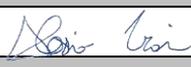
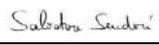




# SST Programme: Configuration and Data Management Plan

SST-PRO-PLA-002

Version 2c

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# Table of Contents

Table of Contents.....	3
List of Figures.....	4
List of Tables.....	4
1 Introduction .....	5
1.1 Scope & Purpose .....	5
1.2 Applicability.....	5
1.3 Applicable Documents.....	5
1.4 Reference Documents.....	5
1.5 Definition of Terms and Abbreviations.....	6
1.6 Evolution of this Document.....	8
2 System Programme Overview .....	9
3 Configuration And Data Management .....	11
3.1 Organization structure and responsibilities.....	11
3.2 Policies, directives and procedures .....	11
3.3 SST-STR contractors CADM policy .....	11
4 Configuration Management Activities.....	12
4.1 General.....	12
4.2 Configuration identification.....	12
4.3 Configuration Selection .....	13
4.4 Configuration Item Identification .....	14
4.5 Configuration Baselines and Reviews .....	15
5 Configuration Control.....	18
5.1 Change Control.....	18
6 Configuration Status Accounting.....	26
6.1 Configuration documentation .....	26
7 Interface and Requirements Control.....	29
7.1 Interface Documentation .....	29
7.2 ICD Updating and/or Changing.....	29
7.3 Requirements Documentation .....	30
7.4 Requirements Updating and/or Changing.....	30
8 Information And Documentation Management.....	31

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8.1	Document Identification and Numbering.....	31
8.2	Document Preparation .....	33
8.3	Document Composition.....	33
8.4	Drawings & Nomenclatures.....	35
8.5	Document Categories & Approval.....	35
8.6	Document Review, Approval and Update Process .....	36
8.7	Documentation Approval Cycle, Distribution and Archiving.....	37
8.8	Documentation Change Control.....	39
Annex 1	.....	40
Annex 2	.....	45
Annex 3	.....	46
Annex 4	.....	47

## List of Figures

Figure 4-1: SST Product Breakdown Structure .....	13
Figure 4-2: Request for Deviation/Waiver Flow .....	23
Figure 7-1: SST Telescope Requirement Tree.....	30
Figure 8-1: Example of field of for SST document formalization .....	37
Figure 8-2: document approval cycle and archiving.....	38

## List of Tables

Table 2-1. Small-sized telescope main properties .....	10
Table 8-1: Originators and Document Types for SST configured Document ID.....	32
Table 2: Project Management and Reporting Documents Set .....	41
Table 3: PA, QA & RAM Documents Set .....	41
Table 4: System Engineering Plan Documents Set .....	42
Table 5: Design Definition Documents Set .....	42
Table 6: Design Justification Documents Set.....	43
Table 7: Product Reference Documents Set.....	43
Table 9: Mathematical Models and Simulations Set .....	44

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# 1 Introduction

## 1.1 Scope & Purpose

This document establishes the overall Configuration And Data Management (CADM) rules and procedures to achieve an effective control over the design and finally over the products as built status and relevant supporting data. It defines rules and procedure for documentation release and control to be undertaken by SST Consortium.

This plan defines the how and when the CADM rules and procedures are applied to ensure that:

- each Configuration Item (CI) and related documentation are uniquely identified,
- the design standard of the CI is defined, traceable and retrievable at each point in time,
- effective change control is established and maintained,
- reports are timely established and released to support program activities
- design and product inspections are performed to verify the current configuration status
- applicable CM process is monitored to verify correct application of CADM requirements
- program documentation is received, reviewed, released and recorded in an orderly and consistent manner

## 1.2 Applicability

This plan is applicable to institutes and SST-STR contractors of the SST Consortium during design, development, manufacturing, assembly, integration, verification, on-site integration and final acceptance from piece-part level to complete SST Telescope and associated equipment. SST-STR contractors will provide the CADM relevant the provided product.

## 1.3 Applicable Documents

- [AD1] SST Programme Project Management Plan, SST-PRO-PLA-001, Version 3a
- [AD2] Document Numbering System, V1 Rev. c, 12 June 2019 CTA-STD-SEI-000000-0001
- [AD3] CTAO Configuration Management Plan Doc. No: CTA-PLA-MGT-000000-0002\_1b
- [AD4] AD2: CTAO Acceptance Process CTA-PRO-MGT-000000-0002\_DRAFT01

## 1.4 Reference Documents

- [RD1] ECSS-M-ST-40C\_Rev.1.6

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## 1.5 Definition of Terms and Abbreviations

### 1.5.1 Abbreviations and Acronyms

AIT	Assembly Integration and Testing
AIV	Assembly Integration and Verification
BKO	Bridging phase Kick-Off
CDR	Critical Design Review
CTA	Cherenkov Telescope Array
CTAO	Cherenkov Telescope Array Observatory
FAR	Final Acceptance Review
FRC	France Contribution
DR	Delivery Review
DVER	Design Verification Engineering Review
ERIC	European Research Infrastructure Consortium
IKC	In Kind Contribution
ESC	Executive Steering Committee
INAF	Istituto Nazionale di Astrofisica
INSU	Institut National des Sciences de l'Univers
KO	Kick-Off
MPIK	Max-Planck-Institut für Kernphysik
OP	Observatoire de Paris
PA	Product Assurance
PBS	Product Breakdown Structure
PM	Project Manager
PR	Product Review
PMP	Programme Management Plan
PO	Project Office
PQR	Production Qualification Review
PR	Product Review
PRM	Programme Manager
PRR	Production Readiness Review
PSE	Programme System Engineer
QA	Quality Assurance
QM	Quality Manager
RAMS	Reliability, Availability, Maintainability & Safety
SE	System Engineer
SST	Small Size Telescope
T-TRR	Telescope Test Readiness Review
TRR	Test Readiness Review
WBS	Work Breakdown Structure
WP	Work Package

## 1.5.2 Glossary

TERM	DEFINITION
"As Built" Configuration	The as-built configuration or applied configuration is defining the as-built status per each serial number of Configuration Item (CI) subject to formal acceptance.
"As Designed" Configuration	The as-designed configuration or Applicable configuration is defining the current design status of a Configuration Item (CI)
AIV	AIV is the Assembly Integration and Verification, which is referred to the integration activities related with the verification of the system or sub-system. In the framework of SST for briefness this term includes also the Assembly Integration and Testing which is related with the integration activities and testing to be performed during the integration at system and subsystem levels
Baseline	Set of information which describes exhaustively a situation at a given instant of time or over a given time interval.
Change	Vehicle for proposing modifications to an approved baselined data or the business agreement.
Configuration	Functional or physical Characteristics of a product defined in configuration definition documents subject to configuration baseline.
Configuration Item	Aggregation of hardware, software, processed materials, services or any of its discrete portions, that is designated for configuration management and treated as a single entity in the configuration management process. <b>NOTE:</b> A configuration item can contain other lower-level configuration item(s).
Deviation	Written authorization to depart from the originally specified requirements for a product prior to its production.
Firmware	Firmware is software programmed onto an electronic device which is treated like a pure hardware device.
Executive Steering Committee	The SST Executive Steering Committee (ESC) is the high-level decision-making body which will manage the strategic direction of the Programme and will be in charge of overseeing progress and facilitating global collaboration among the participating groups.
Institutes	Research Institutes involved in the SST Programme.
Contractor	Industry involved in the SST Programme which has a contract with an institute
SST-PRO	It is the team composed by Institutes and Contractors responsible, involved in the production of SST telescopes elements, which coordinate the project-level activities.
Hardware	Hardware is a single or an assembly of physical electronic devices, which cannot be changed in its user environment.
Item	Any part, component device, sub-unit, unit, equipment or device that can be individually considered.
Model	Physical or abstract representation of relevant aspects of an item or process that is put forward as a basis for calculations, predictions or further assessment useful for the preparation of SST production
Partners	are those entities taking responsibility for IKC delivery by signing IKC agreements with CTAO, plus any organisation identified by these signing entities as playing an essential role in SST delivery. The institutes are the partners of the CTA-SST consortium.
Product	A product (hardware, software, service) required in the frame of the program and included as element of the product tree having a unique identifier. A product may be deliverable or not.
Product Breakdown Structure	Hierarchical structure depicting the product orientated breakdown of the project into successive levels of detail down to the configuration items necessary to deliver the required functions. The Product Breakdown Structure (PBS) in general is influenced by Institutes/partners decisions to group certain products or by program history. It identifies products and their interfaces; it serves as the basis for the WBS
Service	Service is the result of at least one activity necessarily performed at the interface between the SST consortium and CTA and is generally intangible. SST-AIV is the main service foreseen in the SST Programme
Software	Set of computer programs, procedures, documentation and their associated data.
SST-E2E	The SST end-to-end telescope, or simply SST, will consist of the SST Structure and the SST Camera (including all mechanics, mirrors, auxiliary devices and required software), integrated and commissioned on-site including all required documents. It ends at (and integrates into CTA via) the system interfaces specified by the CTA PBS.
SST Consortium	The SST Consortium then consists of the Partners and their associated Teams, where a Team is a set of individuals within a single organisation at a single location (such as a university group).
System	An entity of products assembled or working together for a well-defined specified purpose. In SST the term system can be utilised in alternative to Telescope End-to-End.
Sub-System	Like a system but a lower level. In SST the SST system is composed by the subsystem SST-MECH, SST-OPT, SST-TCS and SST-CAM.
Waiver	Written authorization to use or release a product which does not conform to the specified requirements
Work Breakdown Structure	Hierarchical representation of the activities necessary to complete a project.

---

## 1.6 Evolution of this Document

This document should be fixed once consolidated in the Bridging Phase and used as applicable document for SST project management documentation and programme configuration.

---

## 2 System Programme Overview

When a VHE gamma-ray interacts with the atoms and ions in the upper levels of the atmosphere, it induces a cascade of secondary particles which propagate over many kilometres at nearly the speed of light through the atmosphere. These particles emit Cherenkov light, forward-beamed with an opening angle of about one degree. A Cherenkov light event consists of a time-correlated multi-photon image with a typical timescale of  $\sim 10$  ns. Cascades originate at an altitude of  $\sim 10$  km above ground and create a light pool on the ground of  $\sim 120$  m radius. Telescopes placed on the ground, containing large reflectors, focus the light to an imaging camera. Such Cherenkov cameras must be highly pixelated, cover a large field of view, and be able to detect UV/blue light down to the single photon levels with exposure times of approximately a billionth of a second. To provide a high imaging sensitivity over an extensive energy range, from a few tens of GeV up to a few hundreds of TeV, the Cherenkov Telescope Array Observatory (CTAO, see web page link at <https://www.cta-observatory.org>) will be made of sub-arrays with three different types of telescopes: large-sized (LST, 23 m diameter), medium-sized (MST, 12 m diameter) and small-sized (SST, 4 m diameter) telescopes. They are distributed in two observing sites, the Northern one in La Palma, the Canary Islands, and the Southern one in the Chilean Andes in the Paranal area. The CTA South “Alpha Configuration” would include LSTs, MSTs and SSTs. In particular, it envisages the construction and installation of 42 SSTs (a number that could increase up to 70 in future upgrades).

The SSTs are developed by an international consortium of institutes that will provide them as an in-kind contribution to CTAO. The SSTs rely on a Schwarzschild-Couder-like dual-mirror polynomial optical design, with a primary mirror of 4 m diameter, and are equipped with a focal plane camera based on SiPM detectors covering a field of view of  $\sim 9^\circ$ . They are sensitive in the band from  $\sim 0.5$  TeV up to  $\sim 300$  TeV, providing the Observatory with sensitivity to the highest energies. The current SST concept has been validated by developing the prototype dual-mirror ASTRI-Horn Cherenkov telescope and the CHEC-S Cherenkov camera. Table 2-1 reports main properties of the Small-Sized telescope (SST).

Table 2-1. Small-sized telescope main properties

<b>Small-Sized telescope (SST) main properties:</b>	
Optical Design	modified Schwarzschild-Couder
Primary reflector diameter	4.3 m
Secondary reflector diameter	1.8m
Effective mirror area (including shadowing)	>5 m <sup>2</sup>
Focal length	2.15 m
Total weight	17.5 t
Field of view	>8.8 deg
Number of pixels in SST Camera	2048
Pixel size (imaging)	0.16 deg
Photodetector type	SiPM
Telescope data rates (before array trigger)	>600 Hz
Telescope data rates (readout of all pixels; before array trigger)	2.6 Gb/s
Positioning time to any point in the sky (>30° elevation)	90s
Pointing Precision	< 7 arcsecs

---

## 3 Configuration And Data Management

### 3.1 Organization structure and responsibilities

Each SST Programme as well as the SST Projects will identify a CADM Officer. For the purpose of contract control the main contractors will provide CADM to the customers. The project CADM Officers provide effective coordination with SST-PRO CADM Officer.

The CADM Officer provides effective control over the Configuration Management discipline and achieves effective responsiveness to all configuration management matters related to hardware and software.

The CADM Officer is responsible for assuring compliance with SST-PRO requirements management, including the timely establishment of configuration management baselines and control of changes thereto.

The CADM Officer is responsible for establishing and administering the SST-PRO configuration and data management requirements through co-ordination between institutes, contractors and internal functional departments.

In this capacity, the CADM Officer, is responsible for establishing new and revised plans and procedures which identify the Configuration Management requirements of this plan to the appropriate supporting elements and for assuring that they are fulfilled in a satisfactory manner.

### 3.2 Policies, directives and procedures

Each SST Project have established a Configuration And Data Management framework, in compliant with this document.

### 3.3 SST-STR contractors CADM policy

SST-STR contractors are required to prepare a CADM plan, explaining organization and the procedures they intend to implement to satisfy the SST CADM environment as addressed in this document.

---

## 4 Configuration Management Activities

### 4.1 General

Configuration management is establishing and maintaining a consistent record of a product's functional and physical characteristics compared to its design and operational requirements. Configuration management is applied throughout the entire life cycle of the product and allows to:

- know at any time the technical description of a product using approved documentation;
- record and control the evolution in the technical description of a product (e.g., system and its products);
- provide traceability of the evolution of the product's technical description;
- ensure the consistency of the internal and external product interfaces;
- verify and demonstrate to all actors that documentation is and remains the exact image of the products it describes;
- identify the current configuration baseline and the as-built configuration of a product (mainly at TRR, TRB, DRB and provisional acceptance), to record discrepancies detected during production, delivery or operation and dispositioned for further use;
- enable any actor to know the operational possibilities and limitations of each product item and, in case of non-conformance, to know which items are affected.

### 4.2 Configuration identification

Configuration Identification is the process of identifying the Configuration Items (CIs) and their lower-level structure and identifying documents for each CIs describing their physical and functional requirements and the detailed design.

In detail, the Configuration Identification discipline will have the following objectives:

- establish the PBS down to Unit level or further, as necessary;
- select and designate CIs on the basis of the consistent Product Tree and according to specific criteria and selection guidelines,
- establish and implement an identification numbering system, for hardware/software and related Documentation

## 4.2.1 SST Product Breakdown Structure

The SST PBS, limited to the third level, is shown in Figure 4-1. The complete PBS is reported in the document “SST Programme Project Management Plan” [AD1].

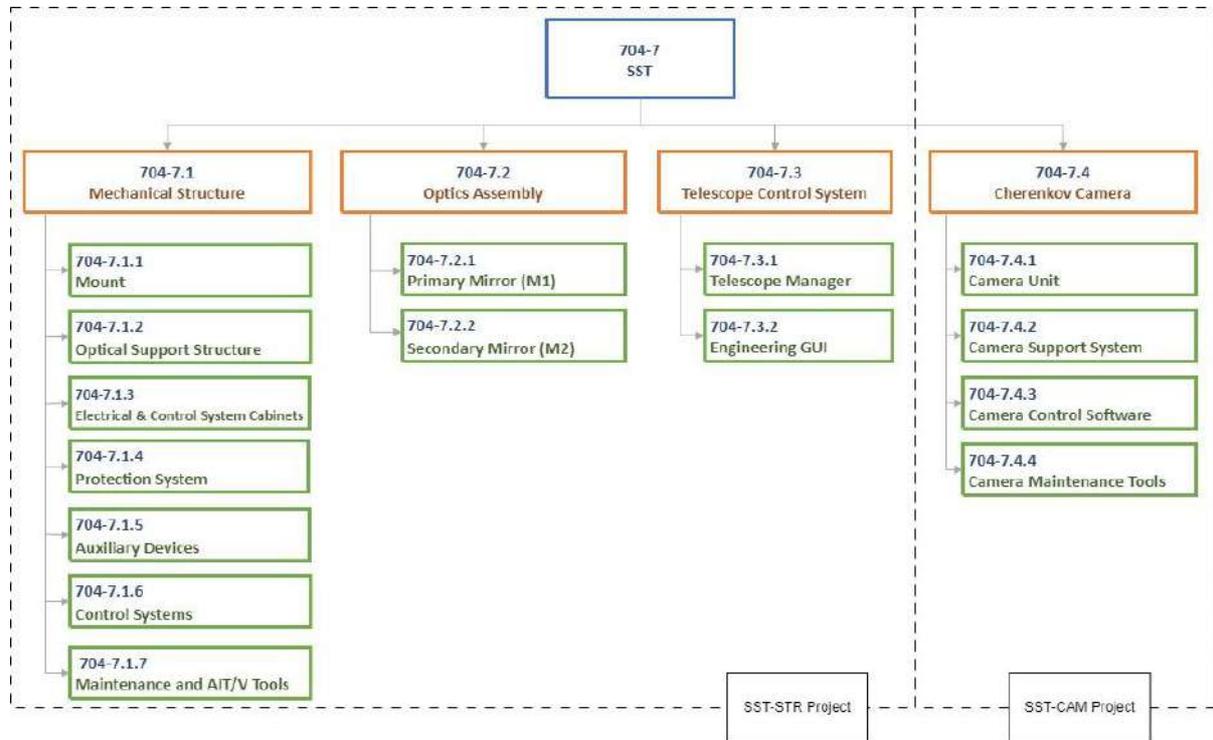


Figure 4-1: SST Product Breakdown Structure

## 4.3 Configuration Selection

CI are selected from PBS as appropriate for a given sub-system. The process for selecting a CI relies on good system engineering judgment, and configuration management experience, supported by cost trade-off considerations. Items from the PBS that are satisfying the definition included in the next paragraphs will be selected as CIs as well as those products with the following characteristics:

- They are deliverable items that are manufactured, assembled and subject to a test campaign and a final acceptance review
- Their characteristics are defined by a Technical Specification
- Any item identified by SST-PRO to be managed as a CI

The CI selection has the purpose to define a manageable set of hardware and software items in the early phase of the Programme. The purpose of this activity is to define the relevant CI List that will be maintained during the overall SST life-cycle.

---

## 4.4 Configuration Item Identification

A CI is defined as an aggregation of hardware, software, processed materials, services or any of its discrete portions, that is designated for configuration management and treated as a single entity in the configuration management process.” A CI is a specific item that is referenced, as an End-use Function Item in the SST Partnership agreements and is defined for manufacturing, assembly, acceptance and delivery by a Design Specification. A Design Specification may define one or more CIs.

The CI number, Part Number, and relevant serial numbers and revision index shall define the state of the art of the design and its built standard.

Each PBS element (i.e. product item), whether a CI or not, is identified in unique way by an alphanumeric code.

Each separable item shall be marked or stamped for permanent identification and in accordance with Product Assurance requirements.

For developed hardware CI, the following information shall be included:

1. CI Identifier
2. Part number
3. Serial number
4. Manufacturer identifier
5. Product name or abbreviation.

For developed software CIs, the following shall be included in the header:

1. Manufacturer identifier;
2. CI identifier
3. Software identifier
4. Version and revision number
5. Release date
6. Product name or abbreviation.

All product items, not defined as a CI, shall be marked or labelled with the following information:

1. Manufacturer identifier;
2. Part number
3. Serial or lot number, when applicable

All product items subject to major non-conformances shall receive supplemental identification to provide a link to the departure authorization document.

For media containing software, the following information shall be included as a minimum:

1. Manufacturer identifier;
2. CI identifier;
3. S/W identifier;
4. Version and revision number;
5. Date of generation;
6. Product name or abbreviation;
7. SCF (Software Configuration File) reference including issue and date;
8. Total number of delivered media per information set (1 of ...);
9. Copy or serial number of data set.

---

Identification marking of software products shall be established through the hardware product where the software is resident (i.e., programmed PROMs), or the media in which the software is stored.

When the physical dimensions of the item don't permit full identification marking, the following shall apply:

1. Select a minimum set of information which uniquely identifies the items. Selection of the information shall be agreed on case-by-case basis with CTAO.
2. Identify on a permanent tag, if possible.
3. If permanent tag is not possible, identify on a removable tag or on the packaging.

The identification marking methods applied, defined in the configuration definition document, shall be compatible with the product's operational environment.

An exclusive serial number shall identify identical items sharing a unique CI number. These numbers shall begin with number 1 (one) and shall be assigned in unbroken numerical progression within one CI series.

The standard definition of serial numbers refers to identification of units built to the same P/N, i.e., identical and interchangeable.

## 4.5 Configuration Baselines and Reviews

Configuration baselines represent the approved status of requirements and design at key milestones of the SST program and provide the point of departure for further evolution. These configuration baselines are applicable to both hardware and software.

A configuration baseline comprises the documentation that describes the characteristics of a product.

This documentation is formally designated as the configuration reference at a key point in the product life cycle corresponding to a major product definition event. Any subsequent change of a product characteristic proposed for this documentation is subject to a formal change procedure involving all the actors and disciplines concerned before it can be incorporated.

During the life cycle of the product (see PBS par. 4.2.1), baselines shall be established and checked during the following design reviews:

- CDR
- PRR
- DR
- ACRV

For each review a Data Package is defined according to the agreed set of documentation, to be defined prior the CDR.

Prior to each campaign of these reviews, specific plans issued by CTAO or SST-PRO will specify:

- how to conduct the reviews and to produce RIXs
- how to negotiate them and monitor their status
- how to close action derived from Design Review

Detailed definition of Configuration Baselines and associated reviews, as well as the relevant content, is given in the next paragraphs.

---

### 4.5.1 Configuration Baseline Content

The documentation that constitutes the baseline of the hardware and software products is defined as follows and shall reflect the actual configuration of the product, at any given point in the product life cycle.

For hardware products (TBC):

- the functional specification;
- the technical specification;
- general specifications (e.g., environment, radiation, design rules, interfaces, and PMP);
- procurement specification for OTS items;
- standardization document;
- engineering drawings (e.g., interface control drawings, parts and assembly drawings, and installation drawings) and associated lists;
- the interface control document;
- the CIs data list;
- the installation/user/operating/maintenance manual;
- test specifications;
- test procedures;
- applicable engineering changes;
- applicable deviations.

For software products (TBC):

- software system technical specification, when applicable;
- software requirements document (SRD);
- software design document;
- interface control document;
- software configuration file (SCF) (including the source code listing);
- software release document;
- the installation/user/operating/maintenance manual;
- the configuration description of the development tools (e.g. compilers, and linkers);
- software validation testing specifications;
- software test procedures;
- maintenance procedures;
- applicable engineering changes;
- applicable deviations.

### 4.5.2 Configuration Baseline

The following baselines shall be established as a minimum to ensure proper design and hardware control:

- Agreement Baseline
- Functional Baseline
- Preliminary Production Baseline
- Production Baseline
- Qualified Product baseline

---

#### 4.5.2.1 *Agreement Baseline*

Agreement Baseline is established at the Bridging Phase Kick-Off and consolidates the program architecture and CTA requirements (technical and management) that will be the basis for the next program phases.

#### 4.5.2.2 *Functional Baseline*

The Functional Baseline will be established at the Product Review (PR). Baseline documentation will include those specification, plans, interface control document and selected documents or drawings approved as adequate to meet the applicable Requirements by CTA.

#### 4.5.2.3 *Preliminary Product Baseline*

The Preliminary Product Baseline will be established at CDR by review of preliminary manufacturing/assembly drawings test documentation: upon approval, baselined documentation will be placed under Configuration Control and maintained through formal change procedure.

#### 4.5.2.4 *Product Baseline*

The Product Baseline will be established at PRR by review of final manufacturing/assembly drawings and related pre-production test documentation.

#### 4.5.2.5 *Qualified Product Baseline*

The Qualified Production Baseline is established at ACVR based on the results of the first and second telescope AIT/V.

### 4.5.3 SST Reviews

The main SST Programme events (reviews, meetings and decision point) are reported in the document "SST Programme Project Management Plan" [AD1].

---

## 5 Configuration Control

Configuration Control is the process of providing the tools and procedures to identify, document and manage the baseline and changes therein, across all phases of the programme.

### 5.1 Change Control

#### 5.1.1 Change Approach

Institutes and Contractors will apply, within the Configuration Control discipline, a Change Control programme, which provides tools, processes and procedures to identify and document all the changes to CIs and associated documentation. The Change Control programme is foreseen to start after the CDR, when the Preliminary Production Baseline will be established.

The procedures and rules, detailed in this section, are to be applied for the following changes:

- Changes in design that affect requirements
- Changes in technical interfaces
- Changes in milestones
- Change in IKC money matrix
- Changes in the IKC or contract conditions
- Changes in the IKC or contract baseline

ECP/CCN's affecting the above criteria shall be primarily to SST-PRO for implementation decision.

Other type of changes shall be handled in accordance to other control procedures (e.g.: Non-conformance)

The Change Control objective is:

- To identify the changes that has occurred,
- To ensure that changes are beneficial,
- To manage the actual changes when and if they occur,
- To maintain the integrity of the project baseline,
- To ensure that approved changes will be reflected in the definition of the project scope and other affected areas as cost, time, risk, organisation and subcontracts.

During the project life cycle, the Change Control process will monitor change activity, record change reports, analyse impacts and plan for change, seek change endorsement, schedule and implement each change, track change and its progress and report change status as required by accounting requirements.

Inter-related changes will be identified, synchronised and co-ordinated in the framework of consortium as well as the industrial contractors..

Changes affecting interchangeability of an item will clearly identify this aspect and all changes to documentation will be identified up to level where interchangeability is established.

**Note.** in the following then term "Customer" is referred to the IKC partner which has a contract with an industrial contractor.

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#### 5.1.1.1 Classification of a Change

The classification of a change will be defined on the basis of the responsibilities of the participants to bear the impacts in terms of cost, schedule and technical aspects in accordance with the SST consortium agreement or the contractual condition.

Therefore, each change will be classified into one of the following classes: Class A+, Class A, Class B.

- Class A+ are those that affect the agreement with CTAO concerning:
  - Level B requirements
  - I/F with CTAO infrastructure
  - Money matrix
- Class A change are those which affect the IKC agreement or contract terms
- Class B change are all other changes.

The change classification will always be proposed by the change originator and submitted to the higher-level authority. For Class A+ change the authority reference is CTAO for requirements and interface.

After internal approval the CRs impacting the IKC shall be submitted to CTAO, activating the CTAO process for IKC change [AD3].

#### 5.1.1.2 Initiation of a change

Each participant in the project may initiate, after the constitution of the first Configuration Baseline (the Agreement Baseline, established at the DVER), a written request for a change to be introduced. The possibilities are the following:

- Change proposal initiated by the CTAO to SST-PRO by means of a Change Request (CR) as defined in the CTAO CADM.
- Change proposal initiated by the SST-PRO to IKC partner or contractor by means of a Change Request (CR).
- Change proposal initiated by SST-PRO to CTAO via the Engineering Change Proposal (ECP)/ Change Notice process.
- Change proposal initiated by an IKC partner to the SST-PRO by means of Engineering Change Proposal (ECP)/ Change Notice process.
- Requested by IKC partner, as Customer, to the own contractor via a Change Request (CR)

The form of Change Request is in Annex 3.

#### 5.1.1.3 Changes Request (CR)

The CR will be issued by CTAO to direct SST-PRO and by SST partner, as Customer, to direct its contractors for investigating a modification in the work to be done within its contract.

Following the receipt of a CR, the receiving part will issue to CTAO/Customer, within the requested time, an ECP either indicating the CR implications or with a declaration of “no impact”.

Only after written acceptance of the ECP by the CTAO/Customer Project Manager, a change Notice will be issued.

---

The CR does not authorise any work implementation nor will stop or extend the planned activity or authorise new tasks to be performed, other than activities related to the preparation and submittal of an ECP/CCN.

In case a contractor is affected by a Change Request initiated by CTAO, the Customer will issue a dedicated CR to its contractor.

#### *5.1.1.4 Engineering Change Proposal (ECP)*

In response to a CR, or in case of an unsolicited change, SST-PRO/contractor will propose a modification to its Configuration Baseline by means of an ECP.

IKC partner Contractors will be involved as well, if affected by the change.

The ECP will be prepared and managed through the CCB organisation and will include all the data necessary to present and justify the change in accordance with the CTAO CADM.

In case of a change initiated by (or affecting) a contractor, the relevant ECP will be evaluated by the Customer CCB and, only after its approval, transmitted to CTAO/SST-PRO.

The ECP will contain all the information listed below.

- Title of Change
- ECP Number
- Number(s) of affected work package(s)
- Recommended classification
- Initiator (name, company, department)
- Date
- Description of change. The description of change must be detailed.
- Reason for change. This section must substantiate the change.
- Related factors. The following terms must be checked and if applicable described in detail:
  - Performance
  - RAMS
  - Interface
  - Weight
  - Dimensions
  - Electrical Parameters
  - Software
  - Higher level requirements
  - Test Activities
  - Material and Processes
  - Spare Parts
  - Agency furnished property
  - Packing
  - Publications
  - Commissioning
  - Modification kits.
- Ceiling price.  
The ceiling price must be quoted accurately since no upward revision will be permitted, when the CCN is submitted.
- Schedule influence.
- Duration of the proposed work

- 
- Recommended introduction point
    - Influence on schedules, milestones and delivery dates
    - Required decision date
    - Models affected
  - Resulting consequences if required decision date cannot be accepted
  - Notes/Comments
  - Signatures by Project Manager and Contracts Officer and Configuration Manager

The work related to the implementation of the change will start immediately after the ECP/CCN is agreed in writing by the entities affected by the change.

#### 5.1.1.5 *Change Notice (CN)*

Two weeks after the approval of the ECP, a CN will be submitted to CTAO/Customer; time for ECP submission is reduced to one week if no Subcontractor is involved.

The following information will be included:

- description and proposed classification of the change;
- reason(s) for the change;
- implications on configuration, performance, reliability, schedule, risk or any other relevant aspect;
- price of the change, at type and level applied in the agreed contract baseline;
- identification of work packages affected;
- proposed introduction date, i.e. the date considered compatible with the work programme and which will cause the least expense, risk or other inconveniences to the project.

The CN will be signed by the Project Manager, the Contracts Officer (for contractor only) and Configuration Manager.

The substantiating documentation for each CN will be included, but not be limited to the following:

- a detailed description of the envisaged additional tasks in the form of a small statement of work, broken down into the affected work package, and/or a list of the tasks to be eliminated;
- updated Work Package descriptions;
- an analysis of the impact on the product, the project schedule including, as appropriate, revisions of the affected documents;
- a detailed Work Package Manpower and Cost Plan for the difference (credit or debit) to the approved baseline for each work package affected.

The CN format is shown in Annex 4 of this document.

The CN will have the same company identification and sequence number as the ECP.

The price of a change will neither include the cost related to the investigation nor management cost associated with the change implementation.

#### 5.1.1.6 *Contractors initiated CN (CCN)*

In response to a customer CR, or for an unsolicited change, the contractor will submit an ECP/CCN to contractor

---

The ECP/CCN will be evaluated by contractor within the CCB organisation.

In case the change has also impacts on Customer activities/budgets, the ECP/CCN will be incorporated in a Customer ECP/CCN and submitted to Customer higher authority for approval.

In case of no impacts on the Customer activities, Customer will prepare jointly with the SST-PRO a proper ECP/CCN including his assessment and conclusion / recommendation on proposed ECP/CCN by the contractor.

The ECP/CCN from contractor will be annexed to Customer/SST-PRO ECP/CCN.

In case of ECP/CCN issued by the contractor for the formal updating of the contractual baseline without any cost and schedule impacts, Customer will direct the contractor and inform SST-PRO.

The work related to the implementation of the change will start immediately after the ECP/CCN is agreed by the Customer Program Manager.

The consequences raised by the violation of the above statement will be borne by the contractor.

#### *5.1.1.7 Request for Waiver/ Deviation (RFW/D)*

The CADMO (CADM Officer) will be responsible for the managing of both Request for Waiver (RFW) and Request for Deviation (RFD).

RFD will be submitted to grant for a planned departure from requirements or design. It will describe the extent to which the concerned product will not fulfil the baselined configuration documentation.

The approved text of the RFD will constitute a "new" baseline requirement subject to change control.

The RFD reference number will be mentioned in the applicable CIDL (Configuration Item Data List), and consequently in the affected product EIDP.

RFW will be submitted to grant for unplanned departures from design through manufacturing or software coding errors, which are detected through non-conformance report whose disposition can be either "use as is" or "repair".

Each RFW will describe the extent to which the concerned product will not fulfil the current Configuration Baseline with the exception that the non-conforming product has already been produced and await permission for use as described in the waiver.

The RFW / RFD flow is shown in Figure 4-2

The RFW/RFD format to be used by SST-PRO is depicted Annex 2 of this document.

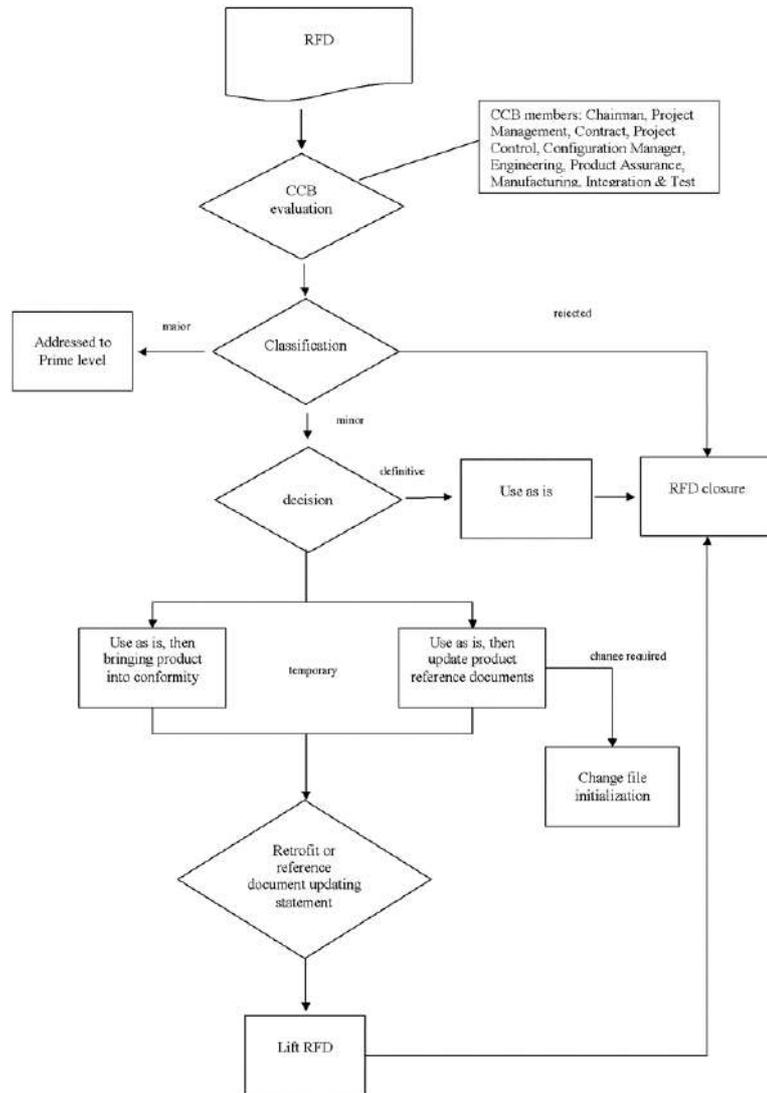


Figure 4-2: Request for Deviation/Waiver Flow

### 5.1.2 Change Log

SST-PRO will create and maintain an up-to-date log (Contract Change Notices Status List) of all its own, and their lower-level Contract changes, including:

- List of approved CN/CCN's (and ECP's)
- List of rejected or withdrawn CN/CCN's (and ECP's)
- List of changes submitted to the CTAO/SST-PRO, but not yet approved
- List of changes still under preparation
- List of Change Requests issued by CTAO, with reference to the related CN.
- List of Change Requests issued by Customer, with reference to the related CCN.

The Contract Change Notices Status List will be issued at each Progress Meeting with the contractor.

---

### 5.1.3 Configuration Control Board

SST-PRO will establish a Configuration Control Board (CCB) as a permanent structure within the project, responsible for the analysis, evaluation and disposition of all changes (including RFW/RFD) affecting both the established baseline and current baseline

Forms duly filled and coordinated by CADMO will be presented to CCB for commitment and approval.

Some representatives will be permanent members of CCB, others (specialists) will be requested to participate when necessary.

CCB shall consist, as a minimum, of members from Project management, Contracts, Project Control, Configuration Management, Engineering, Product Assurance, Manufacturing, Integration and tests. They shall have sufficient authority to take decision for the SST Programme and each SST Project they represent and to approve the proposed change to the baseline.

The CADM Officer will act as secretary for the CCB, and the Programme/Project Manager (or an appointed delegate) will act as Chairperson.

Decisions will be taken unanimously. In case of conflict, it will be a responsibility of the Chairperson to take an overriding decision.

CCB meetings will be convened by notification with a specific agenda.

Minutes will be prepared and distributed containing all decisions taken during the CCB, and the associated actions, if any. Approval/rejection of a deviation/change will be notified internally and to the originator, by the distribution of the form duly signed

CADMO will maintain a status of all changes processed by CCB, with opportune references to the baselines they have affected.

The detailed rules of the various members are:

#### Program Manager

- Acts as CCB Chairman
- Evaluates inputs from all IKC partners.
- The Program manager propose the final change decision

#### Project Managers

- Support CCB Chairman
- Evaluates inputs from all affected functional departments, contractors, agencies, etc.
- The Project manager of impacted project takes final change decision, approving or rejecting change.

#### Configuration Control

- Ensures the coordination of change impacts.
- Verifies that proposed change description is adequate and complete and that all supporting documentation is prepared to the level of detail required to support CCB Action.
- Administers CCB functions, including pre-CCB activities and prepares CCB meeting schedule and agenda.
- Establishes and maintains CCB minutes, actions item log, and change proposal status log.

- 
- Performs periodic evaluation of timeliness and accuracy of the change process and makes recommendations for corrective actions as required.

#### Project Control

- Advises chairman regarding to the impact of change on program schedule and cost, program planning documents, and contractual schedule requirements.

#### Engineering

- Identifies complete engineering work package for all hardware affected by a proposed ECP.
- Performs preliminary coordination of the change package with other affected departments as required.
- Provides detailed justification for change.
- Provides technical inputs for those affecting controlled specification and interface documentation.

#### Contracts

- Advises the Chairman on contractual implications of the change.
- Product Assurance
- Reviews all proposed changes to verify that Product Assurance Requirements are met and that new hazard are not introduced or are duly analysed and controlled.

### 5.1.4 Decision Board

Final cost and cost responsibility of the change will be decided during a CCB extended to the Executive Steering Committee (EST).

The MOM of CCB's will be considered as integral and overriding part of the CCN's.

After the approval of the CN/CCN, the change will be implemented into the project documentation, reporting in the change log the identification number of the implemented CN/CCN.

---

## 6 Configuration Status Accounting

The Configuration Status Accounting is the process for systematic recording, correlation and reporting of project information needed for effective control of the CIs.

The Configuration Accounting process will be implemented by means of an informative tool based on Product Data Management (PDM) technologies. This application system will:

- identify the current approved Configuration Baseline related to each CI (CIDL/TCDL)
- record and report the status of the proposed changes (ECP/CCN/CR and RFD) from the receipt up to the final approval and authorization
- record and report the results of the program reviews to include the status and the final disposition of the identified discrepancies (RIXs status)
- generate the As Built Configuration List as a section of the Log Book

### 6.1 Configuration documentation

All functional, performance and physical characteristics of a configuration item shall be documented within the defined configuration baselines. Related documentation includes, among others:

- Requirement specifications
- General specifications (e.g., environmental, design references, etc.)
- Architecture/design descriptions
- External and internal interface control documents
- Design/product specifications
- RAM analysis reports
- Safety compliance reports and hazard analysis
- Engineering drawings/models
- Verification plan
- Test/verification specifications/procedures/reports
- Installation/user/operating/maintenance manuals
- Change Request (CR), Request-for-Waiver (RFW), Request for Deviation (RFD) records
- Verification and compliance matrices
- Configuration Items Data List (CIDL)

#### 6.1.1 Document Index and Status

Each entity of SST Consortium will prepare a document listing all documents prepared or received in the frame of the SST programme. This record shall be maintained currently updated during the whole program and submitted by SST-PRO as part of the Progress Report.

The information contained in this report are, as a minimum, the following: Document number, title, date, issue/revision and approval CTA status.

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### 6.1.2 Configuration Item Data List (CIDL)

Each entity of SST Consortium will prepare a document describing the as-designed configuration in known as the Configuration Item Data List. Each CI shall be described in a dedicated CIDL identified by a different document number.

The CIDL contains three sections:

- List of applicable documents
- CI documentation \ CI structure (bill of material)
- List of applicable changes

The first section shall contain, as a minimum, the list of the documents defining requirement baseline. The second section shall contain, documents defining the design baseline. Typical documents are:

- Equipment specification
- Declared components list
- Declared materials list
- Declared processes list
- Drawings family tree
- Interface Control Drawing (ICD)
- Acceptance and qualification test procedures
- Circuit Diagram
- Top Assembly Drawing (TAD)
- Handling, transportation and loading procedures
- Operation maintenance manual
- Manufacturing flow chart
- Integration procedure
- Test plan and/or Design, Development and Qualification plan (DDQ)
- Special tooling drawings
- Test procedures

The list will be consolidated as proposed by CTAO.

In addition, in this section, will be listed all the drawings necessary for the technical definition of the CI, from the top assembly to the detail level. Drawings shall be complete of title, number of sheets and related issue/rev. Part numbers and associated drawings shall be listed indented in descending order of assembly and showing the required item quantity. Indenture has to be shown by a number depicting the level. This section will be later used to define the AS BUILT certification compared to the AS DESIGN status.

The third section shall list all applicable changes to the frozen baselines:

- Approved and/or implemented Change Request (CR)/ Change Notice (CN)
- Request For Deviations (RFDs) and Request for Waiver RFWs CIDL will be prepared and maintained in accordance with the applicable DRD (Document Requirements Description).
- 

### 6.1.3 As-built Configuration Document (ABCD)

The ABCD is a document derived from the CIDL and made available by CADM for the certification of the configuration as built.

---

The ABCD is prepared for each deliverable serial number of a CI (subsystem of telescope) and identifies the “as manufactured” and “as tested” statuses applicable to parts composing a CI.

Using the CIDL as a reference, any difference between the ABCD and the CIDL shall be documented in the ABCD by reference to the applicable NCR(s) or RFW(s).

#### 6.1.4 Software Configuration File (SCF)

The Software Configuration File (SCF) is a document with the objective to provide the configuration status of a software CI. The SCF acts to control the evolution of a given SW CI during the programme life cycle.

The SCF will be composed of several sections as hereafter described:

- a. brief description of the software CI.
- b. For the software CI, the following information shall be provided:
  - how to get information about the software CI;
  - composition of the software CI: code, documents;
  - means to develop, modify, install, run the software CI;
  - differences from the reference or previous version;
  - status of software problem reports, software change requests, and software waivers and deviations related to the software CI.
- c. Inventory of materials
  - list of all physical media (e.g. listings, tapes, cards or disks) and associated documentation released with the software CI.
  - Definition of the instructions necessary to get information (e.g. files) included in physical media.
- d. Baseline documents
- e. Identification of all documents applicable to the delivered software CI version.
- f. Inventory of software CI
  - description of the software CI.
  - list of all files constituting the software CI:
  - source codes with name, version, description;
  - binary codes with name, version, description;
  - associated data files necessary to run the software;
  - media labelling references;
  - checksum values;
  - identification and protection method and tool description.
- g. Means necessary for the software CI. Description of all items (i.e. hardware and software) that are not part of the software CI, and which are necessary to develop, modify, generate and run the software CI, including:
  - items related to software development (e.g. compiler name and version, linker, and libraries);
  - build files and software generation process;
  - other software CIs.
- h. Installation instructions. Instructions necessary to install the software CI version, its means and procedures necessary to install the product and to verify its installation.

- 
- i. Change list. list of all changes incorporated into the software CI version, with a cross reference to the affected software CI document, if any. Changes not incorporated yet but affecting the S/W CI shall also be listed. This list shall include:
    - software problem reports;
    - software change requests and proposals;
    - contractual change notices;
    - software waivers and deviations.
  - j. Auxiliary information. Any auxiliary information to describe the software configuration.
  - k. Possible problems and known errors. Identification of any possible problems or known errors with the software CI version and any steps being taken to resolve the problems or errors.

### 6.1.5 CN / RFW / RFD / CR / RIX Index and Status List

Each entity of SST Consortium will prepare a document listing all the Change Notices (CN), Requests For Waiver/ Deviation (RFW / RFD), Change Requests (CR) and Review Item eXception (RIX applicable to a CI in line with what requested by CTA.

## 7 Interface and Requirements Control

Interfaces can be categorized as those between the SST and CTAO (external interfaces) and those between sub-systems of the SST (internal interfaces). External interfaces are managed within the Programme by means of CTAO to SST Interface Control Documents (ICDs) to which SST-PRO are contributing through the provisions of inputs to CTA.

Requirements flow down from the highest-level (science), to the level applicable directly to the SST as managed by CTAO. Within the SST Programme these requirements are further broken down and managed internally.

### 7.1 Interface Documentation

The SST Programme interfaces data consist of Interface Requirements, collected in the SST Programme/Projects/Items and by interface control data defined by the ICDs.

The interface control data will describe the current status of the SST-PRO main item interface design by means of Configuration, Layout, Interface and manufacturing drawings, interfaces listing and interface tables.

SST-PRO will provide CTAO with a set of ICDs as required in the applicable DRL defined in the CTAO/SST Project Agreements.

After freezing, changes to ICDs data will be implemented via formal change procedure as described below.

### 7.2 ICD Updating and/or Changing

SST-PRO will establish and maintain a system, which shall ensure that Institutes/Contractors will not be able to change the ICDs, once formally released and contractually implemented, prior to receiving formal approval from a higher-level authority.

When the ICDs are approved and agreed with CTAO, any changes may be initiated either by a Change Request or by a proposal from an Subcontractor by means of a CN. Changes shall be evaluated and coordinated among all parties involved.

Changes to ICD involving the CTAO are submitted to the SST-ESC for approval.

### 7.3 Requirements Documentation

Figure 7-1 depicts the specification tree of SST Programme requirements. SST-applicable level-B requirements, collated by CTAO in a document, are then propagated within the SST Programme to the level of the SST (Level C) and SST subsystems (Level D). The SST requirements (Level C) are captured in the SST Telescope Technical Specification which shall be provided by the SST-PRO to CTAO.

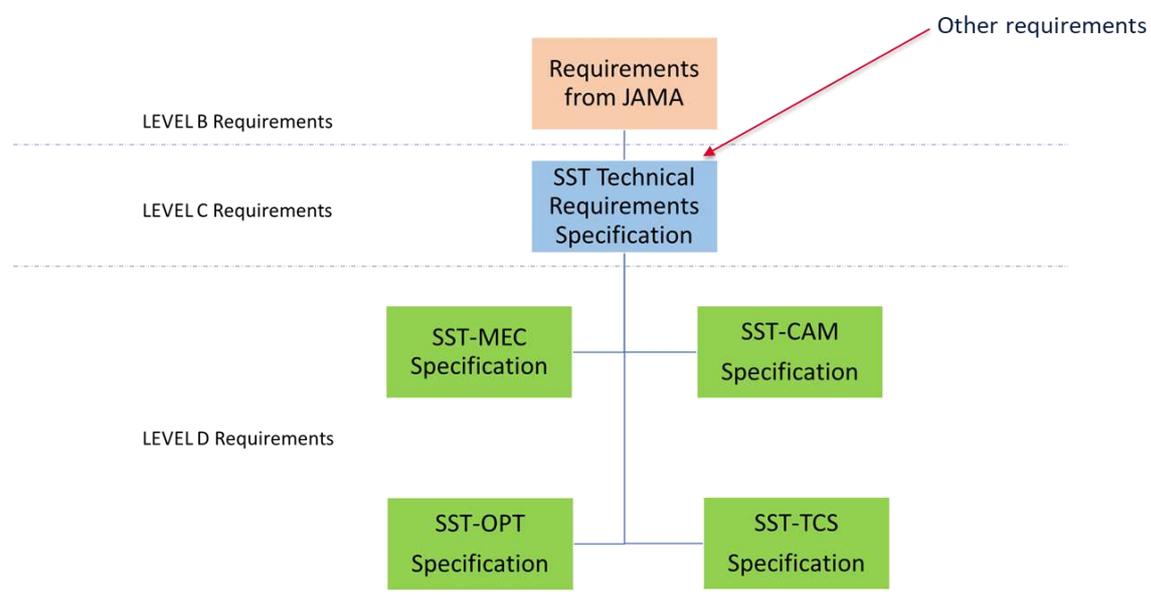


Figure 7-1: SST Telescope Requirement Tree

### 7.4 Requirements Updating and/or Changing

Changes to requirements at Level C and lower, impacting Level B, will be submitted to the SST-ESC for approval before their submission to CTAO. Those changes that do not impact Level B, are submitted to the SST-PRO CRB.

New requirements, or changes to existing requirements, at Level B originating from CTAO are submitted to the SST-ESC, jointly with a preliminary evaluation of their impact, for coordination of discussion with CTAO.

---

## 8 Information And Documentation Management

This section defines the procedures applicable to all data and documentation provided for the duration of the SST Programme. Document management is based on a remotely-accessible system compatible with the configuration management system, that allows up-to-date information exchange between all project participants to facilitate efficient communication.

The established system allows to:

- maintain a data bank for all documents produced during the project
- verify that all the documents identified in this document are produced and delivered
- number the documents following the numbering system of codification defined here under
- periodically inform on received and issued documents
- fully approve changes before introduction in the baseline documents
- set-up a receipt, recording, and dispatch system for all technical and project management data.

### 8.1 Document Identification and Numbering

#### 8.1.1 Document Reference

The SST Programme document numbering system is derived from, and is compatible with, the CTAO document numbering system [AD2].

Documents will be identified by a document identification code (Document ID) according to a system, which is made up of four elements separated by a dash symbol "-":

- Document ID: SST-<originator>-<document type>-<number>

The Document ID shall uniquely identify a document; sharing the same code between two documents is strictly forbidden. Each element of the Document ID is defined in Table 8-1.

Document file names shall comply to the following naming convention, using the "\_" (underscore) symbol as a separator. The value stored in the <Title> may be an abbreviation of the actual document title.

- Document File Name: <Document ID>\_<issue><revision>\_<Title>.<file extension>

Each issued document shall include an issue/revision number. The list of the issues and revision along with dates and description of modifications shall be mandatorily included in a dedicated section of the document called "Change Records". The issue number shall be included whenever referencing a particular issue of the document. If the number is not present it is intended at the last issue available. Document versioning is thus implemented by means of the <Issue> <Revision> fields, where <Issue> is composed by single digits and <Revision> from a character. The <Issue> field starts at value 1. A draft issue has the additional tag D. The <Revision> field starts at alphabetic character "a".

A representative example of a configured SST document file name is reported below:

- Example: SST-STR-LIS-001\_1a\_Structure document list.docx

The title reported in the document file name can be shortened removing the acronym "SST" at the beginning and using the standard document acronyms (e.g., Configuration and Data Management Plan becomes CADM).

Table 8-1: Originators and Document Types for SST configured Document ID

Originator	Document Type	Number	Issue	Revision (*)
	ABC (As Built Configuration Data List)			
	ADC (Configuration Item Data List)			
	ANR (Analysis Report)			
	ATR (Acceptance Test Report)			
	COC (Certificate Of Conformance)			
	CRE (Change Request)			
	CCR (Contractual Change Request)			
	DSR (Design Report)			
	DWD (Drawings & Diagrams)			
	DWL (Deviation & Waiver List)			
	ECR (Engineering Change Request)			
	ICD (Interface Control Document)			
	INS (Instruction)			
	INL (Inventory List)		1	a
	LIS (List)		...	...
	LGS (Logbook of Subsystems)		9	z
ESC	LGT (Logbook of Telescopes)			
CAM	MAN (Manual)			
FRC	MIN (Minute of Meeting)	001		
MEC	NCR (Non-Conformance Report)	...		
PRO	OPD (Operations Document)	999		
OPT	OTR (On-site Test & Verification Report)			
STR	PAD (Test Procedure as done)			
TCS	PAL (Packing List)			
	PLA (Plan)			
	PRC (Procedure)			
	PRE (Presentation)			
	PRR (Progress Report)			
	RFW (Request for Waiver)			
	SOW (Statement of Work)			
	SPE (Specification)			
	STD (Standard)			
	TRE (Technical Report)			
	PRC (Procedure)			
	REP (Report)			
	MAT (Mathematical Model & Simulator)			
	TEC (Technical Note)			
	MSD (Management Support Document)			
	VER (traceability and Verification Matrix)			

(\*) the draft version of the document is identified by an additional “D” after the last digit. The letter D will be removed after the document signature.

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### 8.1.2 Other Formal Documents

All the other formal document not specified in the list of Table 8-1 (e.g. letters, Memorandum of understanding, Authorization) shall be tracked and report a reference number identified with the following reference:

- SST-ZZZ-NNN

Where:

- SST: Programme Code,
- ZZZ: Originator as defined in Table 8-1.

NNN: sequential number in the data base. In the document text are identified as a minimum:

- the document type,
- originator (Institute/Company name, name of writer),
- date of document,
- reference number.

### 8.1.3 Action Item Reference

All Action Items used in the framework of SST Programme are referenced by the minutes of meeting reference and a sequential number, as follows:

- SST-ZZZ-MIN-NNN-AA

Where:

- ZZZ: Project element as defined in Table 8-1,
- AA: sequential action number in the minutes of meeting.

Note: the applicability of this rule depends on the actions data base flexibility, which is not yet identified.

## 8.2 Document Preparation

Documents shall be produced in DIN-A-4 size portrait or, when necessary, landscape or A3 layout. The document shall be written in English and using Microsoft Office tools (or another other compatible tool).

## 8.3 Document Composition

A document is primarily composed by:

- Front-Matter
  - Cover Sheet
  - Version History
  - Table of Contents
  - Table of Annex
  - List of Figures
  - List of Tables
- Introduction
  - Scope & Purpose

- 
- Applicability
  - Applicable Documents (including standards/handbooks)
  - Reference Documents
  - Definition of terms and abbreviations
    - Abbreviations and acronyms (if applicable)
    - Glossary of terms/definition (if applicable)
  - Evolution of this Document / Document Roadmap
  - Main text (arranged in numbered sections)
  - Annexes (as applicable)

### 8.3.1 Cover Sheet

The main elements of the cover sheet are:

- Standard Page Header (and relevant information)
- SST Programme logo
- Document title
- Document control number
- Originator/approval-authority
- Project authorization (with signatures, as applicable)

### 8.3.2 Version History

The main elements of the second page are:

- Current release information
- Document History.

The document history is a report of the document changes, identifying all major alterations to the document, by listing the section/paragraph number, the new change index, the date of the change and information about the reason for previous document issue.

### 8.3.3 Page Header

The page header is empty.

### 8.3.4 Page Footer

In each page:

- Programme/subsystem acronym
- Document title and protocol
- Page
- Document Category (defined in 8.5.1)
- Date of latest issue / release

### 8.3.5 Table of Contents

The Table of Contents lists all paragraphs which are contained in the document showing the paragraph number, the paragraph title (same as within the text) and the paragraph page.

---

### 8.3.6 Table of Annex

The Table of Contents lists all annexes contained in the document showing the annex number, the annex title (same as within the text) and the paragraph page.

### 8.3.7 Introduction

This paragraph summarizes the scope of the document, its applicability and the document roadmap

### 8.3.8 List of Abbreviations

This section lists the more frequent abbreviations and their description, used within the document.

### 8.3.9 Glossary of Terms

This section, if applicable, contains a selection of standard definitions of terms which are used within the text of the document.

### 8.3.10 Main Text Paragraphs

The main text is structured by the author's needs and contain all descriptive text, tables and figures. The content of each table and figure is briefly described with a short caption.

### 8.3.11 Annexes

This section contains all the document annexes.

## 8.4 Drawings & Nomenclatures

The drawings bear their own reference. Whenever drawings are part of a document, the drawings will bear their identification number and the reference of the subject document. This rule could be suspended in case of identification number already foreseen by the entity issuing the drawing. In this eventuality the drawing(s) shall be provided together the whole drawing list.

## 8.5 Document Categories & Approval

### 8.5.1 Document Categories

Documents are classified according to three following categories:

- Category A (Documents for Approval)

Documents to be formally approved by signature before distribution external to SST team

- Category R (Documents for Review)

Documents to be formally approved by signature before distribution external to SST team and submitted to the planned reviews. The document protocol of Category R is preassigned.

- Category I (Documents for Information)

All other documentation.

All the document tagged SST-PRO... or SST- ESC.... have to be authorised by SST-ESC chair.

SST-ESC approval is evidenced on the Document front page by the signature of the SST-ESC chair in a dedicated signature box.

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## 8.6 Document Review, Approval and Update Process

All documents follow the life cycle:

- preparation (by the author)
- review
- verification (potentially by several people, e.g., to confirm correctness of technical contents of document & conformance to quality standard)
- approval (to confirm that this document may be used during a later project phase). All documents need approval as described in Section about document categories. If it is a CI document, it shall be placed under configuration control.
- distribution
- modification
- replacement and archive.

### 8.6.1 Internal Approval Cycle

The internal approval cycle is performed in accordance with the Institute/Contractor policies and is certified by the hand-written signature on the original cover sheet.

The formal emission of the document is performed only after successful completion of the signature release cycle, embracing, as a minimum the following signature:

- For Editorial Board
  - Author(s)
- For Revision Board
  - Project Office Manager
  - System Engineer(s)
  - Product Assurance Manager
  - Documentation Manager
- For ESC Approval (only for SST-PRO and SST-ESC categories)
  - ESC Chair

Figure 8-1 is an example of the signature flow of SST-PRO documents category issued by Institutes.

There is a set of documents of the SST-PRO categories assigned to the contractors. This set of documents will be available for formal reviews (see **Errore. L'origine riferimento non è stata trovata.**) without the approval step by the SST-ESC. After the review and document updating (if any) for the implementation of all formal actions and recommendations of the review committee, the documents will be approved by SST-ESC Chair.



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## SST-CTAO Interface Cabinet Concept

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SST-PRO-TEC-001  
Version 1a

<b>Prepared by:</b>		
Gino Tosti (INAF)		SST-STR SE
Giuliana Gianitto (SST-CAM)		SST-CAM SE
Alessio Trois (INAF)		SST-PRO SE
<b>Latest Release Checked by:</b>		
Primo Attinà (INAF)		SST-PRO FRM
Salvatore Scuderi (INAF)		SST-STR PM
Emma Robert (OP-INSU)		SST-FRC PM
Richard White (MPE)		SST-CAM PM
Nicola La Falombara (INAF)		SST-PRO QM
Alberto Macchi (INAF)		SST-PRO CAOM
<b>Approved by:</b>		
Gianpiero Tagliaferri		SST-ESC

Editorial board

Revision board

ESC Approval

Figure 8-1: Example of field of for SST document formalization

### 8.6.2 Updating of Documents

The updating of a document is done according to one of the following methods:

- issuing of a new document version with minor revisions
- reissuing the complete document

The updated document must be submitted for Review/Approval according to its class.

A record of the history of updates is reported in the Change Records sheet.

## 8.7 Documentation Approval Cycle, Distribution and Archiving

The document approval cycle is provided in Figure 8-2.



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### 8.7.2 Documentation and Data-File Archiving

The SST-PRO maintains a documentation database to make available a constantly updated record of all issued documents together with their revision history.

The SST-PRO Documentation Management Tool provides:

- recording of received and issued documentation
- electronic filing of document content
- friendly query to search documents

## 8.8 Documentation Change Control

Class A documents are modified only through the following procedure:

- the intended changes must be described on a Change Proposal (CP) or Change Request (CR) with all relevant data.
- changes to a document must be submitted to local CCB for approval.
- copy of the CP/CR related to Class A documents must be sent to SST-ESC for approval
- the approved CP/CR is formally signed during a foreseen meeting; a copy must be sent at the same time, to the other Institutes/Contractors involved
- In case of rejection or comment, a revised CP/CR must be prepared with consideration to the rejection motives or to the comments and has to be resubmitted.

The granted approval is evidenced on the CP/CR front page by the reference and date of the telecopy/PEC.

After approval of the CP/CR by SST-ESC for Class A documents:

- the changes must be introduced in the document
- the reference of the approved CP/CR must be mentioned in the change records sheet of the document concerned.

Class R, or I documents must be modified, using only Change Record and in house CCB released.

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## Annex 1

### List of documentation from the SST consortium

Table 2: Project Management and Reporting Documents Set

Document Control Number	CADM TAG	Title	Document submission Event	Note	Applicable				
					SST-PRO	SST-CAM	SST-MEC/AV	SST-OPT	SST-TCS
PM-001	PLA-001	Programme Management Plan	PR, CDR	Including Product Breakdown Structure and WP	1	2	3	3	2
PM-002	PLA-002	Configuration & Data Management Plan	PR, CDR		1	2	3	3	2
PM-003	PLA-003	Cost Plan	PR, CDR		1				
PM-004	PLA-004	Risk Management Plan	PR, CDR		1	2	3	3	2
PM-005	INS-001	Document Requirements Definition	CDR	Document Tree + Short Description	1				
PM-006	REP-001	Risk Analysis Report	N/A	Risk Register. Available on demand starting from Consolidation Phase KO	1	2	3	3	2
PM-007	REP-002	Cost Estimation Report	CDR	Internal Use Only	1	3	3	3	2
PM-008	REP-003	Master Schedule Report	PR, CDR	For the PR is internal to the PMP it can be also available on demand starting from Consolidation Phase KO	1	2	3	3	2
PM-009	PRR-XXX	Progress Report	Monthly starting from Contractor Kick Off, for Programme TBD	Includes project status, meeting planning , action status, documentation status, NC status, identification of critical areas.	1	2	3	3	2
PM-010	SOW-ZZZ	Statement of work	N/A	SOW class documents is for internal use of SST's program/projects, only. SOW visibility is established by the program/project responsible					

1= Programme Level Document

2= Project/Subsystem level embedded in the Program Level Document

3= Project/Subsystem document which can be decomposed in lower level documents

Table 3: PA, QA & RAM Documents Set

Document Control Number	CADM TAG	Title	Document submission Event	Note	Applicable				
					SST-PRO	SST-CAM	SST-MEC	SST-OPT	SST-TCS
PA-001	PLA-005	Product Assurance & Quality Plan	PR, CDR	For HW and SW.	1	2	3	3	2
PA-002	PLA-006	Safety Management Plan	PR, CDR	For HW and SW.	1	2	3	3	2
PA-003	PLA-007	Audit Plan	CDR	to be updated after CDR when necessary			3	3	
PA-004	PLA-008	Key and Mandatory Inspection Points (KIP/MIP) Plan	CDR				3	3	
PA-005	ANR-001	Failure- Modes, Effects and Criticality Analysis (FMECA/S-FMECA)	CDR	Include Single Point Failure List (SPF).	1	3	3	3	3
PA-006	ANR-002	Worst Case Circuit Analysis (WCA)	CDR	for the Camera 3* is part of the RAM			3		
PA-007	ANR-003	Part Stress Analysis and de-rating analysis (PSA)	CDR	for the Camera 3* is part of the RAM			3	3	
PA-008	ANR-004	RAM Analysis Report	CDR	For the Camera includes WCA and PSA	1	3	3	3	
PA-009	ANR-005	Safety Assessment Report	CDR	Hazard Analysis	1	3	3	3	
PA-010	LIS-001	Declared Item List (DIL)	PR, CDR, DRB	Includes Long Lead Item List Built Part List @ DR/PAR	1	3	3	3	2
PA-011	LIS-002	Declared Material List (DML)	CDR, DRB		1	3	3	3	2
PA-012	LIS-003	Declared Process List (DPL)	CDR, DRB		1	3	3	3	2
PA-014	NCR-XXX	No Conformance Report	when necessary		1	3	3	3	3
PA-015	RFD-XXX	Request for Deviation / RFD	when necessary	RFD is related with an NC emerged before production	1	3	3	3	3
PA-016	RFW-XXX	Request for Waivers / RFW	when necessary	RFD is related with an NC emerged during the production/integration phases	1	3	3	3	3

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Table 4: System Engineering Plan Documents Set

Document Control Number	CADM TAG	Title	Document submission Event	Note	Applicable				
					SST-PRO	SST-CAM	SST-MECH	SST-OPT	SST-TCS
SE-001	PLA_009	Engineering Development and on Factory Verification Plan	PR, CDR	Only for test before delivery to site. Including the verification on factory.	1	3	3	3	2
SE-002	PLA_010	Software Development and Verification Plan	PR, CDR	test before and after HW/SW integration		3	3		1
SE-003	PLA_011	Factory AIT Plan	PR, CDR	Only for the first Telescope (Qualification Model -> ECAM + first model of each SS + TCS)			1	2	3
SE-004	PLA_012	On site AIT Plan	PR, CDR, DRB	SST-MECH/AIV team is the leader of in-site AIT. It includes the H/W & S/W integrated test.		3	1	2	3
SE-005	PLA_013	On site Verification Plan	PR, CDR, DRB	The documents is relevant the verification process after on site Telescope integration. It includes performance test and calibration plan.	1	2	2	2	2
SE-006	PLA_014	Contamination Control Plan	CDR			3			
SE-007	PLA_015	On-site Maintenance Plan	PR, CDR, DRB		1	3	3	3	2
SE-008	PLA_016	Logistic Plan	CDR, DRB	Logistic from Europe to Chile	1		3	3	2

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Table 5: Design Definition Documents Set

Document Control Number	CADM TAG	Title	Document submission Event	Note	Applicable				
					SST-PRO	SST-CAM	SST-MECH/AIV	SST-OPT	SST-TCS
DD-001	SPE-001	Telescope Technical Requirements Specification	PR, CDR	Level C requirements at Telescope level and Level D for SST STR and SST-CAM Includes Compliance Matrix	1				
DD-002	SPE-002	Subsystem Technical Requirement Specification	PR, CDR	Level D, E.. Requirements at subsystem and lower levels		3	3	3	
DD-003	SPE-003	Software Requirements Specification	CDR			2	3		1
DD-004	DSR-001	Design Report	PR, CDR	includes design description, analysis, studies, trade-off Includes the support equipments for integration and tests	1	3	3	3	
DD-005	DSR-002	Architecture & Design Summary Report	PR		1				
DD-006	DSR-003	Software Architecture Description Report	CDR			2	3		1
DD-007	DSR-004	Software Detailed Design Description Report	CDR			3	3		1
DD-008	TRE-001	Technical Budgets Report	CDR	Mass, power, alignment, volume, data rate, CPU time, mass memory	1	3	3	3	
DD-009	SPE-004	Test Specifications	CDR	Procedure/Setup - Test/Demonstration	1	3	3	3	3
DD-014	ICD-005	MEC/OPT I/F Control Document	CDR	SST-TEL I/F define the I/Fs between the subsystems			1		
DD-015	ICD-006	SW I/F Control Document (SICD)	CDR	SST-TEL I/F define the I/Fs between the subsystems		2	3		1
DD-016	ICD-007	MEC/CAM I/F Control Document	PR, CDR	The document presents the main I/F requirements (H/W, Optical) between STR and CAM. Include Electrical I/F drawings. Includes Mechanical & Thermal I/F drawings.			1		
DD-017	OPD-001	SST Operational Concept Document	PR, CDR	The document presents the operational concept of SST Telescope in compliance with the CTA Operational concept	1		3		
DD-018	DWD-001	Drawings and Diagrams	CDR, OF-PQR, DRB	Include Drawing Tree, top-level assy drawings, electrical diagrams, Manufacturing drawings (includes PCB), Cabling. SST-TEL & SST-STR are defined the SST-MECH framework		3	3	3	
DD-019	ADC-001	Configuration Item Data List (CIDL)	CDR, DRB	to be updated when necessary Telescope level document is linked to the ADCD at subsystem levels	1	3	3	3	3
DD-020	VER-001	Verification Matrix	CDR, DRB, ACRV, FAR	Traceability & Verification Matrix	1	3	3	3	3

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Table 6: Design Justification Documents Set

Document Control Number	CADM TAG	Title	Document submission Event	Note	Applicable				
					SST-PRO	SST-CAM	SST-MEC	SST-OPT	SST-TCS
DJ-001	ANR-006	Top level & trade-off analysis Report	PR, CDR		1	2	2	2	2
DJ-002	ANR-007	Thermal Analysis Report	CDR			3	1	3	
DJ-003	ANR-008	Structural Analysis Report	CDR	thermo-elastics, strength and stiffness analysis		3	1	3	
DJ-004	ANR-009	Optical Analysis Report	PR, CDR		1	3		2	
DJ-005	ANR-010	Performance Analysis Report	PR, CDR	based on the MonteCarlo Model of the Telescope	1	2	2	2	
DJ-007	PRC-001	Storing, Transport and Handling Procedures	CDR, DRB			3	1	3	
DJ-008	PRC-002	AIT/V Procedures	TRR	only for test at S/S level		3	3	3	3
DJ-009	PRC-003	On-Factory AIT/V Procedures	TRR	Qualification Telescope (first model).		2	1	2	2
DJ-009	PRC-003	On-Site AIT Procedures	O-TRR	Onsite AIT of the telescopes		2	1	2	2
DJ-010	PRC-004	On-Site Verification Procedures	O-TRR	Onsite Verification of the telescopes	1	2			
DJ-011	PRC-005	Test Procedures	TRR	available two weeks before	1	3	3	3	3

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Table 7: Product Reference Documents Set

Document Control Number	CADM TAG	Title	Document submission Event	Note	Applicable				
					SST-PRO	SST-CAM	SST-MEC/AI	SST-OPT	SST-TCS
PR-001	PAD-YYY	Test Procedures "as done"	TRB	available at the completion of each test. This document can be the original test procedure with the changes made during the test highlighted (red-marked copy)	1	3	3	3	3
PR-002	ATR-YYY	Acceptance Test Report	TRB	it includes test data and compliance evaluation report		3	3	3	3
PR-003	OTR-YYY	On-Site Test and Verification Reports	O-TRB, FAR	15 days after the test campaign completion	1	2	2		
OP-003	MAN-001	Telescope/Subsystem User Manual	CDR, OF-TRR, DRB, ACRV		1	2	3		3
PR-005	LGS-YYY	SST Subsystem logbooks	DRB	to be maintained until the subsystem is formally provided to the user For the TCS is the list/history commit		3	3	3	3
PR-006	LGT-YYY	SST Telescope logbooks	DRB, ACRV	SST-Tel logbook will collect the subsystem logbooks. It will be provided once per telescope at the FAR	1		3		
PR-007	ABC-YYY	As Built Configuration Document (ABCD)	DRB	to be updated when necessary Telescope level document is linked to the ABC at subsystem levels	1	3	3	3	
PR-008	PAL-YYY	Packing List	DRB	to be updated when necessary Telescope level document collects the lists at subsystem levels. Shipping List	1	3	3	3	
PR-009	INL-YYY	Inventory List	DRB, ACRV	Not needed for each telescope. Including parts & material for spare, attrition and maintenance	1	3	3	3	
PR-010	DWL-YYY	Major Request of Waivers / Request for Deviations (RFW / RFD) list	DRB, ACRV	This is the list of RFW/RFD, to be included in the EIDP each delivered telescopes. Telescope level document links the set at subsystem levels, integrated with NC and RFW emerged after telescope integration	1	3	3	3	3
PR-012	COC-YYY	Certificate of Conformance	DRB, ACRV	2 weeks after PQR/FAR	1	2	3	3	2

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Table 8: Mathematical Models and Simulations Set

Document Control Number	CADM TAG	Title	Document submission Event	Note	Applicable				
					SST-PRO	SST-CAM	SST-MEC/AI	SST-OPT	SST-TCS
MM-001	MAT-001	CAD model	CDR, OF-PQR, DRB			3	1	3	
MM-002	MAT-002	Structural Mathematical Model (SMM)	CDR, OF-PQR, DRB	linked to structural analysis report. For PR the SMM is not deliverable. Linked to mechanical analysis model		2	1	3	
MM-003	MAT-003	Thermal Mathematical Model (TMM)	CDR, OF-PQR, DRB	linked to thermal analysis report. For PR TMM is not deliverable.		3	1	3	
MM-004	MAT-004	Optical Mathematical Model (OMM)	CDR	(Internal) linked to optical analysis report	1				
MM-005	MAT-005	Input to Monte Carlo Model (MCM)	PR, CDR	linked to Performance Analysis Report	1	2		2	
MM-006	MAT-006	TEL-SW Simulator for ACADA (TSS)	CDR	(Internal) Description of SW simulator will accompany the simulator. At PR high level TSS will be released.		3			1

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## Annex 2

RFD/RFW Form

TBW

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## Annex 3

### Change Request Form

TBW

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## Annex 4

### Change Notice (CN) Form

TBW

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End of Document