<List of Software Components that implement Major functions>* | *<List of Software Components that implement Minor functions>* |

# IV&V activities:

<*For first clearance of the software >*

The following IV&V activities are performed as per the *<IVVP/ SVP>*.

<*For clearance of software changes*>

* *Problem report / user feedback / change request*
* *Details of the previously cleared software (version, checksum, dependencies on external systems or hardware configuration)*
* *Details of new functionality added/ deleted/ modified*
* *Impact Analysis of the new/ changed functionality*
* *Details of the delta IV&V applicable to the changed software*

## Software Planning Review

* *Certification plan including the milestones, documents, approvals, types of clearances etc.*
* *Verification plan with methodologies, tools etc.*
* *Configuration management and QA as per the design organisation’s internal practices and policy.*

## Software Requirements Review and Analysis:

* *Summary of completeness and consistency of all requirements/ changed requirement w.r.t system/ functional requirements.*
* *Reference of Checklists used*
* *Details of Observations found in review and analysis, and their closure status.*
* *Bidirectional traceability*

## Software Design:

* *Summary of correctness, completeness and suitability of design w.r.t requirements.*
* *Reference of Checklists used*
* *Algorithm/ model validation status and conclusion*
* *Details of Observations found in review and analysis, and their closure status.*
* *Bidirectional traceability*

## Software Code Analysis:

|  |  |  |
| --- | --- | --- |
| Sl No | Document | Reference |
|  | Source Code  | *Version and Checksum* |
|  | Libraries/ COTS | *Reference* |
|  | Other interacting CSCIs, FPGAs, CPLDs (within the LRU) | *Versions and Checksum* |

* *Summary of Code walkthrough report for correctness and completeness w.r.t design.*
* *Summary of Code quality analysis*
* *Details of Observations found in review and analysis, and their closure status.*

## Static and Dynamic testing:

* *Summary of Static & Dynamic test reports, complexity, data flow, control flow, along with tools used and the configuration setting of the tools.*
* *Details of Observations found Timing and memory analysis of software and effect with previous build*
* *Bidirectional traceability to SRD, SDD & ICD*

## Hardware software integration testing:

* *Summary of hardware software integration test reports (either complete or regression test cases).*
* *Bidirectional traceability to Functional requirements*
* *Details of Observations found in review of test cases and test results*

## BSP/OS/Drivers validation:

*Conclusion from tests/ analysis carried out for COTS items and the acceptability of OEM documentation/ certification.*

# Deviation from software plans/ IA

* *List of activities in software plans or IA (in case of change evaluation) that could not be performed, along with reasons for non-compliance.*

# Configuration Identification:

* RTOS version identification
* BSP version identification
* Application CSCIs version with checksum
* Hardware configuration with LRU name, part number, hardware version
* Test rig/ ATE software, simulators used with associated databases
* Dependencies and compatibility, if any (To external system, software, aircraft configuration etc, and set specific data such as calibration, look up tables, characterization etc)
* Software Checksum verification and loading utilities

# Open problems from previous build

*List of observations/ lacunae which are carried forward from previous build that are yet to be resolved, and the justification for keeping them open.*

# Open problems in present build

*List of observations/ lacunae which are found during IV&V of the present build that are not resolved, impact of the open points and the justification for keeping them open. References to SPRs.*

# Limitations

*Operational/ maintenance related limitations that may arise due to the current build of software, and the implications of these limitations*.

# Recommendations:

*Satisfactory/unsatisfactory status of the software in view of effect on safety and performance. Recommendations for clearance in terms of flight envelop, aircraft type, aircraft configuration, system configuration and mission type.*

**Abbreviations:**

ATE Automatic Test Equipment

BSP Board Support Package

COTS Commercial Off the Shelf

CPLD Complex Programmable Logic Device

CSCI Computer Software Configuration Item

FPGA Field Programmable Gate Array

FRS Functional Requirement Specification

HSI Hardware Software Integration

IA Impact analysis

ICD Interface Control Document

IVVP Independent Verification and Validation Plan

LRU Line Replaceable Unit

OEM Original Equipment Manufacturer

RTOS Real Time Operating System

SARAD System Architecture and Requirement Allocation Document

SPR Software Problem Report

SCMP Software Configuration Management Plan

SCP Software Certification Plan

SRD Software Requirement Document

SDD Software Design Document

SQAP Software Quality Assurance Plan

SVP Software Verification Plan