ICS 35.240.99, 49.140 TECHNICKÁ NORMALIZAČNÁ INFORMÁCIA Január 2022

TNI	**Zabezpečovanie výrobkov kozmického programu Posudzovanie a zlepšovanie softvérového procesu Časť 1: Rámec**	**TNI CEN/CLC/TR 17602-80-11** 31 0539

Space product assurance - Software process assessment and improvement - Part 1: Framework

Táto technická normalizačná informácia obsahuje anglickú verziu CEN/CLC/TR 17602-80-11:2021.
This Technical standard information includes the English version of CEN/CLC/TR 17602-80-11:2021.

Táto technická normalizačná informácia bola oznámená vo Vestníku ÚNMS SR č. 12/21

obsahuje farebné strany

134184

Úrad pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky, 2022
Slovenská technická norma a technická normalizačná informácia je chránená zákonom č. 60/2018 Z. z. o technickej normalizácii.

TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

CEN/CLC/TR 17602-80-11

October 2021

ICS 49.140; 35.240.99

English version

Space product assurance - Software process assessment and improvement - Part 1: Framework

Assurance produit des projets spatiaux - Evaluation et amélioration des processus logiciel - Partie 1: Principes

Raumfahrtproduktsicherung - Software - Prozessüberprüfung und -verbesserung - Teil 1: Grundstruktur

This Technical Report was approved by CEN on 13 September 2021. It has been drawn up by the Technical Committee CEN/CLC/JTC 5.

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Ref. No. CEN/CLC/TR 17602-80-11:2021 E

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European Foreword

This document (CEN/CLC/TR 17602-80-11:2021) has been prepared by Technical Committee CEN/CLC/JTC 5 “Space”, the secretariat of which is held by DIN.

It is highlighted that this technical report does not contain any requirement but only collection of data or descriptions and guidelines about how to organize and perform the work in support of EN 16602-80.

This Technical report (CEN/CLC/TR 17602-80-11:2021) originates from ECSS-Q-HB-80-02 Part 1A.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document has been developed to cover specifically space systems and has therefore precedence over any TR covering the same scope but with a wider domain of applicability (e.g.: aerospace).

Introduction

This handbook provides a framework for the assessment and improvement of software processes for the European space industry and organizations, weather customers or suppliers.

The framework presented in this handbook is called SPiCE for Space (S4S). As its name already mentions, S4S is based on SPICE (Software Process Capability dEtermination), a major international initiative to support the development of ISO/IEC 15504. In turn, ISO/IEC 15504 provides a common internationally recognized framework for the terminology and reference process assessment description.

The process assessment and improvement standardization efforts within the SPICE project have tried to be as general as possible, to be applicable to all domains, including the space domain. The space software development processes are not substantially different from software processes in some other application domains (e.g. defence, public transport), therefore S4S uses the material provided in ISO/IEC 15504 'as is' as much as possible.

The major benefits of using a standardized approach to process assessment and improvement are that it can:

- lead to a common understanding of the use of process assessment for process improvement and capability determination;
- facilitate capability determination in procurement;
- contribute to increase the efficiency and competitiveness of an organization
- be controlled and regularly reviewed in the light of experience of use;
- be changed and improved only by international consensus;
- encourage harmonization of existing schemes

Nevertheless, a number of requirements were identified from the ECSS Standards which appear to be unique, or which are of particular importance for space software processes. All space requirements not adequately represented within the ISO/IEC 15504 process assessment model were addressed and incorporated into S4S.

This Handbook provides the instruments and information to determine the level of process performance and capability, to improve the software processes identifying the changes or additions that should be done, and to ensure that all ECSS requirements are met for a given project. ECSS Standards impose requirements on processes but do not constitute process descriptions themselves.

S4S can be used by an organization to:

- understand the state of its own processes for process improvement;
- determine the suitability of its own processes for a particular requirement or class of requirements;
- determine the suitability of another organization's processes for a particular contract or class of contracts;
- improve weaknesses of organization's processes.

As such, this handbook should be of interest to quality managers, project managers, or software process improvement managers of companies and organizations currently within the space domain or who wish to enter the space domain.

S4S allows managers to focus on particular areas for process improvement.

Organisations performing their own internal assessments can choose to assess a single project, a business unit, or the entire organization, as deemed appropriate. The assessment responsible can select which processes to assess up to which capability level.

Organisations willing to improve their overall quality require using a proven, consistent and reliable method for assessing the state of their processes. They need also the means to use the results as part of a coherent improvement programme. The use of process assessment and improvement within an entire organization enables:

- a culture of constant improvement and the establishment of proper mechanisms to support and maintain that culture;
- the definition and implementation of processes to meet business goals;
- to better control resources, cost and schedule;
- to increase the quality of products and processes;
- to increase the efficiency and competitiveness of an organization.

Customers can also benefit from the use of process assessment and improvement. Its use as means for capability determination or in a conformance assessment can:

- reduce uncertainties in selecting suppliers of software by enabling the risks associated with the supplier's capability to be identified before contract award;
- enable appropriate controls to be put in place for risk containment;
- provide a quantified basis for choice in balancing business needs, requirements and estimated project cost against the capability of competing suppliers.

1 Scope

This handbook defines methods for process assessment and improvement that may be used to meet the requirements on process assessment and improvement of the ECSS-Q-ST-80C subclause 5.7. These methods constitute a clear and proven way of implementing those requirements. Alternative methods can be used provided that they meet the detailed instructions provided in this handbook for recognition of software process assessment schemes and results and process improvement.

This handbook provides a detailed method for the implementation of the requirements of the ECSS-Q-ST-80C for software process assessment and improvement. It also establishes detailed instructions for alternative methods intended to meet the same ECSS-Q-ST-80C requirements.

The process assessment and improvement scheme presented in this handbook is based on and conformant to the ISO/IEC 15504 International Standard. In designing this process assessment and improvement scheme the ISO/IEC 15504 exemplar process assessment model was adopted and extended to address ECSS specific requirements.

The methods provided in this handbook can support organizations in meeting their business goals and in this context they can be tailored to suit their specific needs and requirements. However when used to claim compliance with relevant requirements in ECSS-Q-ST-80C only the steps and activities explicitly marked as recommended in this handbook may be omitted or modified.

2 References

EN Reference	Reference in text	Title
EN 16601-00-01	ECSS-S-ST-00-01	ECSS System - Glossary of terms
EN 16601-10	ECSS-M-ST-10C rev.1	Space project management - Project planning and implementation
EN 16601-10-01	ECSS-M-ST-10-01C	Space project management - Organization and conduct of reviews
EN 16601-40	ECSS-M-ST-40C rev.1	Space project management - Configuration and information management
EN 16601-60	ECSS-M-ST-60C	Space project management - Cost and schedule management
EN 16601-80	ECSS-M-ST-80C	Space project management - Risk management
EN 16602-10	ECSS-Q-ST-10C	Space product assurance - Product assurance management
EN 16602-10-04	ECSS-Q-ST-10-04C	Space product assurance - Critical-item control
EN 16602-10-09	ECSS-Q-ST-10-09C	Space product assurance - Nonconformance control system
EN 16602-20	ECSS-Q-ST-20C	Space product assurance - Quality assurance
EN 16602-20-07	ECSS-Q-20-07A	Space product assurance - Quality assurance for test centres
EN 16602-30	ECSS-Q-ST-30C	Space product assurance - Dependability
EN 16602-40	ECSS-Q-ST-40C	Space product assurance - Safety
EN 16602-80	ECSS-Q-ST-80C	Space product assurance - Software product assurance
EN 16603-10	ECSS-E-ST-10C	Space engineering - System engineering general requirements
EN 16603-10-02	ECSS-E-ST-10-02C	Space engineering - Verification
EN 16603-10-03	ECSS-E-10-03A	Space engineering - Testing
EN 16603-40	ECSS-E-ST-40C	Space engineering - Software

EN Reference	Reference in text	Title
	ISO/IEC 15504: 2003-2006	Information technology – Process assessment Part 1: Concepts and vocabulary (normative) Part 2: Performing an assessment (normative) Part 3: Guidance on performing an assessment (informative) Part 4: Guidance on use for process improvement and process capability determination (informative) Part 5: An exemplar process assessment model (informative)
	ISO/IEC 12207:2004 Amd 1/Amd2	Information Technology – Software life cycle processe

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