



SME initiative

Configuration Management Training

Section 9

Understanding ECSS-M40A

prepared and lectured under ESA contract by

INGENIEURBURO WOLFGANG WEISS

INDUSTRIEBERATUNG

Section 9 - Understanding ECSS-M-40A

- The original scope for the ECSS CM standard
 - Establish level 2 ECSS standard in order to execute paragraph 7.4 of ECSS-M-00 “Policy and principles of space project management”
 - Create a basis set of requirements subject to tailoring (or full application) in the business agreement (contract)
 - Define CM requirements with emphasis on satellite projects
 - Refer to a subset of level 3 ECSS standards, providing guidelines for CM practitioners who have to implement ECSS-M-40A (as tailored)

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- Yet to be established level 3 CM guidelines
 - ECSS-M-40-01 Guidelines for the preparation of CM Implementation Documents (CM plan)
 - ECSS-M-40-02 [Guidelines for the preparation of Functional Specifications]
 - ECSS-M-40-03 [Guidelines for the preparation of Technical Specifications]
 - ECSS-M-40-04 [Guidelines for the preparation of Design Justification Files]
 - ECSS-M-40-05 [Guidelines for the preparation of Interface Control Documents]
 - ECSS-M-40-06 [Guidelines for compilation of end item data packages]
 - ECSS-M-40-07 [Guidelines for the preparation and maintenance of Configuration Log Books]
 - ECSS-M-40-08 [Guidelines for the preparation of User Documentation (installation, user, operating, maintenance manuals)]

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- Yet to be established level 3 CM guidelines (contd)
 - ECSS-M-40-09 Guidelines for the establishment of Software Configuration Files
 - ECSS-M-40-10 [Guidelines for the preparation of Technical Specifications for software products]

Note:

All document titles listed are not confirmed to date

Titles in brackets represent level 3 ESSM standards not mentioned in ECSS-M-40A;
source for such titles is ECSS-M-40 WG Draft 4

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- Walking through section 5 and evaluating the requirements:
Configuration Identification
 - Configuration Items shall be identified in the Product Tree concurrent with the approval of the Technical Specification, ensuring that the complete system is controlled. (Requirement 5.1.1)
 - Expected output: List of Configuration Items
 - The starting point of formal configuration control . . . (Requirement 5.1.2)
 - for Functional Specification it shall be the Functional Specification approved by the consumer at the end of phase A (PRR)
 - for Technical Specification it shall be:
 - » the system TS approved after the SRR,
 - » the product TS approved after the PDR at the end of phase B.
 - of the Design Justification File it shall be the issue of its corresponding Technical Specification

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- Walking through section 5 and evaluating the requirements:
Configuration Identification (contd)
 - The starting point of formal configuration control . . . (contd)
 - for the ICDs it is the ICD version finalized at the CDRs
 - for the Production Master File it is the version of the file approved after the CDR
 - of the User's Manual it is the User's Manual version finalized at the Qualification Review
 - of the Log Book it is the Acceptance Review
 - A unique identification block shall be allocated to each Configuration Item in the Product Tree (Requirement 5.1.3)
 - Expected output: A unique identifier for each Configuration Item.

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- Walking through section 5 and evaluating the requirements:
Configuration Identification (contd)
 - A Configuration Item shall be unambiguously defined in the following manner: (Requirement 5.1.4)
 - its complete design description if it is developed for space application,
 - the list of its performances and interface characteristics (or its procurement specification) if it is a purchased product,
 - its standardized reference if it is a purchased product defined by a standard in the public domain.
 - » Expected output: Technical description of the Configuration Item.
 - All the constituents identified as per 5.1.4 and all the other interchangeable items shall be marked or labeled.

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- Walking through section 5 and evaluating the requirements:
Configuration Identification (contd)
 - The documents required to control a Configuration Item shall be identified during phase B and confirmed at the Preliminary Design Review of the corresponding product, or at latest on signing the development business agreement. (Requirement 5.1.6)
 - EXPECTED OUTPUT: The configuration documentation for the Configuration Items available to the extent required to start phase C.
 - The documentation list which identifies the baseline of a Configuration Item shall be approved by the customer. (Requirement 5.1.7)
 - EXPECTED OUTPUT: The configuration documents of the Configuration Items available for next phase.

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- Walking through section 5 and evaluating the requirements:
Configuration Identification (contd)
 - The supplier shall identify and keep up-to-date the baseline of the product states according to figure 1. (Requirement 5.1.8)
 - The consumer shall maintain the baseline of the Configuration Item throughout its use or operation. (Requirement 5.1.9)
 - EXPECTED OUTPUT: Appropriate identification of the Configuration Item throughout the product life-cycle.
 - Each product forming a Configuration Item shall bear a unique identifier, which is traceable to its technical description.(Requirement 5.1.10)
 - EXPECTED OUTPUT: Coherent product and documents identification system.

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- Walking through section 5 and evaluating the requirements:
Configuration Identification (contd)
 - Interface management responsibilities shall be defined according to ECSS-M-10. Interfaces shall be controlled using Interface Specifications and / or Interface Control Documents / Drawings. (Requirement 5.1.11)
 - EXPECTED OUTPUT: Interface Control Documents / Drawings.
 - Configuration documents (including changes) shall be released according to ECSS-M-50 requirements. (Requirement 5.1.12)
 - EXPECTED OUTPUT: Only released configuration documents in use.

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- Walking through section 5 and evaluating the requirements:
Configuration Control
 - A product's configuration baseline shall be identified by approved documents. (Requirement 5.2.1)
 - EXPECTED OUTPUT: Documented configuration baseline.
 - Document changes are subject to the same authorization and circulation conditions as the initial documents. (Requirement 5.2.2)
 - EXPECTED OUTPUT: Document changes approved or agreed.
 - Formal actions shall be defined for the approval of configuration baselines. (Requirement 5.2.3)
 - EXPECTED OUTPUT: Approval procedure available at reviews.

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- Walking through section 5 and evaluating the requirements:
Configuration Control (contd)
 - A change procedure shall be established to document any evolution of a configuration baseline. (Requirement 5.2.4)
 - EXPECTED OUTPUT: Change procedure.
 - Any evolution of a Configuration Item, in relation to an approved configuration baseline, shall be described, justified and classified by the requesting party, then submitted to the actor's organization responsible for review and approval. (Requirement 5.2.5)
 - EXPECTED OUTPUT: Documented and approved evolution of a configuration item.
 - Proposed changes shall be classified by the originator, according to the rules of the business agreement. (Requirement 5.2.6)
 - EXPECTED OUTPUT: Classification of changes.

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- Walking through section 5 and evaluating the requirements:
Configuration Control (contd)
 - Any evolution of a Configuration Item in relation to a configuration baseline shall be subject, after examination, to an evaluation and decision taken by the assigned control authority and in a formal process to which the actors involved have to contribute. (Requirement 5.2.7)
 - EXPECTED OUTPUT: Assessed and documented impact of the evolution.
 - Any evolution of a Configuration Item's baseline shall be reported in accordance with business agreement requirements. Such evolution to the configuration baseline shall have formal back-up. (Requirement 5.2.8)
 - EXPECTED OUTPUT: Change proposal.
 - The customer or supplier shall initiate all the changes including cost and schedule impacts, by the means of a formal procedure. (Requirement 5.2.9)
 - EXPECTED OUTPUT: Change Proposal disposition.

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- Walking through section 5 and evaluating the requirements:
Configuration Control (contd)
 - Each project actor shall examine, in the time limits specified by the business agreement, any request or proposal for an evolution of a configuration baseline, which is presented to him by his customer or supplier. (Requirement 5.2.10)
 - EXPECTED OUTPUT: Internal procedure for change impact assessment.
 - In all the cases where a negotiated and agreed change proposal affects directly the conditions of the business agreement baseline, the new baseline shall be introduced into the business agreement by means of a rider. (Requirement 5.2.11)
 - EXPECTED OUTPUT: Update of the business agreement baseline.

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- Walking through section 5 and evaluating the requirements:
Configuration Control (contd)
 - The supplier shall request permission for non-conformances to requirements and design in relation to baselined configuration identification documentation. (Requirement 5.2.12)
 - EXPECTED OUTPUT: Request for deviation or waiver.
 - The control of physical and functional interfaces shall be implemented at every level of the organization and integrated into project activities. (Requirement 5.2.13)
 - EXPECTED OUTPUT: Interface Control Documents.
 - The interface evolution shall be processed according to a formal change procedure. (Requirement 5.2.14)
 - EXPECTED OUTPUT: Formal change procedure for interface evolution.

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- Walking through section 5 and evaluating the requirements:
Configuration Status Accounting
 - Configuration status accounting shall be organized in such a way as to be processable by a system enabling the recording and usage of configuration data. (Requirement 5.3.1)
 - EXPECTED OUTPUT: Documented status accounting system.
 - Each supplier shall deliver to his customer status reports of the configuration of the products for which he is responsible. (Requirement 5.3.2)
 - EXPECTED OUTPUT: Configuration status reports, Software Configuration file.

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- Walking through section 5 and evaluating the requirements:
Configuration Verification
 - Project reviews shall conclude with the establishment of Configuration Baselines as defined in sub-clause 4.5. (Requirement 5.4.1)
 - EXPECTED OUTPUT: Configuration baselines.
 - Audits to verify the application of Configuration Management requirements shall be conducted in the life cycle of the product. (Requirement 5.4.2)
 - EXPECTED OUTPUT: Audit reports. Definition and implementation of recovery actions.

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- Walking through section 5 and evaluating the requirements:
Application Methods: Implementation Documentation for Configuration Management
 - Each actor shall prepare an Implementation Document for Configuration Management and submit it to his customer for approval. (Requirement 5.5.1)
 - EXPECTED OUTPUT: Implementation Document for Configuration Management.

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- Conclusion and the future of the ECSS CM standard
 - The current ECSS standard for Configuration Management is a little bit more practical for use than ISO 10007
 - As the working group's kick-off paper was provided by the satellite branch of CNES, the standard still features unique processes and terms of this space flight segment
 - Complementing level 3 CM standards (guidance documents) are still not existing
 - Forthcoming Revision B of ECSS-M-40 should eliminate inconsistencies and the "satellite flavour"
 - ECSS-M-40A is under promotion to become prEN 13290-5
 - The question is: what will be first; ECSS-M-40B or prEN 13290-5 ?