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D4 MARTe Quality Assurance Plan

Under the Specific Contract no. F4E-OFC-361-06, with subject “Fast plant controller prototype”, this document is deliverable D4 MARTe Quality Assurance Plan (QAP).

This plan establishes process and procedures used to achieve the objectives of the quality assurance process for the development of the MARTe framework. The QA processes described in this plan are conforming to the requirements of ...

Approval Process			
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MARTe Quality Assurance Plan

Fast plant controller prototype (F4E-OFC-361-06)

Summary

Under the Specific Contract no. F4E-OFC-361-06, with subject “Fast plant controller prototype”, this document is deliverable D4 MARTe Quality Assurance Plan (QAP).

This plan establishes process and procedures used to achieve the objectives of the quality assurance process for the development of the MARTe framework. The QA processes described in this plan are conforming to the requirements of F4E-QA-115 - Supplier Quality Requirements (F4E_D_22F8BJ v4.0).

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0 INTRODUCTION

0.1 Purpose and scope of the document

Under the Specific Contract no. F4E-OFC-361-06, with subject “Fast plant controller prototype”, this document is deliverable D4 MARTe Quality Assurance Plan (QAP).

This plan establishes process and procedures used to achieve the objectives of the quality assurance process for the development of the MARTe framework. The QA processes described in this plan are conforming to the requirements of F4E-QA-115 - Supplier Quality Requirements (F4E_D_22F8BJ v4.0).

0.2 Relationship to other plans

Next figure shows the relationship between this plan and the other plans referenced in this document.

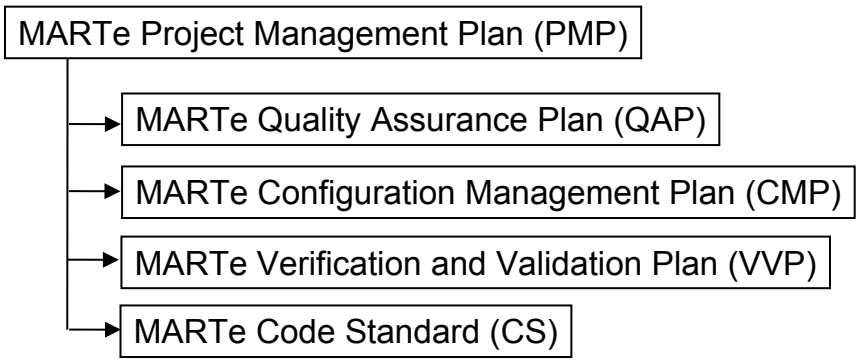

Figure 1 Relationship to other plans

Quality, configuration management and verification processes are known as integral processes. That is, they are present during the entire software life cycle of MARTe.

0.3 MARTe framework overview

MARTe (Multithreaded Application Real-Time executor) is a multi-platform C++ real-time control middleware, with a simulink-like way of describing the problem. It allows for a modular development and execution environment to control systems, which ensures and monitors real-time, and facilitates test and commissioning.

The project objective is to develop a MARTe2 version, which will be the result of a reduction exercise of the core framework with the lessons learned from MARTe. This version will incorporate an integral quality assurance process.

0.4 Applicable and reference documents

Ref.	Code	IDM / Date	Ver.	Description
AD1	MARTe-P-PMP-01	F4E_D_2RBL9F	1.0	MARTe Project Management Plan

Table 1 Applicable documents

Ref.	Code	IDM / Date	Ver.	Description
RD1	MARTe-P-CIE-01	F4E_D_2JEP9G	1.2	MARTe Continuous Integration Environment
RD2	MARTe-P-DEN-01	F4E_D_2SB7R8	1.1	MARTe Development Environment
RD3	MARTe-P-VVP-01	F4E_D_3S94CT	1.0	MARTe Verification and Validation Management Plan
RD4	MARTe-P-CMP-01	F4E_D_2R5FL3	1.0	MARTe Configuration Management Plan

Table 2 Reference documents

0.5 Definitions, acronyms and abbreviations

Term	Definition
AD	Applicable Document
API	Application Program Interface
CCS	CODAC Core System
CM	Configuration Management
ITER	International Thermonuclear Experimental Reactor
F4E	Fusion for Energy
IDM	ITER Document Management
MARTe	Multithreaded Application Real-Time executor
RD	Reference Document
QA	Quality Assurance
QO	Quality Officer

Table 3 Definitions, acronyms and abbreviations

1 ORGANIZATION AND ENVIRONMENT

1.1 Organization

The MARTe project manager is responsible for appointing a quality officer (QO) for the quality assurance (QA) process. The QO will guarantee that the QA activities are executed accordingly to the software development process defined in [AD1].

The QO conducts independent reviews and audits all data and processes involving the development, production, and maintenance of MARTe deliverables. QO verifies the degree of compliance for project applicable standards, and project plans and processes. QO is responsible for ensuring that standards and procedures are being followed during the project life cycle, and that the quality of the delivered product is not compromised.

1.2 Resources and Tools

QO has access to the software configuration management resources included. See the CMP [RD4] for details about CM processes and system.

This method allows the QO access to all project-controlled data including source code, tests and documentation.

QO uses the project's Redmine tool (https://vcis-redmine.f4e.europa.eu/projects/marte2) for reporting.

2 QA ACTIVITIES

The primary QA activities are:

- Audit requirements, software, verification data and documents;
- Document the result of each review and audit;
- Perform follow-up actions to verify resolution of discrepancies;
- Monitor software development life cycle activities and products.

Review and audit results are recorded in checklist and memos. Checklist templates are identified and maintained under CM.

2.1 Audits

QA conducts audits during the project life to verify the compliance with the performance and milestones described in the CMP [RD4 §2.2].

Any discrepancies will be documented in an audit report provided to the MARTe Project Manager.

Audits are held during the project's life cycle phases to verify product consistency as it evolves through the development process, and that the established processes for the current phase are employed. Audits are performed early in the phase to ensure the correct processes are used form the start.

Audits can also determine whether processes are compliant with applicable process standards (i.e. auditing the process to determine if process rules are being followed). Input material for an audit includes formal process descriptions and transition criteria documented in the PMP [AD1], and evidence of process execution.

Audits are conducted to established requirements, captured design, reviewed code and test. Audits are focused on the following information:

1. Inputs and outputs of each life cycle phase (see PMP [AD1 §5]);
2. Checklists and responsible assigned to complete the checklists (see VVP [RD3 §3]);

Relevant questions:

- Were the correct checklists / audit review reports used and are the items under CM control?
- Were the checklists (audit review reports) completed correctly?
- Was there compliance with the applicable standard?
- Has the transition criteria been met (reference applicable subsection in PMP [AD1 §5])?

The result of all audits are documented by using *redmine*, which identifies the discrepancies found and provide an overall process assessment. The assessment is stated as Approved, Approved with Actions or Failed. Significant compliance deviations are noted and must be followed up to ensure their correction, resolution, or waiver.

QA audits the project's software development life cycle processes to verify compliance with plans and standards. Audits may be scheduled or performed without notice to determine if processes are being followed consistently. Audits may be comprehensive, or based on a random sample of the information being audited. The result of all audits will be retained for the life of the project. If

audit results indicate a need for corrective action, then a follow-up review will be performed to determine whether the corrections have been made and are adequate.

QA will audit data archives to determine whether data that should be in the archive is physically present. These archives may include file cabinets containing hard-copy data, and digital copies of data in the project configuration management system.

QA will document the audit approach and results in an audit report. Copies of the audit report are maintained by QA and provided to the Project Manager. The report will describe:

- Type of audit performed (e.g. *Scheduled* or *Unexpected)*;
- Scope of the audit: (e.g. *Total* or *Partial*);
- Date of the audit (in format DD/MM/YYYY);
- Project audited (e.g. MARTe2; if *Partial* then specify the area/component/level audited);
- Audit findings;
- Required corrective actions (if any).

MARTe Project Manager has the responsibility to solve any deficiencies identified in the QA audit reports.

If the audit examination indicates deficiencies in the audited areas or other areas, additional audits will be conducted to identify and correct the deficiencies.

2.2 Audits triggering

These are the main events triggering audits:

- Product release. Each time a new MARTe2 release is intended, an audit on the full lifecycle must be done [AD1 §3.2.1].
- Stakeholder's request. Third parties directly or indirectly related to MARTe2 may be interested in reviewing its process or results. If this were the case, MARTe Project Manager could trigger an audit to answer their needs.

3 PROCESS TIMING AND TRANSITION CRITERIA

The QO's involvement starts when the project team considers an item is ready for a review. The QO will review, comment on, and approve the data. QO also performs periodic audits in order to control the project status and ensure that the process is properly followed according to project standards.

QO may review or audit any part of the project at any time to determine whether established plans and procedures are followed.

4 PROCESS IMPROVEMENT

The effectiveness of QA processes and other project development processes are continually evaluated by QO and MARTe development team. When process deficiencies or potential improvements are identified, they are entered into the project's Redmine tool as Task issues, labelled with an identifier such as "[QA-*start* / *stop* / *continue*] descriptive title".

In order to facilitate the gathering of these deficiencies / improvements, a retrospective meeting will be planned at the end of each iteration development process. In that retrospective, the team members will be asked to openly identify issues, which will be classified into one of the following three types:

- Things that the team should start doing
- Things that the team should stop doing
- Things that the team should continue doing

Approved process improvements are implemented by updating the appropriate standards, procedures, processes, checklists, or other related documentation (which are controlled configuration items).

5 CONTRIBUTORS CONTROL

Although there are no sub-tier suppliers in the framework of this project, data concerning the software requirements phase will be directly provided by F4E. In that phase, F4E will be subjected to the QA activities described in this plan.

6 ISSUE TRACKING

Change control process uses redmine system to document and track changes to controlled data. Change control process is based on two activities:

- Problems reports management: A problem report will be closed after review of the Project Manager and QO during internal peer reviews previous to formal reviews;
- Change request management: A change request will be accepted and closed after approval from the Project Manager and QO during internal peer reviews previous to formal reviews.

7 QA RECORDS

During MARTe software development life cycle, all QA activities and results will be maintained on redmine. These redmine issues include all QA communications and reports including:

- Review and audit reports;
- Checklist;
- Meeting minutes.

The QA records shall be maintained in electronic form.

After product delivery, QO will export the QA records from redmine to PDF files for the archiving of all quality assurance activities performed.