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HANDBOOK

SOFTWARE PRODUCT ASSURANCE CONTENT OF A SOFTWARE QUALITY CONTROL PLAN

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LIST OF ABBREVIATIONS

CALLIOPE	Software Design Methods Support Tool
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organisation for Standardisation
PCQ	Quality Control Plan
PQL	Software Quality Plan
SADT	Structured analysis and Design Technique
DBMS	Database Management System

CONTENTS

1. INTRODUCTION

This document, "Content of a Software Quality Control Plan", is part of the collection of Handbooks associated with the DR1 standard.

2. PURPOSE

This document describes the content of a Software Quality Control Plan, that is to say it is the document which exhaustively describes all the inspections a supplier agrees to carry out to ensure that all the stipulations defined in the Software Quality Plan have been applied.

The quality control activities form part of the quality actions described in the le PQL. The PCQ can be either a chapter of the PQL or a distinct document called by the PQL.

For all the development production (intermediate or final), it describes the list of items to be inspected, the type of inspections to be carried out, the means to be implemented and the type and form of the results expected.

3. DOMAIN OF APPLICATION

This document is complies with the customer - supplier relationship logic, it is therefore applicable to all levels of a project's manufacturing organisation.

This document aims to be as exhaustive as possible in order to cover a maximum of situations; it must therefore be adapted to the specific features of each project.

Its content has a relatively wide coverage and must be able to be applied to all "scientific" or "real-time" projects in the space domain. However, certain specific concepts like, for example, the use of the DBMS or Artificial Intelligence techniques are not covered in the current version of this document; they will basically have an impact on the type of inspections on the products.

4. REFERENCE DOCUMENTS

[DR1] Software Product Assurance
RNC-ECSS-Q-ST-80

[DR2] Contenu d'un bilan qualité logiciel
RNC-CNES-Q-HB-80-510

[DR3] Guide pour la sélection et l'interprétation des mesures de complexité du logiciel
RNC-CNES-Q-HB-80-503

[DR4] Contenu d'un bilan de projet logiciel
RNC-CNES-Q-HB-80-511

[DR5] Evaluation of Software Products
NF ISO/IEC 9126 (Z67-133)

[DR6] The development of Metrics for Software
Proceedings of the annual Reliability and Maintainability Symposium 1978, IEEE

5. APPLICABLE DOCUMENTS

None

6. BASIC PRINCIPLES OF THE METHOD

The Software Quality Control Plan must be established right from the start of the project, in parallel with the Quality Plan for the software. It follows the same approval rules between customer and supplier as the Quality Plan (cf. DR1), as well as the modification and concession rules defined at project level.

It describes all the inspections to be carried out on each product and on the associated processes during development. If the characteristics of the project (size, ...) justify the implementation of sampling inspections, the scope of the inspections must be defined taking into account the relative criticalities of the components of the software considered.

A software product is comprised of all the elements resulting from the development process such as, for example: a text document whatever it might be, SADT diagrams, a CALLIOPE pseudo-code listing, the source code, installation or generation procedures, ...

The following list (list not exhaustive, given as an indication only) can be used as a basis for identifying the types of inspections to be carried out:

- checking the application of the rules concerning product development (specification rules, design rules, coding rules, documentation standards, standard document plans, ...),

- checking a product's internal coherence: ensuring that there is no ambiguity, contradiction, redundancy, or superfluous elements,..., within the same product

- checking a product's external coherence: ensuring that there is no ambiguity, contradiction, redundancy, or superfluous elements,..., between different products,

- checking that the project management procedures are applied (configuration management rules, test or acceptance management rules, archiving rules, ...),

- checking the configuration status,

- checking the implementation of verification actions performed by the development team (cross reading, traceability matrices, ...),

- ...

7. DESCRIPTION OF THE METHOD

7.1. Table of Contents for the Software Quality Control Plan

The PCQ's table of contents must be based on the following structure:

1. INTRODUCTION
    - 1.1. Purpose
    - 1.2. Applicable Documents and Reference Documents
2. LIST OF ITEMS TO BE INSPECTED
3. DESCRIPTION OF THE INSPECTIONS
    - 3.1. Objectives of the Inspections
    - 3.2. Type of Inspections
    - 3.3. Inspection Points
    - 3.4. Inspection Means
    - 3.5. Scope of the Inspections
4. SUBCONTRACTOR INSPECTIONS
5. EXPECTED INSPECTION RESULTS
    - 5.1. Formalisation of the Inspection Results
    - 5.2. Documents Associated with the Results
6. INSPECTION SUMMARY

7.2. Software Quality Control Plan Drafting Guide

Each PCQ must systematically cover the points explained below and, where necessary, specify the points which are not applicable.

In the case of development subcontracted by a supplier, the supplier's PCQ must describe the software quality control actions carried out with respect to each of his subcontractors.

In addition, where applicable, the supplier's PCQ must indicate the actions which can be carried out on his behalf by an external organism (e.g.: company specialised in software quality control).

1. INTRODUCTION

1.1. Purpose

Here we give a brief reminder of the characteristics of the project, the supplier's responsibilities, and we specify the product(s) concerned by this PCQ (if necessary, with the subsystem to which the products belong).

1.2. Applicable Documents and Reference Documents

We give a reminder of the references of the customer's applicable requirements:

- Software Quality specifications for the project considered,

and the references of the supplier's specific responses:

- Software Quality Plan for the project considered,
- associated standards or rules,
- Configuration Management Plan for the project,
- Documentation Management Plan for the project.

2. LIST OF ITEMS TO BE INSPECTED

For each product concerned by the PCQ (cf. *1.1* below), we indicate the items to be inspected by precisely identifying them.

3. DESCRIPTION OF THE INSPECTIONS

For each element in the above list, we fill in the following items:

3.1. Objectives of the Inspections

In this paragraph we describe the objectives of the inspections which will be carried out and give the references of the software quality objectives described in the Software Quality Plan.

If a structured software quality evaluation procedure (cf. DR5 or DR6, for example) is applied, it is described in this paragraph. We detail each of the steps in the procedure and the rules for moving from step to step.

3.2. Type of Inspections

Here we give the complete list of all the types of inspections which will be carried out during development, whoever may be responsible for them (technical supervisor or quality supervisor, supplier or subcontractor, ...).

These inspections are transformed into concrete measures for evaluating whether the objectives given in paragraph *3.1* have been respected.

We indicate the inspections on the products (e.g.: ensuring that the specification drafting rules are have been respected) and the inspections on the process (e.g.: ensuring that the author-reader cycles have been respected for the specifications).

3.3. Inspection Points

Here we indicate the different inspection points associated with each type of inspection identified in the previous paragraph; these inspection points are indicated in the form of rendezvous points with the development cycle and not in the form of dates (which would change during development).

The rendezvous can be: at the start, during or at the end of a development phase; before or after a review; before acceptance, contractual delivery (specify how many working days before), ...

3.4. Inspection Means

Here we list the different tools which will be used to carry out the inspections: complexity measurement tools, automatic coding rule inspection tools, test cover measurement tools, ...

In the case of complexity analysers (cf. DR3) or of test cover, we specify which measurements will be considered as significant, the associated thresholds, and how these thresholds will be used as indicators for additional manual inspections.

If no tools are used, we define the inspections which will be performed manually (cross reading, code inspections, ...).

3.5. Scope of the Inspections

For each type of inspection, we specify if it is exhaustive, or performed on samples. An inspection can be performed on samples:

- on a number of items; we then describe the planned sampling rate, and indicate the criteria on which this rate was established (e.g.: use of the list of critical items, cf. DR1).

- on a number of rules; we then specify the subset of rules to be effectively inspected (e.g.: the coding rules which must be inspected on the set of items).

If necessary, we specify the minimum volume for each inspection (minimum percentage of items to be checked with respect to the total number).

Then we indicate how the results from the different inspection tools will be used to reorientate the following tools (e.g.: readjusting the effort on the modules exceeding a given complexity, cf. DR3).

4. SUBCONTRACTOR INSPECTIONS

In the same way as for the supplier (cf. §3 above), we define the inspections the supplier must carry out on his subcontractors' products and processes.

5. EXPECTED INSPECTION RESULTS

5.1. Formalisation of the Inspection Results

We describe the procedures and tools implemented at project level to memorise the different inspections performed, with their results, and to monitor the progress of the actions resulting from them.

In general, traceability and monitoring of inspections is based on inspection sheet management, assured by the quality supervisor. We then describe in detail:

- the management circuit for these sheets and the associated actions,
- the formulas used,
- the use of the support tool for this management.

Whatever the monitoring system implemented, it must allow the state of progress of the inspections to be known at any moment, as well as the current state of the remedial actions decided as a result of the inspections.

5.2. Documents Associated with the Results

Here we list the documents which physically represent the inspection results, with their status (this must conform to the contractual procedures of the project):

- inspection sheets: they can at least be consulted by the customer,

- measurement files produced by the inspection tools (static or dynamic analysers): they are deliverable or consultable,

- summary report concerning the inspection sheets and associated actions: it must at least be consultable,

- quality status reviews (cf. DR3), which summarise the inspection results and analyse what has been done with these results: they are deliverable.

6. INSPECTION SUMMARY

A complete summary of the inspections to be carried out is presented in the form of one or more tables which, for each phase in the development cycle, show:

- the list of products and items to be checked,
- the types of inspections to be carried out,
- the inspection action supervisors.

To simplify this summary, the inspections which are systematic or repetitive can be indicated in a specific manner.

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