

VxWorks and HVP

Generic Software Quality Assurance Plan

**PROPRIETARY**

|  |  |  |
| --- | --- | --- |
| Prepared by: | Shree Vidya Jayaraman | SQA Lead |
| Reviewed by: | Doina Lepadatu (VxWorks)  Rodger Williams (HVP) | Engineering Program Manager |
| Approved by: | Kitty Kong (VxWorks)  Martin Cote (HVP) | Engineering Director |

|  |  |
| --- | --- |
| Document ID: | WRGeneric\_SQAP |
| Author: | Shree Vidya Jayaraman |
| Version: | 0.1 |
| Version Date: | 06/09/2020 |
| Status: | Draft |

**Copyright Notice**

Copyright 2020 Wind River Systems, Inc.

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means without the prior written permission of Wind River Systems, Inc.

Wind River, Simics, Tornado, and VxWorks are registered trademarks of Wind River Systems, Inc. Helix, Pulsar, Rocket, Titanium Cloud, Titanium Control, Titanium Core, Titanium Edge, Titanium Edge SX, Titanium Server, and the Wind River logo are trademarks of Wind River Systems, Inc. Any third-party trademarks referenced are the property of their respective owners. For further information regarding Wind River trademarks, please see:

[www.windriver.com/company/terms/trademark.html](http://www.windriver.com/company/terms/trademark.html)

This product may include software licensed to Wind River by third parties. Relevant notices (if any) are provided for your product on the Wind River download and installation portal, Wind Share:

<http://windshare.windriver.com>

Wind River may refer to third-party documentation by listing publications or providing links to third-party websites for informational purposes. Wind River accepts no responsibility for the information provided in such third-party documentation.

**Corporate Headquarters**

Wind River

500 Wind River Way

Alameda, CA 94501-1153

U.S.A.

Toll free (U.S.A.): +1-800-545-WIND

Telephone: +1-510-748-4100

Facsimile: +1-510-749-2010

For additional contact information, see the Wind River website:

[www.windriver.com](http://www.windriver.com)

For information on how to contact Customer Support, see:

[www.windriver.com/support](http://www.windriver.com/support)

| Revision History | | | |
| --- | --- | --- | --- |
| Date | Version | By | Description of Change |
| 05/09/2020 | 0.1 | Shree Vidya Jayaraman | Initial Draft |

**Table of Contents**

[1 Introduction 6](#_Toc42595810)

[1.1 Overview 6](#_Toc42595811)

[1.2 Scope 6](#_Toc42595812)

[1.3 Relationship to Other Planning Documents 6](#_Toc42595813)

[1.4 Applicable Documents 7](#_Toc42595814)

[1.5 Readership 7](#_Toc42595815)

[1.6 Glossary and Acronyms 8](#_Toc42595816)

[2 Lifecycle 9](#_Toc42595817)

[2.1 Lifecycle Overview 9](#_Toc42595818)

[3 Responsibility and Environment 10](#_Toc42595819)

[3.1 Responsibility 10](#_Toc42595820)

[3.1.1 Independence of Roles 10](#_Toc42595821)

[3.2 Environment 10](#_Toc42595822)

[3.2.1 Program Release Reporting Structure 10](#_Toc42595823)

[3.2.2 Interfaces 11](#_Toc42595824)

[3.2.3 Software Standards and Checklists 12](#_Toc42595825)

[3.2.4 Tools and Methods 12](#_Toc42595826)

[4 Software Quality Assurance 13](#_Toc42595827)

[4.1 Internal Audit and Noncompliance Process 13](#_Toc42595828)

[4.2 Audit Sampling Methodology (review/confirm with NL) 13](#_Toc42595829)

[4.3 Quality Assurance Activities 13](#_Toc42595830)

[4.3.1 Quality Process Audit 13](#_Toc42595831)

[4.3.2 Security Audit – Check with Kitty, Martin, and Roger 14](#_Toc42595832)

[4.3.3 Configuration Management Audit – Check with Kitty & Martin 14](#_Toc42595833)

[4.3.4 Customer Audit (performed by the customer) 14](#_Toc42595834)

[4.4 Management Review 14](#_Toc42595835)

[4.5 Quality Records 15](#_Toc42595836)

[5 Plan Review and Approval 16](#_Toc42595837)

List of Figures

[Figure 1: Project Reporting Structure 11](#_Toc11312101)

List of Tables

[Table 1: Applicable Documents 7](#_Toc11312102)

# Introduction

## Overview

This plan specifies the activities for quality assurance during the software lifecycle of the VxWorks and HVP programs.

This plan identifies the Wind River generic quality management procedures and activities used to ensure that the Software Lifecycle meets software quality management objectives.

## Scope

Software Quality Assurance activities are necessary to ensure quality software is identified, monitored, and controlled. These activities include audits, monitoring of noncompliances and are carried out by personnel with the independence of role and the authority to prevent the release of work products.

Work products (also referred to as artifacts) are all software life cycle data produced during planning, development, integration, test, and release of the software. All items developed throughout the development are generally indicated as work products throughout the document.

The project will be audited against the processes identified in the plan documents and process definitions. The generic plan documents identify the intended approach to software development used as a basis for SQA monitoring and enforcement.

## Relationship to Other Planning Documents

The software development lifecycle activities for the verification effort are described in the following documents:

* Generic Software Development Plan [Ref.1]
* Generic Software Configuration Management Plan [Ref.2]
* Overall Product Test Strategy [Ref.3]
* Generic Validation Plan [Ref.4]
* Generic Product Release Profile/Plan [Ref.5]

The Software Development Plan (SDP) describes the software development lifecycle activities.

The Software Configuration Management Plan (SCMP) describes the processes that will be used to meet the configuration management objectives of the program release.

The Overall Product Test Strategy (PTS) describes the program release level test strategy, including the overall goals and activities of the product testing – including the interaction, coverage, and integration of the team-specific development and test documents. ?? check with Kitty

The Validation Plan describes the validation activities for the program.

The Product Release Profile/Plan establishes an overall plan for program release management. It identifies the overall tasks and engineering management planning required to control the design, development, and tests associated with the program.

The processes defined facilitate the activities performed throughout the development lifecycle and by the support functions such as Program Release Management, Configuration Management, and SQA.

## Applicable Documents

Table 1 lists all documents referenced in this plan.

| Ref. | Document Title |
| --- | --- |
|  | Wind River VxWorks and HVP Generic Software Development Plan |
|  | Wind River VxWorks and HVP Generic Software Configuration Management Plan |
|  | Wind River VxWorks and HVP Generic Overall Product Test Strategy |
|  | Wind River VxWorks and HVP Generic Validation Plan |
|  | Wind River VxWorks and HVP Generic Product Release Profile/Plan |
|  | Wind River VxWorks and HVP Generic Roles and Responsibilities |
|  | Wind River VxWorks and HVP Generic Process Definition |
|  | Wind River VxWorks and HVP Generic Glossary |
|  | Wind River VxWorks and HVP Generic Document Responsibility Matrix |

Table : Applicable Documents

## Readership

This plan will be used by the project Software Quality Assurance (SQA) Lead to follow-up of the processes used during the program release, collecting the objective evidence.

This plan is also intended for use by the certification authorities and their designees to allow a review of the intended software quality approach and to allow determination of the adequacy of the quality processes used.

## Glossary and Acronyms

For a list of terms and acronyms used in this document, refer to the Glossary document [Ref.8].

# Lifecycle

## Lifecycle Overview

The software lifecycle processes used in the software development of the program releases are described in the Lifecycle Activities section in the SDP [Ref.1].

# Responsibility and Environment

## Responsibility

The Software Quality Assurance (SQA) Lead conducts audits by reviewing processes, talking to project team members, and analyzing quality records. The SQA Lead specifies and documents quality goals, activities, and roles.

The SQA Lead seeks objective evidence on whether the audited activities comply with the requirements of the following documents:

* Software Development Plan
* Software Configuration Management Plan
* Software Quality Assurance Plan [this document]

Audit results and checklists are recorded in the internal audits reports stored in the Audit and Noncompliance system.

The SQA roles and responsibilities are defined in the Roles and Responsibilities [Ref.6] document. Refer to the Roles and Responsibilities document for SQA Lead competency requirements.

Specific training needs shall be identified based on experience and previous training. A training plan shall be written and a training record kept to track process training and other required training.

### Independence of Roles

The SQA Lead reports up through its organization and is independent of the Engineering Manager. The SQA Lead does not report through the Engineering Program Manager (EPM).

## Environment

### Program Release Reporting Structure

In the context of the program release, the Development & Test Manager, Technical Feature Owner and report to the Engineering Director.

The Product Manager is a proxy for the customer and also reports to the Engineering Director in the context of the project.

The SQA lead reports to the Director of Engineering Systems/Certification Office Head. This reporting structure ensures the independence of roles.

The following figure illustrates the Wind River VxWorks and HVP program release reporting structure under which development will be conducted for the product. This figure is NOT a representation of the company organization structure.

The Generic Roles and Responsibilities document [Ref.6] further describes the roles and responsibilities of team members for the program release.



Figure : Project Reporting Structure

### Interfaces

The term interface is defined as the lines of communication between functional leads and program release team members.

SQA is the contact point for the queries with regards to SW quality assurance.

Regular status is reported informally through regular scrum meetings with the Engineering Program Manager (EPM). The SQA Lead interfaces with all the program key stakeholders (e.g., EPM, Product Manager, Technical Feature Owner, Development and Test Manager, SCM Lead, etc.)

SQA will participate in the certification audit and provide evidence of quality assurance activities.

### Software Standards and Checklists

The Software Development Plan [Ref.1] the document describes the following standards in use by the Wind River VxWorks and HVP program releases:

* Wind River VxWorks and HVP Generic Coding Standard
* Wind River VxWorks and HVP Generic Design Specification Standard (DSS)
* Wind River VxWorks and HVP Generic Requirements Specification Standard (RSS)

SQA audits all engineering activities and the outputs against these standards at the end of each release (before the RTO milestone). The RSS is used during the requirements activities, the DSS is used during the design activities and the Coding Standard is used during the coding activities. The standards are used when auditing the requirements, design, and coding activities.

### Tools and Methods

The software development environment is described in the SDP [Ref.1]. The SQA Lead has full read/write access to the entire software development environment CM system. For details of the CM system and software change process, refer to the Software Configuration Management Plan [Ref.2].

Tools/Resources include but may not be limited to the following:

* Configuration Management system
* Change Management system
* Action Tracking system
* Defect Management system
* Audit Tracking system
* Program Release Management system
* Requirements Management system

The Tools and Environment or Product Release Profile/Plan document will call out the exact tools that will be used.

The tools/resources allow SQA access to all controlled configuration items such as requirements, design, code, tests, and other documentation and reports.

# Software Quality Assurance

The quality assurance activities are necessary to enforce compliance with plans and to ensure that an audit trail can be established to allow verification and validation activities to be undertaken effectively. To achieve this goal, SQA shall:

* Plan, execute and monitor audits
* Document and monitor noncompliances
* Document and monitor defects (corrective actions)
* Document and monitor risk mitigation plans (preventive actions)

## Internal Audit and Noncompliance Process

The internal audit and noncompliance processes are documented as part of the Generic Process Definition [Ref.7].

## Audit Sampling Methodology (review/confirm with NL)

Sampling methodology is different for small and large populations of data. The selection of 50 sample items as the cutoff between small and large was done based on the size of data that can be examined manually.

Small populations (≤ 50): In audits involving a small number of items, no sampling shall be used and all items shall be examined.

Large populations (> 50): If a large population can be audited reasonably by the use of automated scripts or queries, the entire set shall be examined. If examination of a large data set is done manually, the auditor may choose to not examine every object, and may instead use systematic sampling. Systematic sampling shall examine every *kth* sample item from a random starting point. Choosing to use systematic sampling is up to the professional judgment of the auditor based on the auditor’s assessment of the risk in using sampling methodology.

## Quality Assurance Activities

### Quality Process Audit

An internal audit checklist shall be created using the criteria identified in the process definition and generic plan documents. The following areas were agreed to by the key stakeholders (Engineering Program Manager, and Engineering Manager) as covering the core processes that are key to product quality. SQA audit is performed at the end of each release before the RTO milestone completion. These areas shall be audited during each Continuous Delivery (CD) release:

* Requirement management
* Defect management
* Architecture and design
* Coding
* Verification and Validation

SQA audits the change requests and defects to ensure that they are properly resolved.

### Security Audit – Check with Kitty, Martin, and Roger

The Security audit is described in the Security Plan or Security Section of the SDP and performed by the Security Lead along with SQA.

One of the Security audit objectives is to verify that the security-related practices are followed as defined in the Security Plan or Security Section of the SDP.

### Configuration Management Audit – Check with Kitty & Martin

The configuration management audit is described in the Software Configuration Management Plan [Ref.2] and performed by the Configuration Management Lead along with SQA.

One of the CM audit objectives is to verify that the software life cycle data is controlled by the lifecycle controls defined in the Software Configuration Management Plan.

### Customer Audit (performed by the customer)

The Engineering Program Manager and SQA work together to accommodate and support customer audits of VxWorks and HVP programs, if applicable.

## Management Review

SQA participates in Management reviews. Management review is a routine (cross-functional leads), periodic evaluation to help improve performance, identify recommendations for improvement or corrective actions for the deficiencies and inefficiencies raised during the reviews.

Management review enables Wind River management to gain insight into the implementation of software lifecycle processes across all projects.

Management reviews are documented through meeting minutes.

## Quality Records

SQA activities and results will be maintained as action items in the Action Tracking System. These include:

* Review records
* Audit reports
* Action items (corrective action follow-up)
* Checklists (e.g., audit/review)
* Management Review minutes

The quality records will be maintained and archived under the CM system.

# Plan Review and Approval

The Software Quality Assurance Plan (this document) shall be modified and controlled as specified in the Software Configuration Management Plan [Ref.2].

The plan shall be modified and controlled and any recommended changes to this document shall be reviewed and approved before the start of every program release.  The SQA Lead shall make the necessary updates and submit the plan for internal review (with key stakeholders) and approval.