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MAN-MACHINE LANGUAGE

STRUCTURE AND FORMAT OF QUALITY MANUALS FOR TELECOMMUNICATIONS SOFTWARE

ITU-T Recommendation Z.400

(Previously "CCITT Recommendation")

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation Z.400 was prepared by the ITU-T Study Group X (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

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NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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STRUCTURE AND FORMAT OF QUALITY MANUALS FOR TELECOMMUNICATION SOFTWARE

(Helsinki, 1993)

1 Introduction

As telecommunication applications have grown in functionality, size and complexity, so has the importance of their quality. In order to meet requirements for quality, suppliers of telecommunication products and services need to develop, adopt, and follow a well defined quality system. The quality system should define the organizational structure, responsibilities, procedures, processes, and resources that are needed and used for implementing these requirements. International standards on quality systems for general products/services are provided by ISO 9001. Guidelines for applying ISO 9001 to the development, supply, and maintenance of software are provided in ISO 9000-3, Part 3.

2 Definitions

For the purposes of this document, the definitions given in ISO 2382-1 Part 01, ISO 8402 and ISO 9126 apply.

3 Types of quality manuals

Quality manuals are documents describing quality systems. There are two types of quality manuals:

1) *Operational quality manuals*

   Operational quality manuals are used in the internal supplier's operations, and their target audience is all the suppliers employees. The purposes of these manuals are:

   – to serve as a reference for the procedures, rules, and practices that the supplier's employees should follow in order to ensure that the requirements for quality are met;

   – to serve as the basis for auditing, so that the supplier's management can determine whether these requirements are being met.

2) *Demonstrational quality manuals*

   Demonstrational quality manuals are used to demonstrate the quality system to people outside the supplier's organization, and their target audience is the supplier's customers and potential customers. The purposes of these manuals are:

   – to demonstrate to customers and potential customers that the supplier developed, adopted, and followed a quality system;

   – to present to customers and potential customers the outlines of the quality system;

   – to assure customers and potential customers that the quality system is adequate for their requirements for quality.

Some suppliers may prefer to develop one quality manual to be used for both operational and demonstrational purposes. Other suppliers may prefer to develop two separate quality manuals, one for each purpose. International standards and guidelines for developing quality manuals for general products/services are currently being developed by ISO.

4 Scope

This Recommendation specifies the format of demonstrational quality manuals for telecommunication software. The Recommendation should be used when a supplier of telecommunication products and/or services needs to demonstrate to customers and potential customers the quality system used for creating the software part of the telecommunication products. Suppliers may also use this Recommendation as guidelines for writing their operational quality manual.

NOTES

1 Suppliers may develop manuals describing the quality system of the whole telecommunication product rather than just of its software. In that case it is recommended that the demonstration of the quality system's elements applicable to the software follow the format described below. Elements of the quality system that are not applicable to the software part of the telecommunication product should be demonstrated in additional sections of the quality manual.

2 Elements of the quality system may contain proprietary information. In describing the various elements, the keyword is "demonstrate". That is, the quality manual should prove that the quality system elements are implemented and that they satisfy their requirements. The level of disclosure of actual procedures and tools that constitute the quality system elements should be mutually agreed upon by the supplier and the customer.

5 Format of the quality manual

Annex A outlines the recommended format of a quality manual, its sections and the contents of each section.

Annex A

Recommended format of a quality manual, sections and contents of sections

(This annex forms an integral part of this Recommendation)

A.1 Title pages

A.1.1 Approval and authorization

The quality manual should be accepted at the highest level of the supplier's management. The front page of the manual should contain the necessary statements and signatures of the approving managers to certify full acceptance of the quality manual.

A.1.2 Issue identification

This section of the quality manual should show the supplier's document identification of the manual and should provide a summary of the different text units version numbers as well as the dates that they became official.

A.2 Table of contents

A table of contents should show the names of the sections within the quality manual and how they can be found. The numbering/coding system of sections, subsections, pages, figures, exhibits, diagrams, tables, etc. should be clear and logical.

A.3 General information

A.3.1 Introduction

This section should provide an introductory overview of the quality manual.

A.3.2 Scope

This section should describe the purpose of the quality manual and its intended audience. It should state whether the manual describes the quality system for all the supplier's telecommunication products or the quality system for some specific products; whether it describes the quality system for the whole product or only its software part; and whether it is used as a demonstrational quality manual, operational quality manual, or both.

A.3.3. Revisions and maintenance procedures

This section should describe or reference the procedures for maintaining and changing the quality manual. It should show how the quality manual is maintained, who reviews its content and how often, who is authorised to change the manual, and who is authorised to approve the changes.

A.3.4 History of changes

This section should contain the history of the quality manual, including dates of previous issues and a brief description of the changes from one issue to the next.

A.3.5 Distribution control

This section should briefly describe the procedures used to control distribution of the quality manual. If appropriate, the section may include a distribution list showing the number of quality manuals in existence and the holders of the numbered copies.

A.4 Quality system – Framework

A.4.1 Quality policy

This section is where the supplier's management documents its quality policy, goals, and values; how they are being communicated to and made understood by all levels of the organization; and how their implementation is ensured. This section should reflect section 4.1.1/ISO 9001:

> *The supplier's management shall define and document its policy and objectives for, and commitment to, quality. The supplier shall ensure that this policy is understood, implemented and maintained at all levels of the organization.*

A.4.2 Organization

A.4.2.1 General

This section should provide a high level view of the supplier's organization.

A.4.2.2 Quality organizations

This section should provide a detailed description of the supplier's quality organizations. The section should demonstrate that the responsibilities, authorities, and interrelations of all personnel and organizations who manage, perform, and verify work affecting quality are well defined.

A.4.3 Quality system

This section should show that the quality system as described in the quality manual is an integrated process that is carried throughout the entire life cycle of the telecommunication software. The section should provide references to related documents that describe the quality system's implementation.

A.4.4 Internal quality audits

This section should demonstrate that the supplier implemented a comprehensive system of planned and documented audits to

- verify that all of the quality system's procedures, activities and elements are being followed;
- determine the effectiveness of the quality system.

A.4.5 Corrective actions

This section should describe the requirements for corrective actions and demonstrate that the supplier established, documented, and implemented procedures for

- analyzing processes and procedures to detect and eliminate potential causes of nonconforming software;
- investigating the causes of nonconforming software occurrences;
- applying corrective actions needed to prevent recurrence of nonconformity;
- implementing and recording the changes in processes and procedures that result from the corrective actions.

A.5 Quality systems – Life cycle activities

A.5.1 Contract review

This section should demonstrate that the supplier established, documented, and implemented procedures for reviewing contracts. The procedures should be demonstrated as adequate for ensuring that

- the scope of the contract and its requirements are defined and documented;
- the supplier has the capability to meet all contractual requirements;
- acceptance criteria are defined and documented;
- all information required by the customer from the supplier and by the supplier from the customer is well defined.

A.5.2 Requirements specification

This section should demonstrate that the supplier established, implemented, and documented procedures for creating a complete set of requirements and that the requirements satisfy the contractual agreement with the customer.

A.5.3 Development planning

This section should demonstrate that the supplier established, documented, and implemented procedures for planning the software's development. It should be demonstrated that the development plan includes

- allocation and organization of resources (human resources, non-human resources and subcontractors) that are adequate for developing the software;
- definitions of the quality objectives;
- assignment of responsibilities;
- division of the development into logical phases;
- definitions of the required inputs to, outputs from, and verifications of each development phase;
- definitions of entrance and exit criteria for each phase;
- schedule;
- progress control.

A.5.4 Design and implementation

This section should demonstrate that the supplier established, documented, and implemented procedures for designing and implementing the telecommunication software. It should be clear that

- the procedures constitute a systematic methodology that is appropriate and adequate for telecommunication software;
- the procedures ensure that the software satisfies all of its requirements.

A.5.5 Testing and validation

This section should demonstrate that the supplier established, documented, and implemented procedures for testing and validating the software. It should be demonstrated that these procedures ensure that

- the testing and validation are planned and the plan is documented;
- all the resources required for testing and validation, including hardware, test environment, and tools, are identified and allocated;
- the testing and validation are complete; all of the software features (including quality features such as performance, robustness, usability, etc.) are tested and validated;
- all discovered problems and their possible impacts are recorded and solved;
- changed software and all other parts of the software that may be affected by the change are retested.

A.5.6 Maintenance

This section should demonstrate that the supplier established, documented, and implemented procedures for maintaining the software after it was delivered to the customer. It should be demonstrated that the procedures guarantee that

- the maintenance activities are planned and the plan is documented;
- an organization to coordinate and support the maintenance activities is defined;
- the interface between the supplier and the customer is well defined;
- the supplier's response time for addressing problems reported by the customer conforms to the contractual requirements;
- any changed or additional software conforms to the requirements for quality;
- interference with the customer's operations due to the installation of changed or additional software does not exceed the contractual limitations.

A.6 Quality system – Supporting activities

A.6.1 Configuration management

This section should demonstrate that the supplier established, documented, and implemented a system for configuration management, consisting of tools and procedures, for identifying, controlling, and tracking the versions of each software unit (including related documentation). It should be demonstrated that the configuration management system guarantees that

- changes in the software are carried out according to approved procedures;
- changes in the software can be identified and traced;
- simultaneous updating of a software unit by two or more persons is controlled;
- the version of each software unit is uniquely identified;
- the versions of all software units that together constitute specific version of a complete software product are identified.

A.6.2 Document control

This section should demonstrate that the supplier established, documented, and implemented procedures to control all documents relating to the quality system. It should be demonstrated that the procedures ensure that

- all documents subject to the document control procedures are identified;
- all documents are reviewed and approved by authorized personnel prior to their issuance;
- changes to documents are made, reviewed, and approved by authorized personnel;
- obsolete documents are removed from the points of issue and use.

A.6.3 Measurements

This section should demonstrate that the supplier established, documented, and implemented procedures and tools to collect and analyze relevant data so that quantitative measures of the telecommunication software quality and the processes used to develop the software can be obtained. In addition, it should be demonstrated that

- data is collected and analyzed on a regular basis;
- objectives for the expected results of the quantitative measures are defined and documented;
- procedures are defined and documented for corrective actions to be applied when the quantitative measures do not conform to the objectives.

NOTE 1 – Documentation can be either in the format of paper or electronic media that can be accessed on line.

A.6.4 Rules, practices and conventions

This section should demonstrate that the supplier established, documented, and implemented rules, practices, and conventions (e.g. coding standards, documentation standards, etc.) for developing the software.

A.6.5 Tools and techniques

This section should demonstrate that the tools, facilities, and techniques used for developing the telecommunication software are adequate and effective.

A.6.6 Purchasing

This section should demonstrate that the supplier established, documented, and implemented procedures for evaluating the adequacy of purchased products. A purchased product may be software intended for inclusion in the telecommunication software itself or a tool intended to assist in developing the software.

A.6.7 Human resources management

This section should describe or reference the requirements for managing human resources. Examples of topics to be included are

a) description of or references to training requirements;

b) description of or references to procedures involving employee recognition and performance measurement.

Bibliography

[1] ISO 2382-1: 1984, *Data Processing – Vocabulary – Part 01: Fundamental terms*.

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[3] ISO 9000: 1987, *Quality Management and Quality Assurance standards – Guidelines for selection and use*.

[4] ISO 9001: 1987, *Quality System – Model for quality assurance in design/development, production, installation and use.*

[5] ISO 9000-3: 1990, *Quality Management and Quality Assurance standards – Part 3: Guidelines for the application of ISO 9001 to the development, supply, and maintenance of software*.

[6] ISO 9126: 1991, *Information Technology – Software Product Evaluation – Quality characteristics and guidelines for their use*.