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KAAN Project
EXPS ATA 47 Explosion Prevention System
Configuration Management Plan

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CONFIGURATION MANAGEMENT PLAN

TURKISH FIGHTER DEVELOPMENT

KAAN PROJECT

EXPS ATA 47 EXPLOSION PREVENTION SYSTEM PROJECT

TÜBİTAK MAM

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Configuration Management Plan

EXPS ATA 47 EXPLOSION PREVENTION SYSTEM PROJECT	
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AUTHORIZATION

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CONFIGURATION MANAGEMENT PLAN CHANGE RECORDS

Issue No	Date	Reason(s) for Change	Chapter/page
1.0	24.02.2022	Initial Issue	-
2.0	17.03.2023	Updated according to Turkish Aerospace comments	
3.0	29.11.2023	RFV Form	Appendix B All sections have been edited
4.0	10.01.2024	Updated according to Turkish Aerospace comments	

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5.0	28.03.2024	FCA and PCA checklists have been updated according to Turkish Aerospace comments	Section 9.5.3 /62-64 & 67-70
6.0	19.08.2024	Section 9.1.8.1 have been updated according to Turkish Aerospace comments	Section 9.1.8.1 / 41
7.0	xx.10.2024	Revision	All Document

DISTRIBUTION LIST

Distribution Number	Issue	Company	Department	Name	Title	Method
1	1.0	Turkish Aerospace	Tedarik ve Sözleşme Milli Muharip Uçak (MMU) Genel Müdür Yardımcılığı	Koray CANPOLAT	Contracts Responsible	Electronic and Printed Copy
2	2.0	Turkish Aerospace	Tedarik ve Sözleşme Milli Muharip Uçak (MMU) Genel Müdür Yardımcılığı	Koray CANPOLAT	Contracts Responsible	Electronic and Printed Copy
3	3.0	Turkish Aerospace	Tedarik ve Sözleşme Milli Muharip Uçak (MMU) Genel Müdür Yardımcılığı	Koray CANPOLAT	Contracts Responsible	Electronic and Printed Copy

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4	4.0	Turkish Aerospace	Tedarik ve Sözleşme Milli Muharip Uçak (MMU) Genel Müdür Yardımcılığı	Koray CANPOLAT	Contracts Responsible	Electronic and Printed Copy
5	5.0	Turkish Aerospace	Tedarik ve Sözleşme Milli Muharip Uçak (MMU) Genel Müdür Yardımcılığı	Koray CANPOLAT	Contracts Responsible	Electronic and Printed Copy
6	6.0	Turkish Aerospace	Tedarik ve Sözleşme Milli Muharip Uçak (MMU) Genel Müdür Yardımcılığı	Koray CANPOLAT	Contracts Responsible	Electronic and Printed Copy
7	7.0	Turkish Aerospace	Tedarik ve Sözleşme Milli Muharip Uçak (MMU) Genel Müdür Yardımcılığı	Koray CANPOLAT	Contracts Responsible	Electronic and Printed Copy

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DEFINITIONS

Term	Definition
Allocated Baseline (ABL)	The initially approved documentation describing an item's functional, interoperability, and interface characteristics that are allocated from those of a system or a higher level configuration item, interface requirements with interfacing configuration items, additional design constraints, and the verification required to demonstrate the achievement of those specified characteristics.
Configuration Item	Hardware or software or an integration of both for configuration management.
Contract	The formal agreement between TUSAŞ and TÜBİTAK MAM Chemical Technology Institute named Turkish Fighter Development KAAN Project EXPS ATA 47 Explosion Prevention System.
Contractor	TUBITAK MAM
Customer	TUSAŞ-Turkish Aerospace
Deviation	A specific written authorization, granted prior to the manufacture of an item, to depart from a particular requirement(s) of an item's current approved configuration documentation for a specific number of units or a specified period of time. (A deviation differs from an engineering change in that an approved engineering change requires corresponding revision of the item's current approved configuration documentation, whereas a deviation does not.)

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Engineering Change	A change to the current approved configuration documentation of a configuration item at any point in the life cycle of the item.
Functional Baseline (FBL)	The initially approved documentation describing a system's or item's functional, interoperability, and interface characteristics and the verification required to demonstrate the achievement of those specified characteristics.
Functional Configuration Audit (FCA)	The formal examination of functional characteristics of a configuration item, prior to acceptance, to verify that the item has achieved the requirements specified in its functional and allocated configuration documentation.
Item	System, subsystem, unit and part thereof.
Physical Configuration Audit	The formal examination of the "as-built" configuration of a configuration item against its technical documentation to establish or verify the configuration item's product baseline.
Product Baseline (PBL)	The initially approved documentation describing all of the necessary functional and physical characteristics of the configuration item and the selected functional and physical characteristics designated for production acceptance testing and tests necessary for support of the configuration item. In addition to this documentation, the product baseline of a configuration item may consist of the actual equipment and software.
Project	EXPS ATA 47 Explosion Prevention System Project

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Requirement Baseline (RBL)	The initially approved documentation describing an item's functional, interoperability, and interface characteristics that are required by TAI from those of a system or a higher level configuration item, interface requirements with interfacing configuration items, additional design constraints, and the verification required to demonstrate the achievement of those specified characteristics.
User	Turkish Air Forces (TurAF)

ABBREVIATIONS

Abbreviation	Meaning
CCB	Configuration Control Board
CDR	Critical Design Review
CM	Configuration Management
CR	Configuration Responsible
CMP	Configuration Management Plan
CPS	Cardinal Points Specification
FCA	Functional Configuration Audit
MAM	Marmara Research Center (also referred as MRC)
PCA	Physical Configuration Audit
PDR	Preliminary Design Review
PM	Project Manager
SRD	System Requirements Document
QAR	Quality Assurance Responsible

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TUBITAK	The Scientific and Technological Research Council of Turkey
TUSAŞ	Turkish Aerospace Industries
ECP	Engineering Change Proposal

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KAAN Project EXPS ATA 47 Explosion Prevention System Configuration Management Plan

1. GENERAL

Configuration Management (CM) is the ongoing process of identifying and managing changes to deliverables and other work products. The Configuration Management Plan (CMP) is developed to define, document, control, implement, account for, and audit changes to the various components of this project which is under the Contract between Turkish Aerospace and TUBITAK MAM for SDR Stage-1 Phase 2 of KAAN Project.

The CMP has been prepared in accordance with the EIA-649-1 standard and defines all configuration activities that will cover the contract requirements of the "EXPS ATA 47 Explosion Prevention System" project.

2. AIM & SCOPE

The purpose of the plan is to define the content of the Configuration Management Plan (CMP) according to the requirements of the "EXPS ATA 47 Explosion Prevention System" Project Contract. The Plan is an overview of the organization, activities, overall tasks, and objectives of the Configuration Management as defined in EIA-649-1 National Consensus Standard for Configuration Management. It addresses configuration management functions and principles which includes configuration item (CI) identification, change management, configuration status accounting, and configuration verification and audits at a high level. The Project team and all organizational interfaces will utilize the methodology described in this CMP.

3. APPLICABILITY

This CMP shall be applicable to all stages of the "EXPS ATA 47 Explosion Prevention System" project and all the products and services defined within the Project Agreement. This CMP shall be applicable for all activities related to configuration of this Project. This plan applies to Project team members and subcontractors' management activities. CMP shall be under configuration control after its first release to the Customer. Any revisions of the CMP shall be controlled as described in this plan.

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4. APPLICATION PROCESS OF PLAN CHANGES

This CMP is subject to Customer's approval and shall be under configuration control after its first release whereas it is a living document as well. Configuration Responsible is responsible for applying changes into CMP. This plan will be updated if it is affected by the following conditions:

- Contract or its appendices changes,
- Organizational changes,
- Methods or environment changes
- Reference plans and/or document changes.

The revision detail information and dates is given in the "Change Records" section of the CMP. Regardless of the reason, changes in the document will be specified in a draft version and submitted to relevant stakeholders for review. Upon agreement with relevant stakeholders and getting Customer's approval it will be reissued and document Revision number will be incremented by (1).

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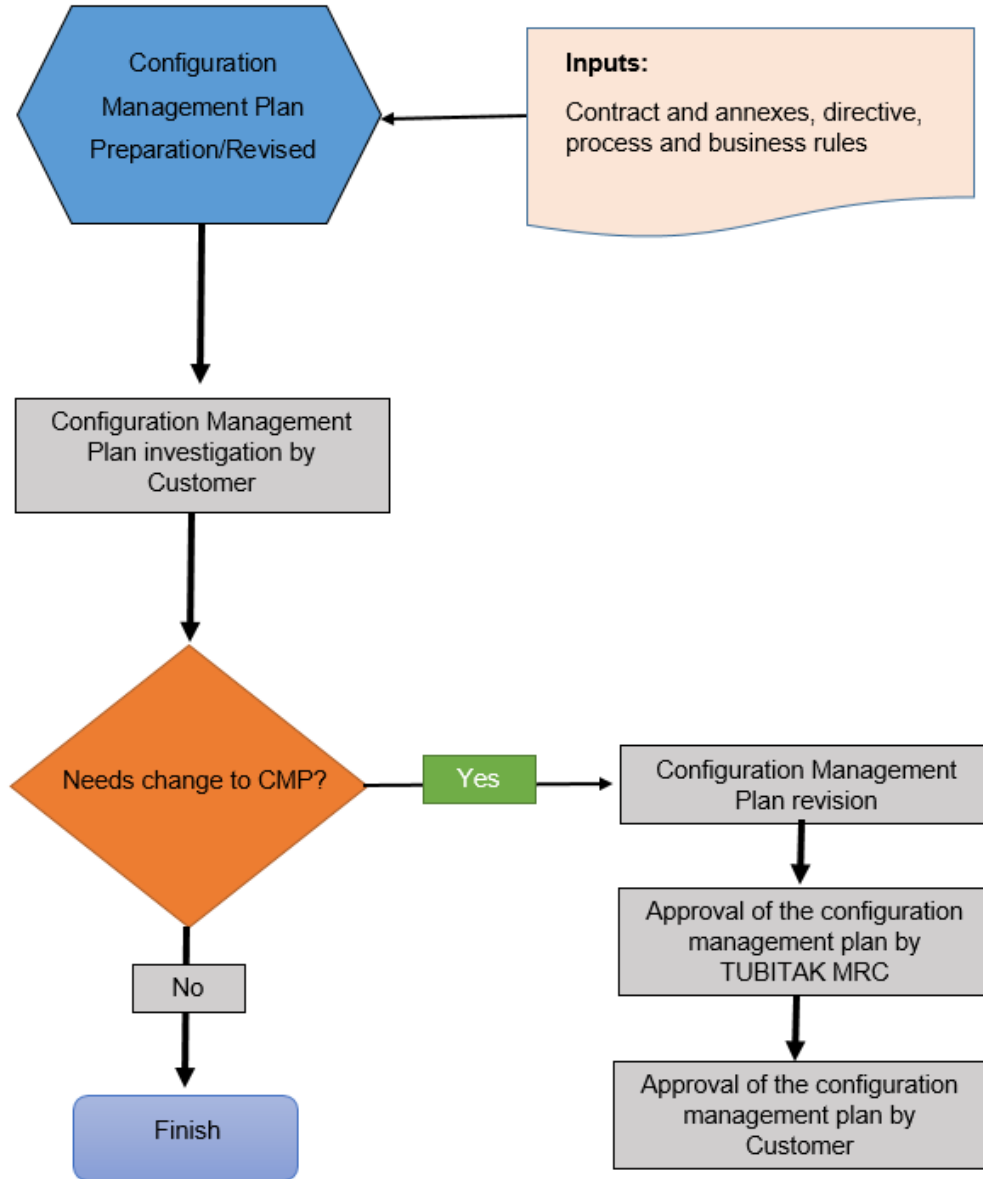


Figure 1 Schematic process for application process of plan changes

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5. APPLICABLE AND REFERENCE DOCUMENTS

For the documents listed herein, unless otherwise stated, latest issues are applicable.

5.1. Applicable Documents

Table 1 Applicable Documents

No	Document No	Document Title	Issue	Date
[AD01]	TUSAŞ-TÜBİTAK MAM-202400217	TUSAŞ- TÜBİTAK MAM Arasındaki Yaşam Destek Sistemi (ExPS) Projesi Dönem-I Aşama-II Sözleşmesi Hüküm ve Şartlar	1.0	
[AD02]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 SOW	1.0	
[AD03]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 Annex-A Contract Data Requirements List (CDRL)	1.0	
[AD04]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 Annex-B Subcontract Design Review	1.0	
[AD05]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 Annex-C 3rd Country Components/Parts	1.0	
[AD06]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 Annex-D Design Organization Interface Document (DOID)	1.0	
[AD07]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 Annex-E Engineering Coordination Memo (ECM) Format	1.0	
[AD08]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 Annex-F Turkish Aerospace Furnished Articles (TAFA)	1.0	

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No	Document No	Document Title	Issue	Date
[AD09]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 Annex-G Quality Management Requirements	1.0	
[AD010]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 Annex-H Deliverables List	1.0	
[AD011]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-3 Information Security Requirements For Subcontractors	1.0	
[AD012]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-4 Project Implementation and Delivery Schedule (PIDS)	1.0	
[AD013]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-5 Price Breakdown Structure (PBS)	1.0	
[AD014]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-12 Business Plan	1.0	

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5.2. Reference Documents

Table 2 Reference Documents

No	Document No	Document Title	Issue	Date
[RD01]	EIA-649-1	National Consensus Standard for Configuration Management.	EIA 649-1	2019-02-07
[RD02]	ASD S3000L	International Procedure Specification for Logistic Support Analysis.	1.1	2014-07-01
[RD03]	AQAP 2105	NATO Standard: NATO Requirements for Quality Plans.	Edition C Version 1	2019-01-15
[RD04]	AQAP 2110	NATO Standard: NATO Quality Assurance Requirements for Design, Development and Production.	Edition D Version 1	2016-06-24
[RD05]	AQAP 2310	NATO Standard: Quality Assurance Requirements for Aviation, Space and Defence Suppliers.	Edition B Version 2	2022-01-24
[RD06]	AS 9100	Quality Management Systems- Requirements for Aviation, Space, and Defence Organizations	AS9100D	2016-09-20
[RD07]	AS 9110	Quality Maintenance Systems- Aerospace-Requirements for Maintenance Organizations	AS9110C	2016-11-04
[RD08]	DEF STD 00-41	Reliability and Maintainability. MOD Guide to Practices and Procedures.	3	1993-06-25
[RD09]	DEF STD 00-42 Part 4	Reliability and Maintainability. Testability.	Part 4	2014-02-20

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[RD10]	DEF STD 00-60	MOD Requirement for the application of Integrated Logistic Support (ILS)		2000-06
[RD11]	DEF STD 00-600	MOD Integrated Logistic Support. Requirements for MOD Projects.		2016-11-28
[RD12]	EMAR Part 21 Subpart J	EMAR Certification of Military and Related Products, Parts and Appliances, and design and Production Organisations. Part J Military Design Organisation Approval.	1.2	2016-10-4
[RD13]	IEEE STD 15288.1-2014	IEEE Standard for Application of Systems Engineering on Defence Programs.		2014-11-10
[RD14]	INCOSE-TP-2003-020-01	Technical Measurement: A Collaborative Project of PSM, INCOSE, and Industry.	1.0	2005-12-27
[RD15]	ISO 9001	Quality Management Systems – Requirements	5	2015-09
[RD16]	ISO 10005	International Standard: Quality Management – Guidelines for Quality Plans.	3	2019-08
[RD17]	ISO/IEC/IEEE 15288:2015	Systems and software engineering - System life cycle processes.	First edition	2015-05-15
[RD18]	JSP 886	The Defence Logistics Support Chain Manual.	2,4	2012-12-20

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[RD19]	MIL-HDBK-217F	Department of Defence Handbook: Reliability Prediction of Electronic Equipment.	F	1991-12-02
[RD20]	MIL-HDBK-470A	Department of Defence Handbook: Designing and Developing Maintainable Products and Systems.	A Notice-2	2012-05
[RD21]	MIL-HDBK- 516C	Department of Defence Handbook: Airworthiness Criteria.	C	2014-12
[RD22]	MIL-HDBK-2165	Department of Defence Handbook: Testability Program for Systems and Equipment.	Notice-1	2014-04
[RD23]	MIL-HDBK- 46885A	Department of Defence Handbook: Human Engineering Program Process and Procedure.	A	2011-05
[RD24]	MIL-STD-785B	Department of Defence Standard: Reliability Program for Systems and Equipment Development and Production	B	1998-07
[RD25]	MIL-STD-882E	Department of Defence Standard Practice System Safety	E	2012-05
[RD26]	MIL-STD-1472G	Department of Defence Design Criteria Standard: Human Engineering.	H	2020-09
[RD27]	MIL-STD-1629A	Department of Defence Standard: Procedures for Performing A Failure Mode Effects and criticality Analysis.	A	1998-08

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[RD28]	MIL-STD-2165	Department of Defence Standard: Testability Program for Systems and Equipment.	Notice-1	2014-04
[RD32]	SAE ARP5580	Recommended Failure Modes and Effects Analysis Practices for Non- Automobile Applications		2012-05-01
[RD33]	SAE ARP4754A	Guidelines for Development of Civil Aircraft and Systems		2010-12-21
[RD34]	Y.01.14	TUBITAK MAM Configuration Management Instruction		2006-12-20
[RD35]	ISO 14001-2015	Çevre Yönetim Sistemi		2018-09
[RD36]	TS EN ISO/IEC 17025	Deney ve Kalibrasyon Laboratuvarlarının Yeterliliği İçin Genel Gereklilikler		2017
[RD37]	OHSAS 18001	İş Güvenliği Yönetim Sistemi		2007

*Although some of the documents referenced are cancelled, they are still applicable to the Subcontractor since they are the best suited documents for the related activities.

6. RELATIONSHIP TO OTHER PLANS

The CMP must be compatible with the following plans and documents that will be prepared in accordance with the Contract. The technical information obtained during the project will provide input to the Configuration Plan and other plans.

- Program Management Plan
- Project Progress Report
- Life Cycle Cost Analysis Report
- Integrated Master Plan
- Integrated Master Schedule

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- Work Breakdown Structure
- Program Quality Management Plan
- Program Risk, Opportunity and Issue Management Plan
- Systems Engineering Management Plan (SEMP)
- Stakeholder Management Plan
- System Requirements Document(s)
- Configuration Management Plan
- Safety Program Plan
- Specialty Engineering Analyses/ Assessments Dossier
 - System Safety Assessment
 - Reliability Analysis Report
 - Maintainability Analysis Report
 - Testability Analysis Report
 - The Piece-Parts / Hardware Failure Mode, Effects and Criticality Analysis Report
 - E3 Analysis
- Electromagnetic Environmental Effects (E3) Control Plan
- CDR Report
- TRR Report
- SVR Report
- Qualification Status Report
- System Design Description
- Thermal Analysis Report
- Maturity C 3D Models
- Supplier Equipment Specification
- Interface Control Document
- System Verification Plan
- System Analysis Dossier

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- Test and Evaluation Plan
- System Test Procedures Dossier
 - Verification Test Procedure
 - Environmental Qualification Test Procedure
 - Acceptance Test Procedure
 - E3 Test Plan
 - E3 Test Procedure
- System Verification Test Report
 - Verification Test Report
 - Environmental Qualification Test Report
 - Acceptance Test Report
- Declaration of Design and Performance
- Conformance of Certification CoC or Form-1
- Design Organization Interface Document
- First Article Inspection Report (FAI/Delta FAI)
- Dry-Run Test Reports
- Quality Management Review Report
- Project Audit Plan
- Critical Personnel List
- Human Resources Management Plan
- Security Classification Guide
- Weight Management Plan
- Model Validation Report
- FRS
- SIL FRS
- DATA ICD
- SIL TEST PROCEDURE

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- SIL TEST REPORT
- Integrated Product Support Dossier
- Illustrated Part Catalogues
- Spare Part List
- Consumables and CMMs

If references are made to other plans and documents related to the project in any item in this plan, the details of that item can be accessed from the relevant document.

7. DOCUMENT PRIORITIES

In the event of any inconsistency between this CMP and other plans referred to herein, the order of precedence shall be as follows according to the Contract:

- Contract and its appendixes
- Project Management Plan
- Configuration Management Plan
- Other project plans,
- TUBITAK MAM Quality Management System Documents (ISO 9001-2008 and ISO 14001-2004, TS EN ISO/IEC 17025, TS 18001)

8. PROJECT OVERVIEW

One of the objectives of the KAAAN project is design & development of EXPS ATA 47 Explosion Prevention System. The scope of this project is as mentioned in "Appendix-1 Explosion Prevention System Statement of Work (SOW) " to achieve a better product defined specification.

TF-X Development Stage-I Phase-II subcontractor design mainly consists following reviews:

- System Requirements Review (SRR)

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- System Functional Review (SFR)
- Preliminary Design Review (PDR)
- Preliminary Design Optimization Review (PDOR)
- Critical Design Review (CDR)
- Test Readiness Review (TRR)
- System Verification Review (SVR)

System Requirements Review (SRR): For the TF-X Program the SRR is conducted to ensure that the Subcontractor is cognisant of and in agreement with the requirement set. Additionally it will review, and amend if necessary, the Subcontractor's initial plans to ensure an effective output.

System Functional Review (SFR): SFR is conducted to ensure that the System Design Description defines the functionality to cover the System Requirements and is at sufficient maturity to proceed with preliminary design activities. At SFR decision gate, the design descriptions are evaluated and a functional baseline is established for the system.

Preliminary Design Review (PDR): PDR is conducted to ensure the System preliminary design has reached the maturity to proceed with detailed design. At the PDR decision gate, the allocated baseline is evaluated.

Preliminary Design Optimization Review (PDOR): PDOR is conducted to optimize preliminary design to reach the maturity for proceeding with detailed design. At the PDOR decision gate, the allocated baseline is evaluated.

Critical Design Review (CDR): CDR is conducted to finalize detailed design to reach the maturity for proceeding with production activities. After CDR design data is baselined and change management process is started.

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Test Readiness Review (TRR): TRR is conducted to review the preparation for the test activities including the test procedure, test infrastructure and production activities of system that will be tested. After TRR, test activities for system requirements verification is started.

System Verification Review (SVR): SVR is conducted to evaluate all the verification activities that are executed. After SVR, final DDP is released, and final delivery is executed.

In line with this objective, EXPS Project under the Contract for Phase-1 Stage-1 and Stage-2 of KAAN Project, is defined as the total effort for

- Requirement maturation with Turkish Aerospace (TA)
- Provide necessary services (providing necessary CDRL, reviews (SRR, SFR, PDR, PDOR, CDR, TRR, SVR)
- Delivery of EXPS within stage- 2
- The collaborative work in scope of;
 - Common Reconfigurable Architecture Framework for KAAN
 - Air Vehicle, Support and Training System and EXPS System Level Systems Engineering and Integration
 - EXPS Integrated Product Teams
 - Ground and Flight Tests support to Turkish Aerospace (TA)

9. CM FUNCTIONS AND PRINCIPLES

The CM is comprised of five CM functions and their CM principles that together provide a flexible implementation structure. The CM provides consistency between product requirements, product configuration information and product attributes.

The five CM functions are;

1) Configuration Management Planning and Management

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- 2) *Configuration Identification*: All configuration requirements on a project should be identified and recorded. This includes functionality requirements, design requirements, and any other specifications. The completion of this process results in the configuration baseline for the project.
- 3) *Configuration Change Management*: As the project scope is altered, the impact on the configuration must be assessed, approved, and documented. This is normally done within the project change control process.
- 4) *Configuration Status Accounting*: Tracks the project's configuration at all times. Configuration's version should be clearly identified and have a historical record of the old versions. It's crucial to have an account of all versions so author could trace changes throughout the project.
- 5) *Configuration Verification & Audit*: This includes any tests to prove that the product conforms to the configuration requirements. It leads to build a report that must run within 10 seconds. The audit tests to see if the finished report actually runs that fast. Often, audits and checks will be built in at the completion of major project phases.

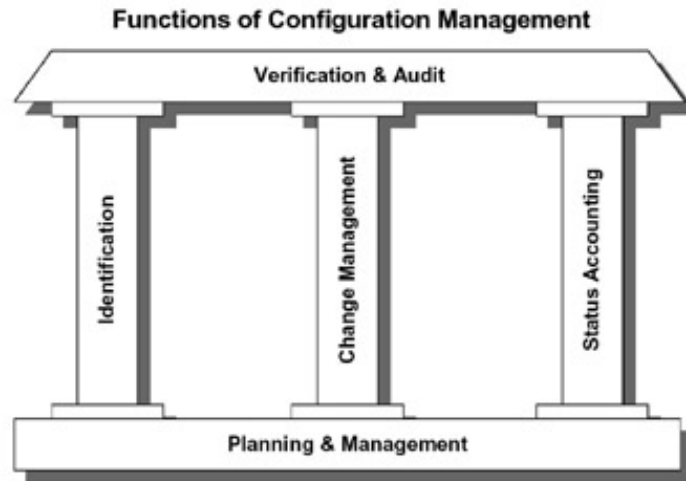


Figure 2 Functions of Configuration Management

Configuration Management Planning and Management

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Configuration management plan describes project specific procedures and the extent of their application. Configuration management integrates the technical and administrative activities of identifying, documenting, controlling, auditing and reporting the functional and physical characteristics of the Project. Each change to these characteristics and data shall be fully documented in a comprehensive and timely manner.

The Project configuration management team, which will be coordinated by the Project Configuration Responsible, shall continuously identify requirements and factors that might impact configuration management activities. This CMP includes CM procedures to implement CM activities, resources, roles and responsibilities, and the other project specific attributes to successfully manage system and its subsystems' configurations.

9.1.1. Identification of Context and Environment

The schematic representation of project consortium is given in Figure 3.

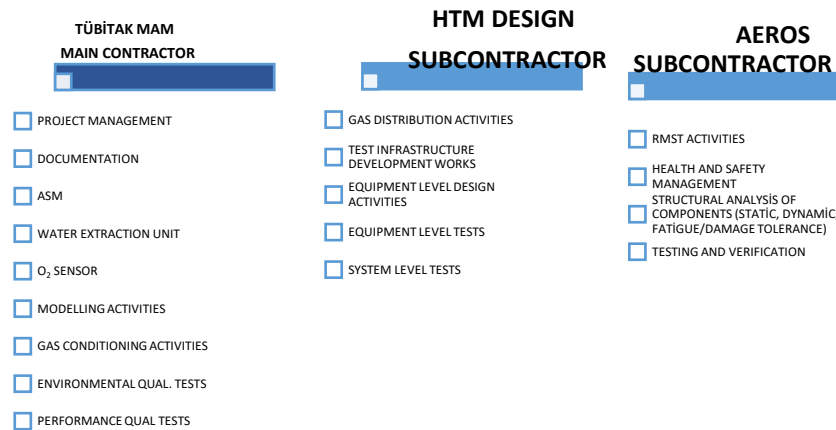


Figure 3 Relationship between Main Contractor and Subcontractors

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9.1.2. Document the CM Planning

CM planning will assure to document and record the technical and management processes and detailed implementation procedures within the life cycle of the Project to maintain consistency and to provide integrity of the larger systems. It also provides a holistic approach for effectively controlling any change to the Project. It helps to verify that changes are considered in terms of the entire system, minimizing adverse effects. Changes to the system are proposed, evaluated, and implemented using a standardized, systematic approach that ensures consistency.

This CMP that reflects efficient application of configuration management principles and practices to the identified context and environment includes the following topics:

- General product definition and scope,
- Description of CM activities and procedures for each major CM function,
- Organization, roles, responsibilities, and resources,
- Definitions of terms,
- Programmatic and organizational interfaces,
- Deliverables, milestones, and schedules.

The change process of CMP is explained in Section 4 “APPLICATION PROCESS OF PLAN CHANGES”.

9.1.3. Application of Adequate CM Resources and Assign Responsibilities

EXPS ATA 47 Explosion Prevention System Project Manager is responsible for the decisions, actions, and directions necessary to ensure that the CM system fulfils the Project requirements. Configuration Responsible (CR) is responsible for implementing and maintaining this CMP. CR is in charge of CM planning, configuration, identification, change management, configuration status accounting, configuration verification and audits.

The project organization team authority and responsibilities is given in the following.

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Figure 4 Project organization plan

Project management officer contains mainly Technical Management, Quality Assurance Team, Configuration Management and Contract Management. Technical Management Office contains System Engineering IPT, Component Development IPT, Technology Development IPT, Test and Evaluation IPT.

Configuration Responsible (CR)

- Plans and coordinates the configuration activities to assure that the related Project requirements are fully met,
- Identifies all documents required to maintain the configuration of all configuration items, including all related documents and data,

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- Prepares and maintains configuration baselines (as defined in),
- Performs change management processing including variance management,
- Coordinates Configuration Control Board and related actions follow-up,
- Reports Configuration Status Accounting,
- Participates in the Customer reviews as required and provides information on configuration management issues,
- Manages and performs physical and functional configuration audits,
- Manages the documentation and data of the Project,
- Contributes to the Project Progress Reports for configuration management matters,
- Designates configuration management staff.

Project Manager (PM)

- Responsible for delivering the project, with authority and responsibility from the Project Board to run the project on a day-to-day basis.
- Ensures that the CM system fulfils the Project requirements,
- Managing the production of the required deliverables
- Planning and monitoring the project
- Preparing and maintaining project, stage and exception plans as required
- Participates in Configuration Change Board,
- Participates in configuration audits of the Project.

Project Quality Assurance Responsible (PQAR)

- Participates in Configuration Control Board,
- Participates in the configuration audits of the Project,
- Reviews the adequacy the Project Data Management Area,

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- Audits the Configuration Management process implementation.
- Design, implement, and improve company quality standards.
- Create reports to track progress.
- Responsibility of coordination with the Customer about quality issues

Configuration Control Board (CCB)

Configuration Control Board (CCB) is an organization within the project which is responsible for evaluation the proposed changes to the product/system and disposition of all changes affecting the established baseline. CCB permanent members are mainly Project Manager, Technical Manager, Project Quality Assurance Responsible and Quality Assurance Representative of Customer (*if requested*). The decisions are carried out face-to-face meetings or electronically. The CCB participants have sufficient authority to make decision for the teams they represent and to approve the proposed change to the baseline. Records of CCB meetings, containing all decisions taken during the CCB and the associated actions, if any, are prepared by CR. CR is in charge of maintaining the status of all changes and variances processed by CCB, with respect to the decisions taken during the CCB meeting

Researchers

Researcher has responsibility to carrying out the determined job in the work packages, managing the necessary work in its own work package, completing the relevant work packages and the task on time, and preparing the relevant project documents on time.

Technician

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Technician is responsible for carrying out the work given by the project manager in the project and the activities specified in the work plan.

9.1.4. Establish, Implement and Maintain Procedures

The configuration management activities shall be executed as per the following procedures of TUBITAK MAM Quality Management System in conjunction with the Project specific requirements that stated in related topics of this CMP:

- 1) Configuration Management Instruction [RD34]: This procedure provides the use of methods of defining, changing, controlling and auditing the product configuration in order to ensure the traceability and control of the products throughout their life-cycle in accordance with customer requirements.
- 2) Documented Knowledge Management and Control Instruction [RD34, Annex-1]: This procedure consist of general documentation rules of TUBITAK MAM.

9.1.5. CM Training

The Project team members shall comply with the principles and the procedures expressed in this plan. Thus, any emergent training requirements throughout the life cycle of the Project shall be fulfilled internally in order to ensure this objective. Sustainability goals for the Project will be achieved as building the related training concept within the Project. CR assures that team members understand their responsibility, authority, accountability, and procedures for performing specified CM tasks by means of CM trainings and ongoing support during the project life cycle.

9.1.6. Assess Compliance and Effectiveness

The purpose of reporting the configuration status is to record and report the progress of the configuration parts throughout the project life cycle. In these reports, changes in baseline configuration items is going to be reported. The following metrics will be used to assess CM performance:

- Percentage of open non-conformances identified during CM process audits,
- Percentage of open changes and variances

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- Percentage of closed Supplier changes and variances
- Percentage of minor changes/variances
- Percentage of major changes/variances

Configuration items and documents, which is created according to the CDRL, including item/document number, revision information, approval date, approved main line name and date, status of engineering changes, results of configuration audits is reported with project progress reports

9.1.7. Supplier Configuration Management

The flow down of CM requirements, including the requirement to monitor their subcontractors (HTM Design and AEROS) and suppliers provides an appropriate application of CM functions and principles to the entire supply chain for the Project lifecycle. These requirements will be tailored for subcontractors and suppliers according to their work scope, if needed. Subcontractors'/Suppliers' configuration management activities shall be monitored via reviews, configuration change management, demonstration results, configuration audits, and CM surveillance reviews, as appropriate and controlled to ensure the total success of the Project CM process. The CR together with the Project Quality Assurance Responsible is responsible for assessing subcontractors'/suppliers' configuration management systems and activities.

Subcontractors are responsible for following the configuration activities within this plan document. When any change occurs within the package of subcontractors, CCB process within TÜBİTAK MAM is executed. Subcontractors shall execute their own change management process and inform process for further evaluation of change at system level.

For non-conformity TÜBİTAK MAM non-conformity procedure: "Y.01.18 Directive for control of non-conforming product and activity" is executed.

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9.1.8. Product Configuration Information Processes

In order to provide effective CM, information processes, including data collection and information processing, controlling status, providing interoperability and exchange, and long-term preservation, shall be implemented and considered with priority. The details are given in the subsections below.

9.1.8.1. Plan for Revision Tracking of Produced Design Documents

Safir Depo and SVN are used to manage design documents produced with subcontractors.

The connections between Safir Depo and SVN are described in Figure 5

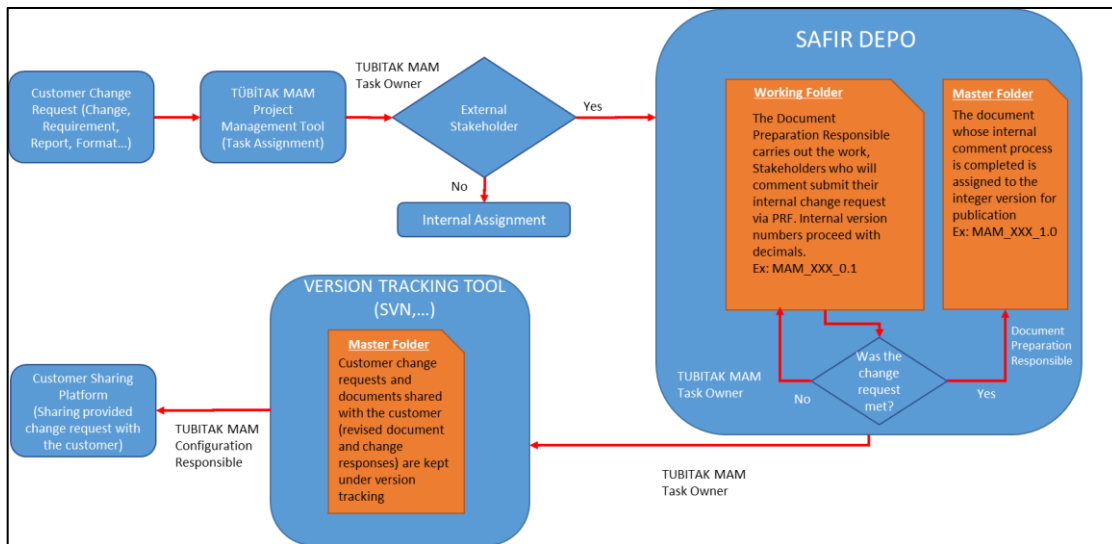


Figure 5 Safir Depo and SVN Connections

- Within the scope of the change notification shared by the customer, task assignment is made by the Project Manager through the TÜBİTAK MAM Project Management tool (Jira Software (task distribution within MAM)). A similar practice is expected from subcontractors.
- The responsibilities of the Document Preparation Responsible and the project stakeholders who will make comments within the scope of the relevant work package

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- are determined by the project management and the Task List is published at Safir Depo.
- Within the scope of the task list, the assigned staff adds the Customer's change notification to the Working Folder on the document sharing platform (e.g. Safir Depo) determined within the scope of the project and notifies to the Document Preparation Responsible and other project stakeholders.
 - Two basic folders will be defined for the relevant project on the document sharing platform:
 - Working Folder
 - Master Folder
 - Each stakeholder will define its own configuration responsible, and adding documents to the common area will only be carried out by the responsible of the relevant stakeholder.
 - After the document preparation phase on the document sharing platform, the documents will be transferred to SVN by TÜBİTAK MAM in a similar structure, the necessary version tracking will be carried out and shared through a secure sharing method determined by the Customer.
 - A subfolder will be defined within the main folders for each document to be prepared within the scope of the project phase.

✓ E.g:

- Working Folder
 - SDD
 - V0.1
 - ICD
 - V0.1
 - RMST
 - V0.1

○ Master Folder

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- *SDD*
 - *V1.0*
- *ICD*
 - *V1.0*
- *RMST*
 - *V1.0*

Working Folder

- During the creation of a document, the documents that each stakeholder works on are located in this folder.
- This folder is named “TÜBİTAK_Internal” in Safir Depo.
- Each stakeholder has its own letter code. This information is defined in the task list.
- After the Document Preparation Responsible completes his activity, he/she publishes the document with its internal version number and opens it for internal opinion.
- Internal version number is defined according to the following rules:
 - ✓ Work Package_Document Abbreviation_Internal Version Number
 - ✓ In the Working folder, versions are progressed in decimal numbers. (such as 0.1, 0.2). Responsibility for internal version bypassing lies with the document preparation responsible.
 - ✓ *E.g:*
For example, let's say the first version of the RMST document is being prepared through Stakeholder1 within the scope of the PDR work package.
The first loop starts like this:
PDR_RMST_0.1.docx
- Staff who will give their opinions on the document share their opinions through the internal_PRF document defined within the scope of the project and add it to the subfolder of the relevant document in the Working Folder (TUBITAK_Internal) with its internal version number and specified code.

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- Those who have no comments about the current version will mark the "no comment" option in the comment status column in the internal PDF document. (Figure 6).

TÜBİTAK MAM		DOCUMENT PROOF READING FORM				TÜBİTAK MAM	
PROJECT		ORIGINATION DATE		VERSION NUMBER			
DOCUMENT NAME		ISSUE NUMBER		COMMENT DATE			
DOCUMENT NUMBER		DEADLINE FOR COMMENTS					
AUTHOR							
PROJECT MILESTONE							
No	READER NAME / COMPANY	COMMENT STATUS (if the document will not be commented by the reader, it will be stated here with version or issue number)	CHAPTER NUMBER AND TITLE	COMMENT(S)	AUTHOR'S RESPONSE (Accept / Reject / Action taken)	REMARKS	FINAL STATUS

Figure 6 Internal Proof Reading Form

✓ E.g:

- PRF_PDR_RMST_0.1_A.xls.
- PRF_PDR_RMST_0.1_B.xls.

- The Document Preparation Responsible evaluates the change requests of all defined personnel and increases the internal version number by one decimal number and publishes it in the working folder (TUBITAK_Internal).

✓ E.g:

- PDR_RMST_0.2.docx

- The previous process is repeated with an increasing number of internal revisions until the comments are completed by all commenting stakeholders.
- The document whose Internal Revision phase has been completed is evaluated by the personnel assigned to the task at TÜBİTAK MAM according to whether the format and change request has been met.
- If the change request is not met, the document is forwarded back to the Document Preparation Responsible to make the necessary arrangements. If the change request

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is met, the document is added to the Master Folder (TUBITAK_TO_TAI) using a higher integer (e.g. 1.0, 2.0).

✓ *E.g:*

▪ *PDR_RMST_1.0.docx*

- The document with completed internal revision and the opinions of all other relevant stakeholders are taken from the Master Folder by the TUBITAK MAM Configuration Responsible and transferred to the configuration tracking platform (e.g. SVN) for version tracking.
- One basic folder will be defined for the relevant project on the Configuration Tracking platform:

✓ *Master Folder*

- All document revisions and change responses shared with the Customer or shared with TUBITAK are located in the Master Folder.
- If a new comment is made to the revised document by the customer, the process continues on the revised revision number with a decimal number.

✓ *E.g:*

- *PDR_RMST_1.1.docx*
- *PDR_RMST_1.2.docx*
- *PDR_RMST_1.1.docx*

- The new version, completed with the process flow outlined above, is shared with the customer as the updated revision with the following integer numbering, via the sharing method preferred by the customer.

✓ *E.g:*

- *PDR_RMST_2.0.docx*

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- During the document preparation process, internal stakeholders other than TÜBİTAK MAM are expected to carry out their own revision control, and process control is carried out in the auditing studies to be carried out within the periods determined within the scope of the project.

Working and Master folders can be called studying and approval folders, respectively. Work is carried out with the preparation of the document during the internal cycle process in the Working Folder located on SAFİR DEPO, a collaborative working platform, and each stakeholder updates the document during the determined business cycle process. For documents whose inner loop process has been completed, if the document maturity has reached a sufficient level in terms of all denominators and there are no open items, the document version is upgraded and transferred to the Master folder in SAFİR DEPO. The master folder contains the versions shared with the customer. An equivalent of Master Folder is located in SVN, and the change authority of the file in SVN is only under the control of the Configuration Responsible. Other users have only viewing authorities. Thus, the latest documentation version shared with the Customer is only under the control of the Configuration Responsible and uncontrolled use is prevented. In addition, users are also enabled to work on the latest version.

TÜBİTAK MAM monitors its own revision control with relevant task assignments in JIRA software. Relevant roles such as updating, review or control are assigned to the relevant project team member or to the relevant document preparation officer and are tracked on JIRA.

9.1.8.2. Plan for Data Collection and Information Processing

Data collection and information processing is the process for ensuring timely and effective creation, collection, review, delivery, storage, and archiving of Project information. The Project data will be collected from engineering, project management, quality assurance, technical management, support teams, subcontractors and suppliers, the Customer and the other related sources. All Project data, such as performance, interface, and design information; testing procedures and results; operational and maintenance procedures; delivered unit configurations shall be managed

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and maintained electronically.

The following activities will be performed for data collection and information processing;

- Creation, collection, review, delivery, storage, retrieval and archiving of Project data (documents, records, information, files, etc.)
- Supporting requirement management by IBM Doors
- Provide unique identification of documents, files and document representations,
- Keep the essential file and version relationships,
- Monitor the data status,
- Controlled access and update of Project data.
- Implementation of configuration items changes and deviations of items through standard processes (ECP),
- Store and retrieve CI's current configuration,
- Store and recover any previous versions of configuration items and all related data,
- Allow an up-to-date information exchange between all project participants in order to have an efficient communication system.
- Create status accounting reports.

9.1.8.3. Plan for Preservation of CM-related Information

In order to ensure continued usability of the configuration items related information throughout the product's life cycle and beyond, all CM-related information shall be preserved and accessed in case of necessity.

As stated in the Contract; such information shall be retained for 2 (two) years after the completion of Project's Phase II.

Configuration Identification

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The process is;

- Identifying the documentation that describes a configuration item
- Grouping related configuration items into baselines
- Labelling revisions to configuration items and baselines.

The purpose of configuration identification is to maintain control of an evolving system by;

- Uniquely identifying the system, revisions of the system and the component parts of each revision
- Understanding the status of configuration items as they progress through the development process.

It is aimed to achieve;

- Breaking a system down into a number of known and manageable parts (configuration items)
- Uniquely identifying each of these parts
- Identifying the various revisions of a part as it evolves throughout its development life cycle
- Establishing baselines to give visibility of the completeness of a system at critical points in its development lifecycle.

9.2.1. Product Configuration Information

Product configuration information is the subset of product information that consists of product definition information and product operational information as illustrated in Figure 7.

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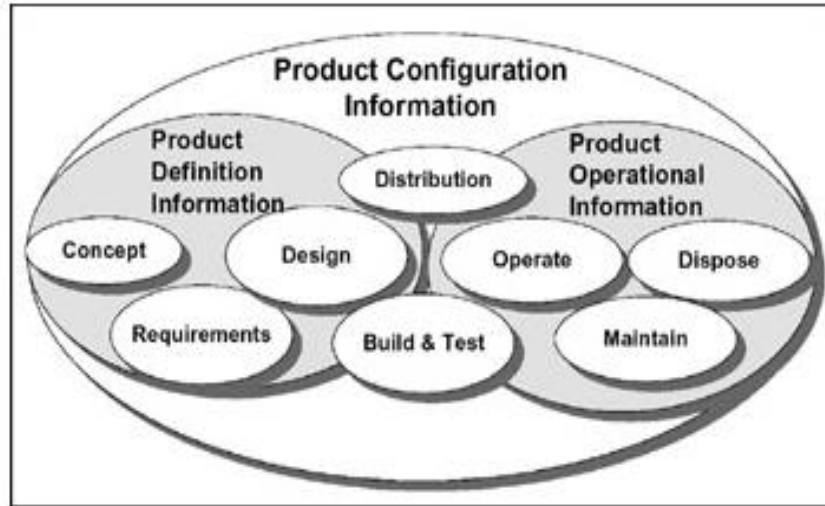


Figure 7 Illustration of Product Configuration Information

Product definition information describes the product's performance, functional, and physical attributes, including requirements information, (e.g., specifications, requirements documents) and design information, (e.g. drawings, part models, software listings and design descriptions). Product definition information provides the technical basis for actions taken during all product life cycle phases, for product validation, and for product operational information.

Product operational information is derived from the product definition information. Product operational information consists of procedures and technical information needed by operators and support personnel to operate, maintain and dispose of the product including operating procedures, security procedures, maintenance procedures, spare parts lists, and disposal methods.

9.2.2. Identifying the Product Configuration Information

Configuration identification is the process of defining the products (sub-products/parts) and documents to which configuration management will be applied. All of these operations are

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performed by the Configuration Responsible using the Configuration Management System as follows.

9.2.2.1. Product and Configuration Code

Product configuration is defined which consists of key information such as product code, configuration number, configuration output number, configuration phase, configuration status and document set number. The naming convention for the “EXPS ATA 47 Explosion Prevention System” Project is described in the TUBITAK MAM Configuration Management Instruction section [RD34].

According to the TUBITAK MAM Configuration Management Instruction product code details as given below.

AAA-BB-CCCC-DDD

a b c d

- a) Project Code (project abbreviation): Project code is selected uniquely for each project, and it resembles the project name or context. Project code is defined at the beginning of the project.
- b) ATA Chapter Number
- c) Sequential Code: 4 digits can be executed sequentially from 0000 to 9999, but it can also be pre-grouped and reserved to distinguish different categories, such as structural components, cabling, and electronic systems specific to the project.
- d) Part / Sub-assembly Code: Subassemblies are numbered between 000 - 199. Detail part numbers start from 200 and are numbers up to 999. Numbering of detail parts generally proceeds in even numbers in aviation. A part that is symmetrical is numbered with the next

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odd number. This numbering is mostly valid for platforms and may not be applied in systems.

E.g.: EXP-47-0000-000

Product Configuration Development

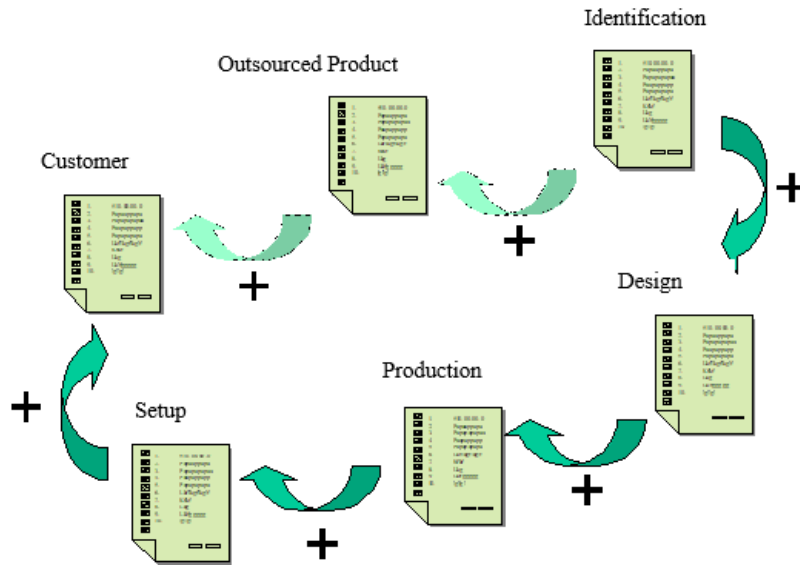


Figure 8 Development of product configuration

9.2.2.2. Document Numbering

Each defined document gets a document number according to TUBITAK MAM Configuration Management Instruction. Document numbering information is given below.

MAM-XXX-YY-ZZZ

a x y z

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- a) Abbreviation for Marmara Research Center
- x) Project Code (project abbreviation)
- y) Document Category
- z) Sequential Number

Table x Document Category List

Document Category	Document Content
DD	Description document. (i.e. Equipment or System Description Document)
FM	Forms (i.e. Meeting Notes, Plan Templates)
LS	List (i.e. Action list, check list, item list)
ML	User Manual and guides (i.e. Installation Manual)
MD	Models (i.e. Maturity A,B CAD)
PL	Plans (i.e. Project Plan, Project Certification Plan, Configuration Management Plan, V&V Plan)
PP	Process, General Rules, Policies (i.e. System Integration Process, Procurement Process)
PR	Technical Procedure (i.e. Test Procedure, Maintenance Procedure)
RT	Request for Test
RP	Report (i.e. Test, Analysis, Feasibility, Progress and Review Reports)
RQ	Requirements
TD	Technical Directive
TM	Template

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E.g.:

Project Code: EXPS

Document Name: Project Management Plan

Document Number: MAM-EXPS-PL-001

9.2.3. Product Structure

The product structure shall be established as representing the composition, relationships and quantities of a product and its components. This structure shall identify the relationship of components and the visualization of a product in relation to its higher and lower level components, from any level.

9.2.4. Configuration Items

Configuration Item (CI) is the collection of products in the configuration management process and considered as a single element. Configuration item refers to both configuration elements and configuration components. Items under configuration management contain interface documents and specifications that define requirements for the product. Configuration item is the baseline of product in configuration management.

9.2.5. Configuration Baselines

Configuration baselines represent the approved documents (specifications, drawings, Technical Data Packages) by the Customer in a specific point in time. Project milestones are defined in the project management plan. The configuration baselines consist of configuration elements definition, creating of configuration management system and determining the main baseline. Configuration baseline mainly consists of 3 baselines. 1. Requirement Baseline, 2. Functional Baseline, 3. Allocated Baseline.

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According to the SOW [ADX02], CDRL [AD03] and Deliverables List [AD010] the following baselines, with the related documentation, are to be developed.

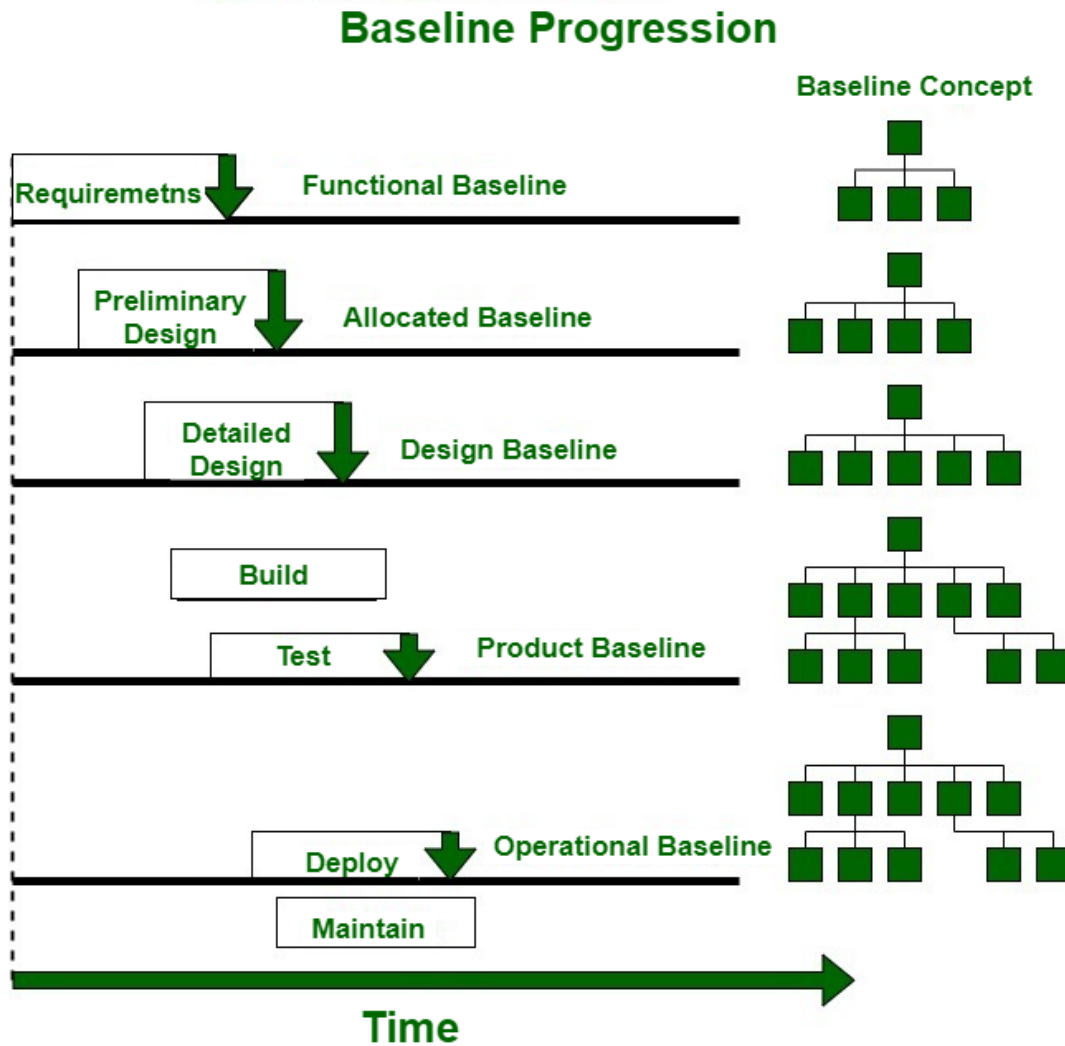


Figure 9 Schematic representation of Baseline Progression

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Table 3 Project Configuration Baselines & Related Documentation and Data

Baseline	Related Project Milestone	Items to be Baselined
Requirement Baseline	System Requirements Review (SRR)	Project Management Plan
		Validation Plan
		Verification Plan
		Human Factors Engineering Plan
		Configuration Management Plan
		Configuration Status Report
		Configuration Index Document
		SRR Report
		Project Management Review (PMR)
		Quality Management Plan
		Design Organization Interface Document
Functional Baseline	System Functional Review (SFR)	System Description Document
		Maturity A CAD Models
		Interface Control Document
		Validation Report
		Safety Management Plan
		RMST Management Plan
		Configuration Status Report
		Configuration Index Document
Allocated Baseline	Closure to Preliminary Design Review (PDR)	System Description Document
		Maturity B CAD Models
		Interface Control Document
		Structural Static Analysis Report

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		Structural Dynamic Analysis Report
		Fatigue / Damage Tolerance Analysis Report
		Validation Report
		Verification Report
		Health Management Report
		Preliminary System Safety Assessment
		Safety Assessment Report
		RMST Management Plan
		FMECA Report
		Reliability Analysis Report
		Maintainability Analysis Report
		Testability Analysis Report
		LSA Plan
		Human Reliability Assessment
		Environmental Effects Management Plan
		Configuration Status Report
		Configuration Index Document
		Equipment Specification Documents
		Environmental, Safety and Occupational Health Plan
		PDR Report
Allocated Baseline	Closure to Preliminary Design Optimization Review (PDOR)	System Description Document
		Equipment Specification Documents
		Maturity C CAD Models
		Interface Control Document

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		System Assessment Reports
		Thermal Analysis Report
		Safety Management Plan
		Preliminary System Safety Assessment
		Safety Assessment Report
		System Safety Assessment
		Safety Program Plan
		Reliability Analysis Report
		Maintainability Analysis Report
		Testability Analysis Report
		Supportability Analysis Report
		System Human Factors Engineering Program Plan
		System Electromagnetic Environmental
		System Engineering Management Plan
		Acceptance Test Specification Criteria Document
		Strategic Item and Procurement List
		Test Infrastructure Assembly Plan
		Infrastructure Description Document
		PDOR Report
	Critical Design Review (CDR)	Program Management Plan
		Project Progress Report
		Life Cycle Cost Analysis Report
		Integrated Master Plan

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		Integrated Master Schedule
		Work Breakdown Structure
		Program Quality Management Plan
		Program Risk, Opportunity and Issue Management Plan
		Systems Engineering Management Plan (SEMP)
		Stakeholder Management Plan
		System Requirements Document(s)
		Configuration Management Plan
		Safety Program Plan
		Specialty Engineering Analyses/ Assessments Dossier
		<i>System Safety Assessment</i>
		<i>Reliability Analysis Report</i>
		<i>Maintainability Analysis Report</i>
		<i>Testability Analysis Report</i>
		<i>The Piece-Parts / Hardware Failure Mode, Effects and Criticality Analysis Report</i>
		<i>E3 Analysis</i>
		Electromagnetic Environmental Effects
		CDR Report
		TRR Report
		SVR Report
		Qualification Status Report
		System Design Description

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		Thermal Analysis Report
		Maturity C 3D Models
		Supplier Equipment Specification
		Interface Control Document
		System Verification Plan
		System Analysis Dossier
		Test and Evaluation Plan
		System Test Procedures Dossier
		<i>Verification Test Procedure</i>
		<i>Environmental Qualification Test Procedure</i>
		<i>Acceptance Test Procedure</i>
		<i>E3 Test Plan</i>
		<i>E3 Test Procedure</i>
		System Verification Test Report
		<i>Verification Test Report</i>
		<i>Environmental Qualification Test Report</i>
		<i>Acceptance Test Report</i>
		Declaration of Design and Performance
		Conformance of Certification CoC or Form-1
		Design Organization Interface Document
		First Article Inspection Report (FAI/Delta FAI)
		Dry-Run Test Reports
		Quality Management Review Report

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		Project Audit Plan
		Weight Management Plan
		Security Classification Guide
		Human Resource Management Plan
		Critical Personnel List
		Model Validation Report
		FRS
		SIL FRS
		DATA ICD
		SIL TEST PROCEDURE
		SIL TEST REPORT
		Integrated Product Support Dossier
		Illustrated Part Catalogues
		Spare Part List
		Consumables and CMs

9.2.6. Baselines And Configuration Documentation

The baselines established for all CIS in accordance with the terms of the contract. The FCD, ACD, DCD and PCD defining the configuration baselines shall be mutually consistent and compatible. Each succeeding level of configuration documentation from FCD to ACD to PCD shall be traceable to, and be a detailed extension of, its predecessor(s):

Functional Configuration Documentation (FCD):

The documentation required for the functional baseline defined in accordance with the requirements of the contract. The FCD shall be in the form of a system specification for a system, or a prime item development specification for a single item development program plus other applicable documentation. The FCD shall also identify the configuration documentation for selected

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items which are to be integrated or interfaced with the CI, such as items separately developed or currently in the inventory.

Allocated Configuration Documentation (ACD):

The documentation required for the allocated baseline defined in accordance with the requirements of the contract. The ACD shall define requirements allocated from the FCD or from a higher level CI to a lower level CI. The ACD shall be in the form of development or requirement specifications, referenced interface control drawings/documents, and other applicable documentation. Requirements may be allocated to facilitate the management of complex CIS, to facilitate the development and integration of system components, or to focus management attention on critical or high-risk components.

Maintenance of configuration documentation:

Once the related configuration baseline has been established, the originals of the current approved configuration documentation controlled and maintained for all configuration items specified in the contract.

Engineering release and correlation of manufactured products:

An engineering release system and use the system to issue configuration documentation to functional activities (e.g., manufacturing, logistics, quality assurance, acquisition) and to authorize the use of configuration documentation associated with an approved configuration. The current and historical engineering release information for all configuration documentation maintained of all configuration items and their component parts. The engineering release system interrelate with our internal system of controls to assure that all approved Class I engineering changes have been incorporated in production items as specified.

Specification release and approval.

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The release signature indicating that the document has been reviewed and is suitable for its intended use include on each CI specification. If needed specifications submit to TAI for approval signature. In addition, accomplished on the version of the specification in baseline submitted for approval. Completion of the release and approval activities indicates mutual acceptance by TAI and TUBİTAK MAM of the CI'S requirements, as defined in the specification and referenced documents. After approval the specification establishes the appropriate baseline.

9.2.7. Interface Management

Interface management identifies, documents, and controls all functional and physical characteristics relevant to the interface of two or more items provided by one or more organizations. Interface control is part of the configuration control activity necessary to freeze and implement interface data, and the control of changes affecting the interfaces.

The interface management is under the responsibility of Systems Engineering IPT supported by Configuration Management. Configuration Management provides the necessary assistance and supports in recording the status of the interface data and in verifying their compliance against requirements. The Configuration Management provides the means to track and report on the status of approved interfaces.

Configuration Change Management

The configuration change management function includes managing both changes to and variances from the approved product configuration information for a product, using a systematic, measurable process. The configuration change management function applies to all CIs and in the development life cycle beginning with the initial Documentation Baseline.

The purpose of change management is to:

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- Enable change decisions to be based on knowledge of complete change impact
- Limit changes to those that are necessary or offer significant benefit
- Facilitate evaluation of cost, savings, and trade-off
- Ensure customer interests are considered
- Provide orderly communication of change information

All proposed changes are evaluated in terms of their anticipated impact on the entire system. CM also verifies that changes are carried out as prescribed and documentation of items and systems reflects their true configuration.

The change control process ensures that the following activities are covered:

- Prevention of changes causing degradation of product capability.
- Involvement of all actors in the concerned analysis and decision process of changes.
- Control that authorized changes or deviations are implemented, verified and recorded.
- Mention of the implementation of unauthorized changes or deviations.

Change control procedures are applied following the establishment of the Requirement Baseline. All released baseline documentation, thereafter, is subject to configuration control, including submission to the Customer for review and approval. As such, no formal change can be generated without an approved baseline.

9.3.1. Engineering Changes Implements to the Current As-Designed Configuration

An engineering change notice is a form that communicates the details of an approved change to someone who needs to know about the change. It often authorizes a notice recipient to make a

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change to the design or process, which may include purchasing new materials. A detailed description and an explanation of the change should be captured on the ECP form as given in Appendix-1. The form must contain the list of the items impacted and how to disposition each of them.

9.3.2. Change Notice (CN) Identifier

Change Notification feature allows the tracking of configuration changes entered on a per-session and per-user basis.

The change notice is a type of documentation that contains the list of changes that are made during the entire project management design by using unique identifiers. It tracks the progress of each change based on its review, approval (or rejection), implementation as well as closure. Moreover, the change notice also contains the date of the change and its impact on the project in terms of the risk, time as well as cost. Moreover, rejected changes are also included in the change notice. The change notice can easily be managed by using manual methods such as documents or spreadsheets. It can also be managed automatically through web-based tools or software.

9.3.3. CN Revision

Product change revision provides the following information before implementing any notifiable changes:

- Detailed description
- Reason for change
- Product identification (affected products)
- Contact information
-

9.3.4. CN Description

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A change notice represents a work authorization to resolve a problem, often identified by an approved change request. It can be created in reference to one or more change requests or it can be created without a change request if your administrator has configured your change process to do so. The change notice description includes a clear information of the component before and after the change.

9.3.5. CN Date

CN date is the date information belongs to the product change notice requested date.

9.3.6. Open Changes Linked to Related Product / CI (S)

A change request is a formal proposal for an alteration to some product or system.

In project management, a change request often arises when the client wants an addition or alteration to the agreed-upon deliverables for a project. Such a change may involve an additional feature or customization or an extension of service, among other things. Sometimes change requests are beyond the scope of the agreement of contract. In such cases, it is impossible to open changes to linked related product or configuration items.

9.3.7. Change Management Process

Change management process is composed of proposal for change, assessment of change proposal, coordination among related disciplines and taking the final decision. If approved, change implementation shall also be coordinated within change management process. Overall change management process is defined in Figure 10.

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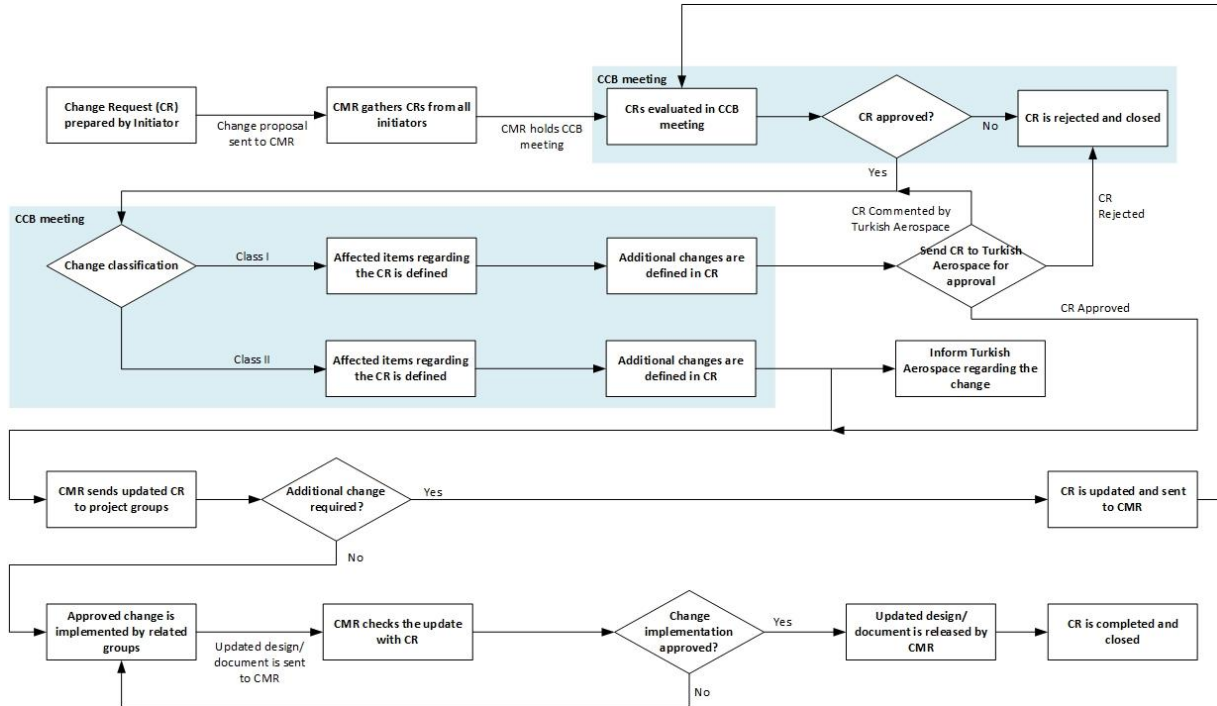


Figure 10. Change Management Process

Change proposals are prepared by engineering groups. Any engineer working in project can initiate change (whom is called initiator). Change requests are defined in Engineering Change Proposal (ECP). A template for ECP is provided in Appendix X. Initiator fills EC and sends it to Configuration Management Responsible (CMR). CMR assigns a unique identifier to ECP. This provides traceability across design versions. Whenever a unique ID is assigned to an ECP it is recorded in CM environment.

After a baseline is established any change for an item shall be subject to change management process. CCB meetings shall be held depending on the project activities. CCB meeting organization is under CMR responsibility. CMR shall define the meeting agenda and sent meeting call to related engineering groups.

During meeting each ECP shall be evaluated by engineering groups state comments regarding the change. If change has a greater impact than stated in ECP additional effects shall be recorded in

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ECP during CCB meeting. If a change evaluated to be irrelevant or incorrect, it might be rejected. If rejected, rejection reason shall be added to ECP. Rejected ECPs shall be kept in CM environment.

If ECP is approved change classification shall be identified by CCB. Change classification criteria is defined in following section. For class I changes approval from Turkish Aerospace is required for implementation. If change proposal is rejected by Turkish Aerospace CR shall be rejected and closed. If Turkish Aerospace responds with comments regarding the CR, its classification shall be re-evaluated and updated according to related comments. For class II changes no approval is required but Turkish Aerospace is informed regarding the changes.

After change classification activities CMR shall send the approved version of ECP to project group. During implementation additional subjects might needed to be added in scope of ECP. In that case initiator shall update the ECP and send it to CMR which will be added to next CCB meeting agenda. If no additional change is required for implementation related updates shall be reflected to design/documents. Updated design/documents are sent to CMR. CMR checks updates with the ECP content. If there is a difference between ECP content and design updates CMR shall feedback to initiator to implement the update according to ECP. If updates are compatible with ECP content, CMR releases the design/document accordingly then sets the status of ECP to closed.

JIRA will be used for following the defined process. Necessary authorizations and approvals will be defined in the process flow.

9.3.8. Change Classification

As defined in EIA-649-1 each change request is categorized according to the impact on product. Change that affect following aspects shall be classified as Class I change.

- A change that affects at least one of the following aspects of the product in regard with baselined documentation.
 - Performance
 - Safety
 - Reliability, maintainability, supportability

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- Weight, weight distribution
 - Interface
 - Electromagnetic characteristics
 - Any technical aspect defined in product specification
- A change, after establishment of the product baseline, i.e., baseline for implementation of the product design, that affects compatibility with interfacing products, including such products as test equipment, support equipment, software, and products furnished by a customer or that affects one or more of the following:
 - delivered operation or servicing instructions
 - required calibration to the extent that product identification should be changed
 - interchangeability or substitutability of replaceable products, assemblies, or components
 - change to add a previously non-qualified supplier, where supplier selection is specified
 - user skills or user physical attributes
 - operator or maintenance training
 - requires retrofit of delivered products; e.g., by product recall, modification kit installation, attrition, replacement during maintenance using modified spares
- A change that does not impact the above criteria and would otherwise be classified as minor, but does impact cost, price, or delivery date to customer(s), including incentives and fees, guarantees, warranties, and contracted deliveries or milestones.

A change shall be classified as Class II if it does not conform to any of the conditions defined above.

9.3.9. Requirements for Requests for Deviation (RFD)

TUBITAK MAM shall not manufacture items for acceptance by TAI that incorporate a known departure from requirements, unless a request for a deviation has been approved in accordance

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Requirements for Requests for Deviation (RFD). TUBITAK MAM shall not manufacture items for acceptance by TAI that incorporate a known departure from requirements, unless a request for a deviation has been approved in accordance with a temporary departure from requirements and do not constitute a change to the FCD, ACD, or PCD. Prior to manufacture of an item, if TUBITAK MAM considers it necessary to temporarily depart from the requirements, TUBITAK MAM may request a deviation. Deviations do not apply to software code listings. Where it is determined that a change should be permanent, a Class I or Class II engineering change must be processed in accordance with this standard.

9.3.10. Variance Management

As defined in EIA-649-1 variance is a departure from approved product definition information, for a limited amount of time or for a specified effectivity, that does not require revision of approved product definition information.

Variance management is similar to change management process, overall process is defined in Figure 11.

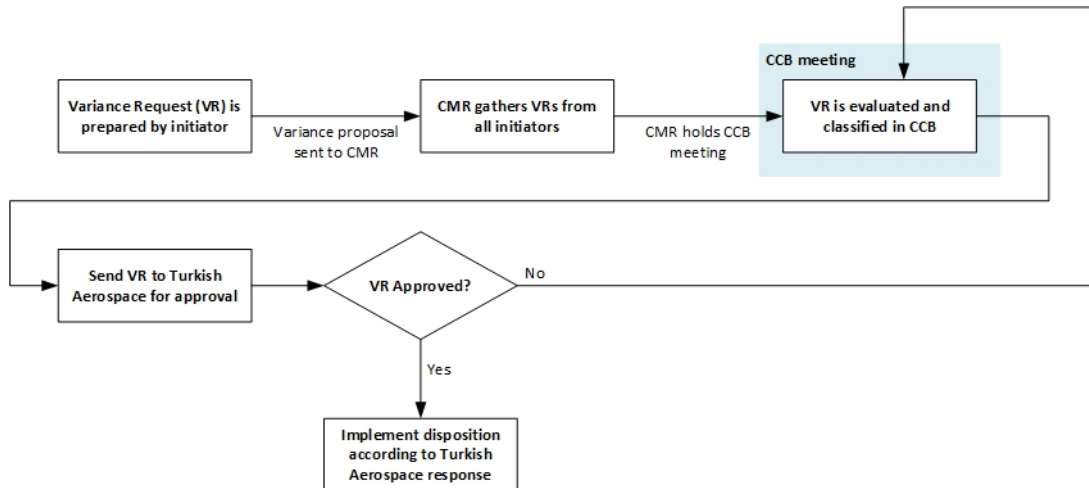


Figure 11. Variance Management

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Class of variance is determined by CCB. Following criteria are used for variance classification:

- Critical variance: Variance that impacts the safety of the product
- Major variance: Variance that have impact on the performance, operational limits, structural strength, qualification characteristics and physical specifications. Also, if a limit is imposed on product due to variance.
- Minor variance: Variance that does not classified as critical or major.

For critical and major variances, a disposition shall be defined regarding the variance. Minor variance can be dispositioned by a “use as-is” or “repair” decision.

Variances are identified by Request for Variance (RFV) form in Appendix B . RFVs are evaluated in CCBs. Turkish Aerospace has the authority to state the classification of a variance and a variance can't be classified without Turkish Aerospace assessment. All VRs shall be sent to Turkish Aerospace and approval is required for disposition.

Configuration Status Accounting

Configuration Status Accounting (CSA) provides a cumulative collection of accurate, timely information base concerning a product and its product configuration information throughout the product life cycle. CSA provides status of proposed changes and the implementation of approved changes as well according to CSR (Configuration Status Report)

CSA enables to review the following information quickly and effectively to:

- Get information on change decisions
- Assist future planning efforts
- Review the complete configuration of a product or any of its component parts
- Review maintenance information
- Review documentation

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9.4.1. CSA Information Capture and Reporting

Configuration Status reports are followed by Configuration Responsible.

The last status of deviation waiver requests, the results of configuration audits and the last status of engineering change proposal (ECP) are stored, monitored and tracked within the scope of the following items.

- Configuration management activities are recorded internally in details in *Safir Depo* in and externally *Tdrive* in common folder which only project personnel can access.
- Thus, the status and content of each configuration element is known and old versions can be accessed.
- It is ensured that the relevant personnel have access and knowledge of the configuration status of the configuration elements.
- Configuration status audits of this project are followed by Project Quality Responsible.

Configuration Status Evaluation information is not stored and monitored by using any software tools.

9.4.2. Configuration Status Accounting Performance Measurements

Metrics derived from configuration status accounting information are used to evaluate and improve CM process effectiveness. The metrics listed in Section 9.1.6 will be used in the EXPS ATA 47 Explosion Prevention System.

9.5. Configuration Verification and Audit

The audit verifies that the product during development or modification has achieved specified requirements and the design is accurately and completely documented in configuration baseline information.

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Verifying the documentation determines that it is adequate for its intended purposes and accurately reflects a design compliant with the product's functional and physical requirements.

"Verifying Product Configuration", "Verifying Incorporation of Approved Changes" and "Configuration Audits" have been detailed in sections 9.5.1, 9.5.2 and 9.5.3 respectively.

9.5.1. Verifying Product Configuration

Verification methods, including product tests, analyses, inspections, demonstrations and simulations, should be carefully planned to ensure all requirements are addressed and the individual verification methods chosen are appropriate. A single verification method or a combination of verification methods is acceptable based on the complexity of the product. Once selected, and approved, the verification method(s) are considered part of the released product configuration information and are not subject to arbitrary change. Verification methods of designs could be subject to customer approval.

9.5.2. Verifying Incorporation of Approved Changes

In case of changes as a result of the review of the approved configuration units, TUBITAK MAM is going to prepare an Engineering Change Memorandum (ECM) according to the EIA-649-1 standard and submitted to the Configuration Control Board. ECM and variance classification according to the EIA 649-1 standard is reported in Configuration Management Plan.

9.5.3. Configuration Audits

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Configuration audits are carried out by the audit team to be determined by the Project Quality Officer to check the conformity of the part dependent on the configuration with the relevant configuration documents. The audit team verifies that all configuration changes are included in the configuration dependent product documentation and prepares an audit report showing all nonconformities.

Configuration audits are including Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA).

TUBITAK MAM conduct the FCAs and PCAs for designated CIs to verify the system allocated and product configuration baselines.

A Functional Configuration Audit (FCA) examines the functional characteristics of the configured product and verifies that the product has met the requirements specified in its Functional Baseline documentation approved at the Preliminary Design Review (PDR) and Critical Design Review (CDR).

A Functional Configuration Audit is conducted for each configuration item for which a separate development or requirements specification has been baselined, except as otherwise required by the contract, and for the overall system, if required by the contract. The objective of the FCA shall be to verify the configuration item's and system's performance against its approved configuration documentation. Test data for the FCA shall be that collected from the test of the configuration of the item that is to be formally accepted or released for production (prototype or preproduction article). If a prototype or preproduction article is not produced, the test data is that collected from test of the first production article., the FCA for complex items may be conducted in increments. In such cases, a final FCA may be conducted to ensure that all requirements of the FCA have been satisfied. In cases where item verification can only be completely determined after system integration and testing, the(final) FCA shall be conducted using the results of these tests.

Responsibilities:

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a. Prior to the audit date TUBITAK MAM provide the following information to TAI

(1) Contractor representation.

(2) Identification of items to be audited:

(a) Nomenclature.

(b) Specification identification number.

(c) CI identification.

(3) Current listing of all deviations/waivers against the CI, either requested of or approved by TAI

(4) Status of test programs to test configuration items with automatic test equipment (when applicable) .

b. TUBITAK MAM provide a matrix for each CI at the FCA that identifies the requirements of sections three and four of the specifications; includes a crossreference to the test plan, test procedures, and test report, results of demonstrations, inspections, and analyses for each requirement; and identifies each deficiency by deficiency report number. The matrix is made a part of the FCA minutes.

b)The contractor shall prepare an FCA check sheet which identifies documents to be audited and tasks to be accomplished at the FCA for the CI. A sample FCA

FCA Checklists created to detect any non-conformance are given in the Table 4 & Table 5 below.

Table 4 FCA Checklists And Evidence-Gathering Techniques Using During Any FCA

Checklist Item	Evidence-Gathering Techniques
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1. Does each baselined configuration item (CI) implement all and only the documented software/system requirements?	• Evaluate requirements-to-CI forward and backward traceability information for completeness and to ensure that no unauthorized functionality has been implemented. • Sample a set of requirements and using the traceability information, review each associated, baselined CI for implementation completeness and consistency. • Sample a set of approved enhancement requests and review their resolution status (or if approved for change, evaluate their associated, baselined CIs for implementation completeness and consistency). • Sample a set of baselined CIs and compare with the previous versions to identify changes. Ensure that each change corresponds to a requirement or approved change request
2. Are all the defects/anomalies reported during verification & validation (V&V) activities adequately resolved (or the appropriate waivers/deviations obtained and known defects with work-arounds are documented in the release notes)?	• Review a sample set of approved defect/anomaly report records for evidence of adequate resolution. • Sample a set of defect/anomaly report records and review their resolution status (or if approved for change, evaluate their associated CIs for implementation completeness and consistency). • Review V&V iteration results data (e.g., re-peer review records, re-test/regression test logs, test case status, and/or metrics) to ensure adequate V&V iteration coverage after defect correction

Table 5 FCA Checklists And Evidence-Gathering Techniques Used for FCA at Product/Release Baseline

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Checklist Item	Evidence-Gathering Techniques
1. Can each system/software requirement be traced forward into tests cases/procedures that V&V that requirement?	• Evaluate requirements-to-tests traceability information for completeness. • Sample a set of requirements and using the traceability information, review the associated test documentation (e.g., test plans, defined test cases/procedures) for adequacy of V&V by ensuring the appropriate level of test coverage for each requirement
2. Is comprehensive system/software testing complete, including functional testing, interface testing and the testing of required quality attributes (performance, usability, safety, security, etc.)?	• Review approved V&V reports for accuracy and completeness. • Evaluate approved test documentation (e.g., test plans, defined test cases/procedures) against test results data (e.g., test logs, test case/procedure status, test metrics) to ensure adequate test coverage of the requirements and system/software during test execution. • Execute a sample set of test cases to evaluate the accuracy of test results.
3. Is the operational & support documentation consistent with the requirements and as-built system/software?	• Review minutes from peer reviews and defect resolution information from operational & support documentation reviews for evidence of consistency. • Evaluate formal test documentation (e.g., test plans, defined test cases/procedures) against test results data (e.g., test logs, test case/procedure status, test metrics) to ensure adequate test coverage of the operational & support documentation during test execution. • Review sample set of updates to previously delivered documents to ensure consistency with requirements and as built system/software.

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In this context, any nonconformities detected will be communicated to the subcontractor by e-mail and they will be asked to respond with improvement activities. Nonconformity lists will be reviewed at weekly meetings.

A physical Configuration Audit (PCA) is the formal examination of the "as-built" configuration of a configuration item against its technical documentation to establish or verify the configuration item's product baseline. The PCA is used to examine the actual configuration of the configuration item (CI) that is representative of the product configuration in order to verify that the related design documentation matches the design of the deliverable CI.

PCA examines the actual configuration of an item being produced and is conducted around the time of the Full-Rate Production Decision. It verifies that the related design documentation matches the Configuration Item (CI) as specified in the contract and confirms that the manufacturing processes, quality control system, measurement, and test equipment, and training are adequately planned, tracked, and controlled. The PCA for a CI shall not be started unless the FCA for the CI has already been accomplished or is being accomplished concurrent with the PCA. After successful completion of the audit and the establishment of a PBL, all subsequent changes are processed by formal engineering change action. The PCA also determines that the acceptance testing requirements prescribed by the documentation is adequate for acceptance of production units of a CI by quality assurance activities. The PCA includes a detailed audit of engineering drawings, specifications, technical data, tests utilized in production of CIS, and design documentation, listings, and operation and support documents for CSCIS. The PCA shall include an audit of the released engineering documentation and quality control records to make sure the as-built or as-coded configuration is reflected by this documentation. The PCA validates many of the supporting processes used by the contractor in the production of the item and verifies other elements of the item that may have been impacted or redesigned after completion of the System Verification Review.

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Responsibility.

TUBITAK MAM shall provide the following information to TAI:

- a. Contractor representation (the test manager should be in attendance) .
- b. Identification of items to be audited by:
 - (1) Nomenclature.
 - (2) Specification Identification Number.
 - (3) CI Identifiers.
 - (4) Serial Numbers.
 - (5) Drawing and Part Numbers.
 - (6) Identification Numbers.
 - (7) CAGE Codes.
- c. A list delineating all deviations/waivers against the CI either requested or TAI approved.

Reference information to the CI being audited as follows:

- (1) CI product specification.
- (2) A list delineating both approved and outstanding
- (3) changes against the CI.
- (4) Complete shortage list.
- (5) Acceptance test procedures and associated test data
- (6) Engineering drawing index including revision letters.
- (7) Operating and support manuals; including operators manuals, maintenance manuals, illustrated parts breakdown, programmer's manuals, diagnostic manuals, etc.
- (8) "Material Inspection and Receiving Report."
- (9) Approved nomenclature and nameplates.
- (10) VDDS , for software.
- (11) FCA minutes for each CI.
- (12) Findings/Status of Quality Assurance Programs. Program parts selection list.
- (13) Interface Design Document for software.

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e. Assemble and make available to the PCA team at time of audit all data describing the item configuration, to include:

- (1) Current approved issue of hardware development and software and interface requirements specifications to include approved SCNS and approved deviations/waivers.
- (2) Identification of all changes actually made during test.
- (3) Identification of all required changes not completed.
- (4) All configuration documentation, or electronic representations of the same, required to identify the CI.
- (5) In manufacturing instructions, manufacturing instruction sheets or computer-aided manufacturing (CAM) data related to drawings and computer-aided design (CAD) presentations of specified parts identified by TAI.

f. Identify any difference between the physical configurations of the selected production unit and the development unit(s) used for the FCA and shall certify or demonstrate to TAI that these differences do not degrade the functional characteristics of the selected units.

PCA Checklists created to detect any non-conformance are given in the Table 6 & Table 7 below.

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Table 6 PCA Checklists And Evidence-Gathering Techniques Using During Any PCA

Checklist Item	Evidence-Gathering Techniques
1. Has each nonconformance or noncompliance from the FCA been appropriately resolved?	Review findings from the FCA audit report, associated corrective actions, follow-up and verification records to evaluate adequacy of actions taken (or appropriate approved waivers/deviations exist).
2. Have all of the identified Configuration Items (e.g., source code, documentation, etc.) been baselined?	Sample a set of Configuration Items and evaluate them against configuration status accounting records
3. Do all of the Configuration Items meet workmanship standards?	- Sample a set of source code modules and evaluate them against the coding standards. - Sample a set of deliverable documents (or sections/pages of those documents) and evaluate them against documentation standards.
4. Has the software been built from the correct components and in accordance with the specification?	- Evaluate the build records against the configuration status accounting information to ensure that the correct version and revision of each module was included in the build. - Evaluate any patches/temporary fixes made to the software to ensure their completeness and correctness. - Sample a set of design elements from the architectural design and trace them to their associated detailed design elements and source code. Compare those elements with the build records to evaluate for completeness and consistency with the as built software.

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Table 7 PCA Checklists And Evidence-Gathering Techniques Used for PCA at Product/Release Baseline

Checklist Item		Evidence-Gathering Techniques		
1. Is the deliverable documentation set complete?		• Evaluate the master copy of each document against the configuration status accounting information to ensure that the correct version and revision of each document subcomponent (e.g., chapter, section, figure) is included in the document. • Sample the set of copied documents ready for shipment and review them for completeness and quality against the master copy. • Evaluate the version description document against the build records for completeness and consistency. • Compare the current build records to the build records from the last release to identify changed components. Evaluate this list of changed components against the version description document to evaluate the version description document's completeness and consistency.		
2. Does the actual system delivery media conform to specification? Has the delivery media been appropriately marked/labeled?		• Evaluate the items on the master media against the required software deliverables (executables, help files, data) to ensure the correct versions and revisions were included. • Sample a set of copied media ready for shipment and review them for completeness and quality against the master media. • Sample a set of copied media ready for shipment and review their marking/labeling against specification.		
3. Do the deliverables for shipment match the list of required deliverables?		• Evaluate the packing list against the list of documented deliverables to ensure completeness.		
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	• Sample a set of ready-to-ship packages and evaluate them against the packing list to ensure that media (i.e., CD, disks, tape), documentation and other deliverables are included in each package.
4. Have 3rd party licensing requirements been met?	• Evaluate the build records against configuration status accounting information to identify 3rd party components and license information to confirm adequate numbers of licenses exist.
5. Have export compliance requirements been met?	• Evaluate the build records against configuration status accounting information to identify components with export restrictions and confirmed export compliance.

While several suggested evidence-gathering techniques are listed for each checklist item, the level of rigor chosen for the audit will dictate which of these techniques (or other techniques) will actually be used.

During these audits, if any non-conformance is found, TÜBİTAK MAM Non-conformity Procedure: "Y.01.18 Directive for control of non-conforming product and activity" will be followed.

In this context, any nonconformities detected will be communicated to the subcontractor by e-mail and they will be asked to respond with improvement activities. Nonconformity lists will be reviewed at weekly meetings.

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10. LIFE CYCLE DATA

Data Life Cycle Management is a process that helps organizations to manage the flow of data throughout its lifecycle – from initial creation through to destruction. While there are many interpretations as to the various phases of a typical data lifecycle, they can be summarized as follows:

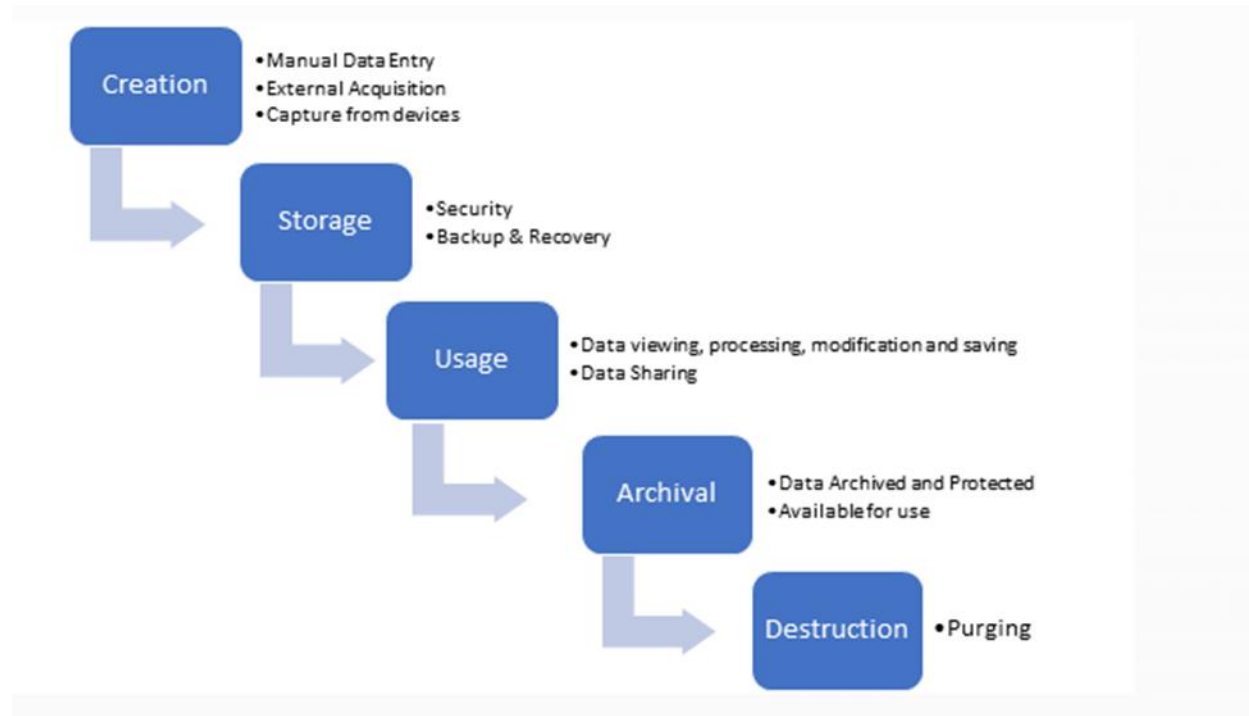


Figure 12 Schematic representation of data life cycle management

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10.1. Data Creation

The first phase of the data lifecycle is the creation/capture of data. This data can be in many forms e.g. PDF, image, Word document, SQL database data. Data is typically created by an organization in one of 3 ways:

- Data Acquisition: acquiring already existing data which has been produced outside the organization
- Data Entry: manual entry of new data by personnel within the organization
- Data Capture: capture of data generated by devices used in various processes in the organization.

10.2. Storage

Once data has been created within the organization, it needs to be stored and protected, with the appropriate level of security applied. A robust backup and recovery process should also be implemented to ensure retention of data during the lifecycle.

10.3. Usage

During the usage phase of the data lifecycle, data is used to support activities in the organization. Data can be viewed, processed, modified and saved. An audit trail should be maintained for all critical data to ensure that all modifications to data are fully traceable. Data may also be made available to share with others outside the organization.

10.4. Archival

Data Archival is the copying of data to an environment where it is stored in case it is needed again in an active production environment, and the removal of this data from all active production environments. A data archive is simply a place where data is stored, but where no maintenance or general usage occurs. If necessary, the data can be restored to an environment where it can be used.

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10.5. Destruction

The volume of archived data inevitably grows, and while you may want to save all your data forever, that's not feasible. Storage cost and compliance issues exert pressure to destroy data you no longer need. Data destruction or purging is the removal of every copy of a data item from an organization. It is typically done from an archive storage location. The challenge of this phase of the lifecycle is to ensure that the data has been properly destroyed. It is important to ensure before destroying data that the data items have exceeded their required regulatory retention period.

11. ARCHIVE AND RELEASE MEDIA

Product release and configuration management continue to be very common conversations. The definition of product release is the process of planning, building, testing and delivering a new product through a series of sprints. For product teams, development just represents one phase of the broader release plan. The mainstream definition of a product should be under control at all times and changes and additions to that definition should be incorporated through a release process.

The project streams and baselines that are no longer use so that they are not shown in the list of configurations. Archiving a configuration does not delete it; configurations cannot be deleted. Restore configurations to make them available for use by you or other project members.

12. APPENDICES

- APPENDIX A. ECP FORM
- APPENDIX B. RFV FORM

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APPENDIX A: ECP FORM

HİZMETE ÖZEL

		Sözleşme No: 202200028
MMU Projesi		Patlama Önleme Sistemi Sözleşmesi

	TF-X PROJECT Engineering Change Proposal (ECP)	
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ECP Ref No:	DATE:	ISSUE:
Initiator:		
Affected items P/N:		
Change reason:	Customer request, design correction, document correction, compatibility with other systems, other.	
Description of Change:	Reason of the change, impact of the change to the whole system, impact on the system if the change is not implemented.	
Applicable design data:	Version of the document, requirement number, 3D model, technical drawing etc.	
Change impacts:		
Decision of the meeting (CCB):	Accepted/ Rejected. If rejected reason of rejection, if accepted Class 1 and Class 2 selection.	
Accepted: Class 1 ☐ Class 2 ☐	Rejected:	
Approver:		
Authorizer:		
Customer Response:		

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APPENDIX B. RFV FORM

	TF-X PROJECT Request For Variance (RFV)	
RFV Ref No:	DATE:	ISSUE:
Initiator:		
Affected items P/N:		
Variance reason:	Customer request, design correction, document correction, compatibility with other systems, other.	
Description of Variance:	Reason of the variance, impact of the variance to the whole system, impact on the system if the variance is not implemented.	
Applicable design data:	Version of the document, requirement number, 3D model, technical drawing etc.	
Variance impacts:		
Decision of the meeting (CCB):	Accepted/ Rejected. If rejected reason of rejection, if accepted Critical/Major/Minor selection.	
Accepted: Critical ☐ Major ☐ Minor ☐	Rejected:	
Approver:		
Authorizer:		
Customer Response:		

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