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ESA Sea level CCI

System Requirements Document (SRD)

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Lists of TBC:

No table of contents entries found.

Lists of TBD:

Applicable documents

AD 1 Sea level CCI project Management Plan
CLS-DOS-NT-10-013

Reference documents

RD 1 User Requirements Document (URD), Issue 1.3, Reference CLS-DOS-NT-10-316, Nomenclature SLCCI-URD-004

RD 2 Data Access Requirements Document (DARD), Issue 1.4, Reference CLS-DOS-NT-10-249, Nomenclature SLCCI-DARD-003

RD 3 Preliminary System Analysis Document (PSAD), Issue 1.0, Reference CLS-DOS-NT-10-297, Nomenclature SLCCI-PSAD-006

RD 4 ECSS-E-ST-10-06C, ECSS Standards collection (8th Oct 2010), Space Engineering – Technical Requirements Specification (6th March 2009)

RD 5 ECSS-E-ST-40C, ECSS Standards collection (8th Oct 2010), Space Engineering – Software (6th March 2009)

RD 6 Product Specification Document (PSD), Issue 1.1, Reference CLS-DOS-NT-11-015 , Nomenclature SLCCI-PSD-016

RD 7 ESA Climate Change Initiative Statement of Work (SoW)

RD 8 MyOcean High Level Requirements Document, Issue 1.4, Reference MYO-TOP-MyOcean High Level Requirements Document (HLRD)

RD 9 Sub System Sea Level TAC Specification Requirements Document, Issue 1.1, Reference MYO-SL-SRD

RD 10 ECSS-Q-ST-80C, ECSS Standards collection (8th Oct 2010), Space Product Assurance – Software Product Assurance (6th March 2009)

RD 11 SEWG Technical Note on “Towards a Collaborative ECV System on Tools and Technology” (June 2011)

RD 12 Review of SLCCI SRD v1.0, Issue 1, Revision 0, Bruno Lucas, 08/08/2011.

RD 13 Review of SLCCI SRD v1.1, Issue 1, Revision 0, Bruno Lucas, 25/01/2012.

RD 14 Review of SLCCI SRD v1.2, Issue 1, Revision 0, Bruno Lucas, 18/04/2012.

List of Contents

1. Executive Summary

The System Requirements Document (SRD) serves to provide a complete set of system requirements for the SLCCI operational system, as requested in the Statement of Work (SoW), geared to the Sea Level ECV. The SRD will function as the primary input to the design of the operational system, as to be described by the System Specification Document (SSD).

This document is a revised issue of SRD v1.2, following ESA feedback [RD 14].

2. Introduction

2.1. Purpose

The System Requirements Document (SRD) defines the requirements of the Sea Level Climate change Initiative (SLCCI) operational system (henceforth the *system*), and so acts as the foundation to the System Specification Document (SSD).

The SRD is a living document, and it is intended that the document undergoes the necessary pressures of review and subsequent revision, during the lifetime of Phase 1. Where change takes place in the SRD, those deliverables which depend on the SRD must be appropriately updated.

2.2. Document Structure

The SRD comprises of

- a brief executive summary of the SRD (**Chapter 1**),
- an introduction (**Chapter 2**) to the purpose of the document, with a description of the structure of the document and the intended readership,
- a useful reference to terms, definitions and abbreviations relevant to the document (**Chapter 3**),
- an overview to the system (**Chapter 4**) through its function and purpose, plus a description on environmental considerations, relationships, dependencies, and constraints acting on the system,
- a description of the requirements engineering approach used (**Chapter 5**), with the aim of reaching a stable system requirements baseline. This includes (i) a mining of business goals from the Statement of Work, from which certain necessary system considerations are defined and system requirements ultimately derived, (ii) an argument for adoption of an existing system to form the basis of the SLCCI operational system, and (iii) description of the requirements engineering process by which the system requirements are elicited, analysed and refined,
- a requirements elicitation (**Chapter 6**) based on the judicious and argued adoption of an existing operational system as its basis, based on the argument formed in Chapter 5.
- a requirements analysis (**Chapter 7**) from which a judicious mapping to the SLCCI system is defined, including description of circumstances where the mapping should not be realised
- a system requirements baseline (**Chapter 8**) comprising of the stable system requirements led to by the earlier requirements elicitation and refinement

2.3. Intended Audience

The readership of this document is comprised of the SLCCI consortium parties and ESA. There may also be scope, following further investigation, as to the use of this document for the Software Engineering Working Group (SEWG), towards finding and forming common ground with other ECV projects as is encouraged by the Statement of Work (SoW).

2.4. Assumptions

This document is based on issue 1.4 of the Data Access Requirements Document (DARD), issue 1.0 of the Preliminary System Analysis Document (PSAD), Issue 1.1 of the Product Specification Document (PSD), and Issue 1.3 of the User Requirements Document (URD); refinement of this document will be necessary of catchment of future issues of these documents.

3. Terms, Definitions and Abbreviations

Term	Definition
CCI	Climate Change Initiative
CIS	Central Information System
CMUG	Climate Monitoring User Group
CRM	Customer Relationship Management
CSW	Catalogue Service
DARD	Data Access Requirements Document
DPM	Detailed Processing Model
DT	Delayed time
ECSS	European Cooperation for Space Standardization
ECV product	Essential Climate Variable product. One of the types of product of the Sea Level Climate Change Initiative project.
FCDR	Fundamental Climate Data Record. One of the types of product of the Sea Level Climate Change Initiative project.
FTSS	Fast Track Service Specification
GUI	Graphical User Interface
IODD	Input Output Data Definition
INSPIRE	The Infrastructure for Spatial InfoRmation in Europe
ITIL	IT Infrastructure Library
LRU	Lowest Replaceable Unit (LRU)
LWE	Long Wavelength Error
MFC	Monitoring and Forecast Centre. A type of MyOcean production centre.
MIS	MyOcean Information System
NRT	Near Real Time
OE	Orbit Error
OGC	Open Geospatial Consortium
OLA	Operation Level Agreement
OPENDAP	Open-source Project for Network Data Access Protocol
OTS	Off The Shelf

PSAD	Preliminary System Analysis Document
PSD	Product Specification Document
PUG	Product User Guide
QUARG	Quality Assurance Review Group
RAMS	Reliability, Availability, Maintainability and Safety
REP	Reprocessed Time Series
RT	Real Time
SCAMG	System Configuration and Change Management Group
SDD	System Design Document
SEWG	Software Engineering Working Group
SLA	Sea Level Anomaly
SMP	Service Management Plan
SLCCI	Sea Level Climate Change Initiative
SoW	Statement of Work
SPD	System Prototype Description
SPF	Single Point of Failure
SRB	System Requirements Baseline
SRD	System Requirements Document
SSD	System Specification Document
SVR	System Verification Report
TAC	Thematic Assembly Centre (TAC). A type of MyOcean production centre.
THREDDS	Thematic Realtime Environmental Data Distributed Service
UNFCCC	United Nations Framework Convention on Climate Change
UPS	Uninterruptable Power Supply
URD	User Requirements Document
WMS	Web Map Service

Table 1- Terms, Definitions and Abbreviations

The phrases *operational system*, *operational SLCCI system*, *SLCCI system* all denote the SLCCI operational system being developed. Where the word *system* is used, it will similarly refer to the SLCCI operational system, unless it is clear from the context that another system is being referred to.

4. System Overview

4.1. Function & Purpose

The Sea Level Climate Change Initiative project is one of eleven parallel Climate Change Initiative (CCI) projects, each focussing on a specific Essential Climate Variable (ECV). The ultimate objective of the CCI, as declared by the ESA Member States driving the programme, is “To realize the full potential of the long-term Earth Observation archives that ESA together with its Member states have established over the last thirty years, as a significant and timely contribution to the ECV databases required by United Nations Framework Convention on Climate Change (UNFCCC).” [RD 7]

The CCI Statement of Work extrapolates from, and refines, this axiomatic objective into a series of constituent requirements and desirabilities, within a phased framework for realisation. The effort towards realisation of a system to enact the ultimate objective of the CCI is split into three phases, with Phase 2 implementing the operational system. Phase 1, within which this System Requirements Document (SRD) resides, declares the system requirements for the operational system of the Sea Level ECV, that is the specification of what the system should do, prior to the subsequent design deliverable describing how the requirements should be realised.

The importance of the CCI Statement of Work (SoW) is acknowledged by its integration into the systems requirements elicitation, from which a series of business goals are formed. One of the reasoned objectives elicited is the reuse of existing functionality towards the development of each CCI operational system. To this end, the System Requirements document (SRD) reasons for the apt adoption of certain requirements from an existing operational system, towards a measured realisation of an SLCCI system. The scope of the operational system from which the SLCCI system will be founded is therefore mature and well defined, given its proven validation over time in an operational context.

4.2. Environmental Considerations and Constraints

The CCI Statement of Work does not directly preclude inclusion of any type of environment, but does encourage reuse of existing similar operational systems, as practiced in Chapter 6 (Requirements Elicitation), which may therefore indirectly constrain the environment(s) which may be considered to those adopted by the existing similar system.

4.3. Relationships & Dependencies

The CCI Statement of Work declares the desirability to a unified multi-ECV system, whereby all, or sets of, ECV operational systems share resources and infrastructure. The CCI System Engineering Working Group (SEWG) has been set up as a vehicle towards satisfying this goal. To this end, acknowledgment and consideration is taken in the System Requirements Document (SRD) with the aim of exploring commonality between the SLCCI and other CCI projects. Additionally, one of the advantages of adoption of the existing system chosen, namely DUACS, is that it has been proven to reside in a broader, multi-variable, system similar to a possible pan-ECV CCI system.

5. Requirements Engineering

5.1. Document Lifecycle

The lifecycle of the System Requirements Document (SRD) starts via a Preliminary System Analysis Document (PSAD) identifying the candidate system for reuse for SLCCI, namely DUACS. A set of system requirements is elicited and refined based on a judicious mapping with DUACS, prior to other inputs being considered. The SRD thereafter undergoes an iteration of review and subsequent modification towards reaching a stable system requirements baseline at each iteration. Figure 5-1 illustrates the SRD lifecycle -

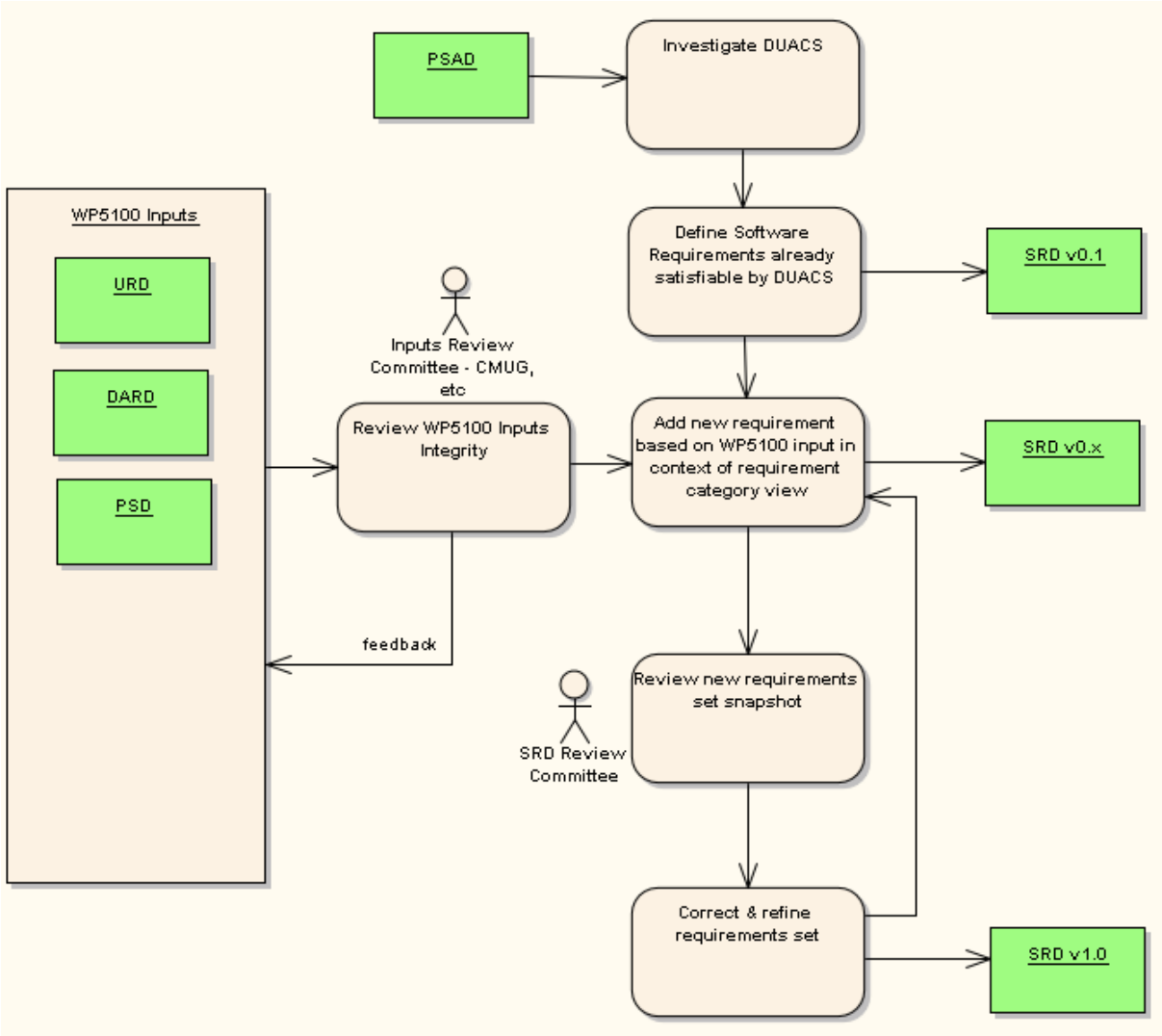

Figure 1 - SRD Document Lifecycle

5.2. Process

The System Requirements Document (SRD) is a living document and therefore ready for absorption and subsequent refinement of requirements during CCI Phase 1, as inputs and assumptions which

the SRD depend on similarly change. To that end, this document describes the set of requirements for a system requirements baseline by stepping through the following stages

- Requirements Elicitation – the attainment of system requirements.
- Requirements Analysis – the analysis and refinement of system requirements attained.
- Requirements Specification – the formal declaration of a complete and consistent system requirements baseline describing what the system shall do.

As will be seen in the following chapter (Requirements Elicitation), special consideration is given to the judicious absorption of an existing similar system into the SLCCI system requirements baseline, namely DUACS as realised for MyOcean SL TAC, identified by the Preliminary System Analysis Document (PSAD).

Re-use of the system for this System Requirements Document (SRD) is undertaken in the context of ECSS standard Q-ST-80C for Space Product Assurance ([RD 10], section 6.2.7), describing good practice for the re-use of existing software.

The following sequence of steps illustrates the argument towards reasoning the adoption of certain apt equivalent system requirements based on DUACS –

1. Requirements Elicitation (**Chapter 6**)
    a. The business goals of the CCI Sea Level operational system are identified from analysis of the CCI Statement of Work.
    b. Pertinent business goals of the CCI SoW, related to system reuse, are highlighted
    c. Identification of a system to be reused
        - Argument towards the reuse of DUACS for SLCCI
    d. Assertion of relevance of DUACS to SLCCI operational system
        - Significant similarities re-asserted with regards to input data types, output data types, and user types
    e. Definition of SLCCI users and scope in context of DUACS, given earlier argued equivalencies
    f. Definition of SLCCI use case packages in context of DUACS use case packages, given operational scenarios are equivalent between SLCCI and DUACS.
        - Definition of SLCCI product pipeline and other use case packages in the form of *macro functionalities* distilled from equivalent DUACS use cases.
            - A macro functionality is a distinct high-level area of functionality, representable by a use case, and ultimately mappable to a sub-system.
    g. Definition of judicious, unrefined, mapping from DUACS system requirements to proposed SLCCI requirements, based on the argued equivalencies between DUACS and SLCCI through
        - scope
        - users
        - use case packages,
        - use cases associated with the use case packages
        - system requirements associated with the use cases

2. Requirements Analysis (**Chapter 7**)
    - The unrefined, raw, mapping elicited is analysed with the aim of outputting refined requirements to the System Requirements Baseline (Chapter 8). Description is made as to how each SLCCI equivalent system requirement need be modified and whether the mapping itself is valid.

3. System Requirements Baseline (**Chapter 8**)
    - The output of the Requirements Analysis is synthesised as a formal System Requirements Baseline. The system requirements are arranged via two dimensions, (i) the SLCCI macro functionalities distilled from the Requirements Analysis, and (ii) the ECSS requirements groups.

4. Requirements Validation
    - During system design and development, the system requirements baseline (Chapter 8) used as validation.

5.3. Requirements for Formulating Technical Requirements

ECSS recommendations on the criteria required for valid requirements are declared via ECSS standards [RD 4], and are listed as follows –

1. Performance - Each requirement should be quantifiable.
2. Justification - Each requirement should be justified, with the responsible entity associated with the requirement identified
3. Configuration management and traceability - Each requirement should be under configuration management, backwards-traceable and forwards-traceable, so accommodating requirements change during the software lifecycle.
4. Ambiguity - Each requirement should be unambiguous
5. Uniqueness - Each requirement should be unique
6. Identifiability - Each requirement should be associated with a unique identifier, associated in the context of where it sits in the system.
7. Singularity - Each requirement should be separately stated.
8. Completeness - Each requirement should be self-contained
9. Verification - Each requirement should be verifiable
10. Tolerance - A tolerance should be declared for each parameter or variable specified in a requirement,

These ECSS criteria are compatible with IEEE 830 Standard on the characteristics of valid requirements.

6. Requirements Elicitation

6.1. Introduction

Initial requirements are directly elicited via (i) the CCI Statement of Work [RD 7] from which business goals and subsequent design requirements are extracted, which includes encouragement for system reuse (ii) a Preliminary Systems Analysis Document [RD 3] describing an adopted existing system significantly similar to SLCCI, namely DUACS, and (iii) relevant documents pertaining to how DUACS is realised for MyOcean in the form of the MyOcean SL TAC. The argument towards reuse of DUACS is aided by the context of system reuse good practice as promoted by ECSS standard Q-ST-80C on Software Product Assurance [RD 10, pg 27].

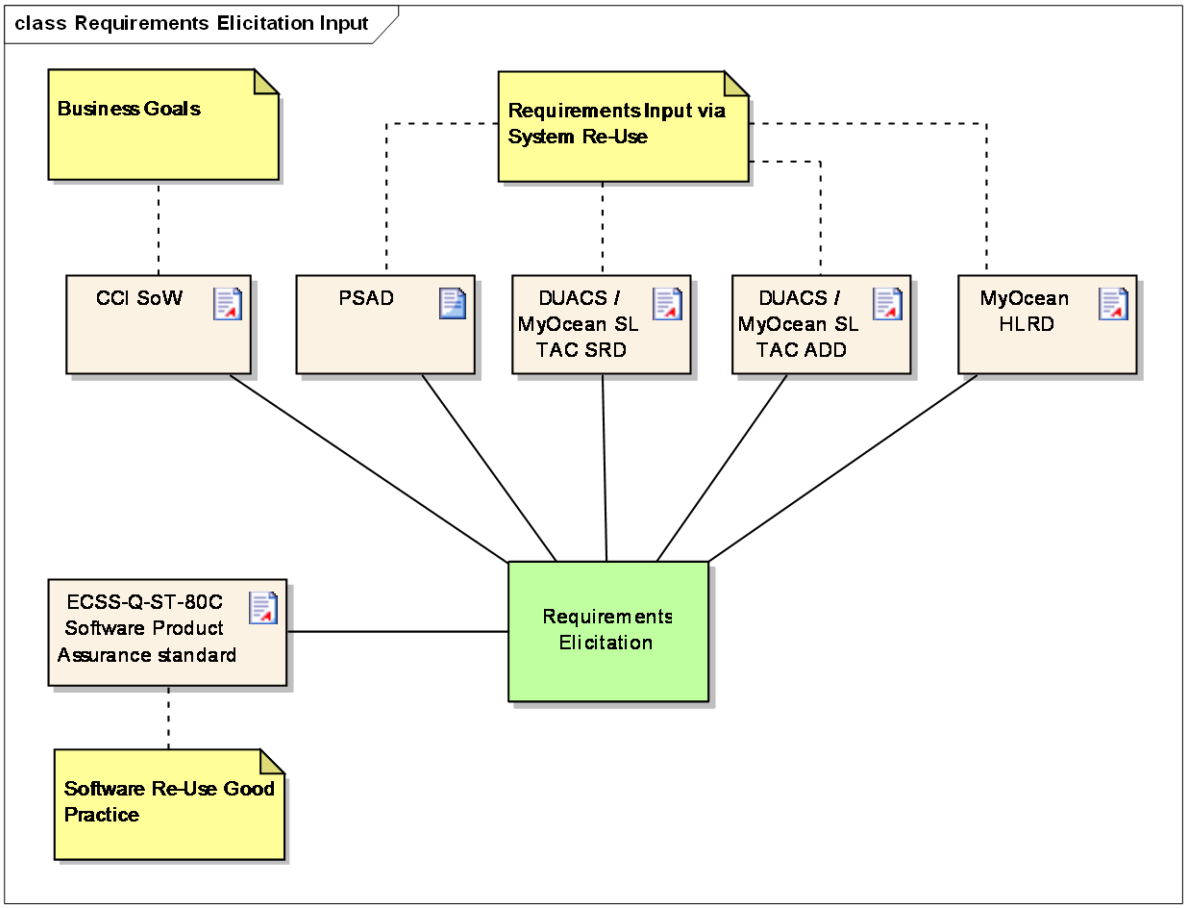

Figure 2 - System reuse document input towards requirements elicitation

As depicted by Figure 6-2, the steps undertaken during Requirements Elicitation start with the extraction of business goals from the Statement of Work, the axiomatic needs for the SLCCI project towards an operational system (Section 6.2). The pertinent business goal regarding system reuse is pursued through the identification and adoption of an apt system for re-use (Section 6.3); a line of argument is posited towards adoption of DUACS based on significant similarities, though also identifying differences for accountability of argument. Based on the argued significant similarities between both operational systems, a definition of SLCCI users and scope (Section 6.5), a definition of SLCCI Use Case Packages (Section 6.6) and their associated Use Cases (Sections 6.7, 6.8, 6.9, 6.10) is

described, leading to an unrefined mapping of system requirements between DUACS and SLCCI, whilst recognising the differences between both systems.

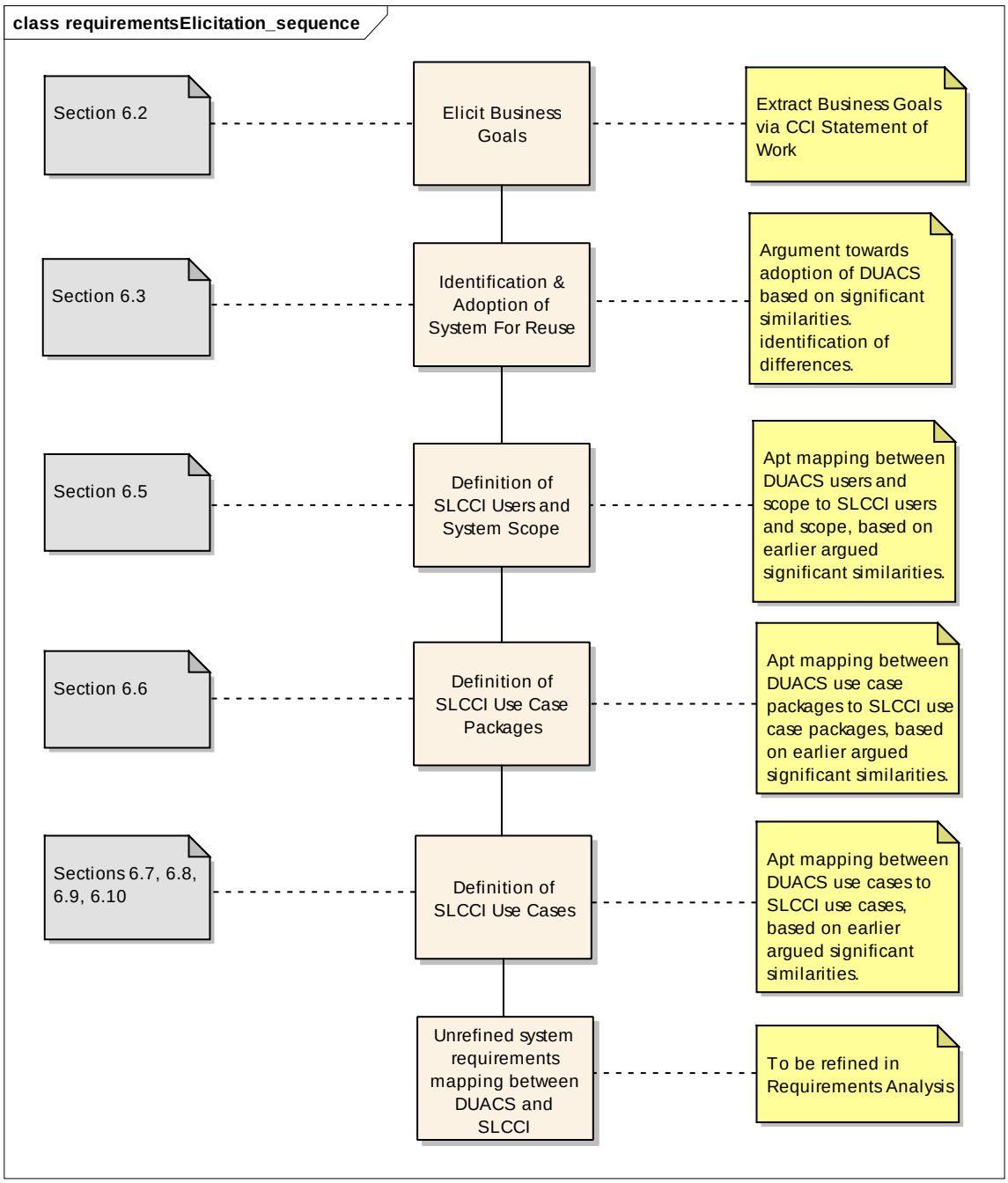

Figure 3 - Sequence of steps taken during Requirements Elicitation

6.2. Eliciting Operational System Business Goals

The ESA Climate Change Initiative Statement of Work [RD 7] represents the source from which the business goals of the system are herein elicited. The ultimate objective of the Climate Change Initiative (CCI) is stated as follows -

"to realize the full potential of the long-term global Earth Observation archives that ESA together with its Member states have been established over the last thirty years, as a significant and timely contribution to the ECV databases required by the United Nations Framework Convention on Climate Change." [RD 7]

The objective of Phase I Task 5 is the "preperation for Phase 2 of the CCI Programme" [RD 7, pg 26]. The CCI Phase I is defined largely as a scientific exercise by the CCI Phase I SoW [RD 7], given the Tasks defined therein. Tasks I to Tasks 4 relate to the scientific endeavour of engaging with the latest scientific understanding, with the ultimate aim of creating a prototype production system which reflects that understanding. Task 5 is a specification of the operationalisation of that prototype production system for the outside world.

The CCI Phase I SoW [RD 7] is here analysed to extract a series of *business goals* pertinent to the operational system. These goals represent certain axiomatic needs of the operational system prepared by Phase I Task 5, and due to be built by future Phase II implementers.

We scope our analysis for arriving at business goals of the operational system, by first defining *operational system*. The operational system is the *operationalisation* of the Task 3 prototype production system, that is a production system and the engineering in of capability onto the production system to allow it to be used in the outside world, following its construction by CCI Phase II. The operational system is specified via Phase I Task 5 and built by future implementers via Phase II.

Our aim in analysing the Statement of Work is to infer a series of goals which are directly related to the operational system. We are not directly concerned, therefore, with the activities leading up to the prototype production system, nor are we directly concerned with the activities at a meta-level associated with the CCI programme organisation, such as the listing of other CCI ECV programmes.

To that end, we have analyised the whole Phase I SoW, inferring business goals, which we illustrate with supporting evidence. It is imperative to note that for each business goal such evidence is one item of *supporting* evidence as labelled, and does not necessarily reflect all items of evidence used to reason the associated business goal. Therefore, a business goal cannot be necessarily inferred by observation of the associated supported illustrativetext alone, but rather by absorption and analysis of the whole document.

Business goals SLCCI-SRB-BUSINESS-GOAL_#1 to SLCCI-SRB-BUSINESS-GOAL_#14 regard the technical constraints listed in SoW §2.8 related to "planning and implementing the CCI project"; these inhabit section SoW §2 (CCI Programme Background) prior to commencement of the description of the tasks to be executed (§3). These §2.8 constraints apply to CCI projects as a whole, and irrespective of the Task at hand. We distil these in context to the operational system alone. With SLCCI-SRB-BUSINESS-GOAL_#1, for example, we propose that since the scientific community represent the end users of the operational system, their expectations with regards to the performance of the operational system must be taken into account.

SLCCI-SRB-BUSINESS-GOAL_#1
Development of the operational system shall be undertaken with apt consideration for scientific consensus on performance specification of the operational system.

Supporting evidence – "Each CCI project team (the contractor) shall take full account of the following key technical constraints when planning and implementing the CCI project:… Need for scientific consensus on detailed ECV Product and performance specifications" [RD 7, pg 11]

SLCCI-SRB-BUSINESS-GOAL_#2
Development of the operational system shall be undertaken with apt consideration for availability of input data from EO archives.

Supporting evidence – “Each CCI project team (the contractor) shall take full account of the following key technical constraints when planning and implementing the CCI project:… Availability and quality input data from EO Archives (ESA and non-ESA)” [RD 7, pg 11]

SLCCI-SRB-BUSINESS-GOAL_#3
Development of the operational system shall be undertaken with apt consideration for quality of input data from EO archives.

The supporting evidence from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#3 is the same as that described above for SLCCI-SR-BUSINESS-GOAL_#2 [RD 7, pg 11].

SLCCI-SRB-BUSINESS-GOAL_#4
Development of the operational system shall be undertaken with apt consideration for availability of associated metadata, cal/val data and documentation.

Supporting evidence – “Each CCI project team (the contractor) shall take full account of the following key technical constraints when planning and implementing the CCI project:… Availability and quality of associated metadata, cal/val data, and documentation” [RD 7, pg 11]

SLCCI-SRB-BUSINESS-GOAL_#5
Development of the operational system shall be undertaken with apt consideration for quality of associated metadata, cal/val data and documentation.

The supporting evidence illustration from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#5 is the same as that described above for SLCCI-SR-BUSINESS-GOAL_#4 [RD 7, pg 11].

SLCCI-SRB-BUSINESS-GOAL_#6
Development of the operational system shall be undertaken with apt consideration for compatibility of data from different missions.

The supporting evidence illustration from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#6 is the same as that described above for SLCCI-SR-BUSINESS-GOAL_#4 [RD 7, pg 11].

SLCCI-SRB-BUSINESS-GOAL_#7
Development of the operational system shall be undertaken with apt consideration for

compatibility of data from different sensors.

The supporting evidence illustration from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#7 is the same as that described above for SLCCI-SR-BUSINESS-GOAL_#6 [RD 7, pg 11].

SLCCI-SRB-BUSINESS-GOAL_#8
Development of the operational system shall be undertaken with apt consideration for trade-off between cost, complexity and impact of new algorithms to be developed and validated during the project.

The supporting evidence illustration from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#8 is the same as that described above for SLCCI-SR-BUSINESS-GOAL_#6 [RD 7, pg 11].

SLCCI-SRB-BUSINESS-GOAL_#9
Development of the operational system shall be undertaken with apt consideration for advance planning for data from new missions to be integrated during the project.

The supporting evidence illustration from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#9 is the same as that described above for SLCCI-SR-BUSINESS-GOAL_#6 [RD 7, pg 11].

SLCCI-SRB-BUSINESS-GOAL_#10
Development of the operational system shall be undertaken with apt consideration for end-to-end throughput of ECV production systems.

The supporting evidence illustration from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#10 is the same as that described above for SLCCI-SR-BUSINESS-GOAL_#6 [RD 7, pg 11].

SLCCI-SRB-BUSINESS-GOAL_#11
Development of the operational system shall be undertaken with apt consideration for re-use of existing capabilities within Europe.

The supporting evidence illustration from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#11 is the same as that described above for SLCCI-SR-BUSINESS-GOAL_#6 [RD 7, pg 11].

SLCCI-SRB-BUSINESS-GOAL_#12
Development of the operational system shall be undertaken with apt consideration for compliance of ESA standards.

The supporting evidence illustration from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#12 is the same as that described above for SLCCI-SR-BUSINESS-GOAL_#6 [RD 7, pg 11].

SLCCI-SRB-BUSINESS-GOAL_#13
Development of the operational system shall be undertaken with apt consideration for availability of external validation data.

The supporting evidence illustration from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#13 is the same as that described above for SLCCI-SR-BUSINESS-GOAL_#6 [RD 7, pg 11].

SLCCI-SRB-BUSINESS-GOAL_#14
Development of the operational system shall be undertaken with apt consideration for avoidance of duplication of activities covered by existing operational projects.

The supporting evidence illustration from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#14 is the same as that described above for SLCCI-SR-BUSINESS-GOAL_#6 [RD 7, pg 11].

Similarly, in CCI Phase I SoW §2, which offers CCI Programme Background, we extract further information relating ESA's vision of the operational system. Before commencement of description of the Phase I Tasks (SoW §3), SoW §2.5 briefly describes the three phases of the CCI programme. We take advantage of this Phase I SoW introductory section, to pre-empt future ESA expectations for Phase II, which concerns the building of the operational system.

SLCCI-SRB-BUSINESS-GOAL_#15
The operational system shall be cost effective.

As described above for Business goals SLCCI-SRB-BUSINESS-GOAL_#1 to SLCCI-SRB-BUSINESS-GOAL_#14, we observe Phase I content general to the phase, and infer from that the goal specific to the operational context. As similarly described earlier, supporting evidence offered is illustrative and does not necessarily form all roots of the reasining. Similarly, as with the content quoted below, for example, we draw on modernity and adaptability of the operational system through other goals inferred.

Supporting evidence – "CCI Phase-1 […] It is thus essential that, from the outset, scientists, systems experts, and prospective operators work side by side in CCI to identify modern, adaptive and cost effective implementation and operational approaches […]" [RD 7, pg 7-8]

SLCCI-SRB-BUSINESS-GOAL_#16
The pan-ECV operational systems must be cost effective as a whole

We recognise the matter of cost effectiveness across the ECVs as imperative to achieving cost effectiveness.

Supporting evidence, relevant CCI SoW extract(s) – "CCI Phase-2 will implement 'operational' systems […] They must also be cost-effective as a whole." [RD 7, pg 8]

SLCCI-SRB-BUSINESS-GOAL_#17
Operational system timeliness is urgent

We acknowledge the urgency of delivery of the operational system to the climate change community.

Supporting evidence – "An essential feature of CCI will be to implement a coherent and continuous suite of actions that encompasses all steps necessary for the systematic generation of relevant Essential Climate Variables (ECVs), and ensures their regular updating on timescales corresponding to the increasingly urgent needs of the international climate change community" [RD 7, pg 4]

SLCCI-SRB-BUSINESS-GOAL_#18
Full advantage shall be taken of the latest developments in computing architectures in the development of the operational system.

Again, in the Phase I "CCI Programme Background" section, we interpret ESA's vision of Phase I prior to the Phase I SoW Task specification; we assume this SoW visionary information underlies in part the motivation of content in the Phase I SoW prior Task definition.

Supporting evidence – "CCI Phase 1 […] Full advantage must be taken of the latest developments in computing architectures, data management and communications technologies. Innovative structures for large-scale data sharing, data (re)processing and user access, need to be investigated and traded off alongside the associated cost models. The main criteria for such tradeoffs are 1) Openness to science-driven evolution 2) Cost effectiveness for operations." [RD 7, pg 8]

SLCCI-SRB-BUSINESS-GOAL_#19
Full advantage shall be taken of the latest developments in data management in development of the operational system.

The description and supporting evidence illustration from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#19 applies above to SLCCI-SR-BUSINESS-GOAL_#18 [RD 7, pg 8].

SLCCI-SRB-BUSINESS-GOAL_#20
Full advantage shall be taken of the latest developments in communications technology in development of the operational system.

The description and supporting evidence illustration from the Statement of Work for SLCCI-SR-BUSINESS-GOAL_#20 applies above to SLCCI-SR-BUSINESS-GOAL_#18 [RD 7, pg 8].

SLCCI-SRB-BUSINESS-GOAL_#21
The operational system development should include cooperation with other consortia producing ECV products.

Again, prior to the Phase I definition of Tasks, we observe the CCI Programme Background section (§2) for Task-wide vision which we may find relevancy for the criteria of operational system as

defined earlier. We denote here the importance of pan-ECV collaboration across Task 5 endeavours, towards cost effectiveness, as is being realised by the System Engineering Working Group (SEWG).

Supporting evidence – "In addressing these cardinal requirements each CCI project team will: […] Liaise with other consortia producing ECV products under the CCI to ensure consistency is assured." [RD 7, pg 10]

SLCCI-SRB-BUSINESS-GOAL_#22
The operational system shall have provision for future data set updates.

The operational system must be flexible enough to be capable to acquire, absorb and process the future data sets being created by scientific endeavour.

Supporting evidence – "address the need for establishing data service systems that ensure ongoing accessibility to the Climate Data Sets into the future as well as the required capacity to update these data sets periodically by addition of new data or by reprocessing complete records when calibration improves or ECV generation methods evolve" [RD 7, pg 27].

SLCCI-SRB-BUSINESS-GOAL_#23
The operational system shall allow algorithm change.

Similarly to the previous CCI Programme Background reasoning above for SLCCI-SRB-BUSINESS-GOAL_#22, the operational system needs to be flexible enough to accommodate algorithms being developed by science, as well as new data (SLCCI-SRB-BUSINESS-GOAL_#22).

Supporting evidence – Appendix 2, describing content of deliverables, portrays the system requirements as needing to include "modularisation to allow for algorithm improvement or algorithm change while minimising reprocessing temporal constraints" [RD 7, pg 51]

SLCCI-SRB-BUSINESS-GOAL_#24
The operational system shall have an archiving facility.

Of all the ingredients listed for inclusion in the SRD, our preliminary analysis points to these as already being considered as part of our system requirements engineering effort, leading to the system requirements baseline. We take explicit note here of archiving, as this is pointed to as a functional need of the operational system.

Supporting evidence – Appendix 2, describing content of deliverables, portrays the system requirements as needing to include "archiving requirements" (baseline data and interim products and outputs and their safeguarding to allow for reprocessing). [RD 7, pg 51]

The above elicited business goals are included as part of the Design Requirements & Implementation Constraints section of the System Requirements Baseline. Therefore, the axiomatic needs of the SLCCI system are made concrete directly in the System Requirements Baseline, so mitigating risk of loss of vision of the system during development.

6.3. Argument for use of DUACS as Existing System for Reuse

The business goals earlier elicited make it clear that adoption of an existing system for reuse for SLCCI is desirable. Adoption of an existing system for re-use is a familiar endeavour in the context of

ECSS standard Q-ST-80C for Space Product Assurance ([RD 10], section 6.2.7), which describes relevant good practice for the re-use of existing software, from which this System Requirements Document (SRD) will observe where apt for SLCCI.

The Preliminary System Analysis Document (PSAD) identified DUACS as a suitable system for adoption. Following further investigation, particularly in the context of how DUACS is realised for MyOcean SL TAC, we here elaborate on the reasons for adopting DUACS to form the foundation of the SLCCI system –

1) The input to the DUACS system and the SLCCI system are significantly similar. Both systems absorb altimetry data spanning the same set of missions over a long term period.
2) The output to the DUACS system and the SLCCI system are significantly similar. Both systems produce a mono mission along-track product, and a merged multi-mission gridded product.
3) The users, the audience, of DUACS and the SLCCI system are significantly similar. The climatology research community are the primary target audience for SLCCI, and represent a significant subset of the DUACS user base.
4) The DUACS system and the SLCCI system are both operational systems
5) CLS, an SLCCI partner, was also prime contractor for DUACS, so facilitating access to shared knowledge
6) DUACS is a mature system; 13 years old
7) We aim for SLCCI to be subsumed with other sibling ECVs in a higher-level system; such an objective has already been proven with DUACS in the context of the (pan-variable) MyOcean high-level system. To this end -
   - Endeavours are being made, and will continue to be made, through the CCI System Engineering Group (SEWG) towards reaching commonality with sibling ECVs towards system design. This activity is of the very utmost importance, given the associated business goals elicited from the Statement of Work [RD 7] -
     i) A business goal directly relevant to cooperation between ECV systems – SLCCI-EB-BUSINESS-GOAL_#21
     ii) Business goals indirectly relevant to cooperation between ECV systems, via desirability of cost effectiveness - SLCCI-EB-BUSINESS-GOAL_#15, SLCCI-EB-BUSINESS-GOAL_#16
   - To accommodate this endeavour in an apt manner during the requirements stage, it is envisaged that the SLCCI system will hook in to higher level Central Information System (CIS) [RD 11], available at the CCI level across all ECV projects (including, in this content, SLCCI), with each ECV implementing its own INSPIRE compliant interoperability with the Central Information System.
8) Metadata will be associated with SLCCI in order to describe all output sea level products. It is anticipated that this SLCCI metadata will take the form of static and dynamic metadata, describing the characteristics and quality of the associated SLCCI product, respectively, as is similarly the case with DUACS metadata. This is recognised in context of the business goals associated to quality and availability of metadata, namely SLCCI_SRB_BUSINESS_GOAL_#4 and SLCCI_SRB_BUSINESS_GOAL_#5.

Given the argued reasons for adopting DUACS as a system underlying SLCCI, it is important to also recognise how DUACS and SLCCI systems differ, in order to reach a system requirements baseline for SLCCI of apt integrity –

- As has been pointed out, both DUACS and SLCCI systems are both associated with a common and significant user type, namely the climatology research community; the complete user type for SLCCI represents a significant subset of DUACS users. Nonetheless, however, a significant number of users from the DUACS user base, in particular those associated with

DUACS NRT services, are irrelevant to SLCCI which is concerned exclusively with the climatology research community.

- DUACS generates Near Real Time (NRT) products , Delayed Time (DT) or Updated mode, and entire reprocessed time series (REP). SLCCI only addresses DT and REP specifically for climate applications.
- DUACS as realised for MyOcean SL TAC links to a higher level system, namely MyOcean. Although the envisaged Central Information System (CIS) for SLCCI is analogous to the MyOcean Information System (MIS), the CIS is intentionally flexible but nonetheless well scoped, rather than a concrete, existing, high level pan-variable system as is the case with MyOcean. No *Acquisition Chain* and *Production Chain*, as used by DUACS documentation, exist on the SLCCI. Instead, the term *production pipeline* is used to refer to the sequential macro-functionalities necessary in producing the data products.

6.4. Inheritance of Limitations During System Reuse

We further demonstrate that the DUACS system can be used for SLCCI product generation, by mitigating development risk in adoption of DUACS. To this end, it is pertinent to eliminate or manage any constraints to the SLCCI inherited from DUACS.

This section is to act as a convenient central point on this matter, with the following two objectives -

- to cross-reference points in the SRD which draw on inheritance of limitations and their elimination or management (Section 6.4.1)
- declare an acknowledgement of the importance with which constraints served by the business goals, and explicitly furnishing Design Requirements & Implementation Constraints in the System Requirements Baseline, should be addressed at the very earliest opportunity during design (Section 6.4.2)

6.4.1. Cross-references

With regards to the first of these, the points in the SRD which are relevant to inheritance of limitations are as follows; we make reference to these here in one location, for convenience –

- the System Requirements Baseline section for Design Requirements & Implementation Constraints (Section 8.19), a requirements group as prescribed in the ECSS standard and adopted for the SRD towards completeness of requirements types, houses “requirements driving the design of the software under specification and any identified implementation constraint”. Accordingly, the standard promotes the requirements relevant to the group as those pertaining to software standards, design requirements, design methods, requirements related to management of numerical accuracy, and more interestingly for the endeavour of the SRD –
    - “specific design requirements to be applied if the software is specified to be designed for intended reuse”, and
    - “specific constraints induced by reused software (e.g COTS, free software and open source)”

  On the first of these, the DUACS system was originally tailored for independent operational use rather than as a general (sub) system hookable elsewhere for re-use. However, use of DUACS towards reuse has been proven in the context of MyOcean, a large scale multi-variable processing and dissemination system, so proving that DUACS is capable of serving for reuse. On the second point, the Design Requirements & Implementation Constraints (Section 8.19) section absorb such matters.

- Description of differences between DUACS and SLCCI (Section 6.3). When mapping between an original system, and the target system reusing the aforementioned original system, it is imperative that the mapping be apt and reasoned. To this end, the SRD declares the differences between the original DUACS system and the target SLCCI system (Section 6.3) to legitimise and reason the mapping. These differences are observed during Requirements Analysis (which takes as its input the raw requirements mapping reasoned during Requirements Elicitation) in order to reason all changes necessary for those requirements which are derived based on the mapping from the original system.
- Usage of ECSS system reuse good-practice. We acknowledge the good practice on system reuse (Section 6.3) as promoted via the ECSS standard for software reuse as elicited by the ECSS standard ECSS-Q-ST-80C (Space Product Assurance, Software Product Assurance), Section 6.2.7 (Reuse of Existing Software), and implement where apt and suitable for our system reuse of DUACS towards SLCCI.
- Elicited goals from CCI SoW regarding software reuse and need for latest technologies where apt (Section 6.2). The elicitation of business goals from the CCI Statement of Work not only highlight the welcoming of system reuse, directly (as SoW explicit content on system reuse) and indirectly (via SoW content on cost efficiencies) , but also the adoption of latest technologies; to this end, the adoption of an existing, mature, system needs to legitimise the balance undertaken of reuse of existing technology with adoption of, or integration with, more novel technologies towards provision of a system of apt quality and timeliness.

6.4.2. Explicit list of constraints

In the context of the System Requirements Baseline, an explicit list of constraints are offered in section 8.19 (Design Requirements & Implementation Constraints). Such constraints are important during SLCCI design, in meeting apt and reasoned reuse of the existing DUACS system. During the design stage, the output of which is communicated in the form of the System Design Document (SDD), this pertinent matter will be attended to at the very earliest opportunity.

6.5. Definition of SLCCI Users and System Scope

6.5.1. DUACS

The following diagram portrays the boundary of the DUACS system, and describes the interaction between the system and its external environment.

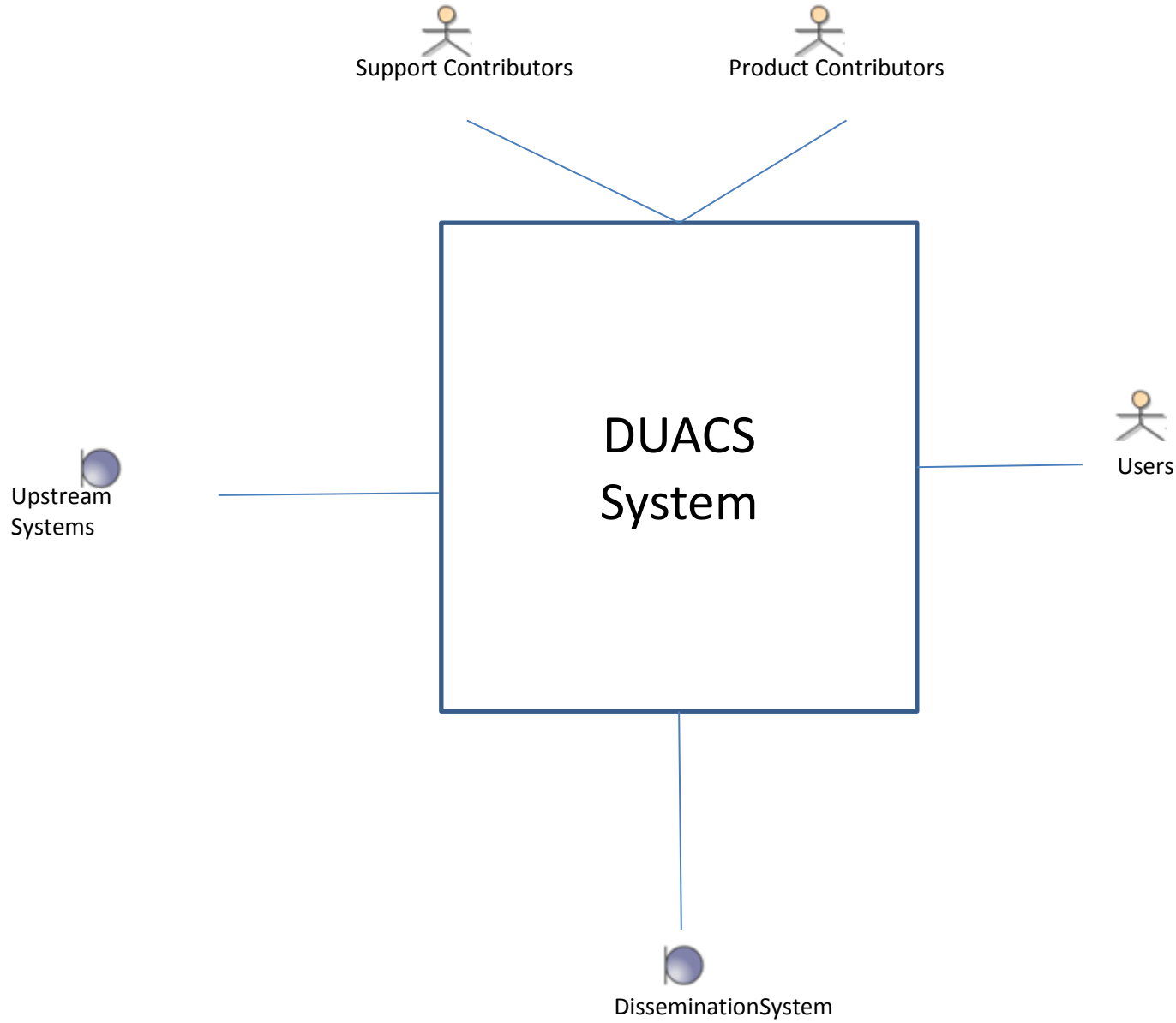

Figure 4 - DUACS / MyOcean SL TAC System Scope

DUACS interacts with the following parties–

- *Upstream Systems* from which data is collected for the production chain.
- *Support Contributor*, users internal to the DUACS system.
- *Product Contributors*, users internal to the DUACS system.
- *Dissemination System*, interface which manages the dissemination of the products they are supported by a Central Information System (CIS) and by a Web Portal.
- *Users*, such as the account holders to the system.

The support contributors and the product contributors are internal users and are considered to be *workers* of the system –

- Product Contributor.

  - "The *Product Contributor* is in charge of the quality and the management of the oceanographic products. While interacting with the system, he is to be considered as an actor and uses specific system capabilities. While performing additional manual or procedural tasks and eventually storing his results in the System. " ([RD 8], pg 38).
- Support Contributor.
  - The *Support Contributor* role uses System capabilities to operate it, or ease its operation (for instance: monitoring)." ([RD 8], pg 39)
- Scientific Expert. A type of Product Contributor.
  - "Not permanent actor and consulted when:
    - a new product has to be defined (definition of its characteristics)
    - an incident on the Production is detected (their intervention is decided by the Service Manager depending on the type of incident)
    - an evolution of the system has to be defined (evolution of the production which have impact on quality of the products through implementation of a new algorithm for instance)
    - deeper validation of the products is needed (scientific analysis of RAN products) ." ([RD 9], pg 23).
- Product Expert. A type of Product Contributor.
  - "Contributes to Product Quality and Product Quality assessment by assessing the quality of products (provides scientific judgment on information)". ([RD 9], pg 23).
- Product Manager. A type of Product Contributor.
  - "Contributes to Product publication (Catalogue and Product Database contents) by:
    - Registering products in a catalogue
    - Maintaining products metadata
    - Recording the Product Quality Information." ([RD 9], pg 23)
- Service Desk. A type of Support Contributor.
  - "Collect and answer to User request[s]." ([RD 9], pg 24).
- Support Operator.
  - "Has expertise on the system:
    - Operating and administering the system
    - Decision on archiving
    - Monitoring (and follow-up of monitoring) System & Service & Products
    - Solving incidents on the system". ([RD 9], pg 24).
- Service Manager. A type of Support Contributor.
  - "Defines the Service Support during development
  - Leads the Service Support (as an actor) during operations
  - Organizes and leads the local Service Desk
  - Checks the monitoring metrics
  - Providing information and decision about Services and Operations (incident management)". ([RD 9], pg 24).

Note that every contributor type is involved in each of NRT, DT and REP production ; each type has a higher frequency of activity involved in the NRT production only because NRT productions are daily compared to other productions which are of a lower frequency (REP,DT).

6.5.2. Defining SLCCI

The SLCCI system will adopt the same system boundary and high level interaction with users, considering the aforementioned operational equivalencies. Caveats to this equivalence are as follows –

- The DUACS system, as realised for MyOcean SL TAC, is part of the higher level MyOcean system, so dependencies with the Top Level, for instance the MyOcean Information System (MIS), are not directly included in the SLCC equivalent.
    - This severance to a higher level system however may be of later use when exploring pan-ECV commonality and the sort of system which could sit at the higher level. Acknowledgement of this potential pan-ECV usage is of the very utmost importance, considering the business goals elicited which relate to system reuse, namely SLCCI-EB-BUSINESS-GOAL_#15, SLCCI-EB-BUSINESS-GOAL_#16, and SLCCI-EB-BUSINESS-GOAL_#21. To this end, a Central Information System (CIS) is adopted for SLCCI.
- The external users quoted for DUACS are a superset of those associated with SLCCI, considering the DT/REP-only nature of SLCCI products. The SLCCI users relate to climatology research and so do not require degraded-quality NRT data products.

Figure 6.4 illustrates the SLCCI System Scope.

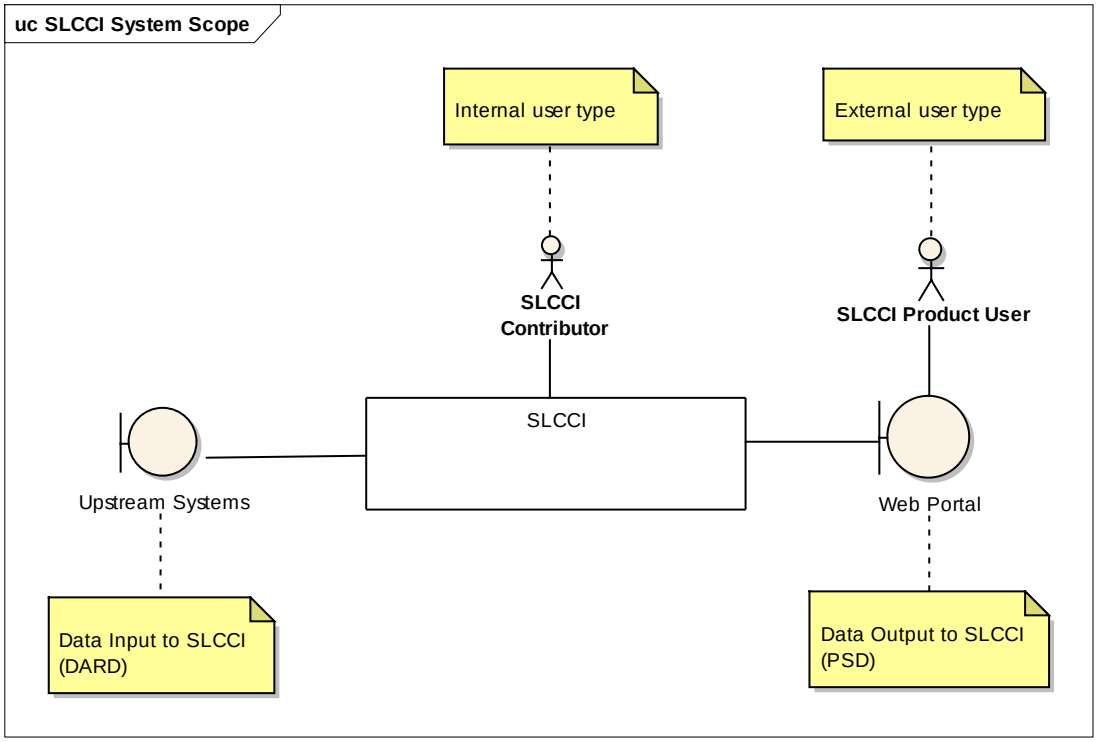

Figure 5 - SLCCI System Scope

The items in the above diagram are herein summarised, based on the DUACS description offered earlier and an analysis of the differences with SLCCI –

- Upstream Systems – the systems from which all altimetry satellite data and associated ancillary data is fed to the system, as define by the DARD.

- Web Portal – the vehicle by which the products of the SLCCI, namely FCDR and ECV products as defined by the PSD [RD 6], are accessible by the users of those products.
- SLCCI Contributor – the highest level internal user type. Represents all internal users.
- SLCCI Product User – the highest level external user type. Represents all external users, the users of the output produced by the SLCCI system.

The diagram below (Figure 6) portrays all SLCCI user types. The SLCCI Product User is considered to be associated with external users of the SLCCI outputted products (Climate modelling communities represented by the CMUG group within the CCI Phase 1), namely the SLCCI FCDR and SLCCI ECV as described by the PSD. The SLCCI contributor, or Worker, denotes an internal user to the system.

Moreover, the diagram represents the relationship between different types of user via the generalisation relationship. Therefore, for example, there are two direct sub-types of SLCCI User, namely an SLCCI Contributor and an SLCCI Product User; in other words, an SLCCI Contributor is an SLCCI User and an SLCCI Product User is an SLCCI User. Indeed all user types in the diagram are SLCCI Users since the SLCCI User type is the ultimate base type of all user types. Following on, an SLCCI Product Contributor (responsible for the quality and management of products) and an SLCCI Support Contributor (representing SLCCI Contributor types supporting operational services), are both direct sub-types of SLCCI Contributor. Furthermore, there are different types of SLCCI Product Contributor (Scientific Expert responsible for modelling, Product Expert responsible for establishing and assessing the quality of products plus providing scientific judgement, Product Manager maintaining the product database, product catalogue content and managing metadata) undertaking the work done on the production chain, and different types of SLCCI Support Contributor (Service Desk interacting with external users, Service Manager overseeing the operational running, Support Operator supporting the systems operations internally) undertaking the support of operational running of the system.

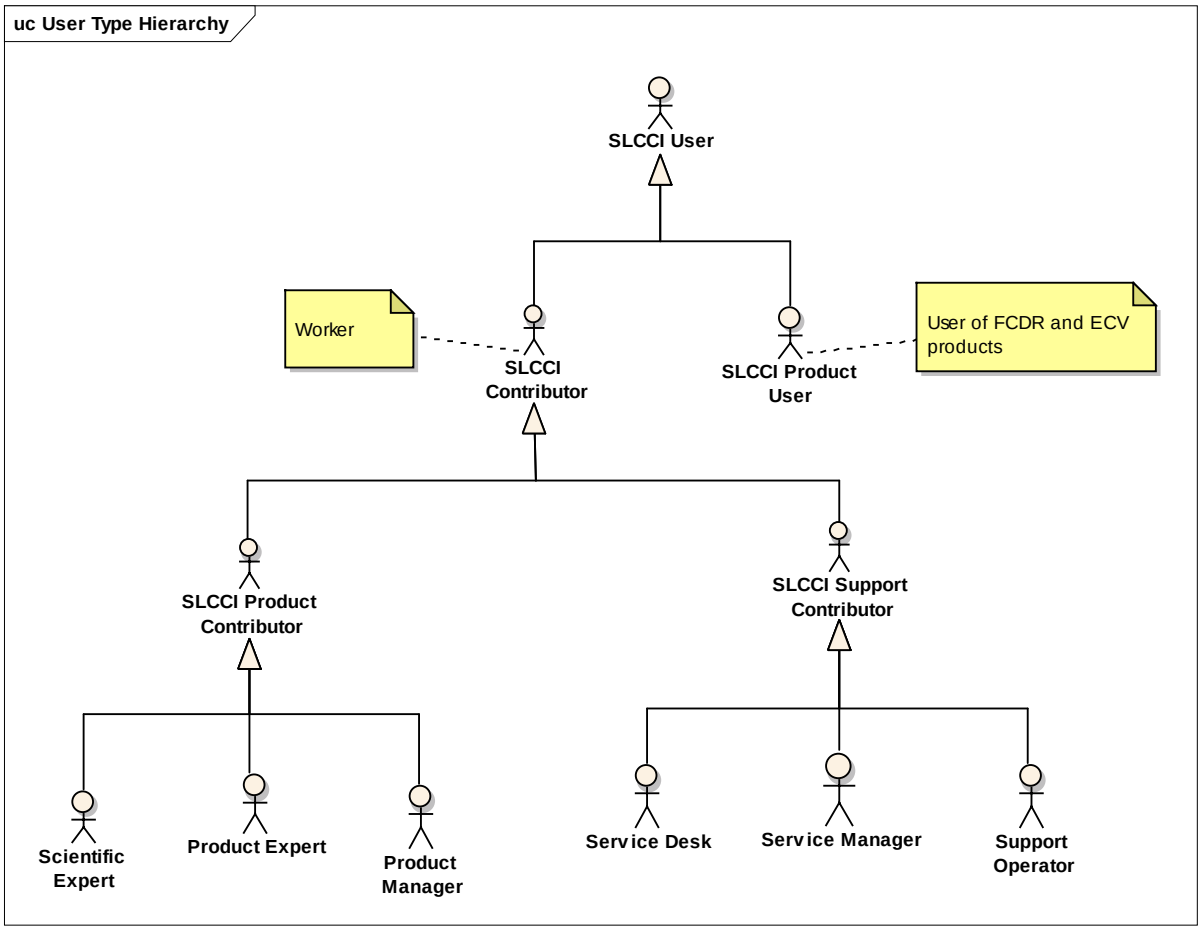

Figure 6 - SLCCI Internal Users Hierarchy

6.6. Defining SLCCI Use Case Packages

Exhaustive scenarios covered by the DUACS operational system, as realised for MyOcean SL TAC, relate to the following use case packages, representing a complete, exhaustive, view of use cases for DUACS operational system [RD 9, section 8.1] –

- Production – The production pipeline, generating DUACS products, attended to by Product Contributors and Support Contributors
- Product Access & Visualisation – The accessing of the generated product, and visualisation of the products, by Users
- Products Management – The management of product via metadata, attended to by Product Contributors and Support Contributors
- Monitoring – the monitoring of the SL TAC system, attended to by Product Contributors and Support Contributors

These four packages exhaustively realise the operational scenarios explored by SL TAC [RD 9, pg 12], and are operationally significantly similar to SLCCI to warrant adoption, given the argument and evidence offered earlier. To this end, the figure below offers an illustration of the SLCCI equivalent Use Case packages adopted.

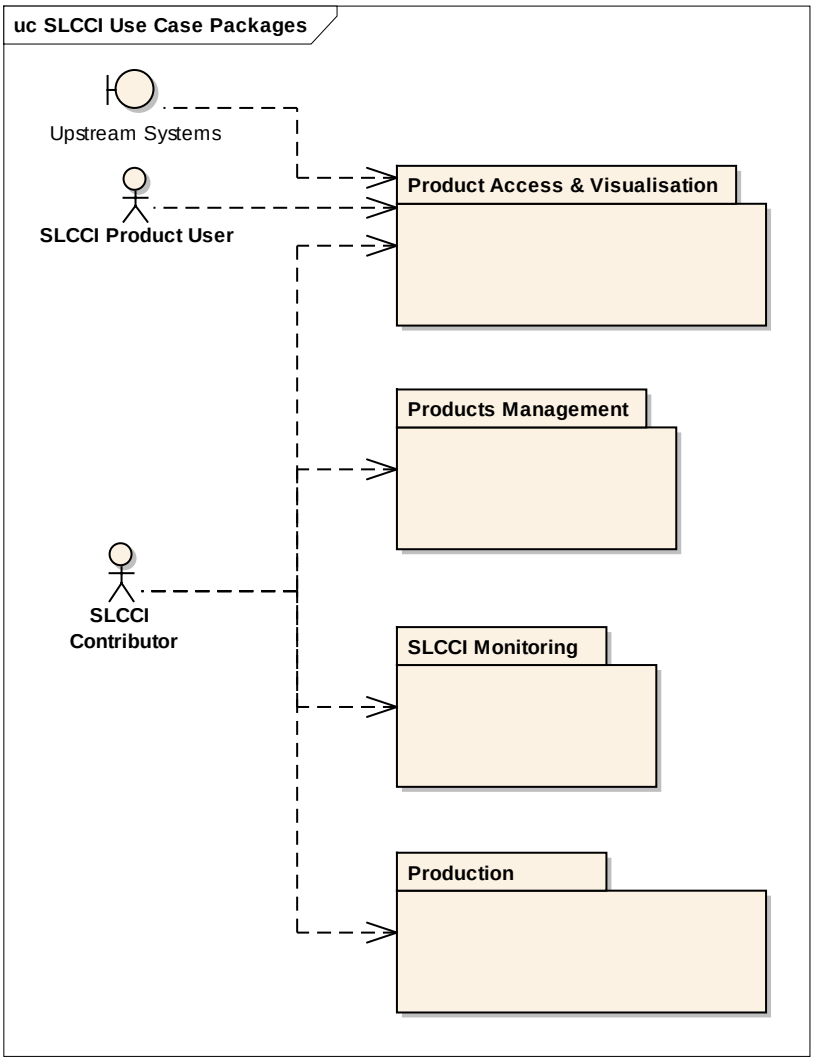

Figure 7 - SLCCI Use Case Packages

A summary description of each SLCCI package, each aptly parallel to the DUACS equivalent, is here offered –

- Production – the production pipeline
- Products Management – management of the products output by the production pipeline
- SLCCI Monitoring – monitoring of the SLCCI system
- Product Access & Visualisation – access and visualisation of the products by users

The following four sections will argue for the apt mapping of use cases and their associated system requirements to the SLCCI system, with each section representing one of the four use case packages, thus covering the entire use case package spectrum.

Each of these following four sections shall subscribe to the following structure –

1. Description of the DUACS use case package,
2. Description of associated DUACS use case requirements

3. Argument for judicious preliminary mapping to DUACS use cases and associated system requirements contained therein to SLCCI, including the noting of where the mapping does not hold and differences to be appreciated where the mapping does hold
4. Explanation that this target mapping of use cases expresses mappable requirements therein, and passing this preliminary, raw, requirements mapping to the Requirements Analysis section to form formal requirements.

6.7. SLCCI Package Definition - Production

6.7.1. DUACS Use Cases

The DUACS production package, as realised for MyOcean SL TAC, use cases are distributed as follows [RD 9, pg 28] –

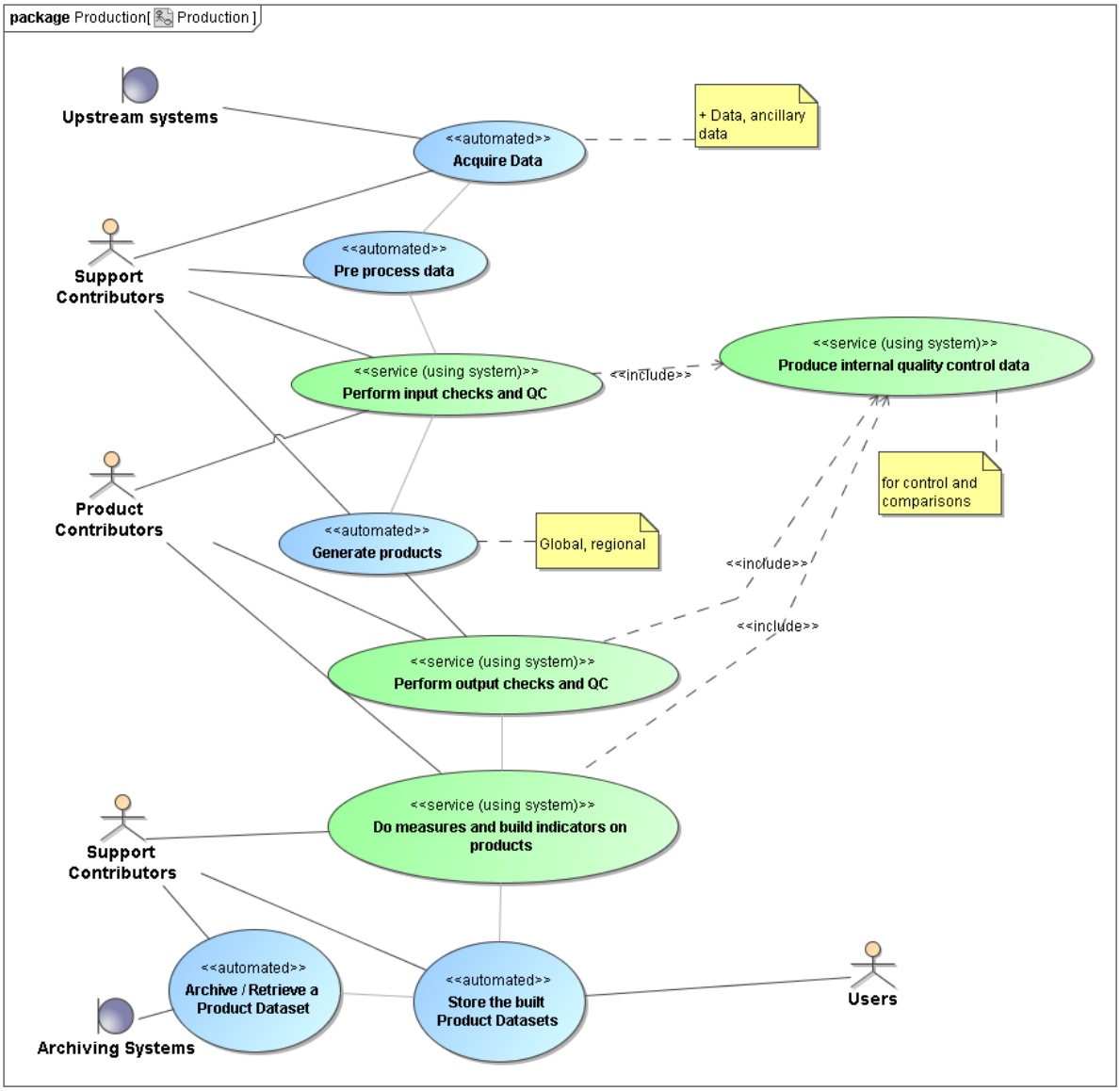

Figure 8 - DUACS / MyOcean SL TAC Production Package [RD 95]

As argued earlier for DUACS, and indeed also by the PSAD, the above use cases are mirrored by macro functionalities describing the pipeline between data input and end product [RD 3]. Each of these high level use cases maps to a macro functionality. The SL TAC SRD [RD 9, section 8.1.1] fully describes the responsibility associated with each DUACS macro functionality.

6.7.2. DUACS requirements

The high level DUACS use cases for production are each associated with a macro functionality, with each macro functionality associated with lower level requirements completely expressing the associated macro functionality. Each macro functionality is detailed in the PSAD. The high level DUACS use cases for production requirements are listed below, noted in the form SR SLTAC-<useCaseReferenceNumber>:

[SR SLTAC-1.1] Acquire Data
[SR SLTAC-1.2] Pre process Data
[SR SLTAC-1.3] Perform input checks and QC
[SR SLTAC-1.4] Produce internal QC data
[SR SLTAC-1.5] Generate Products
[SR SLTAC-1.6] Perform output checks and QC
[SR SLTAC-1.7] Do measures and build indicators
[SR SLTAC-1.8] Store the built Product Datasets
[SR SLTAC-1.9] Archive/retrieve a Product Dataset

Given the evidence and argument so far composed, we may judiciously define a mapping of use cases and subsequently a mapping of the system requirements contained therein, from DUACS to SLCCI. We therefore envisage the same use case to macro functionality parallel for the SLCCI as is the case with DUACS.

6.7.3. Use Case Mapping

The mapping between SLCCI and DUACS equivalent use cases, and therefore macro functionalities, is as follows –

SL TAC Use Case	SLCCI Use Case
Acquire Data	Acquisition
Pre Process Data	Preprocessing
Perform Input Checks and Quality Control	Monomission Cal/Val
Generate Products – Inter calibrate & Unify	Generate Product – Multimission Cross Calibration
Generate Products – Generate Along Track Product	Generate Product - Generate FCDR
Generate Products – Generate Merged Product	Generate Product - Generate ECV
Perform Output Checks and Quality Control	Product Assessment
Do Measures and built Indicators	Measures & Built Indicators

SL TAC Use Case	SLCCI Use Case
Store the Built Product Datasets	Product Dataset Storage
Archive / Retrieve a Product Dataset	Product Dataset Archiving & Retrieval

Table 2 - Production Use Case Package SLCCI and DUACS equivalent use cases

For convenience we explicitly map between SLCCI and DUACS macro functionalities rather than between their associated use cases. Given the evidence provided thus far, we argue that the DUACS production Use Cases, and therefore their associated macro functionalities, map to SLCCI equivalents.

The SLCCI data production pipeline will differ to that for DUACS in the following manners –

- The DARD [RD 2]defines the data input for the SLCCI, and will differ slightly to the equivalent data definition for DUACS (MyOcean SL TAC)
- How products are output will vary. The SLCCI end product is not yet fully defined, but it is certain that the production pipeline will follow the pattern as described above.

The SLCCI macro functionality equivalents are illustrated by the following diagram –

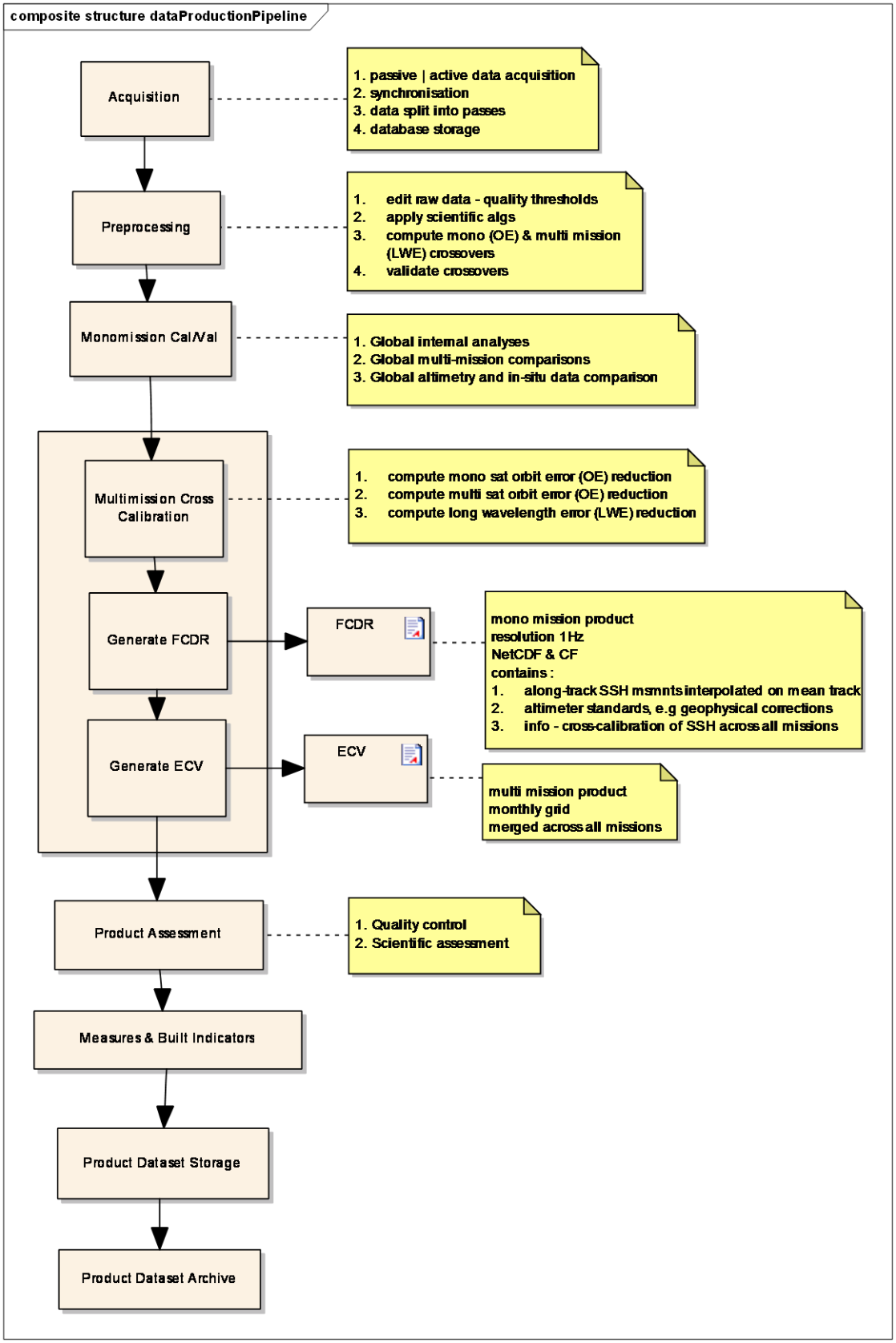

Figure 9 - SLCCI Production Macro Functionalities

As portrayed above, the following stages form the SLCCI production pipeline -

1. Acquisition – The input of data to the system.
2. Preprocessing – The application of pre-processing to the acquired data towards reaching a common treatment of data across all missions
3. Monomission Cal/Val
4. Generate Product - Multimission Cross Calibration.
5. Generate Product - Generate FCDR
6. Generate Product - Generate ECV
7. Product Assessment - the checking and reporting of quality of the output data
8. Measures & Built Indicators
9. Product Dataset Storage – Storage of the product for publication
10. Product Dataset Archiving - Product Dataset Archiving & Retrieval

6.7.4. Requirements Mapping

Chapter 7 (Requirements Analysis) described the apt mapping from the DUACS system requirements, as realised for MyOcean SL TAC, to SLCCI requirements.

6.8. SLCCI Package Definition – Product Access & Visualisation

6.8.1. DUACS Use Cases

The DUACS use case package, as realised for MyOcean SL TAC, for modelling access to the product and its visualisation are described by the SL TAC SRD [RD 9, section 8.1.3] and comprises of the following use cases –

- The visualisation of products via a web portal (the View Product use case), attended to by users
- The accessing of products via the web portal (the Get Product use case), attended to by users
- The supporting of users via a high level service desk (the Support Users use case), attended to by users and Product Contributors

6.8.2. DUACS requirements

The View Product use case relates to visualisation of the product under two guises – a “Preview” of products, and a “Full View” of products [RD 9, pg 48] composed of generated static images. External tools are used to generate these views, namely THREDDS, OPENDAP, and WMS for such visualisation, which expect content in NetCDF format. As explored as part of the Requirements Analysis, these will not necessarily be adopted for SLCCI.

[SR SLTAC-3.1.1] SL TAC shall integrate THREDDS, OPENDAP and WMS components for visualization. These components expect netcdf format. [Normal View]

[SR SLTAC-3.1.2] SL TAC shall generate static images with —preview and —full view. [Normal View]

With regards to the Get Product DUACS use case, the product is downloaded by means of ftp or OPENDAP [RD 9, pg 50]. The product is also available via the MyOcean web portal. Again, the SLCCI equivalents, described in the Requirements Analysis, will illustrate where changes are likened or necessary in order to accommodate the mapping, for instance the adoption of ftp and OPENDAP.

[SR SLTAC-3.2.1] SL TAC shall integrate MIS Gateway production component for download [Normal View]

[SR SLTAC-3.2.2] SL TAC shall integrate external components for download (FTP, OPENDAP) [Normal View]

Regarding the Support Users use case, users' demands for support and information are satisfied via a DUACS web portal supported by a service desk. A high level service desk distributes requests to an SL TAC specific service desk [RD 9, pg 51]. Four relevant user types pertain, the top level and SL level service desks, service manager and support operator.

As stated in earlier, whereas DUACS hooks into an existing higher level infrastructure for the MIS, the SLCCI equivalent will be connected to a Central Information System at the CCI level.

[SR SLTAC-3.3.1] Users Support Service
The requests may be addressed via different communication means (for example through a form), and processed by a dedicated service (Service Desk, at top level) and are cascaded to the SL TAC Service Desk in case of requested information about SL TAC
Request processing can be detailed in 4 phases:

- Receive and acknowledge request (to the Top Level Service Desk)
- Analyze request (to determine actions, implications and involved stakeholders)
- Dispatch request to relevant service or entity (Top Level Service Desk QUARG, SCAMG...)
- Close the request (done at SL TAC level or Top Level?)

[SR SLTAC-3.3.2] Write and provide product information (handbook) to the users

[SR SLTAC-3.3.3] Service Desk organization has to answer User's request.

[SR SLTAC-3.3.4] Answer to an information request
An answer may be returned to an information request via different communication means and within a variable time span depending on information type or availability.
For example, user might be directed towards online system capabilities for general information.

[SR SLTAC-3.3.5] Provision of System information (online)
As a single point of contact, the MyOcean Web Portal, is offered to users to get automated information, integrated system capabilities allow Support Contributors to automatically manage and publish information on this Web Portal.

[SR SLTAC-3.3.6] Kind of information that can be provided:

- information on Products and services
- Availability
- Data Policy
- New dissemination interfaces (associated to "Products").

- "How to" for Users
- System and Products Catalogue
- Status on the sub system in operations
- Status on products (KPI)
- Technical information on SL TAC System
- FAQ, tips, how-tos, training, forum…
- Service Desk related information
- Contacts (for "Production Centre", "Products"...)
- Event (incidents, failures)

6.8.3. Use Case Mapping

Given the earlier supporting evidence for adopting DUACS as realised for MyOcean SL TAC, the mirroring of use case high level packages with SLCCI, and the adoption of equivalent user type structure as expressed for DUACS, we propose the adopting for SLCCI of such DUACS packages, associated use cases and their associated system requirements where viable –

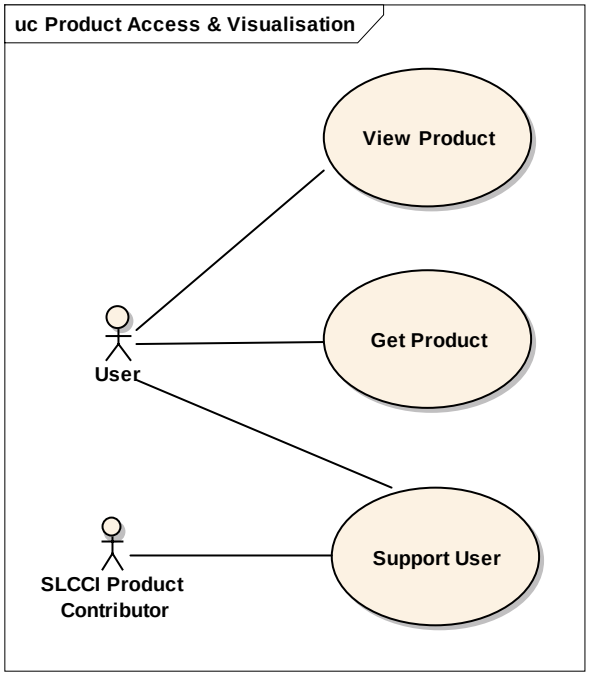

Figure 10 - SLCCI Product Access & Visualisation Package

View Product relates to viewing details of product, as described by its metadata. Get Product is the downloading of the product by an external user; this is accomplished via an SLCCI web portal. Support User is a ticketing system similar as that earlier referred to for DUACS. However, where the mapping does not hold is that no higher level service desk exists for SLCCI, therefore the SLCCI service desk (i.e that at the level of the SLCCI rather than a higher level system) is referred to instead; it is noted however that there is the potential to glue SLCCI to a higher level pan-ECV system, given that DUACS, in the frame of MyOcean SL TAC equivalent, already resides in a pan-variable infrastructure.

Under SLCCI, it is envisaged that users referring to the SLCCI Support User use case are (i) Service Desk, (ii) Service Manager, (iii) Support Operator, that is the complete three types of SLCCI Support Operator. These three user types will enact actions in the SLCCI system requirements on which the support user use case envelopes.

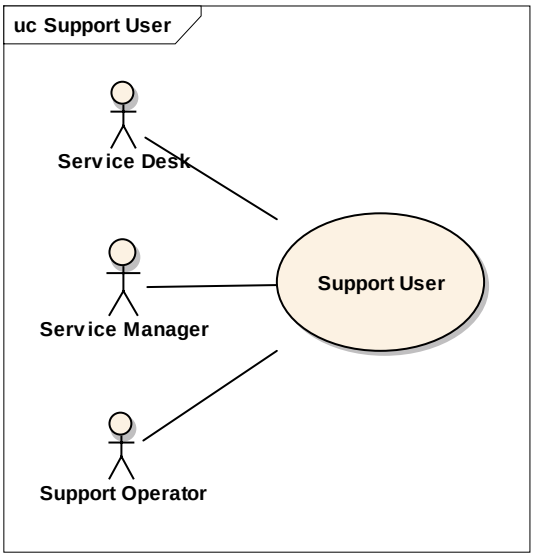

Figure 11 - SLCCI Support User Use Case

6.8.4. Requirements Mapping

Chapter 7 (Requirements Analysis) described the apt mapping from the DUACS system requirements to SLCCI requirements.

6.9. SLCCI Package Definition – Products Management

6.9.1. DUACS Use Cases

The Use Case package describing the management of products in the DUACS system is described in the SL TAC SRD [RD 9, section 8.1.2]. Product information is supplied by static metadata (the Update Static Metadata use case) and dynamic metadata (the Update Dynamic Metadata use case), dependent on the kinds of product updates. A Maintain the Products Database use case subsumes both these metadata update use cases.

6.9.2. DUACS requirements

The Maintain the Product Database use case for DUACS, as realised for MyOcean SL TAC, is related to registering products in the product database and the maintenance of the static and dynamic metadata associated with the products. Actors involved pertain to the Product Manager, Product Expert, which are both Product Contributors, i.e internal users of the system.

[SR SLTAC-2.1.1] Product Managers shall use the "MIS Metadata Editor" provided by the MIS to

maintain the product database.

As earlier indicated, it is proposed that the SLCCI system have a Central Information System (CIS) equivalent to the MyOcean Information System (MIS) component, and therefore the mapping to an SLCCI equivalent during Requirements Analysis (Chapter 7) will accomodate the SLCCI equivalent accordingly.

[SR SLTAC-2.1.2] Registering Products descriptions (static metadata).

The SL TAC "Product Manager" shall register the "Products" in the Product Database managed by MyOcean Information System (MIS) (in conformance with the FTSS):

- Creation of "Product Line" and description of the static metadata
- Creation of "Product Specification" (related to a "Product Line") and description of the static metadata
- Authorization of the "Product" (so that MyOcean can start ?logging? dynamic metadata for this "Product").

Again, an Information System is not proposed for the SLCCI system, as it is not currently warranted. However this could be a valuable solution when relying on (at least partly) existing systems.

As is the case with DUACS, a differentiation is made for SLCCI between two flavours of metadata, namely static and dynamic metadata, describing the characteristics and quality of the associated SLCCI product, respectively.

[SR SLTAC-2.1.3] Maintaining Products descriptions (static metadata and dynamic metadata)

The SL TAC "Product Manager" shall maintain Product information up to date (in conformance with the FTSS):

- Update of "Product Line" static metadata (if update of the FTSS)
- Update of "Product Specification" static metadata (if update of the FTSS)
- Delete of "Product Specification" (if update of the FTSS)
- Delete of "Product Line" (if update of the FTSS, and only if no other Product Specifications depend on the Product Line)
- Update of the Authorization of a product

Update of dynamic metadata of a product (effective delivery characteristics, effective quality characteristics)

It is anticipated, again, that the SLCCI equivalent will justifiably refer to both static (definition of the product characteristics) versus dynamic (definition of product quality) metadata types.

The FTSS (Fast Track Service Specification) is a MyOcean document cataloguing products, containing descriptions to all products generated by MyOcean. An FTSS equivalent for SLCCI is not proposed,

considering the document does not appear to be warranted given the CCI proposed availability of a product user guide. These matters are considered further during Requirements Analysis (Chapter 7) where the raw systems requirements mapping is exercised to produce and refine SLCCI equivalents.

[SR SLTAC-2.1.4] Database Products update coordinated with the Top-Level Product Manager

Each update (creation/deletion of a Product Line/Product specification, authorization of a Product) of the Products Database by the SL TAC Product Manager has to be reported to the Top-Level Product Manager for a validation (particularly regarding the state of a Product: operational or not).

For the SLCCI equivalent, there will be no higher level product manager, with that responsibility falling to the ECV-level product manager,

[SR SLTAC-2.2.1] SL TAC Product Manager can (through the MIS) create a new Product Line or a new Product Specification (either void, either duplicated from an existing one)

[SR SLTAC-2.2.2] The Product Manager must also register as Product Lines the upstream data that are delivered by providers external to MyOcean:

Such Product Lines won't have associated Product Specifications and are necessary to the product dependencies.

[SR SLTAC-2.2.3] SL TAC Product Manager can (through the MIS) update static metadata of Product Line or Product Specification

[SR SLTAC-2.2.4] SL TAC Product Manager can (through the MIS) delete Product Line (allowed only if no other Product Specifications depend on the Product Line) or Product Specification.

[SR SLTAC-2.3.1] Delivery characteristics shall be generated (by the System, through the MIS Gateway Production component within the SL TAC) for each delivered Product.

[SR SLTAC-2.3.2] Quality characteristics shall be registered by the Product Manager with the support of Product Expert for each delivered Product (see Use Case Perform output checks and QC where part of metadata have been updated by the Product Expert)

Again, strengthened by the business goal requirement towards consideration of SLCCI metadata defining availability and quality of product, a semantic equivalency is proposed between DUACS metadata and SLCCI metadata.

6.9.3. Use Case Mapping

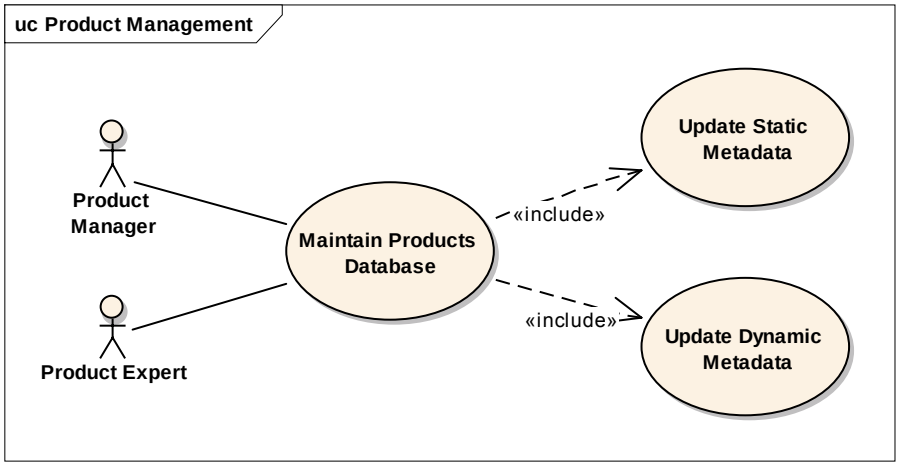

Figure 12 - SLCCI Product Management Package

As earlier indicated during the analysis of the DUACS / MyOcean SL TAC product management, the SLCCI equivalent assumes similar distinction between static and dynamic metadata.

6.9.4. Requirements Mapping

Chapter 7 (Requirements Analysis) described the apt mapping from DUACS system requirements, as realised for MyOcean SL TAC, to SLCCI requirements.

6.10. SLCCI Package Definition – Monitoring

6.10.1. DUACS Use Cases

The DUACS use case package containing all use cases therein related to monitoring of the system is the Monitoring package, are described in the SL TAC SRD [RD 9, section 8.1.4]. Monitor SL TAC Service is a use case offering automated monitoring of three monitorable aspects of the system, each represented as a use case

- Monitoring of the system itself (Monitor System use case)
- Monitoring of the production pipeline (Monitor Production use case)
- Monitoring of support requests made to the system via the Service Desk (Monitor Requests use case)

6.10.2. DUACS requirements

The system requirements associated with the Monitor SL TAC Services use case are as follows -

[SR SLTAC-4.1.1] Product monitoring is done through raw measurements on the products (see Monitor Production Use Case)

[SR SLTAC-4.1.2] System monitoring is done through Raw measurements (see System monitoring Use

Case)

Certain DUACS requirements, as realised for MyOcean SL TAC, must be refined in order to reach their SLCCI equivalents, for instance the defining of raw measurements, and depiction of the CRM tool to be used.

[SR SLTAC-4.1.3] Request monitoring is done through CRM Tool (see Request monitoring Use Case)

[SR SLTAC-4.1.4] Monitoring activities can be implemented through different means:

- by the system itself
- by external tools

[SR SLTAC-4.1.5] Raw measurements are reported to Top-Level for Top Level Services Monitoring Dashboard. Top Level dashboard shows consolidated indicators for all Top level Services. This dashboard allows Service Desk members (Support Operators, Service Managers), at all levels, to know the "health" of the Top Level Services at a glance.

Note that the SLCCI equivalent will not (necessarily) have a top level tier, and so an equivalent at the SL level should be adopted for the SLCCI equivalent.

[SR SLTAC-4.1.6] All the performed monitoring gives Support Operators every opportunity to detect early incidents or failures and take appropriate actions to ensure the continuity of services.

[SR SLTAC-4.1.7] Monitoring: complementary human tasks
Several level of automation might be implemented from fully manual to advanced instrumented monitoring. But in any cases, there will have to be complementary human activities in order to:

- monitor measurements,
- implement ITIL Processes explained and detailed in the SMP,
- support Top-Level on taking decision on whether the OLAs are met or not (Service Manager).

As earlier indicated, ITIL Processes are irrelevant to SLCCI and therefore fall out of scope of the SLCCI system requirements.

[SR SLTAC-4.2.1] System Infrastructure (hardware) is monitored by the Support Operator (Number and duration of failures)

[SR SLTAC-4.2.2] SL TAC System and its components (including physical interfaces with others sub systems such MIS, and provided external interfaces) are monitored by the Support Operator. Acquisition Chain is monitored by the Support Operator to monitor the interfaces with Upstream systems Production Chain is monitored by the Support Operator to monitor the interfaces with the MIS MIS Gateway Production component within SL TAC is monitored File server is monitored THREDDS is monitored

As earlier indicated, the SLCCI equivalent system will have a Central Information System (CIS), residing at the CCI level, equivalent to the MIS component, and therefore SLCCI requirements will reflect this equivalency.

[SR SLTAC-4.2.3] The monitoring can be either an automated procedure or human action.

[SR SLTAC-4.2.4] Raw measurements are performed by the System and the list of metrics will be detailed in the Service Management Plan.

Deferment of certain DUACS characteristics to a Service Management Plan, necessitates examination of the Service Management Plan during Requirements Analysis.

[SR SLTAC-4.3.1] The production is monitored in the SL TAC Production Center.

Athough fitting neatly into the MyOcean structure at a high level, the concept of the production centre is not established in the SLCCI equivalent.

[SR SLTAC-4.3.2] Production monitoring includes : Product availability, latency and delay (this kind of information will be automatically provided by the System) Product quality information. This information is produced and validated by the Product Expert (see "Perform output checks and QC", "Do measures and build indicators on products" Use Cases). The exact nature of the metrics to be monitored will be detailed in the Service Management Plan.

[SR SLTAC-4.3.3] SL TAC Production Center provides its monitoring information to the Top Level Service Desk.
The information could be provided through metadata updated by Production Center and collected by MIS, information sent to the Top level

[SR SLTAC-4.3.4] SL TAC Production Center Service Managers may access the Top-Level production monitoring information related to their Products (internal, external), or to their Product Lines (MyOcean, Upstream).

Request monitoring at the SLCCI level, as required for Requirements Analysis cannot assume inclusion of a higher level system tier to SLCCI, but should flexibly observe a higher level tier where possible.

[SR SLTAC-4.4.1] Requests to SL TAC Service Desk are logged and consolidated in the CRM Tool for further exploitation by the Service Manager.
Loggin is made at the SL TAC level and Top level

[SR SLTAC-4.4.2] Raw measurements must be performed by the SL TAC Service Desk on requests addressed to the SL TAC (kind of request/service, Mean wait time from Top Level Service request until closure of request). The list is described in the Service Management Plan.

DUACS monitoring requests are enacted through a top level providing information on the user relevant to a request, and information regarding the products retrieved by that user. Such assumptions cannot be assumed to be realised for the SLCCI.

6.10.3. Use Case Mapping

The SLCCI equivalent of the Monitoring package is as illustrated below, which mirrors the DUACS use case arrangement as realised for MyOcean SL TAC. Therefore, the three types of monitoring proposed in the DUACS system are similarly adopted for the SLCCI system.

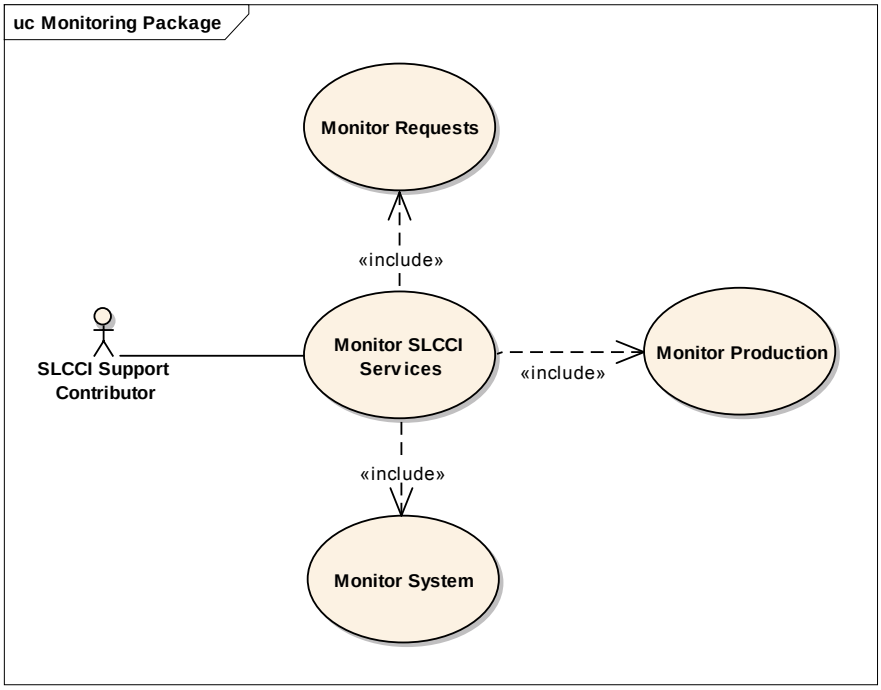

Figure 13 - SLCCI Monitoring Package

The main respect in which the equivalence between DUACS, as realised for MyOcean, and SLCCI does not hold is the presence of a higher level tier for the former. As earlier argued, a higher level presence for SLCCI does not (necessarily) occur, but can be accommodated through well scoped provision where apt for this stage, such as through inclusion of a CCI-level Central Information System.

6.10.4. Requirements Mapping

Chapter 7 (Requirements Analysis) describes the apt mapping from the DUACS system requirements to SLCCI requirements.

7. Requirements Analysis

7.1. Introduction

The Requirements Analysis takes as its input the argued equivalency between DUACS and the SLCCI operational system, in readiness for argued mapping at the system requirement level (§7.2). The analysis also draws in other documents as referenced below, with a subsection similarly associated with each.

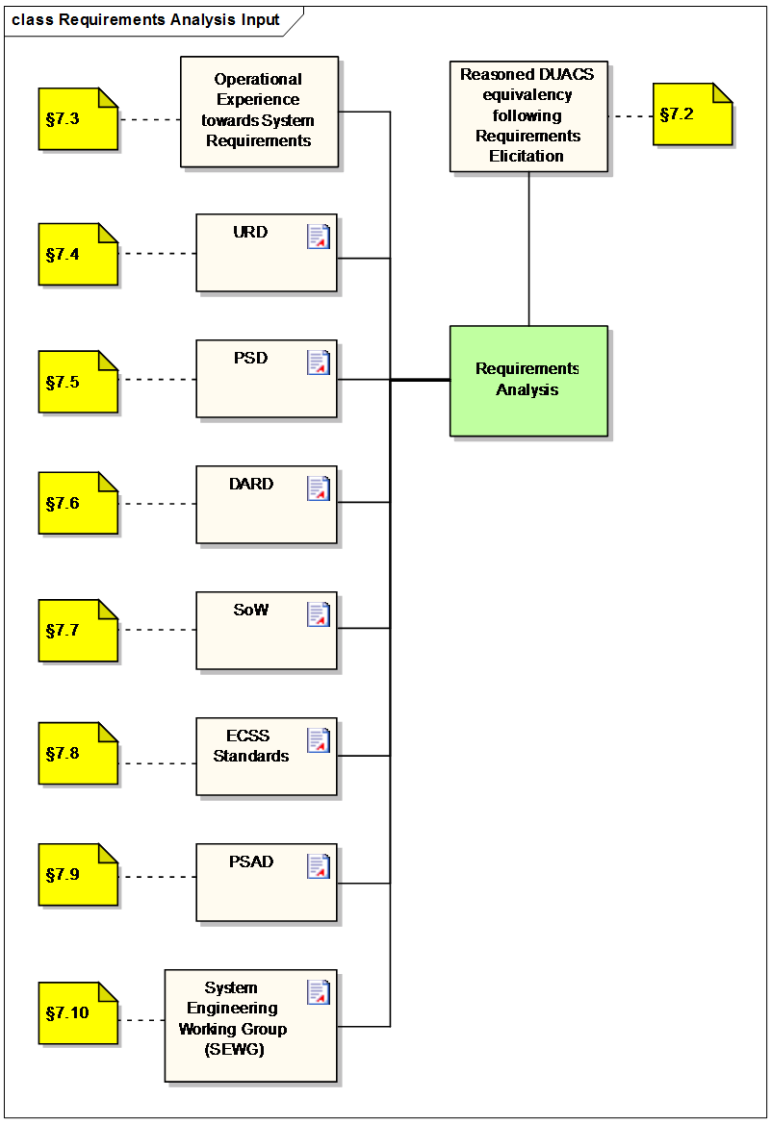

Figure 14 - Requirements Analysis inputs

7.2. System Requirements Analysis Attained Via Reasoned DUACS Equivalency

The objective of this Requirements Analysis is to arrive at a reasoned SLCCI equivalent to the DUACS system requirements as realised for MyOcean SL TAC, given the arguments earlier provided towards reasoned identification of an existing similar system, reasoned mapping to equivalent use case

packages, constituent use cases and their constituent system requirements. As its input, therefore, the Requirements Analysis accepts a reasoned, though unrefined, system requirements between DUACS and SLCCI, based on argued equivalences of user hierarchy, scope, use case packages, use cases, and their associated system requirements during the Requirements Elicitation.

The following four sections (Sections 7.2, 7.3, 7.4, 7.5) portray the judicious mapping from DUACS to SLCCI, given all supporting evidence and argument thus offered. Where the mapping is not possible to an SLCCI equivalent, this is reasoned. Similarly, where a mapping needs to be such that a pertinent difference must hold, then an explicit reference is made to the difference, in order to allow the mapping; the set of differences between the DUACS system, as realised for MyOcean SL TAC, and SLCCI have been given.

The following table lists the tables housed by each of these four sections. Each section table represents the mappings for a use case pertaining to the associated use case package.

Use Case Package	SLCCI Use Case	Table
Production	Acquisition	Table 4 - Production Package Use Case - Acquisition, Table 4, §7.2.1
Production	Preprocessing	Table 5 - Production Package Use Case - PreprocessingTable 5, §7.2.1
Production	Monomission Cal/Val	Table 6 - Production Package Use Case – Monomission Cal/ValTable 6, §7.2.1
Production	Generate Product	Table 7 - Production Package Use Case – Generate ProductTable 7, §7.2.1
Production	Product Assessment	Table 7 - Production Package Use Case – Generate Product Assessment, §7.2.1
Production	Measures & Built Indicators	Table 9 - Production Package Use Case – Measures & Built Indicators, §7.2.1
Production	Product Dataset Storage	Table 10 - Production Package Use Case – Product Dataset Storage, §7.2.1
Production	Product Dataset Archive	Table 11 - Production Package Use Case – Product Dataset Archive, §7.2.1
Product Access & Visualisation	View Product	Table 12 - Product Access & Visualisation Use Case - View Product, §7.2.1
Product Access & Visualisation	Get Product	Table 13 - Product Access & Visualisation Use Case - Get Product, §7.2.2
Product Access & Visualisation	Support User	Table 14 - Product Access & Visualisation Use Case – Support User, §7.2.2
Product Management	Product Management	Table 15 - Product

		Management Use Case Package Requirements Equivalencies, §7.2.3
Monitoring	Monitor SLCCI Services	Table 16 - Monitoring Use Case– Monitor SLCCI Services, section §7.2.4
Monitoring	Monitor System	Table 17 - Monitoring Use Case– Monitor System, §7.2.4
Monitoring	Monitor Production	Table 18 - Monitoring Use Case– Monitor Production, §7.2.4
Monitoring	Monitor Requests	Table 19 - Monitoring Use Case– Monitor Requests, §7.2.4

Table 3 – Use case mappings for reasoned equivalency

The above categories pertain to the complete set of ECSS requirement groups apt for SLCCI [RD 5], other than (i) Functional Requirements and (ii) Performance Requirements, which are more aptly housed within each of the SLCCI macro functionality sections.

Prior to exploring these categories, we summarise our argument so far for a Central Information System –

- §6.3 point (7) - introduces the endeavours being made by the CCI System Engineering Working Group (SEWG) towards a pan-ECV collaborative system. We introduce the concept of a Central Information System (CIS) to our design, to represent our interfacing with other ECVs ; the consensus and specification of such an interface are still under discussion within the SEWG, but we want to make the maintain the concept of such an interface as part of the SLCCI design.
- §6.3 - last point before end of the section, we relate our concept of the Central Information System to the MyOcean Information System.
- §6.5.1 and §6.5.2 - We wish for our SLCCI system not only to disseminate products via a Web Portal, but also make them available to our conceptual Central Information System.
- §6.8.2, §6.9.2 and §6.10.3 – Equivalencies are observed between the DUACS operational system and SLCCI.

7.2.1. SLCCI Package - Production

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Acquisition	-	Acquire Data	SR SLTAC-1.1	General description of use case. Higher level requirement not relevant as catered for by Acquire Data requirements which follow.

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Acquisition	SLCCI-SRB-REQ _1-010, SLCCI-SRB-REQ _1-011, SLCCI-SRB-REQ _1-012, SLCCI-SRB-REQ _1-013	Acquire Data	SR SLTAC-1.1.1	SR SLTAC-1.1.1 split into SLCCI equivalents due to "and" (see [RD 4] requirement phrasing good practice). Also, SLCCI input satellite altimetry data should not be restricted to Level 2 products; reference should be made to DARD. An integrity check for input satellite altimetry data needs to be introduced.
Acquisition	SLCCI-SRB-REQ _1-020	Acquire Data	SR SLTAC-1.1.2	Synchronisation of data flows should not assume input satellite altimetry data is Level2, and instead refer to DARD.
Acquisition	SLCCI-SRB-REQ_1-030, SLCCI-SRB-REQ_1-031, SLCCI-SRB-REQ_1-032, SLCCI-SRB-REQ_1-033, SLCCI-SRB-REQ_1-034, SLCCI-SRB-REQ_1-035, SLCCI-SRB-REQ_1-036	Acquire Data	SR SLTAC-1.1.3	Needs to be split up to distinguish between e.g (i) satellite data product and ancillary data, (ii) integrity of format and integrity of content. Should be placed in the Operational Requirements section.
Acquisition	-	Acquire Data	SR SLTAC-1.1.4	Equivalent not required in System Requirements Baseline. Refers to NRT-specific functionality – provision for product regeneration following update to a degraded mode input.
Acquisition	-	Acquire Data	SR SLTAC-1.1.5	Mapping considered as NRT only.
Acquisition	SLCCI-SRB-REQ_1-060	Acquire Data	SR SLTAC-1.1.6	Need to refer to ancillary data rather than associated data, which highlights not explicitly satellite data (which "associated data" is more likened to be).

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Acquisition	SLCCI-SRB-REQ_1-070	Acquire Data	SR SLTAC-1.1.7	Specification that data is supposed to be delivered on a specified date remains but additionally – (i) this date should be configurable, (ii) a distinguishing between the data being acquired passively and actively needs to be made, (iii) the system requirements baseline should also include specification of a configurable frequency for the active and passive data acquisition.
Acquisition	-	Acquire Data	SR SLTAC-1.1.7.1	Should not be mapped since is related to generation of a degraded product.
Acquisition	SLCCI-SRB-REQ_1-096	Acquire Data	SR SLTAC-1.1.7.2	Should be placed in the Operational Requirements section. Should not refer to higher level system.

Table 4 - Production Package Use Case - Acquisition

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Preprocessing	-	Pre Process Data	SR SLTAC-1.2	General requirement, description of macro functionality ; not required, as expressed by other requirements which use case.
Preprocessing	SLCCI-SRB-REQ_2-010, SLCCI-SRB-REQ_2-011, SLCCI-SRB-REQ_2-012	Pre Process Data	SR SLTAC-1.2.1	Needs to be split up into further requirements for SLCCI, concerning homogenisation, accuracy and automation. However, requirement regarding spurious measurement not required at this point due to similarity with SLCCI-SRB-REQ_3-019 and SLCCI-SRB-REQ_3-020.

Table 5 - Production Package Use Case - Preprocessing

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Monomission Cal/Val	-	Perform IC & QC	SR SLTAC-1.3	Represents macro functionality, therefore not relevant as expressed by Perform IC & QC system requirements which follow.
Monomission Cal/Val	-	Perform IC & QC	SR SLTAC-1.3.1	Requirement can be further refined – currently refers to "variety of quality checks" without specification. Nonetheless not required for SLCCI as semantically similar to SLCCI-SRB-REQ_3-000
Monomission Cal/Val	SLCCI-SRB-REQ_3-020, SLCCI-SRB-REQ_3-019	Perform IC & QC	SR SLTAC-1.3.2	Direct mapping again apt and further refined to specify statistics used. However, the SICCI system will make provision of a tool for a relevant internal user to specify the field of interest as free text, and definition of a threshold for each of those entries on which statistics will be formed.
Monomission Cal/Val	SLCCI-SRB-REQ_3-030	Perform IC & QC	SR SLTAC-1.3.3	Requirement needs to be split into a number of SLCCI requirements.
Monomission Cal/Val	SLCCI-SRB-REQ_3-040	Perform IC & QC	SR SLTAC-1.3.4	Requirement needs to be split into a number of requirements. Also, need issue categorisation. Cannot refer to top level service desk, but rather Service Desk
Monomission Cal/Val	Not Required	Produce Intn QC Data	SR SLTAC-1.4	Higher level use case description, to SLCCI-SRB-REQ_4-010. Not required, as semantically covered by SLCCI-SRB-REQ_4-010.
Monomission Cal/Val	SLCCI-SRB-REQ_4-010, SLCCI-SRB-REQ_4-011	Produce Intn QC Data	SR SLTAC-1.4.1	Needs to be split up into two requirements, distinguishing between requirement for statistics report, and party to check.

Table 6 - Production Package Use Case – Monomission Cal/Val

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Generate Product	SLCCI-SRB-REQ_5-000	Generate Products	SR SLTAC-1.5	Higher level macro functionality, but nevertheless does not semantically encapsulate the other requirements in this use case, therefore mapping holds.
Generate Product	SLCCI-SRB-REQ_5-010	Generate Products	SR SLTAC-1.5.1	The mapping holds integrity.
Generate Product	SLCCI-SRB-REQ_5-020	Generate Products	SR SLTAC-1.5.2	Requirement needs disambiguation, for mapping integrity to hold.
Generate Product	SLCCI-SRB-REQ_5-030, SLCCI-SRB-REQ_5-031	Generate Products	SR SLTAC-1.5.3	Requirement needs to be split up into component requirements for the mapping integrity to hold, so distinguishing between requirement for (i) LWE, (ii) SLA correction
Generate Product	SLCCI-SRB-REQ_5-040, SLCCI-SRB-REQ_5-042	Generate Products	SR SLTAC-1.5.4	Requirement needs to be modified and refined towards generation of FCDR product, for the mapping to hold. All frequency criteria in producing the FCDR should be defined as requirements.
Generate Product	SLCCI-SRB-REQ_5-050, SLCCI-SRB-REQ_5-052	Generate Products	SR SLTAC-1.5.4	Requirement must be specific to ECV product and needs to be refined; see SLCCI_SR_5-040 which needs similar elaboration.

Table 7 - Production Package Use Case – Generate Product

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Product Assessment	SLCCI-SRB-REQ_6-000	Perform OC & QC	SR SLTAC-1.6	Description of macro functionality but again nevertheless does not semantically encapsulate the other requirements in this use case, therefore mapping holds.

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Product Assessment	-	Perform OC & QC	SR SLTAC-1.6.1	General requirements, SLCCI equivalent holds integrity but would be repeating content of SLCCI-SRB-REQ_6-000, therefore not required.
Product Assessment	SLCCI-SRB-REQ_6-020, SLCCI-SRB-REQ_6-019	Perform OC & QC	SR SLTAC-1.6.2	The SLCCI side should not distinguish between internal output data and external output data, but rather output data, seeing that internal and external are not relevant in this context.
Product Assessment	-	Perform OC & QC	SR SLTAC-1.6.3	See mapping comment for SCLCCI_SRB_-020; mapping does not hold. Temporal statistics needs to be further defined.
Product Assessment	-	Perform OC & QC	SR SLTAC-1.6.4	Update to dynamic metadata is not mappable, as NRT specific. Therefore, not required.
Product Assessment	-	Perform OC & QC	SR SLTAC-1.6.5	Mapping does not hold. Requirement specific to RAN products
Product Assessment	SLCCI-SRB-REQ_6-060	Perform OC & QC	SR SLTAC-1.6.6	For mapping to hold, needs to be split up into a number of requirements.

Table 8 - Production Package Use Case – Product Assessment

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Measures & Built Indicators	SLCCI-SRB-REQ_7-000	Do Msrs & Build Indct	SR SLTAC-1.7	Macro functionality description, though does not semantically encapsulate the other requirement in use case, therefore mapping preserved.
Measures & Built Indicators	Not Required	Do Msrs & Build Indct	SR SLTAC-1.7.1	For mapping to hold SLCCI equivalent needs description of KPIs. Reference to NRT irrelevant to SLCCI.
Measures & Built Indicators	Not Required	Do Msrs & Build Indct	SR SLTAC-1.7.2	Ocean Indicators may be irrelevant to PSD, depending on PSD. NRT is irrelevant to the SLCCI.
Measures & Built Indicators	Not Required	Do Msrs & Build Indct	SR SLTAC-1.7.3	interpreted indicators refined for mapping to hold, but NRT is irrelevant to the SLCCI.

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Measures & Built Indicators	SLCCI-SRB-REQ_7-004	Do Msrs & Build Indct	SR SLTAC-1.7.4	Relevant in the event that indicator not calculated.

Table 9 - Production Package Use Case – Measures & Built Indicators

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Product Dataset Storage	-	Store Built Product Ds	SR SLTAC-1.8	Macro functionality description ; removed, as represented by other system requirements associated to use case.
Product Dataset Storage	SLCCI-SRB-REQ_8-010	Store Built Product Ds	SR SLTAC-1.8.1	MIS gateway should not be referred to for SLCCI as not included in system but rather Central Information System (CIS), for the mapping to hold. DUACS / MyOcean SL TAC version refers to datasets, the SLCCI version shall explicitely refer to products
Product Dataset Storage	SLCCI-SRB-REQ_8-020	Store Built Product Ds	SR SLTAC-1.8.2	SLCCI version similarly defines product built by updating of missing metadata. However, rather than SLCCI updates missing metadata, it adds content to product's metadata.
Product Dataset Storage	Not Required	Store Built Product Ds	SR SLTAC-1.8.3	This mapping is not accepted, in order to enforce product metadata update before product is made available.
Product Dataset Storage	SLCCI-SRB-REQ_8-043, SLCCI-SRB-REQ_8-044, SLCCI-SRB-REQ_8-045	Store Built Product Ds	SR SLTAC-1.8.4	MIS Gateway component is referred to in SLCCI at Central Information System (CIS). End of DUACS / MyOcean SL TAC requirement appears to refer to NRT, but earlier content of requirement still holds regarding reporting of ftp failure. SLCCI version will add requirement similar to portal failure of product retrieval. Amount of physical storage should be specified.

Table 10 - Production Package Use Case – Product Dataset Storage

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Product Dataset Archive	-	Archv/Rtr Product Ds	SR SLTAC-1.9	Macro functionality description. Term “product dataset” not used. Not relevant as already expressed by requirements which follow in use case.
Product Dataset Archive	SLCCI-SRB-REQ_9-010, SLCCI-SRB-REQ_9-205.	Archv/Rtr Product Ds	SR SLTAC-1.9.1	Rather than CNES archive as is the case for DUACS, unreferred to archive will be used for SLCCI. Amount of physical storage should be specified.
Product Dataset Archive	Not Required	Archv/Rtr Product Ds	SR SLTAC-1.9.2	Context needs to be further refined for SLCCI context. Instead of output products, specifying products generated by the system. Instead, SLCCI requirement specified as part of SLCCI_SRB_9-010
Product Dataset Archive	SLCCI-SRB-REQ_9-030, SLCCI-SRB-REQ_9-031	Archv/Rtr Product Ds	SR SLTAC-1.9.3	SLCCI version split up into two requirements
Product Dataset Archive	SLCCI-SRB-REQ_9-040	Archv/Rtr Product Ds	SR SLTAC-1.9.4	Assuming that the requirement is not relevant to NRT and RAN only. Also, SLCCI version specifies Product User rather than User, i.e specifying external users.
Product Dataset Archive	SLCCI-SRB-REQ_9-050	Archv/Rtr Product Ds	SR SLTAC-1.9.5	SLCCI refers to archive procedure, as referred to in previous requirement, rather than archive system

Table 11 - Production Package Use Case – Product Dataset Archive

7.2.2. SLCCI Package - Product Access & Visualisation

SLCCI – use case	SLCCI - req	DUACS use case	DUACS req	Note on mapping
View Product	SLCCI-SRB-REQ_10-000	View Product	SR SLTAC-3.1	Macro functionality holds; to view product. MyOcean SL TAC use case describes variant of product preview made available to all users, and full view of products available only to registered users.

SLCCI – use case	SLCCI - req	DUACS use case	DUACS req	Note on mapping
View Product	SLCCI-SRB-REQ_10-220	View Product	SR SLTAC-3.1.1	Reference made to MyOcean SL TAC integration of THREDDS, OPENDAP, WMS. Apt given findings of PSAD and earlier argued equivalencies and analysis.
View Product	SLCCI-SRB-REQ_10-020, SLCCI-SRB-REQ_10-021	View Product	SR SLTAC-3.1.2	Mapping holds, but needs to be split for SLCCI equivalent.

Table 12 - Product Access & Visualisation Use Case - View Product

SLCCI – use case	SLCCI - req	DUACS use case	DUACS req	Note on mapping
Get Product	Not Required	Get Product	SR SLTAC-3.2.1	This mapping to a Central Information System is instead referred to in SLCCI-SRB-REQ_10-040, integrating the equivalent of SR SLTAC-3.2.2 also.
Get Product	SLCCI-SRB-REQ_10-040	Get Product	SR SLTAC-3.2.2	The mapping needs to be modified to refer to higher level CCI central information system – the SLCCI system should provide a download interface compliant with OGC.

Table 13 - Product Access & Visualisation Use Case - Get Product

SLCCI – use case	SLCCI - req	DUACS use case	DUACS req	Note on mapping
Support User	SLCCI-SRB-REQ_10-050, SLCCI-SRB-REQ_10-051, SLCCI-SRB-REQ_10-054, SLCCI-SRB-REQ_10-055	Support Users	SR SLTAC-3.3.1	An SLCCI ticketing system to be proposed, which more tightly accommodates the desirable characteristics of an operational system when dealing with requests. No higher level SLCCI system (necessarily) exists, so acknowledgements of receipt of a request are sent to the requester rather than a higher level service desk.

SLCCI – use case	SLCCI - req	DUACS use case	DUACS req	Note on mapping
Support User	SLCCI-SRB-REQ_10-060, SLCCI-SRB-REQ_10-061	Support Users	SR SLTAC-3.3.2	Mapping holds, requirement needs to be re-worded in context of SLCCI. Additional requirement needed to describe how handbook made available. Also, a relevant user type is specified, namely SLCCI Product User.
Support User	Not Required	Support Users	SR SLTAC-3.3.3	Mapping holds, for SLCCI equivalent of service desk. SLCCI requirement specifying Service Desk user within the service desk organisation. Requirement already addressed by SLCCI-SRB-REQ_10-054
Support User	SLCCI-SRB-REQ_10-080	Support Users	SR SLTAC-3.3.4	Holds for SLCCI equivalent but needs additional refinement for expressing waiting times (to be placed in performance requirements section).
Support User	SLCCI-SRB-REQ_10-090	Support Users	SR SLTAC-3.3.5	Mapping supported but needs rewording and refinement into more than one requirement, in context of SLCCI. Automated information retrieval needs investigation at a later stage where will be apt; SLCCI equivalent requirement refers to example, intelligent word search.
Support User	SLCCI-SRB-REQ_10-100	Support Users	SR SLTAC-3.3.6	Mapping holds. System catalogue removed, and reference to subsystems

Table 14 - Product Access & Visualisation Use Case – Support User

7.2.3. SLCCI Package - Product Management

SLCCI – use case	SLCCI – req	DUACS use case	DUACS SL TAC req	Mapping Note
Product Management	Not Required	Maintain Product Database	SR SLTAC-2.1	Mapping valid but general macro functionality to later

SLCCI – use case	SLCCI – req	DUACS use case	DUACS SL TAC req	Mapping Note
				requirements.
Product Management	SLCCI-SRB-REQ_11-010, SLCCI-SRB-REQ_11-011	Maintain Product Database	SR SLTAC-2.1.1	No MIS component in SLCCI but rather equivalent Central Information System (CIS), so MIS Metadata Editor becomes Metadata Editor provided by Central Information System. Product Database needs definition. Need definition of product metadata.
Product Management	SLCCI-SRB-REQ_11-020, SLCCI-SRB-REQ_11-021	Maintain Product Database	SR SLTAC-2.1.2	No DUACS / MyOcean SL TAC "MIS" in SLCCI but rather an equivalent Central Information system. Also, requirement can be subsumed into single clear requirement. Also, Authorisation of the product removed, as would not be directly relevant in the context of SLCCI. Additionally, distinction between manual and automatic catalogue update included.
Product Management	SLCCI-SRB-REQ_11-030, SLCCI-SRB-REQ_11-033	Maintain Product Database	SR SLTAC-2.1.3	SLCCI version of requirement to be split up. FTSS removed. Again, SLCCI distinction made between static and dynamic metadata, as is the case for DUACS. Product "authorisation" not used, would be ill defined for SLCCI context.

SLCCI – use case	SLCCI – req	DUACS use case	DUACS SL TAC req	Mapping Note
Product Management	Not Required	Maintain Product Database	SR SLTAC-2.1.4	Mapping not apt as no top level layer exists and local Product Manager already managing product, so no coordination required with external product manager at higher level; DUACS / MyOcean SL TAC requirement is specific to communication between layers.
Product Management	SLCCI-SRB-REQ_11-050	Maintain Product Database	SR SLTAC-2.2.1	Mapping used as DUACS requirement specific to static and dynamic metadata, as similar distinction made between static and dynamic metadata for SLCCI.
Product Management	SLCCI-SRB-REQ_11-060	Maintain Product Database	SR SLTAC-2.2.2	Mapping similarly used for SLCCI as for DUACS. Note, . specific to static metadata. For SLCCI, assuming all data delivery external, so not making explicit reference to external providers but rather just providers. Requirement not needed to be split up ; the DUACS equivalency expresses that product lines associated to upstream products could not have associated product specifications rather than stated as a requirement.
Product	SLCCI-SRB-	Maintain	SR SLTAC-2.2.3	Mapping used since

SLCCI – use case	SLCCI – req	DUACS use case	DUACS SL TAC req	Mapping Note
Management	REQ_11-070	Product Database		SLCCI equivalent to DUACS.
Product Management	SLCCI-SRB-REQ_11-080	Maintain Product Database	SR SLTAC-2.2.4	Again, mapping similarly used as distinction between static and dynamic metadata holds in context of SLCCI.
	SLCCI-SRB-REQ_11-090	Maintain Product Database	SR SLTAC-2.3.1	Again, mapping similarly used as distinction between static and dynamic metadata holds. The DUACS equivalent refers to delivery characteristics generated by higher level system, but characteristics generation still holds for SLCCI as it is part of the metadata.
Product Management	Not Required	Maintain Product Database	SR SLTAC-2.3.2	Mapping similarly used as distinction between static and dynamic metadata holds, but semantically similar to earlier mapped requirement.

Table 15 - Product Management Use Case Package Requirements Equivalencies

7.2.4. SLCCI Package — Monitoring

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Monitor SLCCI Services	-	Monitor SL TAC Services	SR SLTAC-4.1	Higher level system requirement not required as captured by lower level system requirements of same use case.
Monitor SLCCI Services	SLCCI-SRB-REQ_12-010	Monitor SL TAC Services	SR SLTAC-4.1.1	Have definition of monitoring first, then explain what each of the three monitoring types does., but leads to semantically equal

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
				requirements so joining with SR SLTAC-4.1.2 and SR SLTAC-4.1.3.
Monitor SLCCI Services	Not Required	Monitor SL TAC Services	SR SLTAC-4.1.2	See SR SLTAC-4.1.1
Monitor SLCCI Services	Not Required	Monitor SL TAC Services	SR SLTAC-4.1.3	See SR SLTAC-4.1.1
Monitor SLCCI Services	Not Required	Monitor SL TAC Services	SR SLTAC-4.1.4	Should be absorbed under SLCCI-SRB-REQ_12-040 as would not represent uniqueness.
Monitor SLCCI Services	SLCCI-SRB-REQ_12-050	Monitor SL TAC Services	SR SLTAC-4.1.5	Mapped to requirement should not refer to top level; instead the SL system level contains the dashboard
Monitor SLCCI Services	Not Required	Monitor SL TAC Services	SR SLTAC-4.1.6	Could be reworded to add focus to Support Operator; SLCCI requirement focuses on Support Operators management of monitoring. However, not required due to semantic similarity to SLCCI-SRB-REQ_12-090.
Monitor SLCCI Services	Not Required	Monitor SL TAC Services	SR SLTAC-4.1.7	Different levels of automation not directly relevant given associated requirements mappings.

Table 16 - Monitoring Use Case– Monitor SLCCI Services

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Monitor System	SLCCI-SRB-REQ_12-080	System Monitoring	SR SLTAC-4.2.1	Term “physical resources” used for SLCCI. Requirement split up to focus on system monitoring provision and who does monitoring (12-090) separately.

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Monitor System	SLCCI-SRB-REQ_12-090, SLCCI-SRB-REQ_12-091	System Monitoring	SR SLTAC-4.2.2	Acquisition Chain and Production Chain reduced to term production pipeline. Responsibilities of Support Operator refined to separate requirements. SLCCI requirements also specifically monitor physical resources related to production pipeline, rather than Acquisition Chain and Production Chain per se.
Monitor System	SLCCI-SRB-REQ_12-100, SLCCI-SRB-REQ_12-101	System Monitoring	SR SLTAC-4.2.3	SLCCI requirement to specify requirement as a partition of system monitoring between human monitored and automated. SLCCI to promote automated monitoring on values with thresholds possible, and these thresholds to be configurable.
Monitor System	Not Required	System Monitoring	SR SLTAC-4.2.4	Not mappable for SLCCI, reference to raw measurements already made in Monitor SLCCI Services use case system requirements.

Table 17 - Monitoring Use Case– Monitor System

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Monitor Production	Not Required	Production Monitoring	SR SLTAC-4.3.1	Production Centre not mappable as DUACS /

				MyOcean SL TAC specific term, SLCCI refer to production pipeline part of system
Monitor Production	Not Required	Production Monitoring	SR SLTAC-4.3.2	Semantically similar to earlier production monitoring.
Monitor Production	Not Required	Production Monitoring	SR SLTAC-4.3.3	Not mappable, no higher level (necessarily) as is explicitely referred to
Monitor Production	Not Required	Production Monitoring	SR SLTAC-4.3.4	Not mappable, no higher level (necessarily) as is explicitely referred to

Table 18 - Monitoring Use Case– Monitor Production

SLCCI – use case	SLCCI – req	DUACS use case	DUACS req	Mapping note
Monitor Requests	Not Required	Requests Monitoring	SR SLTAC-4.4.1	Too semantically similar to 12-010.
Monitor Requests	Not Required	Requests Monitoring	SR SLTAC-4.4.2	Too semantically similar to 12-010.

Table 19 - Monitoring Use Case– Monitor Requests

7.3. System Requirements Analysis Derived Via Operational Experience

The System Requirements Baseline should include requirements derived from the consortium experience in operational systems within Earth Observation, and other sectors where applicable. Such requirements will draw on the operational demands to be put upon the Sea Level CCI system, as well as expectations the operational system should contain for the assessment of its operational health. Analysis through the operational experience of the consortium has comprised of the following –

1. Establishment of **macro functionality performance expectations**, to each of the production chain stages. Each relevant stage of the production chain should have associated performance expectations, towards increasing transparency of production chain performance expectations.
2. Equally, production chain measurement and monitoring should **not significantly impinge on the overall performance of the system**.
3. Inclusion of requirements related to **operational matters**, not directly connected to the production chain but nonetheless required for the running of an operational service, such as asset and inventory management, backups.
4. To help maintain operational integrity to the system, **transparency** to the performance gathering aspects of the system should also warrant consideration, such as in the gathering of operational statistics.
5. The expectations of the system may bind to particular **standards**. Use of such standards differs to those to be adopted within the System Specification Document, where candidate standards are identified and a chosen standard reasoned towards helping satisfy system requirements. Rather, the standards adopted at the system requirements stage signify an

axiomatic need prior to system specification commences, such as the need to adhere to identified compliance, such as INSPIRE.

6. Analysis towards **inference on, and refinement of, relevant expectations** pertaining to the DUACS operational system, for example expansion of operational demands for user registration, download verification, and transaction accounting, linkage to a higher level system.
7. Analysis on **elaborating on the user perspective** towards reasonably capturing future user demands, e.g concerning reasonable demands of user of operational system, for instance allowance of simultaneous downloads, and the associated storage resources required.
8. At a meta-level to specifying requirements of the system, specification of requirements to do with the **conduct of system specification and development itself**, such as apt considerations arising from ECSS.
9. Analysis on system **configuration, installation and delivery**.
10. Analysis towards **security** considerations, towards preserving integrity of the product and the manner in which the product is produced.
11. Expected system metrics for **reliability, availability, maintainability and safety**, as is typically recognised to express operational expectations of a system.
12. **Export of database** types described by the PSAD, so allowing operational flexibility to the system, such as to allow future migration of data to other systems, including other CCI ECVs.
13. Analysis on the recognition of **human factors** required for an operational system, towards facilitating means by which a user or operator can interact with system.
14. Specification of **performance expectations** across an operational system.
15. Acknowledgement that the system needs to understand **future data needs**, not just accommodate existing data needs, so pointing towards the need for scalability of the operational system. The system should, for instance, be able to anticipate Earth Observation data from the Sentinel cluster.
16. Acknowledgement of the **load** put on an operational system by user activity.
17. Sizing of **physical resources** required for an operational system.
18. The **management** of those physical resources assets.
19. Use of **data driven approaches** where possible, towards improving availability of the system; i.e reducing the necessity to halt the system for certain maintenance.
20. Usage of **Off The Shelf (OTS)** where possible.
21. Acknowledgement of particularly **critical components** of the system.
22. Usage of further **engineering design patterns** where appropriate, for example introduction of physical redundancy for identified critical components, where resources allow.

7.4. System Requirements Analysis Derived Via User Requirements Document (URD)

Our analysis of the URD [RD 1] captures the list of user requirements which the operational system should accommodate in a system context. We do so by expressing the accommodation of these desired user requirements. These system focus centres on the SLCCI production chain, and preserve the user consensus on what should be accommodated by the operational system.

This synthesis within the URD proposes the following categories of user requirements, which for the system specification we will bundle to declare that the SLCCI should accommodate such matters. These largely predicate certain characteristic which the production chain should comply with, for example –

1. Length of data set time series ([RD1] §5.1.1, UR-SLCCI-GEN-01).
2. Satellite coverage and overlap over the dataset ([RD1] §5.1.1, UR-SLCCI-GEN-02).

3. Need for the system to cope with future altimetry data ([RD1] §5.1.1, UR-SLCCI-GEN-03, UR-SLCCI-GEN-04).
4. The constraints and nature of some of the acquired data and its processing, such as sampling of mesoscale and coastal areas ([RD1] §5.1.1, UR-SLCCI-GEN-05).
5. Acknowledegement of tidal influences ([RD1] §5.1.1, UR-SLCCI-GEN-06).
6. The system needs to cope with development and maintenance of space and in situ techniques ([RD1] §5.1.1, UR-SLCCI-GEN-07); this is closely in keeping with the Statement of Work desire for the operational system to accommodate future data and algorithms as science progresses.
7. Consideration of other in situ and earth observing systems for cal/val ([RD1] §5.1.2, UR-SLCCI-GEN-07).
8. Characterization of uncertainties ([RD1] §5.1.2, UR-SLCCI-GEN-08)
9. Access to data at least once a year ([RD1] §5.1.3, UR-SLCCI-GEN-09)
10. As with the PSD and endeavours within the Data Standardisation Working Group, the user community has declared an interest in the products being formatted with NetCDF-CF ([RD1] §5.1.3, UR-SLCCI-GEN-10).
11. Access to data through ftp and/or OpenDap ([RD1] §5.1.3, UR-SLCCI-GEN-11).
12. Increased spatial and temporal sampling for high latitude regions ([RD1] §5.1.1, UR-SLCCI-GEN-05).

These matters do not directly point to the scientific practice undergone to arriving at the input data or product generation, but rather user-driven characteristics which the system requirements must be in keeping with.

7.5. System Requirements Analysis Derived Via Product Specification Document (PSD)

Our analysis of the PSD [RD 6] allows us to recognise the production chain product types, to be outputted by the operational system. To this end, the System Requirements Baseline –

1. Should recognise the two types of product produced as FCDR and ECV ([RD6] §1)
2. Makes reference to a definition of the output products as pertaining to the PSD[1] ([RD6] §2&3).
3. In particular, declares the formats of these two product types, given both the PSD ([RD6] §2.2&3.2) and the endeavours of the Data Standardisation Working Group (§7.10).

7.6. System Requirements Analysis Derived Via Data Access Requirements Document (DARD)

Our analysis of the DARD [RD 2] has drawn in the following -

1. Identification of the spread of satellites, missions, instruments and products necessary for application to the operational system, irrespective of the outcome of the Task 2 Round Robin ([RD2] §5).

[1] A similar inference cannot be made regarding the DARD, since the DARD defines all data sets to be input to the Task 3 prototype and therefore also includes data associated with algorithms which will not succeed during the Round Robin and therefore largely irrelevant to the operational system.

2. This version of the SRD attains these identified necessary inputs, with a later version of the SRD introducing further products as input, following identification of the winning algorithm and associated data for Task 2 ([RD2] §5).
3. Recognition of types of auxiliary data input by analysing ([RD2] §5).
4. Recognition that the system must understand data as well as metadata ([RD2] §5).
5. Constraints and findings of the data, allow us to draw specifications for the data capabilities needed for each of the database types identified in the PSAD ([RD2] §5; [RD3] §3.6).
   The system needs to understand future data needs, not just accommodate existing data needs, so pointing towards the need for scalability of the operational system. The system should, for instance, be able to anticipate Earth Observation data from the Sentinel cluster ([RD2] §1).

7.7. System Requirements Analysis Derived Via Statement of Work (SoW)

We draw from the CCI Phase I SoW [RD 7] in the following manners, towards building the System Requirements Baseline -

1. Absorption of business goals within the Statement of Work, representing the axiomatic needs of the system[2]. These relate to expectations of the system directly relevant the operational system scope ([RD7] throughout); see §6.2 for mapping detail per business goal.
2. We offer a direct mapping from these attained business goals to the System Requirements Baseline, so preserving ESA's vision of the operational system. These sit at a meta-level to other system requirements, describing the design requirements and implementation constraints of the operational system; [RD7] throughout, see §6.2 for mapping detail per business goal.
3. Although these system requirements for a Phase II system are derived from a Phase I CCI, there is still a good distillation of information possible in terms of pointing to system requirements for the Phase II system ([RD7] §2.5).

7.8. System Requirements Analysis Derived Via ECSS

We draw on ECSS-Q-ST-80C (Space Product Assurance) towards establishing reasonable expectations for software quality which should be satisfied by the future implementers during Phase II; these are not only beneficial in order for the Phase I SSD to be satisfied, but of benefit to Phase II implementers needing to formally attain and verify good practice. We observe that during system development –

1. An analysis should be carried out as to pros and cons of reusing software ([RD10] §6.2.7.2).
2. Specific respect should be addressed to areas identified for reuse, with regards to their functionality, performance and quality ([RD10] §6.2.7.3).
3. Quality of the existing software should be addressed in the requirements ([RD10] §6.2.7.4)
4. Reuse of the software needs to be documented, including assumptions made and methodology used ([RD 10] §6.2.7.5).
5. The suitability of the system being reused should include assessment of a number of areas ([RD10] §6.2.7.6).

[2] We introduce our mining of the SoW as early as §6.2, due to the then need for acknowledgement on the desire for cost-effectiveness of the operational system, and so forming part of the reasoning for DUACS adoption (§6.3).

6. Corrective actions should be made where the reused software does not meet the objectives of the target system ([RD10] §6.2.7.7).
7. Missing information should be attained to help accommodate verification and validation coverage ([RD10] §6.2.7.8).
8. Appropriate attention should be directed to reflect corrective actions ([RD10] §6.2.7.9).
9. The system being reused should be kept under configuration control during implementation of the target system ([RD10] §6.2.7.10).
10. The configuration status of both the reused software and the target system need to be carefully documented, in order to be able to attain a snapshot of how the target system maps to the reused system ([RD10] §6.2.7.11).

7.9. System Requirements Analysis Derived Via Preliminary System Analysis Document (PSAD)

We analyse the PSAD [RD 3] to support the construction of the System Requirements Baseline. The objective of the PSAD was as an early analysis of how the Task 3 prototype may be used operationally, and conducted by each of the CCI ECV parties. From the SLCCI PSAD, we draw on the following as part of our analysis –

1. The operational system should operate under Delayed Time (DT) and not Near Real Time ([RD3] §3.2). We also subsequently infer that a Reprocessing (REP) mode is required.
2. The PSAD defines two manners by which the operational system should absorb input data – passive and active acquisition. This information, together with the DARD analysis, allows the introduction of system requirements pertaining to the manner in which each of the expected operational system inputs should be acquired ([RD3] §3.3).
3. Limitations of reuse may be inferred, given potential portability constraints described ([RD3] §3.7).
4. Certain implementation constraints may be inferred related to lower level reuse of the system, which may be directly satisfiable by the future Phase II implementers ([RD3] §3.7).
5. Interpreting the PSAD together with the DARD, allows the formation of system requirements pertaining to the data and database, such as the size of particular foreseen databases. Given the need to design an operational system needing to be capable of accommodating future mission data, points to consideration of scalability of the system ([RD3] §3.3, §3.4, §3.5).
6. The URD declares the user needs of the climate modelling community, though it is worth investigating whether we may also draw operational needs of potential future users for outreach, by observing the manner of design and consideration of the existing DUACS operational system ([RD3] §3.1, §3.2, §3.3).
7. Preliminary investigation on operating system suitability given reused environment ([RD3] §3.7).

7.10. System Requirements Analysis Derived Via System Engineering Working Group (SEWG)

We are active participants in the SEWG, and support ESA in their leadership of the group. A vehicle for collaboration which we have introduced into discussion is the concept of a Central Information System, a potential mediator across ECV systems and proxy to the ECV portfolio from the outside world. To that end, we have produced a Technical Note to the SEWG relating to pan-ECV collaboration in the context of such a mechanism [RD 11], and will continue to endeavour towards exploration of a reasonable solution for attaining cost-effectiveness across the ECVs.

This document recognises the efforts of the Data Standardisation Working Group (DSWG), towards reaching consensus on a common format of data product across the ECVs, targeting NetCDF and CF, archiving standards, and other operational matters as described in [RD 11].

We list these activities as follows -

1. DSWG endeavour towards NetCDF and CF concensus
2. Recognition of open standards discussed
3. Central Information System proposed [RD11]

Moreover, the argument for defining the concept of the Central Information System is earlier elaborated in the §7.2 introduction, in reference to the concept through §6.3 point (7), §6.5.1, §6.5.2, §6.8.2, §6.9.2 and §6.10.3.

8. System Requirements Baseline

8.1. System Requirements Baseline Structure

This chapter represents the System Requirements Baseline of the SLCCI operational system, derived from the earlier requirements elicitation (Chapter 6) and subsequent analysis (Chapter 7), as illustrated by Figure 8-1. Further requirements other than those directly elicited via DUACS system re-use are also added.

The system requirements are arranged across two dimensions, garnered from macro functionalities and ECSS standard E-ST-40C ([RD 5], Annex D). Of the ECSS engineering discipline branches, E-40 (Software Engineering) is observed as being the most considerably apt for exhaustive, complete, SLCCI requirement categories in relation to other ECSS discipline branches, and also appropriately envelopes relevant considerations in providing a software related system requirements realisation of ECSS-E-ST-10C (System Engineering General Requirements) clause 5.2, establishing linkage between E-ST-10C and E-ST-40C.

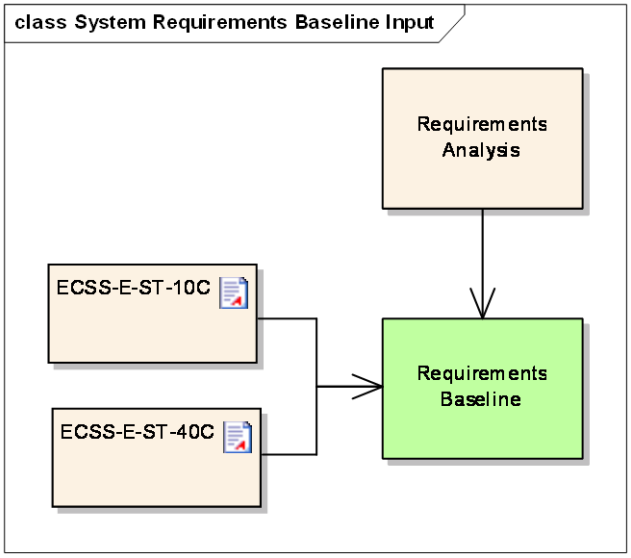

Figure 15 - System Requirements Baseline Input

On one dimension lies a complete listing of relevant ECSS standard requirements groups (Figure 8-3). The second dimension houses the complete list of macro functionalities proposed (Figure 8-2). The requirements elicitation and analysis have revealed the following macro functionalities —

- Production — Acquisition
- Production — Preprocessing
- Production — Monomission Cal/Val
- Production — Generate Product – Multimission Cross Calibration
- Production — Generate Product – Generate FCDR
- Production — Generate Product – Generate ECV
- Production — Product Assessment
- Production — Measures & Built Indicators
- Production — Product Dataset Storage
- Production — Product Dataset Archiving & Retrieval

- Product Access & Visualisation
- Product Management
- Monitoring

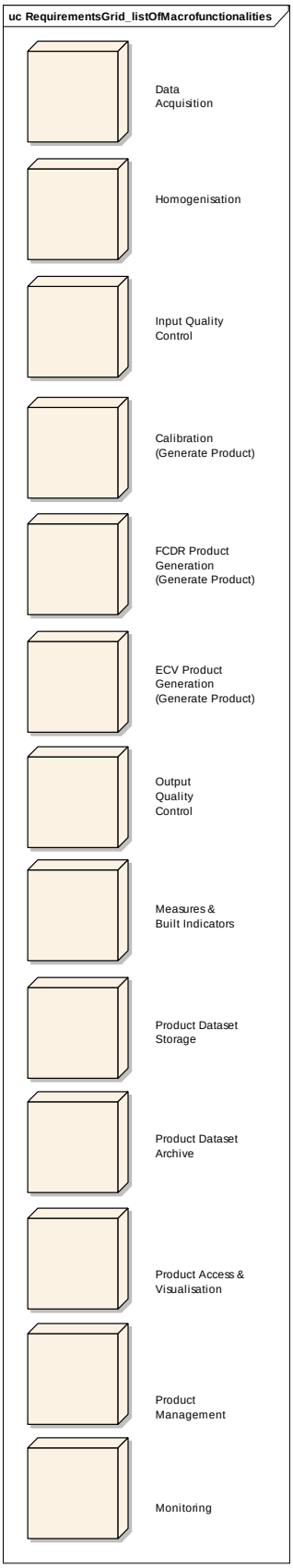

Figure 16 - SLCCI Macro Functionalities

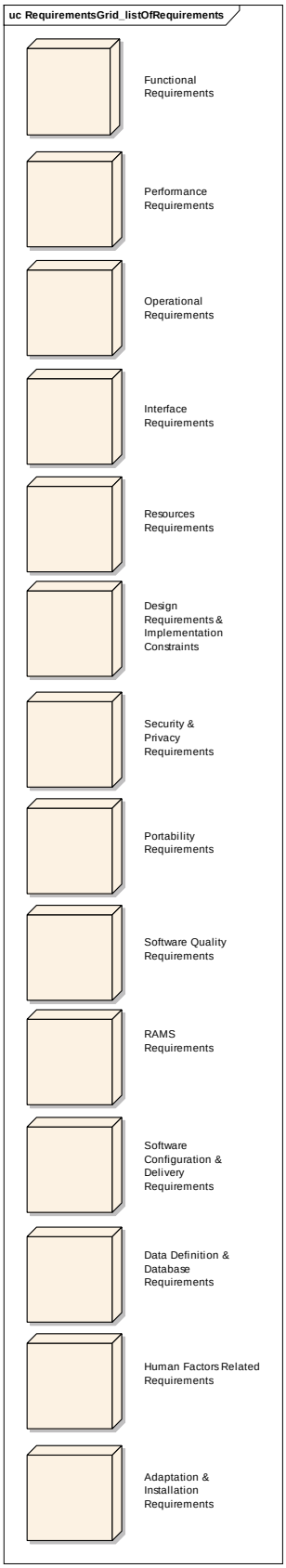

Figure 17 - Relevant ECSS Requirements Groupings

Applying one dimension to another allows a complete, exhaustive, view of ECSS standard requirements involvement across the SLCCI macro functionalities. This completeness is achieved by realisation of two grids, which together exercise the desired completeness, comprised as follows —

1. SLCCI Requirements Completeness Grid 1 (Figure 8-4) - The application of all macro functionalities across the Functional and Performance ECSS requirements. It is reasonable that Functional and Performance requirements be treated this way since
    - Functional and Performance requirements are apt for treatment per macro functionality rather than apt for treatment across the whole system generally. Functional and Performance requirements differ significantly across the macro functionalities.
    - Functional and Performance requirements will conveniently map to functional components in the forthcoming System Specification Document (SDD). That is, the SRD macro functionality system requirements groupings will ultimately map to SSD sub-systems, and for the design of each subsystem it is imperative to have the functional and performance SRD considerations treated per sub-system.
2. SLCCI Requirements Completeness Grid 2 (Figure 8-5) - The application of all ECSS requirements groups other than Functional and Performance (i.e the remaining ECSS requirements groups) to the SLCCI system as a whole (i.e across macro functionalities as a whole); these requirements groupings sit more comfortably neutral to each macro functionality, so applicable to the system as a whole.

The result of these two grids is that all ECSS standard requirements groups are aptly measured against the SLCCI system. Grid 1 observes Functional and Performance requirements across all ECSS requirements groupings. Grid 2 observes the macro functionality neutral ECSS requirements groupings across the whole system.

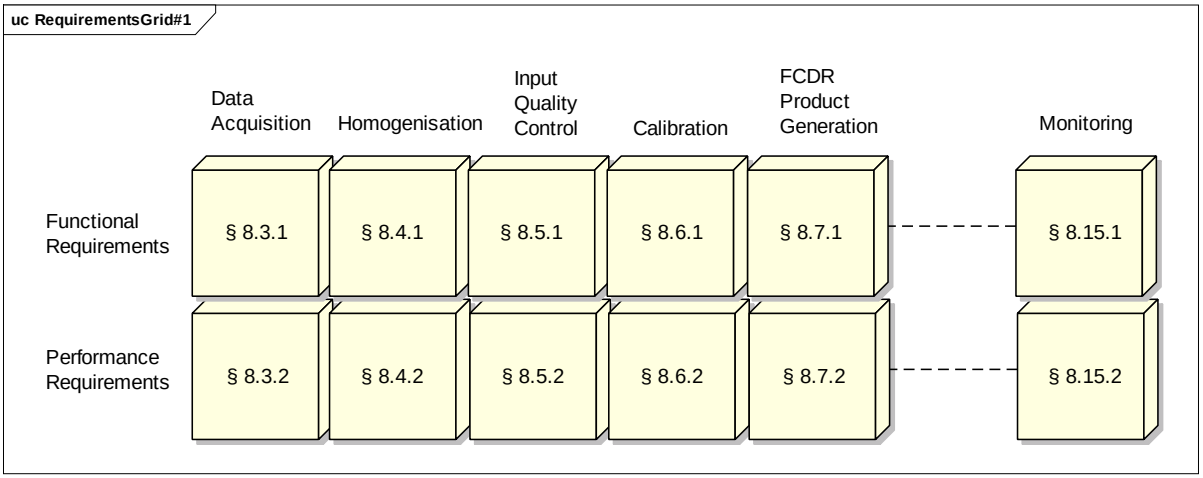

Figure 18 - SLCCI Requirements Completeness Grid 1

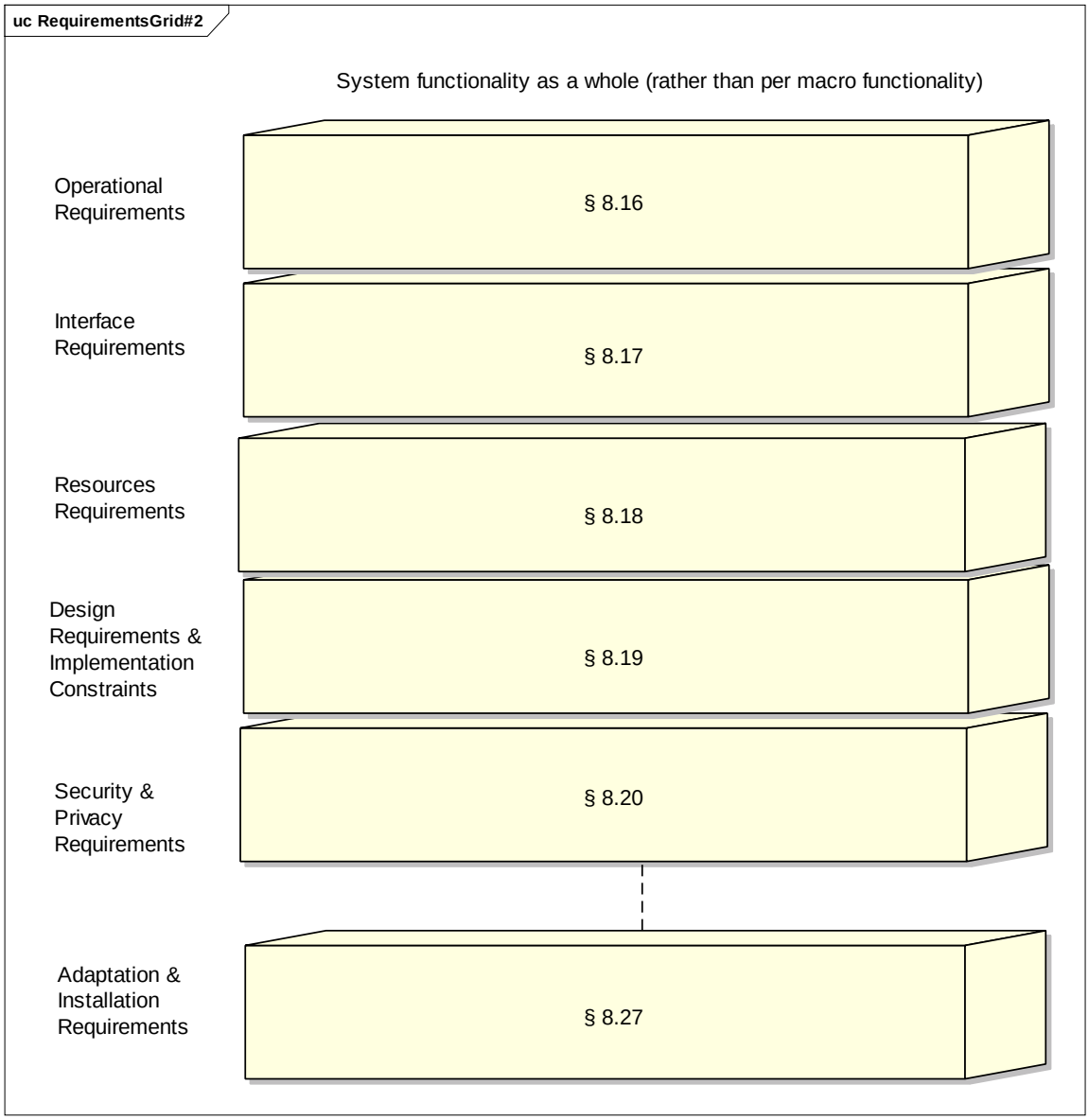

Figure 19 - SLCCI Requirements Completeness Grid 2

8.1.1. System Requirements Notation

The system requirements are formed in tables as illustrated below, with the following columns and associated abbreviated column names.

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_*<RequirementIndex>*	*<Requirement Text>*	*<Traceability>*	*<Form of Verification>*

- "ID"

- The unique identifier of the system requirement.

- "Requirement"
  - The system requirement text.
- "Trc"
  - Traceability of the system requirement. The following format is used –
    - "§x" means section x of this SRD.
    - "§x (y)" means section x of this SRD which refers to area y.
    - "§x Table y" means table y within section x of this SRD
    - "§x (y §z)" means section x of this SRD which refers to section z in document y.
    - A list of traced items for the same system requirement is delimited with a comma character. It is often the case that a system requirement is inferred from a number of sources – for example a system requirement related to the storage of certain processed mission data, may use the PSAD to infer the data identity, DARD to attain mission references and operational experience to attain the formation of the storage constraint specified.
- "Ver"
  - The form of verification for the system requirement. We observe the following types of categories, as defined in ECSS E-ST-10-02C §5.2 –
    - "T" – Test (ECSS E-ST-10-02C §5.2.2.2)
    - "A" – Analysis (ECSS E-ST-10-02C §5.2.2.3)
    - "R" – Review (ECSS E-ST-10-02C §5.2.2.4)
    - "I" - Inspection (ECSS E-ST-10-02C §5.2.2.5)

Also, with regards to the system requirements pertaining to the macro functionalities of the production chain, we have declared a single higher level system requirement for each macro functionality section which semantically composites all system requirements contained within its associated section. We offer such higher level system requirements across the production chain as a convenient vehicle to describing the expectation of the associated macro functionality stage.

Such high level production chain system requirements are denoted are satisfiable if and only if their constituent system requirements are entirely satisfied. For each macro functionality section, we declare the high level functionality and its associated constituents diagrammatically.

8.2. General Production Chain Functional Requirements

The following functional system requirements have been positioned in this section for clarity and convenience as they essentially reflect the scoping of the SLCCI operational system production chain through (i) the inputs to the system, the (ii) outputs from the system, and the (iii) user expectations.

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_0-047	FCDR products shall be represented using -	-	-
(a)	NetCDF (Network Common Data Format)	§0-2&3 (PSD), §7.10-1 (SEWG), §7.4-6 (URD)	T
(b)	CF (Climate and Forecast) convention version 1.4.	§0-2&3 (PSD), §7.10-1 (SEWG), §7.4-6 (URD)	T

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_0-048	ECV products shall be represented using -	-	-
(a)	NetCDF (Network Common Data Format)	§0-2&3 (PSD), §7.10-1 (SEWG), §7.4-10 (URD)	T
(b)	CF (Climate and Forecast) convention	§0-2&3 (PSD), §7.10-1 (SEWG), §7.4-10 (URD)	T
SLCCI-SRB-REQ_0-012	The system shall be extendable to recognition of data associated with future missions	§7.7-3 (SoW), §7.4-5 (URD), §7.3-15, §7.9-6 (PSAD)	I
SLCCI-SRB-REQ_0-013	The system shall take as input, data from the following altimetry products -	-	-
(a)	ERS-1 Phase C OPR V6	§7.6-1 (DARD)	T
(b)	ERS-1 Phase E OPR V3	§7.6-1 (DARD)	T
(c)	ERS-1 Phase F OPR V3	§7.6-1 (DARD)	T
(d)	ERS-1 Phase G OPR V6	§7.6-1 (DARD)	T
(e)	ERS-2 OPR V6	§7.6-1 (DARD)	T
(f)	Envisat GDR 1	§7.6-1 (DARD)	T
(g)	T/P MGDR	§7.6-1 (DARD)	T
(h)	Jason-1 GDR-C	§7.6-1 (DARD)	T
(i)	Jason-2 GDR-C	§7.6-1 (DARD)	T
(j)	GFO GDR NOAA	§7.6-1 (DARD)	T
SLCCI-SRB-REQ_0-024	The system shall take as input the following auxiliary products for the product generation	-	-
(a)	Instrumental auxiliary products	§7.6-3 (DARD)	T
(b)	Orbit auxiliary products	§7.6-3 (DARD)	T
(c)	Meteo auxiliary products	§7.6-3 (DARD)	T
(d)	Ionosphere auxiliary products	§7.6-3 (DARD)	T
SLCCI-SRB-REQ_0-029	The system shall take as input the following auxiliary products for the product validation	-	-
(a)	Tide gauges measurements	§7.6-3 (DARD)	T
(b)	Temperature/Salinity Argo profiles	§7.6-3 (DARD)	T

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_0-051	The system shall be able to accommodate the following with regards to metadata associated with each product type -	-	-
(a)	Syntactically parse the metadata	§7.6-5 (DARD)	T
(b)	Semantically interpret the metadata	§7.6-5 (DARD)	T
SLCCI-SRB-REQ_0-053	The system shall be able to work in two modes	-	-
(a)	Delayed Time (DT): periodical update (~semi annual) by addition of new data	§7.9-1 (PSAD)	T
(b)	Reprocessing mode (REP): reprocessing of the whole time series records, when calibration improves or ECV generation methods evolve (~bi-annual)	§7.9-1 (PSAD)	T
SLCCI-SRB-REQ_0-500	The system shall accommodate the following as part of the production chain -	-	-
(a)	long term data sets covering at least 30 years.	§7.4-1 (URD)	T
(b)	continuous coverage from at least one high-precision satellite altimeter at all times, whilst accommodating with planned extensive overlaps between successive missions and two complementary altimeters in different orbits with lower precision but higher resolution.	§7.4-2 (URD)	T
(c)	account for the necessity to ensure an overlap of 6 months between a satellite follow up and its predecessor	§7.4-3 (URD)	T
(d)	need of precision altimetry for establishment of an ongoing series of follow-on missions in the same orbit	§7.4-3 (URD)	T
(e)	increased spatial and temporal sampling for mesoscale and coastal areas	§7.4-4 (URD)	T
(f)	monitoring of tides which imply selection of orbit that avoids aliasing of the majors constituents at periods longer than 180 days	§7.4-5 (URD)	T
(g)	Development and maintenance of space and in situ techniques	§7.4-6 (URD)	R

ID	Requirement	Trc	Ver
(h)	Consideration of other in situ and space observing systems for cal/val, such as Argo, and GRACE space gravimetry.	§7.4-7 (URD)	R
(i)	Characterization of uncertainties, towards providing full error budget.	§7.4-8 (URD)	R
(j)	Access to data at least once a year	§7.4-9 (URD)	I[3]
(k)	Access to data through ftp and/or OpenDap	§7.4-10 (URD)	T
(l)	increased spatial and temporal sampling for high latitude regions	§7.4-11 (URD)	T

8.3. Data Acquisition Requirements

8.3.1. Data Acquisition – Functional Requirements

The Data Acquisition system requirements associated with functionality are comprised below. Note that the required course of operational action for anomalous data acquisition events is as described by the Operational Requirements (§8.16).

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_1-010	The system shall automatically detect the presence of new primary satellite data where such data is as defined by the DARD.	§7.2.1 Table 4	T
SLCCI-SRB-REQ_1-011	The system shall automatically check the following with regards to primary satellite data, where such integrity is as derived from the DARD -	-	-
(a)	the format of the data should adhere to the accepted logical grammar.	§7.2.1 Table 4	T
(b)	the values content of the data should adhere to the accepted logical type and range.	§7.2.1 Table 4	T
SLCCI-SRB-REQ_1-012	The system shall automatically detect new ancillary data associated with recognised primary satellite data where such ancillary data is as defined by the DARD.	§7.2.1 Table 4	T

[3] Inspection of an exploitation plan of the future CCI system.

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_1-013	The system shall automatically check the following with regards to the ancillary data associated with recognised primary satellite data, where such integrity is as derived via the DARD -	-	-
(a)	the format of the data should adhere to the accepted logical grammar,	§7.2.1 Table 4	T
(b)	the values content of the data should adhere to the accepted logical type and range.	§7.2.1 Table 4	T
SLCCI-SRB-REQ_1-020	If the application detects that it lacks at least one item of auxiliary data to generate the product then the data flow shall be moved to a waiting queue; this logic acknowledges the 'synchronisation' dependency relationship between altimetry data and auxiliary data required before product generation can commence.	§7.2.1 Table 4	T
SLCCI-SRB-REQ_1-060	If required ancillary data is not already acquired when the associated primary data arrives, then the primary satellite data shall be held in a queue until the related ancillary data arrives.	§7.2.1 Table 4	T
[TBD]SLCCI-SRB-REQ_1-100	Once data is made available for Passive Acquisition as defined in the PSAD, the data shall start to be processed within <x> seconds.	§7.3-14, §7.9-2 (PSAD)	T
[TBD]SLCCI-SRB-REQ_1-101	Once data is made available for Active Acquisition as defined in the PSAD, the data shall start to be processed within <x> seconds.	§7.3-14, §7.9-2 (PSAD)	T
SLCCI-SRB-REQ_1-070	In order to accomplish Active Acquisition for a given data product, the system shall check the defined remote directory at a configurable frequency, starting from a configurable date and time.	§7.2.1 Table 4	T

8.3.2. Data Acquisition - Performance Requirements

The Data Acquisition system requirements associated with performance comprise of the following —

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_1-235	If a data file is to be queued because necessary synchronisation cannot yet take place, then the file will start to be acquired for queuing within <x> seconds.	§7.3-1&14	T
[TBD]SLCCI-SRB-REQ_1-236	The database storage of an acquired data file shall be completed within a temporal threshold, which is a multiple of <x> kilobytes acquired and <y> seconds.	§7.3-1&14	T

8.4. Pre processing Requirements

8.4.1. Pre processing – Functional Requirements

The Pre processing system requirements associated with functionality comprise of the following —

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_2-010	The system shall make provision for an automated homogenisation of input data by using suitable geophysical corrections to calculate the Sea Level Anomaly for each altimetry mission.	§7.2.1 Table 5	T
SLCCI-SRB-REQ_2-011	The system application of homogenous geophysical corrections shall be automated.	§7.2.1 Table 5	T
SLCCI-SRB-REQ_2-012	The system shall make provision for the automated editing of data in order to remove spurious measurements.	§7.2.1 Table 5	T

8.4.2. Pre processing – Performance Requirements

The Pre processing system requirements associated with performance comprise of the following —

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_2-100	The system shall complete the pre-processing stage, prior to the editing of spurious measurements, within a multiple of <x> kilobytes acquired and <y> seconds.	§7.3-1&14	T

8.5. Monomission Cal/Val (Level2+)

8.5.1. Monomission Cal/Val – Functional Requirements

The Level2+ Cal/Val requirements associated with functionality comprise of the following.

With regards to automatic quality check –

ID	Requirement	Trc	Ver

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_3-019	A tool shall be provided for an SLCCI Product Contributor to manually accomplish the following -	-	-
(a)	the specification of a list of fields as free text, where each field must textually match the data field of statistical interest in input data	§7.2.1 Table 6	T
(b)	the specification of a numerical quality threshold associated with each entry in the listed fields of (a).	§7.2.1 Table 6	T
SLCCI-SRB-REQ_3-020	The system shall automatically generate data quality statistics on input data, comprised of the following -	-	-
(a)	a display of the configurable data field defined,	§7.2.1 Table 6	T
(b)	the associated quality threshold defined,	§7.2.1 Table 6	T
(c)	unique identification of all items of data matching the configured data field label which have values falling outside the defined threshold.	§7.2.1 Table 6	T
SLCCI-SRB-REQ_3-030	If it is found from the quality checks on the input data that some statistical results fall outside an associated quality threshold, then -	-	-
(a)	the Product Expert shall investigate the source of the errors.	§7.2.1 Table 6	T
(b)	the Product Expert shall warn the relevant upstream system of the anomaly detected on the input data flows	§7.2.1 Table 6	T
(c)	the system shall be set in a state whereby it can accommodate a new version of the same data flow being redelivered	§7.2.1 Table 6	T
(d)	the Product Expert will report the anomaly to the Service Desk Manager	§7.2.1 Table 6	T
SLCCI-SRB-REQ_3-040	If on investigating a Cal/Val related anomaly in input data the Product Expert finds that the problem is more serious, such as non-critical loss of an instrument on the platform, then -	-	-
(a)	the system shall have provision to allow the new configuration of input data, where the decision for the modification must be validated by the Service Manager	§7.2.1 Table 6	T
(b)	the outputs shall still be generated	§7.2.1 Table 6	T

ID	Requirement	Trc	Ver
(c)	information pertaining to the quality of the products shall be reported to the Service Desk from the Service Desk Manager	§7.2.1 Table 6	T
(d)	information pertaining to the quality of the products shall be integrated into the resulting SLCCI product	§7.2.1 Table 6	T

With regards to the associated report –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_4-010	The system shall have provision to generate a Quality Check report, comprising of -	-	-
(a)	scientific Cal/Val	§7.2.1 Table 6	T
(b)	global multi-mission comparisons	§7.2.1 Table 6	T
(c)	global altimetry and In-situ data comparison	§7.2.1 Table 6	T
SLCCI-SRB-REQ_4-011	The Quality Check report shall be checked by the Product Expert.	§7.2.1 Table 6	T

8.5.2. Monomission Cal/Val - Performance Requirements

The Input Quality Control system requirements associated with performance comprise of the following —

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_3-200[4]	The system shall complete the automatic quality check of a given data flow within a time value threshold, which is calculated as being a multiple of the kilobytes of data flow	§7.3-1&14	T

[4] These requirements express that the monomission cal/val needs to be conducted in a time which is in relation to the amount of input data being processed for that stage. The specific temporal threshold for an automatic quality check is calculated as a multiple of the amount of input data and a calculation weighting; for instance, if the calculation weighting is 0.1, and the amount of data flow is 10 kilobytes, then the automatic quality check would need to be done within 1 second for that data flow.

	and a calculation weighting value <y>.		
[TBD]SLCCI-SRB-REQ_3-201[4]	The system shall complete the generation of a Quality Check report for a given data flow within a time value threshold, which is calculated as being a multiple of the kilobytes of data flow associated with the report and a calculation weighting value <y>.	§7.3-1&14	T

8.6. Multimission Cross Calibration (Generate Product) Requirements

8.6.1. Multimission Cross Calibration (Generate Product) - Functional Requirements

The Multimission Cross Calibration system requirements associated with functionality comprise of the following –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_5-000	The system shall generate cross calibrated products	§7.2.1 Table 7	T
SLCCI-SRB-REQ_5-010	The system shall perform a calculation of orbit error for the given data flow.	§7.2.1 Table 7	T
SLCCI-SRB-REQ_5-020	The system shall perform a sea level anomaly (SLA) calculation for each mission along-track of the given data flow.	§7.2.1 Table 7	T
SLCCI-SRB-REQ_5-030	The system shall perform a calculation of the long wavelength error (LWE) of the given data flow.	§7.2.1 Table 7	T
SLCCI-SRB-REQ_5-031	The system shall correct the SLA for the LWE of the given data flow.	§7.2.1 Table 7	T

8.6.2. Multimission Cross Calibration (Generate Product) - Performance Requirements

The Calibration system requirements associated with performance comprise of the following —

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_5-032	The Multimission Cross Calibration stage shall be completed within a multiple of <x> kilobytes and <y> seconds for the given data flow.	§7.3-1&14	T

8.7. FCDR Product Generation (Generate Product) Requirements

8.7.1. FCDR Product Generation (Generate Product) – Functional Requirements

The FCDR Product Generation system requirements associated with functionality comprise of the following –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_5-040	The system shall generate a Fundamental Climate Data Record (FCDR) product as defined by the PSD.	§7.2.1 Table 7	T
SLCCI-SRB-REQ_5-042	The FCDR product shall be generated with a frequency of once per year, the timing of which during each year to be determined by the availability of L0 and L1 reprocessing accomplished by ground segments.	§7.2.1 Table 7	T

8.7.2. FCDR Product Generation (Generate Product) – Performance Requirements

The FCDR Product Generation system requirements associated with performance comprise of the following —

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_5-044	The FCDR Product Generation stage shall be completed within a multiple of <x> kilobytes and <y> seconds for the given data flow.	§7.3-1&14	T

8.8. ECV Product Generation (Generate Product) Requirements

8.8.1. ECV Product Generation (Generate Product) – Functional Requirements

The ECV Product Generation system requirements associated with functionality comprise of the following –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_5-050	The system shall generate an Essential Climate Variable (ECV) as defined by the PSD.	§7.2.1 Table 7	T
SLCCI-SRB-REQ_5-052	The ECV product shall be generated with a frequency of once per year, the timing of which during each year to be determined by the availability of L0 and L1 reprocessing	§7.2.1 Table 7	T

	accomplished by ground segments.		

8.8.2. ECV Product Generation (Generate Product) - Performance Requirements

The ECV Product Generation system requirements associated with performance comprise of the following —

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_5-054	The stage shall be completed within a multiple of <x> kilobytes and <y> seconds for the given data flow.	§7.3-1&14	T

8.9. Product Assessment Requirements

8.9.1. Product Assessment - Functional Requirements

The Product Assessment system requirements associated with functionality comprise of the following —

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_6-000	The system shall perform the following on the generated product -	-	-
(a)	output checks	§7.2.1 Table 8	T
(b)	quality control	§7.2.1 Table 8	T
(c)	scientific validation	§7.2.1 Table 8	T
SLCCI-SRB-REQ_6-019	The system shall make provision for the definition of a threshold to each item in a user-defined list of configurable data fields associated with the generated product, for output checks, quality control and scientific validation. Each configurable data field shall be specified as free text, which must textually match the data field of interest in order for statistics to be generated for that data product field of the generated product.	§7.2.1 Table 8	T

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_6-020	The system shall automatically generate data quality statistics on produced data, comprised of • a display of the configurable data field defined • the associated quality threshold defined • unique identification of all items of produced data matching the configured data field label which have values falling outside the defined threshold.	§7.2.1 Table 8	T
SLCCI-SRB-REQ_6-060	If the Product Expert detects that some statistical readings are out of the user configured expected range for a user configured field then -	-	-
(a)	the Product Expert shall warn the Support Operator	§7.2.1 Table 8	T
(b)	the Product Expert will inform the Service Manager if required	§7.2.1 Table 8	T
(c)	the Product Expert shall run the production pipeline again if the anomaly can be corrected within the system	§7.2.1 Table 8	T
(d)	the system shall produce scientific analyses and detect subtle errors	§7.2.1 Table 8	T
(e)	the system shall generate Global internal analyses	§7.2.1 Table 8	T
(f)	the system shall generate Global multi-mission comparisons	§7.2.1 Table 8	T
(g)	the system shall generate Global altimetry and In-situ data comparison	§7.2.1 Table 8	T

8.9.2. Product Assessment – Performance Requirements

There are no Product Assessment system requirements associated with the performance of product assessment.

8.10. Measures & Built Indicators Requirements

8.10.1. Measures & Built Indicators – Functional Requirements

The Measures & Built Indicators system requirements associated with functionality comprise of the following —

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_7-000	The system shall process -	-	-
(a)	Measures; these comprise of two kinds of measurements - (i) scientific measurements (e.g product quality, accuracy), and (ii) system measurements related to the build (e.g available bandwidth, reprocessing date & time) which complement the product assessment.	§7.2.1 Table 9	T
(b)	Build indicators; these are used for calculating different ocean indicators (e.g mean sea level trends, El Nino) which complement the product assessment.	§7.2.1 Table 9	T
SLCCI-SRB-REQ_7-004	If a performed measure or indicator is not calculated, either the Support Operator or Product Expert shall -	-	-
(a)	investigate the problem	§7.2.1 Table 9	I
(b)	correct the problem	§7.2.1 Table 9	I
(c)	report the incident to the Service Manager	§7.2.1 Table 9	I

8.10.2. Measures & Built Indicators – Performance Requirements

The Measures & Built Indicators system requirements associated with performance comprise of the following —

8.11. Product Dataset Storage Requirements

8.11.1. Product Dataset Storage – Functional Requirements

The Product Data Storage system requirements associated with functionality comprise of the following —

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_8-010	The system shall store the most recent <x> versions of products on a physical space accessible by the -	-	-
(a)	Web Portal ; a web portal within the SLCCI system, comprised of both an http server and an ftp server.	§7.2.1 Table 10	T

ID	Requirement	Trc	Ver
(b)	Central Information System (CIS) ; a conceptual pan-ECV system with linkage to the SLCCI system, and is outside of the SLCCI system.	§7.10 (SEWG) , §7.2.1 Table 10	T
SLCCI-SRB-REQ_8-020	The Product Expert shall add content to a product's metadata before the product is made available via the	-	-
(a)	Web Portal ; the web portal within the SLCCI system.	§7.2.1 Table 10	T
(b)	Central Information System (CIS) ; a conceptual pan-ECV system with linkage to the SLCCI system.	§7.2.1 Table 10	T
SLCCI-SRB-REQ_8-043	If the Web Portal ftp server fails the system shall inform the Service Manager.	§7.2.1 Table 10	T
SLCCI-SRB-REQ_8-044	If the Web Portal http server fails the system shall inform the Service Manager.	§7.2.1 Table 10	T
SLCCI-SRB-REQ_8-045	The system shall make provision for <x> Gb of physical space for the product data storage.	§7.2.1 Table 10	T

8.11.2. Product Dataset Storage – Performance Requirements

The Product Data Storage system requirements associated with performance comprise of the following —

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_8-042	Product storage onto physical space shall take no longer than <x> seconds per <y> kilobytes of product size.	§7.3-1&14	T

8.12. Product Dataset Archiving & Retrieval Requirements

8.12.1. Product Dataset Archiving & Retrieval – Functional Requirements

The Product Dataset Archiving & Retrieval system requirements associated with functionality comprise of the following —

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_9-010	In order to accommodate the long term preservation of data the system shall archive	-	-

ID	Requirement	Trc	Ver
(a)	all generated products	§7.2.1 Table 11	T
(b)	all associated context needed for traceability	§7.2.1 Table 11	T
SLCCI-SRB-REQ_9-030	The system decision to start the archive procedure shall be automated	§7.2.1 Table 11	T
SLCCI-SRB-REQ_9-031	The system shall have provision for an automated archive procedure describing all targets for archiving.	§7.2.1 Table 11	T
SLCCI-SRB-REQ_9-040	Archived products shall only be retrievable for a Product User through a request to a Service Manager, rather than made permanently available.	§7.2.1 Table 11	T
SLCCI-SRB-REQ_9-050	If the archive procedure fails then the incident shall be reported to the Service Manager for repair.	§7.2.1 Table 11	T
SLCCI-SRB-REQ_9-200	The archive procedure shall conform to international open standards and follow the Open Archival Information System reference model	§7.10-2 (SEWG)	I
SLCCI-SRB-REQ_9-205	The system shall make provision for <x> Gb of physical space for the product data archive.	§7.2.1 Table 11	T

8.12.2. Product Dataset Archiving & Retrieval - Performance Requirements

The Product Dataset Archiving & Retrieval system requirements associated with performance comprise of the following —

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_9-051	Product archive onto physical space shall take no longer than <x> seconds per <y> kilobytes of product size.	§7.3-1&14	T

8.13. Product Access & Visualisation

8.13.1. Product Access & Visualisation - Functional Requirements

The Product Access & Visualisation system requirements associated with functionality comprise of the following —

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_10-000	The system shall make provision for functionality to view a product.	§7.2.2 Table 12	T
SLCCI-SRB-REQ_10-020	The system shall generate low resolution static images of its products for preview functionality, at a resolution of 5 percent of maximum resolution.	§7.2.2 Table 12	T
SLCCI-SRB-REQ_10-021	The system shall generate maximum resolution static images of its products for full view functionality	§7.2.2 Table 12	T
[TBD]SLCCI-SRB-REQ_10-200	The system shall make provision for user registration functionality, requiring a	-	-
(a)	username	§7.3-4&7&10	T
(b)	password	§7.3-4&7&10	T
(c)	<TBD>	§7.3-4&7&10	T
SLCCI-SRB-REQ_10-201	The system shall make provision for user access functionality requiring a username and password.	§7.3-4&7&10	T
SLCCI-SRB-REQ_10-210	The system shall provide an interface for user authentication.	§7.3-10	T
SLCCI-SRB-REQ_10-220	The system shall provide an interface for catalogue search, in order to allow interoperability of catalogues (CSW – OGC) and compliance with INSPIRE European Directive (Cf INSPIRE “Invoke” function).	§7.3-5	T
SLCCI-SRB-REQ_10-040	The system shall provide an interface to allow download of products from a Central Information System (CIS), compliant with OGC Web Coverage Service.	§7.2.2 Table 13, §7.3-5	T
SLCCI-SRB-REQ_10-230	The system shall allow download of products only following user authentication.	§7.3-4&7&10	T
SLCCI-SRB-REQ_10-240	The system shall make provision for the logging of product downloading, in order to attain information which may be useful for the enhancement of data dissemination to users in future.	§7.3-4&7&10	T

Users Requests requirements are as follows –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_10-050	The system shall make provision for a ticketing system for dealing with requests from SLCCI Users	§7.2.2 Table 14, §7.3-3&6&13	T
SLCCI-SRB-REQ_10-051	Requests may be addressed to the ticketing system via emailable electronic form.	§7.2.2 Table 14, §7.3-3&6&13	T

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_10-054	When a request arrives at the ticketing system it shall be addressed by the Service Desk user	§7.2.2 Table 14, §7.3-3&6&13	I
SLCCI-SRB-REQ_10-055	The processing of a request will take the form of the following phases -	-	-
(a)	Acknowledgement to the requester that the request has been received	§7.2.2 Table 14, §7.3-3&6&13	T
(b)	The request is analysed to determine action and relevant stakeholders	§7.2.2 Table 14, §7.3-3&6&13	T
(c)	The request is dispatched to the relevant user for treatment	§7.2.2 Table 14, §7.3-3&6&13	T
(d)	Once the request is satisfied, the Service Desk is informed whereby the request ticket is closed and the requester is informed.	§7.2.2 Table 14, §7.3-3&6&13	T
SLCCI-SRB-REQ_10-060	The system shall provide a product information handbook to SLCCI Product Users.	§7.2.2 Table 14	T
SLCCI-SRB-REQ_10-061	The product information handbook shall be made available via the Web Portal.	§7.2.2 Table 14	T
SLCCI-SRB-REQ_10-080	The Service Desk may return an answer related to an information request by different means of communication, comprised of -	-	-
(a)	Email	§7.2.2 Table 14, §7.3-3&6&13	T
(b)	Transfer protocol	§7.2.2 Table 14, §7.3-3&6&13	T
(c)	Paper	§7.2.2 Table 14, §7.3-3&6&13	T
(d)	Phone	§7.2.2 Table 14, §7.3-3&6&13	T
SLCCI-SRB-REQ_10-100	The system shall make available the following types of information on the Web Portal -	-	-
(a)	Information on products and services	§7.2.2 Table 14, §7.3-3&6&13	T

ID	Requirement	Trc	Ver
(b)	Availability	§7.2.2 Table 14, §7.3-3&6&13	T
(c)	Data policy	§7.2.2 Table 14, §7.3-3&6&13	T
(d)	Product dissemination interfaces	§7.2.2 Table 14, §7.3-3&6&13	T
(e)	“How to” information	§7.2.2 Table 14, §7.3-3&6&13	T
(f)	Products catalogue	§7.2.2 Table 14, §7.3-3&6&13	T
(g)	Status on products	§7.2.2 Table 14, §7.3-3&6&13	T
(h)	Technical information pertaining to the SLCCI system	§7.2.2 Table 14, §7.3-3&6&13	T
(i)	FAQ	§7.2.2 Table 14, §7.3-3&6&13	T
(j)	Tips	§7.2.2 Table 14, §7.3-3&6&13	T
(k)	Training information	§7.2.2 Table 14, §7.3-3&6&13	T
(l)	Discussion forum	§7.2.2 Table 14, §7.3-3&6&13	T
(m)	Service desk related information, e.g related to support ticketing system	§7.2.2 Table 14, §7.3-3&6&13	T
(n)	Contact information to relevant SLCCI Contributors (the workers)	§7.2.2 Table 14, §7.3-3&6&13	T
(o)	Information pertaining to system events, such as system incidents and failures.	§7.2.2 Table 14, §7.3-3&6&13	T

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_10-090	The system shall provide requested information to users if available via a Web Portal intelligent word search of the available types of information.	§7.2.2 Table 14, §7.3-3&6&13	T

8.13.2. Product Access & Visualisation - Performance Requirements

The Product Access & Visualisation system requirements associated with performance comprise of the following —

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_10-081	The Service Desk shall return an answer related to an information request within <x> minutes of the request being made.	§7.3-3&6&13	T

8.14. Product Management Requirements

8.14.1. Product Management - Functional Requirements

The Product Management system requirements associated with functionality comprise of the following —

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_11-500	The system shall provide a catalogue of metadata, containing the products and access services descriptions, in order to allow the user to discover the resources	§7.3-3	T
SLCCI-SRB-REQ_11-110	The system shall make provision for a catalogue of metadata compliant with the Central Information System (CSW – OGC).	§7.3-5	T
SLCCI-SRB-REQ_11-120	The metadata format shall comply with principal international standards on this subject -	-	-
(a)	ISO19115 for spatial product metadata	§7.3-5	I
(b)	ISO19119 for spatial access	§7.3-5	I
(c)	ISO19139 official implementation of the two precedent standards	§7.3-5	I
SLCCI-SRB-REQ_11-010	A Product Manager shall have provision of a metadata editor to maintain the product database	§7.2.3 Table 15	T

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_11-011	The Metadata Editor shall reside on the Central Information System (CIS)	§7.2.3 Table 15	T
SLCCI-SRB-REQ_11-020	The Product Manager shall register a new product by manually adding it to the product database.	§7.2.3 Table 15	T
SLCCI-SRB-REQ_11-021	The system shall make provision for the automatic updating of products which are not new ; for instance in the case where a the time coverage is extended through a reanalysis.	§7.2.3 Table 15	T
SLCCI-SRB-REQ_11-030	A Product Manager shall have provision to maintain product information in the form of	-	-
(a)	Static metadata	§7.2.3 Table 15	T
(b)	Dynamic metadata	§7.2.3 Table 15	T
SLCCI-SRB-REQ_11-033	A product can be maintained in the product database by	-	-
(a)	Updating of “Product Line” static metadata	§7.2.3 Table 15	T
(b)	Updating of “Product Specification” static metadata	§7.2.3 Table 15	T
(c)	Deleting of “Product Specification” static metadata	§7.2.3 Table 15	T
(d)	Deletion of “Product Line” static metadata	§7.2.3 Table 15	T
(e)	Update of dynamic metadata of a product, representing quality characteristics of the product	§7.2.3 Table 15	T
SLCCI-SRB-REQ_11-050	The Product Manager shall have the provision to, via the Central Information System (CIS), create	-	-
(a)	a new Product Line	§7.2.3 Table 15	T
(b)	a new Product Specification	§7.2.3 Table 15	T
SLCCI-SRB-REQ_11-060	The Product Manager shall register as Product Lines all upstream data delivered	§7.2.3 Table 15	T
SLCCI-SRB-REQ_11-070	The Product Manager shall have provision, via the Central Information System (CIS), to update	-	-
(a)	Product Line static metadata	§7.2.3 Table 15	T

ID	Requirement	Trc	Ver
(b)	Product Specification static metadata	§7.2.3 Table 15	T
SLCCI-SRB-REQ_11-080	The Product Manager shall have provision, via the Central Information System (CIS), to delete	-	-
(a)	Product Line static metadata	§7.2.3 Table 15	T
(b)	Product Specification static metadata	§7.2.3 Table 15	T
SLCCI-SRB-REQ_11-090	Delivery characteristics shall be generated for each Product, comprised of -	-	-
(a)	Delivery target locations	§7.2.3 Table 15	T
(b)	Total number of deliveries to the locations	§7.2.3 Table 15	T
(c)	Product identifier	§7.2.3 Table 15	T

8.14.1. Product Management – Performance Requirements

Product Management is associated with no performance requirements.

8.15. Monitoring Requirements

8.15.1. Monitoring - Functional Requirements

The Monitoring system requirements associated with functionality comprise of the following –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_12-010	The system shall have provision for three types of monitoring	-	-
(a)	Production monitoring, the monitoring of the product pipeline	§7.2.4 Table 16	T
(b)	System monitoring, the monitoring of system events, including the monitoring of external activity to the SLCCI system supplying required data fields to the SLCCI system.	§7.2.4 Table 16	T
(c)	Request monitoring of transaction accounted downloads accomplished through a Customer Relationship Management (CRM) tool under the auspices of the Service Desk.	§7.2.4 Table 16	T

SLCCI-SRB-REQ_12-050	The system shall provide a dashboard illustrating the state of all monitoring.	§7.2.4 Table 16	T

The System Monitoring system requirements associated with functionality comprise of the following -

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_12-080	The system shall have provision to monitor the SLCCI physical resources	§7.2.4 Table 16	T
SLCCI-SRB-REQ_12-090	A Support Operator shall be responsible for system monitoring	§7.2.4 Table 16	I
SLCCI-SRB-REQ_12-091	System Monitoring shall comprise of -	-	-
(a)	Monitoring of interfaces with upstream systems	§7.2.4 Table 16	T
(b)	Monitoring of physical resources associated with production pipeline	§7.2.4 Table 16	T
(c)	Monitoring of physical resources associated with the file server which houses the products	§7.2.4 Table 16	T
(d)	Monitoring of the Central Information System (CIS) gateway	§7.2.4 Table 16	T
SLCCI-SRB-REQ_12-100	The system shall make provision for automated system monitoring only where the SLCCI physical resource being monitored can have a threshold set	§7.2.4 Table 16	T
SLCCI-SRB-REQ_12-101	The thresholds for automated system monitoring shall be configurable by a Support Operator.	§7.2.4 Table 16	T

Production monitoring is further explained by SLCCI-SRB-REQ_6-019 and SLCCI-SRB-REQ_6-020. Request Monitoring expectations are specified by SLCCI-SRB-REQ_12-010.

8.15.1. Monitoring - Performance Requirements

The Monitoring system requirements associated with performance comprise of the following —

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_12-200	Production Monitoring shall not contribute to overall performance of the system by more than 1 %.	§7.3-2	T
SLCCI-SRB-REQ_12-210	System Monitoring shall not contribute to overall performance of the system by more than 1 %.	§7.3-2	T
SLCCI-SRB-REQ_12-220	Request Monitoring shall not contribute to overall performance of the system by more than 1 %.	§7.3-2	T

8.16. Operational Requirements

The Operational system requirements associated with data acquisition comprise of the following –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_1-030	If the format of the received satellite data products does not adhere to the accepted logical grammar as expected, then the system shall send out a warning to the Support Operator via the dashboard.	§7.2.1 Table 4	T
SLCCI-SRB-REQ_1-031	If the values content of the received satellite data products does not adhere to the accepted logical type or range as expected, then the system shall send out a warning to the Support Operator via the dashboard.	§7.2.1 Table 4	T
SLCCI-SRB-REQ_1-032	If the format of the ancillary data does not adhere to the accepted logical grammar as expected, then the system shall send out a warning to the Support Operator via the dashboard.	§7.2.1 Table 4	T
SLCCI-SRB-REQ_1-033	If the values content of the ancillary data does not adhere to the accepted logical type or range as expected, then the system shall send out a warning to the Support Operator via the dashboard.	§7.2.1 Table 4	T
SLCCI-SRB-REQ_1-034	On receiving a warning regarding the integrity of input data, the Support Operator shall ask the upstream system to re-deliver the input.	§7.2.1 Table 4	I
SLCCI-SRB-REQ_1-035	On receiving a warning regarding the integrity of input data, the Support Operator shall set the system in a state accommodating towards the resending of the input by the upstream operator.	§7.2.1 Table 4	I
SLCCI-SRB-REQ_1-036	The system shall send a warning via the dashboard to Support Operator where data input size is larger than the maximum recognised for the data as derived via the DARD.	§7.2.1 Table 4	T

The Operational system requirements associated with data acquisition exceptions comprises of the following –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_1-096	If an input data flow does not arrive by a defined date plus a configurable delay and the unavailability is definitive then -	-	-
(a)	products for the mission shall not be produced any more	§7.2.1 Table 4	T

(b)	the incident shall be reported to the Service Desk	§7.2.1 Table 4	T

Further refinements associated with SLCCI operational requirements are as follows –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_1-400	Any data backup operation shall not interrupt the normal operation of the system.	§7.3-3	T
SLCCI-SRB-REQ_1-401	Any data backup operation shall not comprise a performance cost of more than 1% of the performance cost of the whole system.	§7.3-14	T
SLCCI-SRB-REQ_1-420	Data backup operation shall be automated where possible.	§7.3-3	I

8.17. Interface Requirements

The SLCCI system necessitates interfacing with a number of external data sources in order to attain the input to product generation as described by the PSAD [RD 3], to be related with the DARD [RD 2] –

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_1-102	The following data type shall be acquired by either Active or Passive acquisition as specified -	-	-
(a)	ERS-1 Phase C OPR V6 - <active/passive>	§7.9-2 (PSAD), §7.6-1 (DARD)	T
(b)	ERS-1 Phase E OPR V3 - <active/passive>	§7.9-2 (PSAD), §7.6-1 (DARD)	T
(c)	ERS-1 Phase F OPR V3 - <active/passive>	§7.9-2 (PSAD), §7.6-1 (DARD)	T
(d)	ERS-1 Phase G OPR V6 - <active/passive>	§7.9-2 (PSAD), §7.6-1 (DARD)	T
(e)	ERS-2 OPR V6 - <active/passive>	§7.9-2 (PSAD), §7.6-1 (DARD)	T
(f)	Envisat GDR 1 - <active/passive>	§7.9-2 (PSAD), §7.6-1 (DARD)	T
(g)	T/P MGDR - <active/passive>	§7.9-2 (PSAD), §7.6-1 (DARD)	T
(h)	Jason-1 GDR-C - <active/passive>	§7.9-2 (PSAD), §7.6-1 (DARD)	T
(i)	Jason-2 GDR-C - <active/passive>	§7.9-2 (PSAD), §7.6-1 (DARD)	T
(j)	GFO GDR NOAA - <active/passive>	§7.9-2 (PSAD), §7.6-1 (DARD)	T
(k)	auxiliary products for the product generation - <active/passive>	§7.9-2 (PSAD), §7.6-3 (DARD)	T

ID	Requirement	Trc	Ver
(l)	auxiliary products for the product validation - <active/passive>	§7.9-2 (PSAD), §7.6-3 (DARD)	T
[TBD]SLCCI-SRB-REQ_1-202	The following data types shall be expected at the following frequencies -	-	-
(a)	ERS-1 Phase C OPR V6 – at least one update every <x> days	§7.6-3 (DARD), 7.3-3	T
(b)	ERS-1 Phase E OPR V3 – at least one update every <x> days	§7.6-3 (DARD), 7.3-3	T
(c)	ERS-1 Phase F OPR V3 – at least one update every <x> days	§7.6-3 (DARD), 7.3-3	T
(d)	ERS-1 Phase G OPR V6 – at least one update every <x> days	§7.6-3 (DARD), 7.3-3	T
(e)	ERS-2 OPR V6 – at least one update every <x> days	§7.6-3 (DARD), 7.3-3	T
(f)	Envisat GDR 1 – at least one update every <x> days	§7.6-3 (DARD), 7.3-3	T
(g)	T/P MGDR – at least one update every <x> days	§7.6-3 (DARD), 7.3-3	T
(h)	Jason-1 GDR-C – at least one update every <x> days	§7.6-3 (DARD), 7.3-3	T
(i)	Jason-2 GDR-C – at least one update every <x> days	§7.6-3 (DARD), 7.3-3	T
(j)	GFO GDR NOAA – at least one update every <x> days	§7.6-3 (DARD), 7.3-3	T
(k)	auxiliary products for the product generation – at least one update every <x> days	§7.6-3 (DARD), 7.3-3	T
(l)	auxiliary products for the product validation – at least one update every <x> days	§7.6-3 (DARD), 7.3-3	T

8.18. Resources Requirements

The Resources system requirements comprise of the following –

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_14-010	The system shall allow for simultaneous downloads from <x> SLCCI Product Users.	§7.3-16	T
[TBD]SLCCI-SRB-REQ_14-020	The system shall make provision for at least <x> TBs of disk storage dedicated to the product pipeline.	§7.3-17	T
[TBD]SLCCI-SRB-REQ_14-030	The system shall make provision for at least <x> TBs of disk storage dedicated to hosting SLCCI products ready for download by SLCCI Product Users.	§7.3-17	T

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_14-040	The system shall make provision for at least <x> TBs of disk storage dedicated for SLCCI product archiving.	§7.3-17	T
[TBD]SLCCI-SRB-REQ_1-300	The system shall be able to accommodate an update absorption of the following expected sizes per data type as expected frequencies -	-	-
(a)	ERS-1 Phase C OPR V6 - <x> Mb	§7.3-17, §7.6-3 (DARD)	T
(b)	ERS-1 Phase E OPR V3 - <x> Mb	§7.3-17, §7.6-3 (DARD)	T
(c)	ERS-1 Phase F OPR V3 - <x> Mb	§7.3-17, §7.6-3 (DARD)	T
(d)	ERS-1 Phase G OPR V6 - <x> Mb	§7.3-17, §7.6-3 (DARD)	T
(e)	ERS-2 OPR V6 - <x> Mb	§7.3-17, §7.6-3 (DARD)	T
(f)	Envisat GDR 1 - <x> Mb	§7.3-17, §7.6-3 (DARD)	T
(g)	T/P MGDR - <x> Mb	§7.3-17, §7.6-3 (DARD)	T
(h)	Jason-1 GDR-C - <x> Mb	§7.3-17, §7.6-3 (DARD)	T
(i)	Jason-2 GDR-C - <x> Mb	§7.3-17, §7.6-3 (DARD)	T
(j)	GFO GDR NOAA - <x> Mb	§7.3-17, §7.6-3 (DARD)	T
(k)	auxiliary products for the product generation - <x> Mb	§7.3-17, §7.6-3 (DARD)	T
(l)	auxiliary products for the product validation - <x> Mb	§7.3-17, §7.6-3 (DARD)	T

Inventory management system requirements are as follows –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_14-100	[Definition] An item of hardware is deemed to be an SLCCI physical resource if it resides as part of the SLCCI system and is at the level of a Lowest Replaceable Unit (LRU).	§7.3-18	-

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_14-110	The system shall allow for the provision of an inventory to account for all SLCCI physical resources associated with the system.	§7.3-18	I
SLCCI-SRB-REQ_14-120	All SLCCI physical resources shall have an asset identification label.	§7.3-18	I
SLCCI-SRB-REQ_14-130	All asset identification labels shall be easily accessible for viewing	§7.3-18	I
SLCCI-SRB-REQ_14-450	The SLCCI physical resources shall be maintainable	§7.3-18	I
SLCCI-SRB-REQ_14-460	A Support Contributor shall provide a support plan indicating how all system assets are to be maintained.	§7.3-18	I
SLCCI-SRB-REQ_14-470	The maintenance support plan shall cover all SLCCI assets, comprising	-	-
(a)	Proprietary software	§7.3-18	I
(b)	OTS software	§7.3-18	I
(c)	SLCCI physical resources	§7.3-18	I
(d)	Open source software	§7.3-18	I
SLCCI-SRB-REQ_14-510	The support plan shall define how updates shall be addressed for all SLCCI assets	§7.3-18	I
SLCCI-SRB-REQ_14-520	The support plan shall define how service packs shall be addressed for all SLCCI assets	§7.3-18	I
SLCCI-SRB-REQ_14-530	The support plan shall define how SLCCI assets must be treated when no longer needed for the SLCCI system ; for example, if an SLCCI physical resource experiences a physical failure which is beyond repair and a new item needs to be purchased, then the support plan needs to describe how the obsolescence of the expired SLCCI physical resource should be treated, such as describing considerations for environmental and sustainability matters which need to be taken into account when disposing of the equipment.	§7.3-18	I
SLCCI-SRB-REQ_14-610	The network infrastructure on which the SLCCI physical resources reside shall accommodate IP based communication	§7.3-18	T

8.19. Design Requirements and Implementation Constraints

These system requirements sit at a meta-level to others as they provide stewardship for the development of the system via the maintaining of the ESA vision of the operational system, and also include system requirements referring to approach of design and implementation which are appropriate at this early stage. Note that system requirements associated with configuration control and system reuse are contained within §8.22.

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_15-010	Development of the system shall be undertaken with apt consideration for scientific consensus on performance specification of the operational system.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#1	R
SLCCI-SRB-REQ_15-020	Development of the system shall be undertaken with apt consideration for availability of input data from EO archives.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#2	R
SLCCI-SRB-REQ_15-030	Development of the system shall be undertaken with apt consideration for quality of input data from EO archives.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#3	R
SLCCI-SRB-REQ_15-040	Development of the system shall be undertaken with apt consideration for availability of associated metadata, cal/val data and documentation.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#4	R
SLCCI-SRB-REQ_15-050	Development of the system shall be undertaken with apt consideration for quality of associated metadata, cal/val data and documentation.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#5	R
SLCCI-SRB-REQ_15-060	Development of the system shall be undertaken with apt consideration for compatibility of data from different missions.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#6	R
SLCCI-SRB-REQ_15-070	Development of the system shall be undertaken with apt consideration for compatibility of data from different sensors.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#7	R
SLCCI-SRB-REQ_15-080	Development of the system shall be undertaken with apt consideration for trade-off between cost, complexity and impact of new algorithms to be developed and validated during the project.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#8	R
SLCCI-SRB-REQ_15-090	Development of the system shall be undertaken with apt consideration for advance planning for data from new missions to be integrated during the project.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#9	R

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_15-100	Development of the system shall be undertaken with apt consideration for end-to-end throughput of ECV production systems.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#10	R
SLCCI-SRB-REQ_15-110	Development of the system shall be undertaken with apt consideration for re-use of existing capabilities within Europe.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#11	R
SLCCI-SRB-REQ_15-120	Development of the system shall be undertaken with apt consideration for compliance of ESA standards.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#12	R
SLCCI-SRB-REQ_15-130	Development of the system shall be undertaken with apt consideration for availability of external validation data.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#13	R
SLCCI-SRB-REQ_15-140	Development of the system shall be undertaken with apt consideration for avoidance of duplication of activities covered by existing operational projects.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#14	R
SLCCI-SRB-REQ_15-150	The system shall be cost effective.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#15	R
SLCCI-SRB-REQ_15-160	The pan-ECV systems must be cost effective as a whole	§7.7-2&1 (SoW); SLCCI-SRB-BUSINESS-GOAL_#16	R
SLCCI-SRB-REQ_15-170	System timeliness is urgent	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#17	R
SLCCI-SRB-REQ_15-180	Full advantage shall be taken of the latest developments in computing architectures in the development of the system.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#18	R
SLCCI-SRB-REQ_15-190	Full advantage shall be taken of the latest developments in data management in development of the system.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#19	R
SLCCI-SRB-REQ_15-200	Full advantage shall be taken of the latest developments in communications technology in development of the system.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#20	R

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_15-210	The system development should include cooperation with other consortia producing ECV products.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#21	R
SLCCI-SRB-REQ_15-220	The system shall have provision for future data set updates.	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#22	R
SLCCI-SRB-REQ_15-230	The system shall allow algorithm change.	§7.7-2&1 (SoW); SLCCI-SRB-BUSINESS-GOAL_#23	R
SLCCI-SRB-REQ_15-240	The system shall have an archiving facility.	§7.7-2&1 (SoW); SLCCI-SRB-BUSINESS-GOAL_#24	R
SLCCI-SRB-REQ_15-300	The monitoring dashboard software shall be usable on	-	-
(a)	Windows OS	§7.9-3&4&7 (PSAD)	R
(b)	Linux OS	§7.9-3&4&7 (PSAD)	R
SLCCI-SRB-REQ_15-400	The system shall be designed to allow amenable interfacing to a higher level system responsible for pan-ECV collaboration, namely the Central Information System.	§7.10-3 (SEWG)	R
SLCCI-SRB-REQ_15-410	The design of the system shall be as similar as possible to external systems associated with parallel ECV projects	§7.10-3 (SEWG)	R
SLCCI-SRB-REQ_15-420	The system shall be designed to be data driven wherever possible	§7.3-19	R
SLCCI-SRB-REQ_15-430	The design of the system shall incorporate proven and scalable Off The Shelf (OTS) systems where possible	§7.3-20	R
SLCCI-SRB-REQ_15-500	The design of the system shall identify particularly critical components of the system.	§7.3-21	R
SLCCI-SRB-REQ_15-510	The system shall be provisioned with increased redundancy for identified critical components.	§7.3-22	R

8.20. Security and Privacy Requirements

The Security and Privacy system requirements are comprised as follows. Note that the provision for authentication has been made in §8.13.

ID	Requirement	Trc	Ver

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_16-070	Any non-registered user shall be able to access all areas of the SLCCI web portal other than for the downloading of SLCCI products.	§7.3-10	T
SLCCI-SRB-REQ_16-071	Any non-registered user shall be able to search the SLCCI web portal, including the product catalogue.	§7.3-10	T
SLCCI-SRB-REQ_16-080	The web portal shall be protected against exploitation of security holes.	§7.3-10	I
SLCCI-SRB-REQ_16-090	The web portal shall be protected against exploitation of worms.	§7.3-10	I
SLCCI-SRB-REQ_16-100	The web portal shall be protected against exploitation of viruses.	§7.3-10	I
SLCCI-SRB-REQ_16-220	The system shall prevent any disclosure of information to unauthorised parties.	§7.3-10	I
SLCCI-SRB-REQ_16-240	The system shall allow access profiles for each SLCCI Contributor to be configurable, so associating each SLCCI Contributor with the privileges required for their role(s).	§7.3-10	T
SLCCI-SRB-REQ_16-241	At the start of their shift, the SLCCI Contributor shall be required to login to the system.	§7.3-10	I
SLCCI-SRB-REQ_16-250	At the end of their shift, the SLCCI Contributor shall be required to logout of the system.	§7.3-10	I
SLCCI-SRB-REQ_16-260	The system shall have provision for the logging of SLCCI Contributor logins.	§7.3-10	T
SLCCI-SRB-REQ_16-270	The system shall have provision for the logging of SLCCI Contributor logout.	§7.3-10	T
SLCCI-SRB-REQ_16-280	The logging of such security related activity by the system shall be comprised of the following -	-	-
(a)	Administrative activity	§7.3-10	T
(b)	Firewall activity	§7.3-10	T
(c)	Login attempts	§7.3-10	T
(d)	Logout attempts	§7.3-10	T
SLCCI-SRB-REQ_16-330	Each security related activity logging shall be comprised of the following -	-	-
(a)	Date & time of the event	§7.3-10	T
(b)	The type of security related activity	§7.3-10	T
(c)	Whether the activity resulted in success or failure	§7.3-10	T

ID	Requirement	Trc	Ver
(d)	Information pertaining to the terminal at which the event occurred	§7.3-10	T
(e)	Identification of the user involved	§7.3-10	T
SLCCI-SRB-REQ_16-400	All SLCCI Contributors shall be cleared to handle commercially sensitive intellectual property where required.	§7.3-10	I
SLCCI-SRB-REQ_16-410	Only SLCCI Contributors cleared to handle relevant commercially sensitive intellectual property shall have physical access to SLCCI physical resources on which the information is stored.	§7.3-10	I
SLCCI-SRB-REQ_16-420	It shall be possible to disassociate a user from any role.	§7.3-10	T
SLCCI-SRB-REQ_16-430	The system shall undergo a security health check as part of a test activities programme.	§7.3-10	I
SLCCI-SRB-REQ_16-440	The test activities programme shall include system penetration tests.	§7.3-10	I
SLCCI-SRB-REQ_16-500	SLCCI Contributors shall not share passwords.	§7.3-10	I
SLCCI-SRB-REQ_16-510	Passwords stored on the system shall be stored in an encrypted form.	§7.3-10	T
SLCCI-SRB-REQ_16-520	Passwords shall be communicated in an encrypted form if the communication of passwords is required between two SLCCI physical resource units.	§7.3-10	T
SLCCI-SRB-REQ_16-530	Passwords shall not be communicated, electronically or verbally, to any party external to the system	§7.3-10	I

8.21. Portability Requirements

The Portability system requirements comprise of the following –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_17-010	All computers within the SLCCI system shall be server-oriented Intel-compatible x86 machines.	§7.3-10	T
SLCCI-SRB-REQ_17-020	All computers within the SLCCI system shall run with the Linux operating system (32 bit).	§7.9-7 (PSAD)	T

8.22. Software Quality Requirements

The Software Quality system requirements are derived from ECSS standard ECSS-Q-ST-80C.

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_15-200	A software configuration system shall be used to manage all source code artefacts during software implementation, so maintaining integrity and traceability during development.	§7.3-8	I
SLCCI-SRB-REQ_15-210	An observation report management system shall be employed to track all observation reports during software implementation	§7.3-8	I

In order to mitigate risk associated with the reuse of an existing system, the following ECSS-Q-ST-80C (Space Product Assurance) requirements are observed –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_18-100	During system development apt attention shall be given to ECSS standard ECSS-Q-ST-80C (Space Product Assurance) as per reuse of existing software (section 6.2.7.2) such that an analysis shall be carried out of the advantages and disadvantages to be attained with the selection of existing software over new development.	§7.8-1 (ECSS), §7.3-8	I
SLCCI-SRB-REQ_18-110	During system development apt attention shall be given to ECSS standard ECSS-Q-ST-80C (Space Product Assurance) as per reuse of existing software (section 6.2.7.3) such that existing software shall be assessed with respect to functional, performance and quality requirements, with a view on identification of an appropriate software system for re-use.	§7.8-2 (ECSS), §7.3-8	I
SLCCI-SRB-REQ_18-120	During system development apt attention shall be given to ECSS standard ECSS-Q-ST-80C (Space Product Assurance) as per reuse of existing software (section 6.2.7.4) such that the quality level of the existing software shall be assessed with regards to project requirements.	§7.8-3 (ECSS), §7.3-8	I
SLCCI-SRB-REQ_18-130	During system development apt attention shall be given to ECSS standard ECSS-Q-ST-80C (Space Product Assurance) as per reuse of existing software (section 6.2.7.5) such that results of the software reuse analysis shall be documented, including assumptions and methods applied towards estimating level of reuse.	§7.8-4 (ECSS), §7.3-8	I
SLCCI-SRB-REQ_18-140	During system development apt attention shall be given to ECSS standard ECSS-Q-ST-80C (Space Product Assurance) as per reuse of existing software (section 6.2.7.6) such that the suitability of the reusable system shall include assessment of	-	-

ID	Requirement	Trc	Ver
(a)	Acceptance and warranty conditions	§7.8-5 (ECSS), §7.3-8	I
(b)	Support documentation	§7.8-5 (ECSS), §7.3-8	I
(c)	Conditions under which installation, preparation, training and use take place	§7.8-5 (ECSS), §7.3-8	I
(d)	Identification & registration via configuration management	§7.8-5 (ECSS), §7.3-8	I
(e)	Maintenance	§7.8-5 (ECSS), §7.3-8	I
(f)	Durability and validity of earlier tools which may be re-used	§7.8-5 (ECSS), §7.3-8	I
(g)	Constraints relating to copyright and intellectual property rights	§7.8-5 (ECSS), §7.3-8	I
(h)	Conditions of licensing	§7.8-5 (ECSS), §7.3-8	I
(i)	Constraints associated with exportability	§7.8-5 (ECSS), §7.3-8	I
SLCCI-SRB-REQ_18-150	During system development apt attention shall be given to ECSS standard ECSS-Q-ST-80C (Space Product Assurance) as per reuse of existing software (section 6.2.7.7) such that corrective actions shall be identified and appropriately documented where the reused software does not meet the appropriate requirements of the SLCCI system.	§7.8-6 (ECSS), §7.3-8	I
SLCCI-SRB-REQ_18-160	During system development apt attention shall be given to ECSS standard ECSS-Q-ST-80C (Space Product Assurance) as per reuse of existing software (section 6.2.7.8) such that missing documentation shall be attained to aptly reach verification and validation coverage.	§7.8-7 (ECSS), §7.3-8	I
SLCCI-SRB-REQ_18-170	During system development apt attention shall be given to ECSS standard ECSS-Q-ST-80C (Space Product Assurance) as per reuse of existing software (section 6.2.7.9) such that identified corrective actions shall be appropriately updated and documented at project milestones.	§7.8-8 (ECSS), §7.3-8	I
SLCCI-SRB-REQ_18-180	During system development apt attention shall be given to ECSS standard ECSS-Q-ST-80C (Space Product Assurance) as per reuse of existing software (section 6.2.7.10) such that the system being reused shall be kept under configuration control.	§7.8-9 (ECSS), §7.3-8	I

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_18-190	During system development apt attention shall be given to ECSS standard ECSS-Q-ST-80C (Space Product Assurance) as per reuse of existing software (section 6.2.7.11) such that the configuration status of the baseline associated with the reused software shall be appropriately documented.	§7.8-10 (ECSS), §7.3-8	I

8.23. Reliability, Availability, Maintainability and Safety (RAMS) Requirements

The RAMS system requirements comprise of the following, with regards to system maintenance –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_19-010	[Definition] The Mean Time Between Maintenance (MTBM) is the mean length of time taken between the end of a planned maintenance session and the start of the following planned maintenance session.	§7.3-11	-
[TBD]SLCCI-SRB-REQ_19-020	The Mean Time Between Maintenance (MTBM) for the system shall be at least <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-030	The Mean Time Between Maintenance (MTBM) specific to functionality within the production pipeline shall be at least <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-040	The Mean Time Between Maintenance (MTBM) specific to monitoring functionality shall be at least <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-050	The Mean Time Between Maintenance (MTBM) specific to product access and visualisation functionality shall be at least <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-060	The Mean Time Between Maintenance (MTBM) specific to product management functionality shall be at least <x> hours.	§7.3-11	T
SLCCI-SRB-REQ_19-070	[Definition] The Mean Maintenance Downtime (MMD) is the mean amount of time that the system is non-operational for the purpose of scheduled maintenance.	§7.3-11	-
[TBD]SLCCI-SRB-REQ_19-080	The Mean Maintenance Downtime (MMD) of the system shall be no more than <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-090	The Mean Maintenance Downtime (MMD) for functionality specific to the production pipeline shall be no more than <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-100	The Mean Maintenance Downtime (MMD) specific to monitoring functionality shall be no more than <x> hours.	§7.3-11	T

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_19-110	The Mean Maintenance Downtime (MMD) specific to product access & visualisation functionality shall be no more than <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-120	The Mean Maintenance Downtime (MMD) specific to product management functionality shall be no more than <x> hours.	§7.3-11	T

The RAMS system requirements comprise of the following, with regards to system availability and reliability –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_19-200	[Definition] The Mean Time Between Failures (MTBF) is the mean of the amount of time taken between the end of a period where the system was non-operational due to a failure, to the start of the next period where the system was non operational due to a failure. MTBF is a measure of reliability, expressing the amount of non-failure operational up time of the system.	§7.3-11	-
SLCCI-SRB-REQ_19-210	[Definition] The Mean Time To Repair (MTTR) is the mean amount of down time experienced by a system whilst repair to a system failure takes place.	§7.3-11	-
[TBD]SLCCI-SRB-REQ_19-220	The Mean Time Between Failures (MTBF) for all functionality within the production pipeline shall be at least <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-230	The Mean Time Between Failures (MTBF) specific to monitoring functionality shall be at least <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-240	The Mean Time Between Failures (MTBF) specific to product access and visualisation functionality shall be at least <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-250	The Mean Time Between Failures (MTBF) specific to product management functionality shall be at least <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-260	The Mean Time To Repair (MTTR) specific to the production pipeline shall be no more than <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-270	The Mean Time To Repair (MTTR) specific to monitoring functionality shall be no more than <x> hours.	§7.3-11	T
[TBD]SLCCI-SRB-REQ_19-280	The Mean Time To Repair (MTTR) specific to product access and visualisation functionality shall be no more than <x> hours.	§7.3-11	T

ID	Requirement	Trc	Ver
[TBD]SLCCI-SRB-REQ_19-290	The Mean Time To Repair (MTTR) specific to product management functionality shall be no more than <x> hours.	§7.3-11	T

We also propose the following, towards mitigating operational risk -

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_19-500	The system architecture shall be free of any single point of failure (SPF).	§7.3-21	I

8.24. Configuration and Delivery Requirements

The Configuration and Delivery system requirements comprise of the following –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_20-010	The software within the system shall be configurable during run-time rather than configurable during down-time wherever feasible, so helping avoid the need to harm availability of the system.	§7.3-9&19	I

8.25. Data Definition and Database Requirements

The Data Definition and Database system requirements comprise of the following –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_21-010	The system shall be able to permanently store data related to the following altimetry products -	-	-
(a)	ERS-1 Phase C OPR V6	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)	T
(b)	ERS-1 Phase E OPR V3	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)	T
(c)	ERS-1 Phase F OPR V3	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)	T

ID	Requirement	Trc	Ver
(d)	ERS-1 Phase G OPR V6	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)	T
(e)	ERS-2 OPR V6	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)	T
(f)	Envisat GDR 1	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)	T
(g)	T/P MGDR	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)	T
(h)	Jason-1 GDR-C	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)	T
(i)	Jason-2 GDR-C	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)	T
(j)	GFO GDR NOAA	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)	T
(k)	Tide Gauges Time Series	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)	T
(l)	Argo	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)	T
SLCCI-SRB-REQ_21-330	The system shall be able to permanently store data related to crossovers in the context of the input altimetry satellite data.	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)	T
SLCCI-SRB-REQ_21-340	The system shall be able to store all user registration information comprising of	-	-
(a)	username	§7.3-3&7&10	T
(b)	password	§7.3-3&7&10	T
SLCCI-SRB-REQ_21-400	The system shall have a provision to export all primary satellite data that it holds.	§7.3-12	T

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_21-410	The system shall have a provision to export all ancillary data that it holds.	§7.3-12	T
SLCCI-SRB-REQ_21-420	The system shall have a provision to export all user registration information that it holds.	§7.3-12	T
SLCCI-SRB-REQ_21-430	The system shall have a provision to export all crossover data that it holds.	§7.3-12	T
SLCCI-SRB-REQ_21-440[5]	The database component used shall be computationally capable of processing the data load of future mission data	§7.3-15	I
[TBD]SLCCI-SRB-REQ_21-500	The maximum database size provision for primary satellite data shall be <x> Mb.	§7.3-17, §7.6-1&2&5 (DARD), §7.9-5 (PSAD)	T
[TBD]SLCCI-SRB-REQ_21-510	The maximum database size provision for ancillary data shall be <x> Mb.	§7.3-17, §7.6-1&2&5 (DARD), §7.9-5 (PSAD)	T
[TBD]SLCCI-SRB-REQ_21-520	The maximum database size provision for crossover information shall be <x> Mb.	§7.3-17, §7.6-1&2&5 (DARD), §7.9-5 (PSAD)	T
[TBD]SLCCI-SRB-REQ_21-530	The maximum database size provision for user information shall be <x> Mb.	§7.3-17, §7.6-1&2&5 (DARD), §7.9-5 (PSAD)	T

8.26. Human Factors Related Requirements

The Human Factors system requirements comprise of the following -

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_22-010	The Web portal shall freely provide all metadata product information irrespective of whether the user has registered or not, for product types -	-	-
(a)	FCDR	§7.3-3&13	T
(b)	ECV	§7.3-3&13	T

[5] Requirement SLCCI-SRB-REQ_0-012 relates to the system recognising the form of data acquired, whereas SLCCI-SRB-REQ_21-440 relates to the system internally coping with the associated data load.

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_22-040	The system shall provide information denoting the algorithms used across production pipeline.	§7.3-3&13	T
SLCCI-SRB-REQ_22-050	The system shall provide the means for portal users to view on-going system activity.	§7.3-3&4&13	T
[TBD]SLCCI-SRB-REQ_22-060	The system shall provide event status information on production pipeline within <x> seconds of a significant event occurring.	§7.3-3&4&13	T
SLCCI-SRB-REQ_22-080	Any user shall be allowed to perform a search query on the product meta information	§7.3-3&13	T
SLCCI-SRB-REQ_22-090	The queries on product metadata shall allow a user to specify	-	-
(a)	Product type	§7.3-3&13	T
(b)	Product name	§7.3-3&13	T
(c)	Mission name	§7.3-3&13	T
(d)	Date of acquisition	§7.3-3&13	T
(e)	Time of acquisition	§7.3-3&13	T
(f)	Area of interest	§7.3-3&13	T
SLCCI-SRB-REQ_22-160	A registered user shall be able to perform a query on the content across all products	§7.3-3&13	T
SLCCI-SRB-REQ_22-200	A style guide shall be constructed for SLCCI graphical user interfaces (GUI).	§7.3-3&13	I
SLCCI-SRB-REQ_22-210	All GUIs shall conform to the SLCCI style guide	§7.3-3&13	I

8.27. Adaptation and Installation Requirements

The Adaptation and Installation system requirements comprise of the following, particularly for test purposes and the accommodation of scientific investigation –

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_23-020	The system shall have associated with it a formal, well defined series of instructions for the setting up of all network infrastructure associated with all SLCCI hardware.	§7.3-9&13	I

ID	Requirement	Trc	Ver
SLCCI-SRB-REQ_23-030	The system shall have associated with it a formal, well defined series of instructions associated with conducting the absorption of the DUACS altimetric database into the SLCCI altimetric database.	§7.3-9&13	I
SLCCI-SRB-REQ_23-040	The system shall have associated with it a formal, well defined series of instructions associated with conducting the absorption of the DUACS crossovers database into the SLCCI crossovers database.	§7.3-9&13	I
[TBD]SLCCI-SRB-REQ_23-050	It shall on average take an SLCCI Contributor no longer than <x> minutes to deploy all software to the SLCCI physical hardware	§7.3-9&13	T
[TBD]SLCCI-SRB-REQ_23-060	It shall on average take no longer than <x> minutes to set up all network infrastructure associated with SLCCI hardware.	§7.3-9&13	T
[TBD]SLCCI-SRB-REQ_23-070	It shall on average take no longer than <x> minutes to conduct the absorption of the DUACS altimetric database into the SLCCI altimetric database.	§7.3-9&13	T
[TBD]SLCCI-SRB-REQ_23-080	It shall on average take no longer than <x> minutes to conduct the absorption of the DUACS crossovers database into the SLCCI crossovers database.	§7.3-9&13	T

Appendix A - **Traceability Summary of System Requirements Baseline**

The following table summarises the mapping between system requirement ID and associated traceability. The system required ID is coloured red if the associated system requirement refers to a value yet to be determined; these cases are also listed under the “Lists of TBD”.

ID	Traceability
SLCCI-SRB-REQ_0-047	-
(a)	§0-2&3 (PSD), §7.10-1 (SEWG), §7.4-6 (URD)
(b)	§0-2&3 (PSD), §7.10-1 (SEWG), §7.4-10 (URD)
SLCCI-SRB-REQ_0-048	-
(a)	§0-2&3 (PSD), §7.10-1 (SEWG), §7.4-10 (URD)
(b)	§0-2&3 (PSD), §7.10-1 (SEWG), §7.4-10 (URD)
SLCCI-SRB-REQ_0-012	§7.7-3 (SoW), §7.4-5 (URD), §7.3-15, §7.9-6 (PSAD)
SLCCI-SRB-REQ_0-013	-
(a)	§7.6-1 (DARD)
(b)	§7.6-1 (DARD)
(c)	§7.6-1 (DARD)
(d)	§7.6-1 (DARD)
(e)	§7.6-1 (DARD)
(f)	§7.6-1 (DARD)
(g)	§7.6-1 (DARD)
(h)	§7.6-1 (DARD)
(i)	§7.6-1 (DARD)
(j)	§7.6-1 (DARD)
SLCCI-SRB-REQ_0-024	-
(a)	§7.6-3 (DARD)
(b)	§7.6-3 (DARD)
(c)	§7.6-3 (DARD)
(d)	§7.6-3 (DARD)
SLCCI-SRB-REQ_0-029	-
(a)	§7.6-3 (DARD)
(b)	§7.6-3 (DARD)

ID	Traceability
SLCCI-SRB-REQ_0-051	-
(a)	§7.6-5 (DARD)
(b)	§7.6-5 (DARD)
SLCCI-SRB-REQ_0-053	-
(a)	§7.9-1 (PSAD)
(b)	§7.9-1 (PSAD)
SLCCI-SRB-REQ_0-500	-
(a)	§7.4-1 (URD)
(b)	§7.4-2 (URD)
(c)	§7.4-3 (URD)
(d)	§7.4-3 (URD)
(e)	§7.4-4 (URD)
(f)	§7.4-5 (URD)
(g)	§7.4-6 (URD)
(h)	§7.4-7 (URD)
(i)	§7.4-8 (URD)
(j)	§7.4-9 (URD)
(k)	§7.4-10 (URD)
(l)	§7.4-11 (URD)
SLCCI-SRB-REQ_1-010	§7.2.1 Table 4
SLCCI-SRB-REQ_1-011	-
(a)	§7.2.1 Table 4
(b)	§7.2.1 Table 4
SLCCI-SRB-REQ_1-012	§7.2.1 Table 4
SLCCI-SRB-REQ_1-013	
(a)	§7.2.1 Table 4
(b)	§7.2.1 Table 4
SLCCI-SRB-REQ_1-020	§7.2.1 Table 4
SLCCI-SRB-REQ_1-060	§7.2.1 Table 4
SLCCI-SRB-REQ_1-100	§7.3-14, §7.9-2 (PSAD)
SLCCI-SRB-REQ_1-101	§7.3-14, §7.9-2 (PSAD)

ID	Traceability
SLCCI-SRB-REQ_1-070	§7.2.1 Table 4
SLCCI-SRB-REQ_1-235	§7.3-1&14
SLCCI-SRB-REQ_1-236	§7.3-1&14
SLCCI-SRB-REQ_2-010	§7.2.1 Table 5
SLCCI-SRB-REQ_2-011	§7.2.1 Table 5
SLCCI-SRB-REQ_2-012	§7.2.1 Table 5
SLCCI-SRB-REQ_2-100	§7.3-1&14
SLCCI-SRB-REQ_3-019	-
(a)	§7.2.1 Table 6
(b)	§7.2.1 Table 6
SLCCI-SRB-REQ_3-020	-
(a)	§7.2.1 Table 6
(b)	§7.2.1 Table 6
(c)	§7.2.1 Table 6
SLCCI-SRB-REQ_3-030	-
(a)	§7.2.1 Table 6
(b)	§7.2.1 Table 6
(c)	§7.2.1 Table 6
(d)	§7.2.1 Table 6
SLCCI-SRB-REQ_3-040	-
(a)	§7.2.1 Table 6
(b)	§7.2.1 Table 6
(c)	§7.2.1 Table 6
(d)	§7.2.1 Table 6
SLCCI-SRB-REQ_4-010	-
(a)	§7.2.1 Table 6
(b)	§7.2.1 Table 6
(c)	§7.2.1 Table 6
SLCCI-SRB-REQ_4-011	§7.2.1 Table 6
SLCCI-SRB-REQ_3-200	§7.3-1&14
SLCCI-SRB-REQ_3-201	§7.3-1&14
SLCCI-SRB-REQ_5-000	§7.2.1 Table 7

ID	Traceability
SLCCI-SRB-REQ_5-010	§7.2.1 Table 7
SLCCI-SRB-REQ_5-020	§7.2.1 Table 7
SLCCI-SRB-REQ_5-030	§7.2.1 Table 7
SLCCI-SRB-REQ_5-031	§7.2.1 Table 7
SLCCI-SRB-REQ_5-032	§7.3-1&14
SLCCI-SRB-REQ_5-040	§7.2.1 Table 7, §0-1 (PSD)
SLCCI-SRB-REQ_5-042	§7.2.1 Table 7
SLCCI-SRB-REQ_5-044	§7.3-1&14
SLCCI-SRB-REQ_5-050	§7.2.1 Table 7, §0-1 (PSD)
SLCCI-SRB-REQ_5-052	§7.2.1 Table 7
SLCCI-SRB-REQ_5-054	§7.3-1&14
SLCCI-SRB-REQ_6-000	-
(a)	§7.2.1 Table 8
(b)	§7.2.1 Table 8
(c)	§7.2.1 Table 8
SLCCI-SRB-REQ_6-019	§7.2.1 Table 8
SLCCI-SRB-REQ_6-020	§7.2.1 Table 8
SLCCI-SRB-REQ_6-060	-
(a)	§7.2.1 Table 8
(b)	§7.2.1 Table 8
(c)	§7.2.1 Table 8
(d)	§7.2.1 Table 8
(e)	§7.2.1 Table 8
(f)	§7.2.1 Table 8
(g)	§7.2.1 Table 8
SLCCI-SRB-REQ_7-000	-
(a)	§7.2.1 Table 9
(b)	§7.2.1 Table 9
SLCCI-SRB-REQ_7-004	-
(a)	§7.2.1 Table 9
(b)	§7.2.1 Table 9
(c)	§7.2.1 Table 9
SLCCI-SRB-REQ_8-010	-

ID	Traceability
(a)	§7.2.1 Table 10
(b)	§7.2.1 Table 10, §7.10-2 (SEWG)
SLCCI-SRB-REQ_8-020	-
(a)	§7.2.1 Table 10
(b)	§7.2.1 Table 10
SLCCI-SRB-REQ_8-043	§7.2.1 Table 10
SLCCI-SRB-REQ_8-044	§7.2.1 Table 10
SLCCI-SRB-REQ_8-045	§7.2.1 Table 10
SLCCI-SRB-REQ_8-042	§7.3-1&14
SLCCI-SRB-REQ_9-010	-
(a)	§7.2.1 Table 11
(b)	§7.2.1 Table 11
SLCCI-SRB-REQ_9-030	§7.2.1 Table 11
SLCCI-SRB-REQ_9-031	§7.2.1 Table 11
SLCCI-SRB-REQ_9-040	§7.2.1 Table 11
SLCCI-SRB-REQ_9-050	§7.2.1 Table 11
SLCCI-SRB-REQ_9-200	§7.10-2 (SEWG)
SLCCI-SRB-REQ_9-205	§7.2.1 Table 11
SLCCI-SRB-REQ_9-051	§7.3-1&14
SLCCI-SRB-REQ_10-000	§7.2.2 Table 12
SLCCI-SRB-REQ_10-020	§7.2.2 Table 12
SLCCI-SRB-REQ_10-021	§7.2.2 Table 12
SLCCI-SRB-REQ_10-200	-
(a)	§7.3-4&7&10
(b)	§7.3-4&7&10
(c)	§7.3-4&7&10
SLCCI-SRB-REQ_10-201	§7.3-4&7&10
SLCCI-SRB-REQ_10-210	§7.3-10
SLCCI-SRB-REQ_10-220	§7.3-5
SLCCI-SRB-REQ_10-040	§7.2.2 Table 13, §7.3-5
SLCCI-SRB-REQ_10-230	§7.3-4&7&10
SLCCI-SRB-REQ_10-240	§7.3-4&7&10
SLCCI-SRB-REQ_10-050	§7.2.2 Table 14, §7.3-3&6&13

ID	Traceability
SLCCI-SRB-REQ_10-051	§7.2.2 Table 14, §7.3-3&6&13
SLCCI-SRB-REQ_10-054	§7.2.2 Table 14, §7.3-3&6&13
SLCCI-SRB-REQ_10-055	-
(a)	§7.2.2 Table 14, §7.3-3&6&13
(b)	§7.2.2 Table 14, §7.3-3&6&13
(c)	§7.2.2 Table 14, §7.3-3&6&13
(d)	§7.2.2 Table 14, §7.3-3&6&13
SLCCI-SRB-REQ_10-060	§7.2.2 Table 14
SLCCI-SRB-REQ_10-061	§7.2.2 Table 14
SLCCI-SRB-REQ_10-080	-
(a)	§7.2.2 Table 14, §7.3-3&6&13
(b)	§7.2.2 Table 14, §7.3-3&6&13
(c)	§7.2.2 Table 14, §7.3-3&6&13
(d)	§7.2.2 Table 14, §7.3-3&6&13
SLCCI-SRB-REQ_10-100	-
(a)	§7.2.2 Table 14, §7.3-3&6&13
(b)	§7.2.2 Table 14, §7.3-3&6&13
(c)	§7.2.2 Table 14, §7.3-3&6&13
(d)	§7.2.2 Table 14, §7.3-3&6&13
(e)	§7.2.2 Table 14, §7.3-3&6&13
(f)	§7.2.2 Table 14, §7.3-3&6&13
(g)	§7.2.2 Table 14, §7.3-3&6&13
(h)	§7.2.2 Table 14, §7.3-3&6&13
(i)	§7.2.2 Table 14, §7.3-3&6&13
(j)	§7.2.2 Table 14, §7.3-3&6&13
(k)	§7.2.2 Table 14, §7.3-3&6&13
(l)	§7.2.2 Table 14, §7.3-3&6&13
(m)	§7.2.2 Table 14, §7.3-3&6&13
(n)	§7.2.2 Table 14, §7.3-3&6&13
(o)	§7.2.2 Table 14, §7.3-3&6&13
SLCCI-SRB-REQ_10-090	§7.2.2 Table 14, §7.3-3&6&13
SLCCI-SRB-REQ_10-081	§7.3-3&6&13
SLCCI-SRB-REQ_11-500	§7.3-5

ID	Traceability
SLCCI-SRB-REQ_11-110	§7.3-5
SLCCI-SRB-REQ_11-120	-
(a)	§7.3-5
(b)	§7.3-5
(c)	§7.3-5
SLCCI-SRB-REQ_11-010	§7.2.3 Table 15
SLCCI-SRB-REQ_11-011	§7.2.3 Table 15
SLCCI-SRB-REQ_11-020	§7.2.3 Table 15
SLCCI-SRB-REQ_11-021	§7.2.3 Table 15
SLCCI-SRB-REQ_11-030	-
(a)	§7.2.3 Table 15
(b)	§7.2.3 Table 15
SLCCI-SRB-REQ_11-033	-
(a)	§7.2.3 Table 15
(b)	§7.2.3 Table 15
(c)	§7.2.3 Table 15
(d)	§7.2.3 Table 15
(e)	§7.2.3 Table 15
SLCCI-SRB-REQ_11-050	-
(a)	§7.2.3 Table 15
(b)	§7.2.3 Table 15
SLCCI-SRB-REQ_11-060	§7.2.3 Table 15
SLCCI-SRB-REQ_11-070	-
(a)	§7.2.3 Table 15
(b)	§7.2.3 Table 15
SLCCI-SRB-REQ_11-080	-
(a)	§7.2.3 Table 15
(b)	§7.2.3 Table 15
SLCCI-SRB-REQ_11-090	-
(a)	§7.2.3 Table 15
(b)	§7.2.3 Table 15
(c)	§7.2.3 Table 15
SLCCI-SRB-REQ_12-010	-

ID	Traceability
(a)	§7.2.4 Table 16
(b)	§7.2.4 Table 16
(c)	§7.2.4 Table 16
SLCCI-SRB-REQ_12-050	§7.2.4 Table 16
SLCCI-SRB-REQ_12-080	§7.2.4 Table 16
SLCCI-SRB-REQ_12-090	§7.2.4 Table 16
SLCCI-SRB-REQ_12-091	-
(a)	§7.2.4 Table 16
(b)	§7.2.4 Table 16
(c)	§7.2.4 Table 16
(d)	§7.2.4 Table 16
SLCCI-SRB-REQ_12-100	§7.2.4 Table 16
SLCCI-SRB-REQ_12-101	§7.2.4 Table 16
SLCCI-SRB-REQ_12-200	§7.3-2
SLCCI-SRB-REQ_12-210	§7.3-2
SLCCI-SRB-REQ_12-220	§7.3-2
SLCCI-SRB-REQ_1-030	§7.2.1 Table 4
SLCCI-SRB-REQ_1-031	§7.2.1 Table 4
SLCCI-SRB-REQ_1-032	§7.2.1 Table 4
SLCCI-SRB-REQ_1-033	§7.2.1 Table 4
SLCCI-SRB-REQ_1-034	§7.2.1 Table 4
SLCCI-SRB-REQ_1-035	§7.2.1 Table 4
SLCCI-SRB-REQ_1-036	§7.2.1 Table 4
SLCCI-SRB-REQ_1-096	-
(a)	§7.2.1 Table 4
(b)	§7.2.1 Table 4
SLCCI-SRB-REQ_1-400	§7.3-3
SLCCI-SRB-REQ_1-401	§7.3-14
SLCCI-SRB-REQ_1-420	§7.3-3
SLCCI-SRB-REQ_1-102	-
(a)	§7.9-2 (PSAD), §7.6-1 (DARD)
(b)	§7.9-2 (PSAD), §7.6-1 (DARD)
(c)	§7.9-2 (PSAD), §7.6-1 (DARD)

ID	Traceability
(d)	§7.9-2 (PSAD), §7.6-1 (DARD)
(e)	§7.9-2 (PSAD), §7.6-1 (DARD)
(f)	§7.9-2 (PSAD), §7.6-1 (DARD)
(g)	§7.9-2 (PSAD), §7.6-1 (DARD)
(h)	§7.9-2 (PSAD), §7.6-1 (DARD)
(i)	§7.9-2 (PSAD), §7.6-1 (DARD)
(j)	§7.9-2 (PSAD), §7.6-1 (DARD)
(k)	§7.9-2 (PSAD), §7.6-3 (DARD)
(l)	§7.9-2 (PSAD), §7.6-3 (DARD)
SLCCI-SRB-REQ_1-202	-
(a)	§7.6-3 (DARD), 7.3-3
(b)	§7.6-3 (DARD), 7.3-3
(c)	§7.6-3 (DARD), 7.3-3
(d)	§7.6-3 (DARD), 7.3-3
(e)	§7.6-3 (DARD), 7.3-3
(f)	§7.6-3 (DARD), 7.3-3
(g)	§7.6-3 (DARD), 7.3-3
(h)	§7.6-3 (DARD), 7.3-3
(i)	§7.6-3 (DARD), 7.3-3
(j)	§7.6-3 (DARD), 7.3-3
(k)	§7.6-3 (DARD), 7.3-3
(l)	§7.6-3 (DARD), 7.3-3
SLCCI-SRB-REQ_14-010	§7.3-16
SLCCI-SRB-REQ_14-020	§7.3-17
SLCCI-SRB-REQ_14-030	§7.3-17
SLCCI-SRB-REQ_14-040	§7.3-17
SLCCI-SRB-REQ_1-300	-
(a)	§7.3-17, §7.6-3 (DARD)
(b)	§7.3-17, §7.6-3 (DARD)
(c)	§7.3-17, §7.6-3 (DARD)
(d)	§7.3-17, §7.6-3 (DARD)
(e)	§7.3-17, §7.6-3 (DARD)
(f)	§7.3-17, §7.6-3 (DARD)

ID	Traceability
(g)	§7.3-17, §7.6-3 (DARD)
(h)	§7.3-17, §7.6-3 (DARD)
(i)	§7.3-17, §7.6-3 (DARD)
(j)	§7.3-17, §7.6-3 (DARD)
(k)	§7.3-17, §7.6-3 (DARD)
(l)	§7.3-17, §7.6-3 (DARD)
SLCCI-SRB-REQ_14-100	§7.3-18
SLCCI-SRB-REQ_14-110	§7.3-18
SLCCI-SRB-REQ_14-120	§7.3-18
SLCCI-SRB-REQ_14-130	§7.3-18
SLCCI-SRB-REQ_14-450	§7.3-18
SLCCI-SRB-REQ_14-460	§7.3-18
SLCCI-SRB-REQ_14-470	
(a)	§7.3-18
(b)	§7.3-18
(c)	§7.3-18
(d)	§7.3-18
SLCCI-SRB-REQ_14-510	§7.3-18
SLCCI-SRB-REQ_14-520	§7.3-18
SLCCI-SRB-REQ_14-530	§7.3-18
SLCCI-SRB-REQ_14-610	§7.3-18
SLCCI-SRB-REQ_15-010	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#1
SLCCI-SRB-REQ_15-020	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#2
SLCCI-SRB-REQ_15-030	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#3
SLCCI-SRB-REQ_15-040	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#4
SLCCI-SRB-REQ_15-050	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#5
SLCCI-SRB-REQ_15-060	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#6
SLCCI-SRB-REQ_15-070	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#7
SLCCI-SRB-REQ_15-080	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#8
SLCCI-SRB-REQ_15-090	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#9
SLCCI-SRB-REQ_15-100	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#10
SLCCI-SRB-REQ_15-110	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#11
SLCCI-SRB-REQ_15-120	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#12

ID	Traceability
SLCCI-SRB-REQ_15-130	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#13
SLCCI-SRB-REQ_15-140	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#14
SLCCI-SRB-REQ_15-150	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#15
SLCCI-SRB-REQ_15-160	§7.7-2&1 (SoW); SLCCI-SRB-BUSINESS-GOAL_#16
SLCCI-SRB-REQ_15-170	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#17
SLCCI-SRB-REQ_15-180	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#18
SLCCI-SRB-REQ_15-190	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#19
SLCCI-SRB-REQ_15-200	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#20
SLCCI-SRB-REQ_15-210	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#21
SLCCI-SRB-REQ_15-220	§7.7-2&1 (SoW) ; SLCCI-SRB-BUSINESS-GOAL_#22
SLCCI-SRB-REQ_15-230	§7.7-2&1 (SoW); SLCCI-SRB-BUSINESS-GOAL_#23
SLCCI-SRB-REQ_15-240	§7.7-2&1 (SoW); SLCCI-SRB-BUSINESS-GOAL_#24
SLCCI-SRB-REQ_15-300	-
(a)	§7.9-3&4&7 (PSAD)
(b)	§7.9-3&4&7 (PSAD)
SLCCI-SRB-REQ_15-400	§7.10 (SEWG)
SLCCI-SRB-REQ_15-410	§7.10 (SEWG)
SLCCI-SRB-REQ_15-420	§7.3-19
SLCCI-SRB-REQ_15-430	§7.3-20
SLCCI-SRB-REQ_15-500	§7.3-21
SLCCI-SRB-REQ_15-510	§7.3-22
SLCCI-SRB-REQ_16-070	§7.3-10
SLCCI-SRB-REQ_16-071	§7.3-10
SLCCI-SRB-REQ_16-080	§7.3-10
SLCCI-SRB-REQ_16-090	§7.3-10
SLCCI-SRB-REQ_16-100	§7.3-10
SLCCI-SRB-REQ_16-220	§7.3-10
SLCCI-SRB-REQ_16-240	§7.3-10
SLCCI-SRB-REQ_16-241	§7.3-10
SLCCI-SRB-REQ_16-250	§7.3-10
SLCCI-SRB-REQ_16-260	§7.3-10
SLCCI-SRB-REQ_16-270	§7.3-10
SLCCI-SRB-REQ_16-280	-

ID	Traceability
(a)	§7.3-10
(b)	§7.3-10
(c)	§7.3-10
(d)	§7.3-10
SLCCI-SRB-REQ_16-330	-
(a)	§7.3-10
(b)	§7.3-10
(c)	§7.3-10
(d)	§7.3-10
(e)	§7.3-10
SLCCI-SRB-REQ_16-400	§7.3-10
SLCCI-SRB-REQ_16-410	§7.3-10
SLCCI-SRB-REQ_16-420	§7.3-10
SLCCI-SRB-REQ_16-430	§7.3-10
SLCCI-SRB-REQ_16-440	§7.3-10
SLCCI-SRB-REQ_16-500	§7.3-10
SLCCI-SRB-REQ_16-510	§7.3-10
SLCCI-SRB-REQ_16-520	§7.3-10
SLCCI-SRB-REQ_16-530	§7.3-10
SLCCI-SRB-REQ_17-010	§7.3-10
SLCCI-SRB-REQ_17-020	§7.3-10
SLCCI-SRB-REQ_15-200	§7.3-8
SLCCI-SRB-REQ_15-210	§7.3-8
SLCCI-SRB-REQ_18-100	§7.8-1 (ECSS), §7.3-8
SLCCI-SRB-REQ_18-110	§7.8-2 (ECSS), §7.3-8
SLCCI-SRB-REQ_18-120	§7.8-3 (ECSS), §7.3-8
SLCCI-SRB-REQ_18-130	§7.8-4 (ECSS), §7.3-8
SLCCI-SRB-REQ_18-140	-
(a)	§7.8-5 (ECSS), §7.3-8
(b)	§7.8-5 (ECSS), §7.3-8
(c)	§7.8-5 (ECSS), §7.3-8
(d)	§7.8-5 (ECSS), §7.3-8
(e)	§7.8-5 (ECSS), §7.3-8

ID	Traceability
(f)	§7.8-5 (ECSS), §7.3-8
(g)	§7.8-5 (ECSS), §7.3-8
(h)	§7.8-5 (ECSS), §7.3-8
(i)	§7.8-5 (ECSS), §7.3-8
SLCCI-SRB-REQ_18-150	§7.8-6 (ECSS), §7.3-8
SLCCI-SRB-REQ_18-160	§7.8-7 (ECSS), §7.3-8
SLCCI-SRB-REQ_18-170	§7.8-8 (ECSS), §7.3-8
SLCCI-SRB-REQ_18-180	§7.8-9 (ECSS), §7.3-8
SLCCI-SRB-REQ_18-190	§7.8-10 (ECSS), §7.3-8
SLCCI-SRB-REQ_19-010	§7.3-11
SLCCI-SRB-REQ_19-020	§7.3-11
SLCCI-SRB-REQ_19-030	§7.3-11
SLCCI-SRB-REQ_19-040	§7.3-11
SLCCI-SRB-REQ_19-050	§7.3-11
SLCCI-SRB-REQ_19-060	§7.3-11
SLCCI-SRB-REQ_19-070	§7.3-11
SLCCI-SRB-REQ_19-080	§7.3-11
SLCCI-SRB-REQ_19-090	§7.3-11
SLCCI-SRB-REQ_19-100	§7.3-11
SLCCI-SRB-REQ_19-110	§7.3-11
SLCCI-SRB-REQ_19-120	§7.3-11
SLCCI-SRB-REQ_19-200	§7.3-11
SLCCI-SRB-REQ_19-210	§7.3-11
SLCCI-SRB-REQ_19-220	§7.3-11
SLCCI-SRB-REQ_19-230	§7.3-11
SLCCI-SRB-REQ_19-240	§7.3-11
SLCCI-SRB-REQ_19-250	§7.3-11
SLCCI-SRB-REQ_19-260	§7.3-11
SLCCI-SRB-REQ_19-270	§7.3-11
SLCCI-SRB-REQ_19-280	§7.3-11
SLCCI-SRB-REQ_19-290	§7.3-11
SLCCI-SRB-REQ_19-500	§7.3-21
SLCCI-SRB-REQ_20-010	§7.3-9&19

ID	Traceability
SLCCI-SRB-REQ_21-010	-
(a)	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)
(b)	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)
(c)	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)
(d)	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)
(e)	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)
(f)	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)
(g)	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)
(h)	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)
(i)	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)
(j)	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)
(k)	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)
(l)	§7.6-1&2 (DARD), §7.3-3 , §7.9-5 (PSAD)
SLCCI-SRB-REQ_21-330	§7.6-1&2 (DARD), §7.3-3, §7.9-5 (PSAD)
SLCCI-SRB-REQ_21-340	-
(a)	§7.3-3&7&10
(b)	§7.3-3&7&10
SLCCI-SRB-REQ_21-400	§7.3-12
SLCCI-SRB-REQ_21-410	§7.3-12
SLCCI-SRB-REQ_21-420	§7.3-12
SLCCI-SRB-REQ_21-430	§7.3-12
SLCCI-SRB-REQ_21-440	§7.3-15
SLCCI-SRB-REQ_21-500	§7.3-17, §7.6-1&2&5 (DARD), §7.9-5 (PSAD)
SLCCI-SRB-REQ_21-510	§7.3-17, §7.6-1&2&5 (DARD), §7.9-5 (PSAD)
SLCCI-SRB-REQ_21-520	§7.3-17, §7.6-1&2&5 (DARD), §7.9-5 (PSAD)
SLCCI-SRB-REQ_21-530	§7.3-17, §7.6-1&2&5 (DARD), §7.9-5 (PSAD)
SLCCI-SRB-REQ_22-010	-
(a)	§7.3-3&13
(b)	§7.3-3&13
SLCCI-SRB-REQ_22-040	§7.3-3&13
SLCCI-SRB-REQ_22-050	§7.3-3&4&13
SLCCI-SRB-REQ_22-060	§7.3-3&4&13
SLCCI-SRB-REQ_22-080	§7.3-3&13

ID	Traceability
SLCCI-SRB-REQ_22-090	-
(a)	§7.3-3&13
(b)	§7.3-3&13
(c)	§7.3-3&13
(d)	§7.3-3&13
(e)	§7.3-3&13
(f)	§7.3-3&13
SLCCI-SRB-REQ_22-160	§7.3-3&13
SLCCI-SRB-REQ_22-200	§7.3-3&13
SLCCI-SRB-REQ_22-210	§7.3-3&13
SLCCI-SRB-REQ_23-020	§7.3-3&13
SLCCI-SRB-REQ_23-030	§7.3-3&13
SLCCI-SRB-REQ_23-040	§7.3-3&13
SLCCI-SRB-REQ_23-050	§7.3-9&13
SLCCI-SRB-REQ_23-060	§7.3-9&13
SLCCI-SRB-REQ_23-070	§7.3-9&13
SLCCI-SRB-REQ_23-080	§7.3-9&13

Appendix B - **DUACS System Requirements**

The following table represents Appendix B (« List of Requirements ») of [RD 9], summarising the list of DUACS system requirements as realised for My Ocean SL TAC.

[SR SLTAC-1] Production v0
[SR SLTAC-1.1] Acquire Data v0
[SR SLTAC-1.1.1] The system detects new data flows (input altimetry level 2 data and auxiliary data). v0
[SR SLTAC-1.1.2] The system checks the synchronization between the input data and the auxiliary data (the dependency between input data and auxiliary data needed for the processing). In nominal case, input and auxiliary data are present and the system acquire them. This process is completely automated. v0
[SR SLTAC-1.1.3] If a received data flow is not as expected (regarding the format and content), the system sends an automatic warning to the Support Operator. The Support Operator analyses the source for the detection of the abnormal flow. He asks the upstream system to deliver again the corrupted flow and run again the acquisition process. v0
[SR SLTAC-1.1.4] Input data coming from the upstream systems may be provided twice for the same data flow. This is due to Level 2 processing that first produces Level 2 data in a degraded mode (with predicted meteorological fields instead of analyzed fields for instance) and regenerates the same data flows in nominal mode. It can happen for NRT data. v0
[SR SLTAC-1.1.5] SL TAC acquisition module is planned to take the first Level 2 delivered by the upstream and ignore the flows that are delivered after the acquisition has been performed. Degraded level 2 data will degrade the quality of the output products. The decision to take into account the new level 2 data must be taken by the Support Operator and approved by the Service Manager. The acquisition process is forced by human intervention. The products of degraded quality are not reprocessed but new products will use the new Level 2 data once they have been acquired. v0
[SR SLTAC-1.1.6] The auxiliary data needed for the input data may not be present. In this case, the associated input data flow is put in a waiting queue until the auxiliary data is present and then, the acquisition is done following the normal flow. v0
[SR SLTAC-1.1.7] The input data are supposed to be acquired on a given date. The system can wait for the acquisition until a defined delay. When the delay is expired, the support operator is automatically warned that the data flow is too late. There are 2 cases: v0
[SR SLTAC-1.1.7.1] The unavailability of the input data is temporary (incident on an altimeter): the output products can be generated but with a degraded quality. The information on the quality of the products has to be reported to the Top Level Service Desk through the SL TAC Service Desk. It may also be reported in the dynamic metadata of the products TBC, upon Service Desk Manager decision. v0
[SR SLTAC-1.1.7.2] The unavailability of the input data is definitive (loss of one altimetry mission): the products of the corresponding mission will not be produced anymore. The incident has to be reported to the Top Level Service Desk through the SL TAC Service Desk since it impacts the products available for the users. The decision for the system evolution must be taken by the scientific experts,

according with the Service Manager. The organization for such a scenario is described in the Service Management Plan. v0
[SR SLTAC-1.2] Pre process Data v0
[SR SLTAC-1.2.1] The data are homogenized by using the suitable geophysical corrections to calculate the Sea Level Anomaly for each altimetry mission. This is a completely automated process. v0
[SR SLTAC-1.3] Perform input checks and QC v0
[SR SLTAC-1.3.1] The system performs different checks on the data v0
[SR SLTAC-1.3.2] The system performs statistics on the data (automated process) v0
[SR SLTAC-1.3.3] If the Product Expert detects that some statistics are out of range, he investigates on the source of these errors. He warns the upstream data centers of the anomaly detected on the input data flows. This error can be corrected by a new acquisition of the input flow that was initially corrupted (not detected at the acquisition level but at the step of the input checks). If needed, he reports the anomaly to the Service Desk Manager. v0
[SR SLTAC-1.3.4] If the problem on the input data flow is more serious (loss of one instrument on the platform but not critical), the output products can be generated but with a degraded quality. The information on the quality of the products has to be reported to the Top Level Service Desk through the SL TAC Service Desk. It may also be reported in the dynamic metadata of the products TBC, upon Service Manager decision. The SL TAC system has to be modified to cope with the new configuration of input data. The decision for the modification must be validated by the Service Manager. The organization for such a scenario is described in the Service Management Plan. v0
[SR SLTAC-1.4] Produce internal QC data v0
[SR SLTAC-1.4.1] The statistics are gathered in a synthesis report to be checked by the Product expert twice a week for V0 and V1, TBD for V2 v0
[SR SLTAC-1.5] Generate Products v0
[SR SLTAC-1.5.1] Calculation of orbit error (this process will evolve between V0 and V1) v0 (old algorithm) v1 (prototype for new method)
[SR SLTAC-1.5.2] Calculation of the residual data sets for each mission (along track Sea Level Anomaly) v0
[SR SLTAC-1.5.3] Calculation of the long wavelength error (LWE) and correct the SLA for the LWE v0
[SR SLTAC-1.5.4] Calculation of the MSLA maps (Mapping of Sea Level Anomaly) which are defined as internal product within MyOcean system v0
[SR SLTAC-1.5.5] Calculation of the along track SLA corrected for the LWE which are defined as external products within MyOcean system (the NRT and RAN Products) v0
[SR SLTAC-1.6] Perform output checks and QC v0
[SR SLTAC-1.6.1] The system performs different checks on the data v0
[SR SLTAC-1.6.2] The system performs temporal statistics on the external output data (automated process) v0
[SR SLTAC-1.6.3] The system performs temporal statistics on the internal output data (automated process) v0

[SR SLTAC-1.6.4] The statistics are gathered in a synthesis report to be checked by the Product expert twice a week. This information will be used to update the dynamic metadata of the products (for NRT products) by the Product expert. v0
[SR SLTAC-1.6.5] For RAN products, the validation is performed by both Product expert and Scientific Experts with deeper validation and use of SL TAC external tools. The validation loop may need to run several times the production chain. A dedicated report is made available to the users, summarizing updates and the quality of the new release. v0
[SR SLTAC-1.6.6] If the Product Expert detects that some statistics are out of the expected range (continuity of the output time series is not respected), he warns the Support Operator. If the anomaly can be corrected in the SL TAC, the production chain is run again (the Use Cases which are impacted). If needed, the Support Operator reports the anomaly to the Service Manager. v0
[SR SLTAC-1.7] Do measures and build indicators v0
[SR SLTAC-1.7.1] The system calculates the different KPI for the SL TAC. The list of the KPI is described in the Service Management Plan. The KPI are available on a daily basis, for NRT products only in V0 and V1. For V2, the KPI calculation will be modified to take into account the on the fly processing. v0 v2 (upgrade)
[SR SLTAC-1.7.2] The system calculates the different Ocean Indictors for the SL TAC. The list of the Ocean Indicators is described in the Service Management Plan. v0
[SR SLTAC-1.7.3] The system calculates interpreted indictors for the SL TAC, which are derived from KPI and scientific metrics. Such indicators shall provide information easier to understand for the users and are described in the Service Management Plan. v0
[SR SLTAC-1.7.4] If some indicators are not calculated (daily update according to the daily NRT production), the Support Operator or the Product expert investigates the problem, corrects the problem and reports the incident to the Service Manager. v0
[SR SLTAC-1.8] Store the built Product Datasets v0
[SR SLTAC-1.8.1] The datasets are stored on the physical space accessible by the MIS Gateway component and the Web Portal. v1
[SR SLTAC-1.8.2] The Products will be built by the Product expert by updating the missing metadata (both static and dynamic) v0 v2 (upgrade)
[SR SLTAC-1.8.3] The product is distributed, even if the metadata are not updated.
[SR SLTAC-1.8.4] If the MIS Gateway component fails, products will be accessed by users by FTP. If the FTP server fails, an incident has to be reported to the SL TAC Service Manager. Once it is repaired, the products are available to the users but with delayed time.
[SR SLTAC-1.9] Archive/retrieve a Product Dataset v0 v1 (upgrade of process)
[SR SLTAC-1.9.1] For the SL TAC, the archive is performed on CNES archive. v1
[SR SLTAC-1.9.2] The output products (internal and external products) and associated context (input and auxiliary data) are archived. v0
[SR SLTAC-1.9.3] The decision and the archive procedure is automatic. v0
[SR SLTAC-1.9.4] Products are retrieved, on request only, coming from the SL TAC Service Manager. This procedure should be very rare since all NRT and RAN products shall be available for the users till the next RAN update. v0

[SR SLTAC-1.9.5] If the archival system fails, the incident is reported to the Service Manager and is repaired. v0
[SR SLTAC-2] Product Management v0
[SR SLTAC-2.1] Maintain the Product Database (for SL TAC products related) v0
[SR SLTAC-2.1.1] Product Managers shall use the "MIS Metadata Editor" provided by the MIS to maintain the product database. v2
[SR SLTAC-2.1.2] Registering Products descriptions (static metadata) v2. The SL TAC "Product Manager" shall register the "Products" in the Product Database managed by MyOcean Information System (MIS) (in conformance with the FTSS): • Creation of "Product Line" and description of the static metadata • Creation of "Product Specification" (related to a "Product Line") and description of the static metadata • Authorization of the "Product" (so that MyOcean can start ?logging? dynamic metadata for this "Product").
[SR SLTAC-2.1.3] Maintaining Products descriptions (static metadata and dynamic metadata) v2. The SL TAC "Product Manager" shall maintain Product information up to date (in conformance with the FTSS): • Update of "Product Line" static metadata (if update of the FTSS) • Update of "Product Specification" static metadata (if update of the FTSS) • Delete of "Product Specification" (if update of the FTSS) • Delete of "Product Line" (if update of the FTSS, and only if no other Product Specifications depend on the Product Line) • Update of the Authorization of a "Product? • Update of dynamic metadata of a product (effective delivery characteristics, effective quality characteristics)
[SR SLTAC-2.1.4] Database Products update coordinated with the Top-Level Product Manager v2. Each update (creation/deletion of a Product Line/Product specification, authorization of a Product) of the Products Database by the SL TAC Product Manager has to be reported to the Top-Level Product Manager for a validation (particularly regarding the state of a Product: operational or not).
[SR SLTAC-2.2] Update Static Metadata v0
[SR SLTAC-2.2.1] SL TAC Product Manager can (through the MIS) create a new Product Line or a new Product Specification (either void, either duplicated from an existing one) v1
[SR SLTAC-2.2.2] The Product Manager must also register as Product Lines the upstream data that are delivered by providers external to MyOcean v1. Such Product Lines won't have associated Product Specifications and are necessary to the product dependencies.
[SR SLTAC-2.2.3] SL TAC Product Manager can (through the MIS) update static metadata of Product Line or Product Specification v2
[SR SLTAC-2.2.4] SL TAC Product Manager can (through the MIS) delete Product Line (allowed only if no other Product Specifications depend on the Product Line) or Product Specification. v1
[SR SLTAC-2.3] Update Dynamic Metadata v0
[SR SLTAC-2.3.1] Delivery characteristics shall be generated (by the System, through the MIS Gateway Production component within the SL TAC) for each delivered Product. v0

[SR SLTAC-2.3.2] Quality characteristics shall be registered by the Product Manager with the support of Product Expert for each delivered Product (see Use Case Perform output checks and QC where part of metadata have been updated by the Product Expert)
[SR SLTAC-3] Product Access and Visualization v0
[SR SLTAC-3.1] View Product v1
[SR SLTAC-3.1.1] SL TAC shall integrate THREDDS, OPENDAP and WMS components for visualization. These components expect netcdf format. v1
[SR SLTAC-3.1.2] SL TAC shall generate static images with “preview” and “full view”. v1
[SR SLTAC-3.2] Get Product v1
[SR SLTAC-3.2.1] SL TAC shall integrate MIS Gateway production component for download v1
[SR SLTAC-3.2.2] SL TAC shall integrate external components for download (FTP, OPENDAP) v0
[SR SLTAC-3.2.3] SL TAC can provide Physical Media delivery (TBC)
[SR SLTAC-3.3] Support Users v0
[SR SLTAC-3.3.1] Users Support Service v0. The requests may be addressed via different communication means (for example through a form), and processed by a dedicated service (Service Desk, at top level) and are cascaded to the SL TAC Service Desk in case of requested information about SL TAC. Request processing can be detailed in 4 phases: • Receive and acknowledge request (to the Top Level Service Desk) • Analyze request (to determine actions, implications and involved stakeholders) • Dispatch request to relevant service or entity (Top Level Service Desk QUARG, SCAMG...) • Close the request (done at SL TAC level or Top Level?)
[SR SLTAC-3.3.2] Write and provide product information (handbook) to the users v0
[SR SLTAC-3.3.3] Service Desk organization has to answer User’s request. v0
[SR SLTAC-3.3.4] Answer to an information request v0. An answer may be returned to an information request via different communication means and within a variable time span depending on information type or availability. For example, user might be directed towards online system capabilities for general information.
[SR SLTAC-3.3.5] Provision of System information (online) v0. As a single point of contact, the MyOcean Web Portal, is offered to users to get automated information, integrated system capabilities allow Support Contributors to automatically manage and publish information on this Web Portal.
[SR SLTAC-3.3.6] Kind of information that can be provided: v0. • Information on Products and services • Availability • Data Policy • New dissemination interfaces (associated to "Products") • "How to" for Users • System and Products Catalogue • Status on the sub system in operations • Status on products (KPI) • Technical information on SL TAC System

• FAQ, tips, how-tos, training, forum… • Service Desk related information • Contacts (for "Production Centre", "Products"...) • Events (incidents, failures)
[SR SLTAC-4] Monitoring v0
[SR SLTAC-4.1] Monitor Sea Level TAC Services v1
[SR SLTAC-4.1.1] Product monitoring is done through raw measurements on the products (see Monitor Production Use Case) v0
[SR SLTAC-4.1.2] System monitoring is done through “Raw measurements” (see System monitoring Use Case) v0
[SR SLTAC-4.1.3] Request monitoring is done through CRM Tool (see Request monitoring Use Case) v0
[SR SLTAC-4.1.4] Monitoring activities can be implemented through different means: v0. • by the system itself • by external tools
[SR SLTAC-4.1.5] Raw measurements are reported to Top-Level for Top Level Services Monitoring Dashboard. Top Level dashboard shows consolidated indicators for all Top level Services. This dashboard allows Service Desk members (Support Operators, Service Managers), at all levels, to know the "health" of the Top Level Services at a glance. v0
[SR SLTAC-4.1.6] All the performed monitoring gives Support Operators every opportunity to detect early incidents or failures and take appropriate actions to ensure the continuity of v0 services.
[SR SLTAC-4.1.7] Monitoring: complementary human tasks v0. Several level of automation might be implemented from fully manual to advanced instrumented monitoring. But in any cases, there will have to be complementary human activities in order to: • monitor measurements, • implement ITIL Processes explained and detailed in the SMP, • support Top-Level on taking decision on whether the OLAs are met or not (Service Manager).
[SR SLTAC-4.2] Monitor System v0
[SR SLTAC-4.2.1] System Infrastructure (hardware) is monitored by the Support Operator (Number and duration of failures) v0
[SR SLTAC-4.2.2] SL TAC System and its components (including physical interfaces with others sub systems such MIS, and provided external interfaces) are monitored by the Support Operator. v0. • Acquisition Chain is monitored by the Support Operator to monitor the interfaces with Upstream systems • Production Chain is monitored by the Support Operator to monitor the interfaces with the MIS • MIS Gateway Production component within SL TAC is monitored • File server is monitored • THREDDS is monitored
[SR SLTAC-4.2.3] The monitoring can be either an automated procedure or human action. v0
[SR SLTAC-4.2.4] Raw measurements are performed by the System and the list of metrics will be

detailed in the Service Management Plan. v0
[SR SLTAC-4.3] Monitor Production v0
[SR SLTAC-4.3.1] The production is monitored in the SL TAC Production Center. v0
[SR SLTAC-4.3.2] Production monitoring includes : v0. • Product availability, latency and delay (this kind of information will be automatically provided by the System) v0 • Product quality information. This information is produced and validated by the Product Expert (see "Perform output checks and QC", "Do measures and build indicators on products" Use Cases). The exact nature of the metrics to be monitored will be detailed in the Service Management Plan. v1
[SR SLTAC-4.3.3] SL TAC Production Center provides its monitoring information to the Top Level Service Desk. v1. The information could be provided through • metadata updated by Production Center and collected by MIS, • information sent to the Top level
[SR SLTAC-4.3.4] SL TAC Production Center Service Managers may access the Top-Level production monitoring information related to their Products (internal, external), or to their Product Lines (MyOcean, Upstream). v1
[SR SLTAC-4.4] Monitor Requests v0
[SR SLTAC-4.4.1] Requests to SL TAC Service Desk are logged and consolidated in the CRM Tool for further exploitation by the Service Manager. v0. Loggin is made at the SL TAC level and Top level?
[SR SLTAC-4.4.2] Raw measurements must be performed by the SL TAC Service Desk on requests addressed to the SL TAC (kind of request/service, Mean wait time from Top Level Service request until closure of request). The list is described in the Service Management Plan. v1
[IR SLTAC-0] Provided FTP basic download physical interfaces: EI_D_FTP_SL-CLS-TOULOUSE-FR v0
[IR SLTAC-1] Provided Subsetter advanced download physical interfaces: EI_D_SUBSETTER_SL-CLS-TOULOUSE-FR v1
[IR SLTAC-2] Provided "Static pre generated images" interfaces by the Production v1 Centres EI_Vi_STATIC_IMAGE_SL-CLS-TOULOUSE-FR
[IR SLTAC-3] Provided "Interactive maps (InSitu and along-the-track products) " interfaces by the Production Centres EI_Vi_MAP_ALL_SL-CLS-TOULOUSE-FR v2
[IR SLTAC-4] Provided " (Advanced) Push Monitoring" physical interfaces by the Production Centres II_C_ADV_PUSH_MONITORING_SL-CLS-TOULOUSE-FR v2
[IR SLTAC-5] The SL TAC shall provide the II_S_ITIL_SUPPORT_SL hook at PC level, see SMP SL TAC v2
[IR SLTAC-6] The SL TAC shall provide the II_S_ PRODUCTS_MNGT_SL hook at PC level,.see SMP SL TAC v2
[IR SLTAC-7] Upstream Production Data interfaces are: v0. • EI_P JASON2 v0 • EI_P JASON1 v0 • EI_P CNES FPAC ENVISAT v0 • EI_P CNES ECMWF v0 • EI_P DUACS DAC v0

• EI_P DUACS GIM v0 • EI_P TOPEX POSEIDON v0 • EI_P ERS1/2 v0 • EI_P CRYOSAT v2 • EI_P NOAA GFO v0
[IR SLTAC-8] Upstream Validation Data interfaces are: EI_V_Tide Gauge Providers v0
[IR SLTAC-9] The input data and products of SL-TAC are archived by CNES. v0
[IR SLTAC-10] SL TAC shall use the II_I_META_EDITOR_MIS to edit its products v2
[IR SLTAC-11] Links to "Production Delivery Recorder" interface (MIS) II_C_PROD_RECORDER_MIS v1
[IR SLTAC-12] Links to "Transaction Accounting Recorder" interface (MIS) II_C_TA_RECORDER_MIS v1
[IR SLTAC-13] The following physical interfaces and conventions are required by the SL TAC from the MIS: v1. • II_M_AUTHENTICATION_MIS v1 • II_M_AUTHORIZATION_MIS v1 • EI_M_FORMAT_CONVENTION_MIS v1 • II_M_VOCABULARY_MIS v1 • II_M_TIME_MIS v1
[NFR SLTAC-1] Activity logging requirements: v1
[NFR SLTAC-] All activities of the SL-TAC system shall be logged as exhaustively as possible. The logging activity includes details on dataflows processed, processing time stamps, status, data transfer details. v0
[NFR SLTAC-] Any operator connection to the SL-TAC production server shall be logged. v0
[NFR SLTAC-] Warning messages and confirmation requests sent by the system to the operators shall be logged. v0
[NFR SLTAC-] Log files shall be kept online for two months, and then archived for six months. v0
[NFR SLTAC-2] Security requirements: v0
[NFR SLTAC-] The SL-TAC system and actors shall comply with CLS' security policy described in [DR 2], [DR 3], [DR 4], [DR 5], [DR 6] and [DR 7] v0
[NFR SLTAC-] The SL-TAC system shall comply with the security policy of all projects CLS carries for CNES, as SL-TAC activities are also carried out in the DUACS framework of SALP, the multi-mission center of the French space agency. The SALP security protocols are described in [DR 8] v0
[NFR SLTAC-] The SL-TAC system and actors shall be as compliant with ISO 17799 and ISO 27002 as possible v2
[NFR SLTAC-] The SL-TAC system shall prevent any disclosure of information to unauthorized individuals or systems. This requirement is applicable to the Production Unit (limited access to internal documents, products and internal data) and to the Distribution Unit (limited access to Service Desk documents, database, and MIS Gateway configuration). v0
[NFR SLTAC-] The SL-TAC system shall prevent modification without authorization of any data. Security measures shall include data access restriction, integrity verification, documented operation

procedures and operator training. v0
[NFR SLTAC-3] Concurrency requirements: v0
[NFR SLTAC-] The SL-TAC system shall prevent any conflict between concurrent automated tasks and processes. v0
[NFR SLTAC-] The SL-TAC system shall prevent any conflict between an automated task and an operator request. v0
[NFR SLTAC-] The SL-TAC system shall prevent any conflict between concurrent operator requests. v0
[NFR SLTAC-] Concurrent requests shall be either set in a processing queue (when compatible and different) or rejected with an error message (when duplicates, incompatible or impossible to carry out).
[NFR SLTAC-4] User friendliness: v0
[NFR SLTAC-] Future SL-TAC products shall be designed and existing products shall be examined to improve user friendliness (e.g additional information and metadata provided online, demonstration use cases) v0
[NFR SLTAC-] The SL-TAC system shall be designed to be user friendly to the operational actors: automated tasks, synoptic views, easy access to logs and information status v0
[NFR SLTAC-5] User interface standards: v0
[NFR SLTAC-] Operational warning and messages shall be sent through well-tagged emails and through the generic GUI used by CLS operators (H.A.L) v0
[NFR SLTAC-] All documents shall be provided in the following formats: plain text files (emails, log, status reports), pdf (validation reports and large documents), or png (images, scientific results, synoptic views, charts, graphical indicators). v0
[NFR SLTAC-] The SL-TAC GUI and monitoring panel (dashboard) shall be usable on Windows and Linux OS. v0
[NFR SLTAC-5] The SL-TAC system shall be activated with scripts and command lines on Linux OS. Automated sequences shall be defined for routine operations. Macros shall be provided through the operator GUI. v0
[NFR SLTAC-6] Accessibility requirements, disabilities, languages: v0
[NFR SLTAC-] External SL-TAC documents shall be written in English. Existing or internal documents may remain or be written in French if necessary. v0
[NFR SLTAC-] External SL-TAC software shall be documented in English. Existing or internal software may remain or be documented in French if necessary. v0
[NFR SLTAC-] Public documents shall be centralized in an accessible repository (Alfresco + local mirror). Internal or confidential documents shall be centralized in an access restricted area. v0
[NFR SLTAC-] CLS premises and facilities used by the SL-TAC are designed to be accessible to individuals with various disabilities (including but not limited to blind and partially-sighted persons). Accessibility shall remain a practical concern of the SL-TAC. v0
[NFR SLTAC-7] Accuracy requirements: v0
[NFR SLTAC-] The SL-TAC system shall be able to detect automatically <<90%>> of its faults, and to

alert the relevant actors proactively. Faults include hardware failure, degraded input data, software error, connection and data transfer errors. v0
[NFR SLTAC-8] Precision requirements: v0
[NFR SLTAC-] <<95%>> of the monitoring information shall be exact. v0
[NFR SLTAC-] For components difficult to monitor, The SL-TAC system shall be configured for strict monitoring, by favoring false alarms to undetected errors. v0
[NFR SLTAC-9] Availability requirements: v0
[NFR SLTAC-] The SL-TAC system shall be able to detect problems and to send an automated warning within <<one hour>> of the event. Critical components and continuous processes shall be monitored every <<15 minutes>>. v0
[NFR SLTAC-] The Mean Time Between Failures (MTBF) of the same service shall be <<120 days >> v0
[NFR SLTAC-] The Mean Time Between Failures (MTBF) of the same system shall be <<30 days >> v0
[NFR SLTAC-] The Mean Time Between Incidents (MTBI) of the same service shall be <<5 working days >> v0
[NFR SLTAC-] The Mean Time To Restore (MTTR) a Service from the time it failed shall be <<4 working hours >> for components affecting users and <<1 working day >> for monitoring services v0
[NFR SLTAC-] During public holidays and week-ends, the SL-TAC services are kept up on a best effort basis. The SL-TAC system and contributors shall try and provide a level of service availability as close to nominal in working hours as possible. The MTTR shall be less than <<24 hours>>. v0
[NFR SLTAC-10] Redundancy v0
[NFR SLTAC-] The SL-TAC NRT production system shall have a passive redundancy with: hardware duplicate, software duplicate, full data mirroring every 12 hours, documented procedures to switch back and forth to the redundant system. v0
[NFR SLTAC-] The SL-TAC DT/RAN production system shall exploit CLS' 50+ PC cluster with hot swapping and task dispatch. v0
[NFR SLTAC-] The SL-TAC distribution system shall host data on hardware with active redundancy v0
[NFR SLTAC-] Redundant equipment shall be located outside of CLS' main premises in Toulouse. The backup system shall be located either in CLS' disaster recovery data center located within the CNES campus, or in CLS' ARGOS backup data center in Washington. v2
[NFR SLTAC-11] Error handling: v0
[NFR SLTAC-] The SL-TAC system shall be designed to minimize the risk of central failure and to create, as many workaround solutions as possible if sub systems are unavailable. v0
[NFR SLTAC-] Documented error cases shall be taken into account into the automated production sequence and/or in the operation manual v0
[NFR SLTAC-] The processing sequence of the daily production shall be periodically optimized to minimize failure risks (components/sub-systems with known/documented fragility) v0
[NFR SLTAC-] A simplified processing sequence shall be designed to facilitate incident management, and to quickly deliver MyOcean product to users, discarding all processes v0 which are not strictly necessary to the product delivery.
[NFR SLTAC-] Operational procedures shall prohibit manual data or software change and alterations.

The only exception to this rule are major incidents and new versions the SL-TAC system. In both cases, the intervention must be discussed and controlled by system and scientific experts. v0
[NFR SLTAC-] Data mirroring to the redundant system and data backups shall be strictly verified to prohibit rollbacks. All possible measures to ensure integrity is not compromised shall be taken. v0
[NFR SLTAC-] Contingency plans and tools shall be created to restore the database integrity in case of major anomaly (e.g. data corruption, hard disk failure…) v0
[NFR SLTAC-12] Stress: v0
[NFR SLTAC-] The SL-TAC production system shall be able to carry out <<two>> different Near Real Time productions at once (e.g validation of new version, and operational production) v0
[NFR SLTAC-] The SL-TAC production system shall be able to dispatch RAN product generation on <<4 to 50>> different servers v0
[NFR SLTAC-13] Turnaround-time: v0
[NFR SLTAC-] The end-to-end Near Real Time production shall be complete in less than <<6 hours>> v0
[NFR SLTAC-14] Throughput: v0
[NFR SLTAC-] The end-to-end Near Real Time production shall be able to process an innovative data flow of up to <<4 days from 4 altimeters>> every day. The processing sequence shall also include up to <<40 days>> of older data not changed since the previous production. v0
[NFR SLTAC-15] Response time: v0
[NFR SLTAC-15.1] The response time of the production system shall be less than <<15 seconds>> v0
[NFR SLTAC-16] Startup and shutdown: v0
[NFR SLTAC-] The startup and shutdown procedures shall be as simple as possible and properly documented in the operations manual. v0
[NFR SLTAC-] Startup and shutdown procedures shall be defined from end to end, including electrical shutdown of the entire data center of CLS, with or without a switch to redundant data center. v0
[NFR SLTAC-17] Scalabilty: v0
[NFR SLTAC-] The SL-TAC system shall be able to scale up to <<6>> different altimetry sensors without any major change of the architecture v0
[NFR SLTAC-] The SL-TAC system shall be able to scale up to <<30>> different ancillary datasets without any major change of the architecture v0
[NFR SLTAC-] The SL-TAC system shall be able to scale up to a full NRT production every <<12 hours>>, or a limited RT production (OGDR flows) every <<4 hours>> without any major change of the architecture v0 (nrt) v2 (rt)
[NFR SLTAC-] The SL-TAC system shall be able to process up to <<12>> regional products (equivalent to Mediterranean Sea products) without any major change of the architecture v0 v1 (upgrade)
[NFR SLTAC-18] Expected changes: v0
[NFR SLTAC-] The SL-TAC system shall be able to add or to remove a mission without any major change of the architecture v0
[NFR SLTAC-] The SL-TAC system shall be able to switch to a different reference mission without any

major change of the infrastructure. Procedures and tools shall be in place to smooth the transition and to make it invisible to the user v0
[NFR SLTAC-] The SL-TAC system shall be able to add or to remove a regional product without any major change of the architecture v0
[NFR SLTAC-] The SL-TAC DT/RAN system shall be able to produce daily maps (internal MyOcean product) without any major change of the architecture v0
[NFR SLTAC-] The SL-TAC system shall be adapted to MyOcean's data policy v0
[NFR SLTAC-] The SL-TAC system shall be able to setup sensor-specific processing and algorithms (pre-processing step). v0
[NFR SLTAC-] Maintenability and Configurability: v0
[NFR SLTAC-] Routine maintenance of SL-TAC system shall be accessible through parameter changes (e.g. de-activation of mission, relaxing warning threshold, changing editing criteria) v0
[NFR SLTAC-] Processing sequences and task priority shall be configurable easily without any software change v0
[NFR SLTAC-] Re-processing of Near Real Time productions shall be doable without any software or parameter changes v0
[NFR SLTAC-] Switches to degraded modes of the Near Real Time system shall be activated without any software or parameter change v0
[NFR SLTAC-20] Localizability and Unit System v0
[NFR SLTAC-] Internal data and products shall be using the metric system v0
[NFR SLTAC-] Internal data and products shall be using the International System of Units whenever possible and relevant v0
[NFR SLTAC-21] Installability and Compatibility requirements: v0
[NFR SLTAC-] The SL-TAC production system shall have an installation manual describing library requirements, system and tools requirements, and the installation procedure and the configuration procedure from scratch v0
[NFR SLTAC-] The SL-TAC production system shall be compatible with a modern PC server and Linux OS v0
[NFR SLTAC-] The SL-TAC production system shall be able to feed the SL-TAC MIS Gateway v0
[NFR SLTAC-] The SL-TAC production system shall be compatible with generic operator tools and controls from CLS v0
[NFR SLTAC-] The SL-TAC production system shall be able to adapt to upstream interface changes without a major upgrade of the architecture v0
[NFR SLTAC-22] Capacity requirements: v0
[NFR SLTAC-] The SL-TAC production system shall be able to provide the MIS Gateway with the resources needed for simultaneous downloads from <<10 users>> v1
[NFR SLTAC-] The SL-TAC production system shall try and provide the MIS Gateway with the resources needed for simultaneous downloads from <<100 users>> v1
[NFR SLTAC-] The SL-TAC Near Real Time production server shall have more than <<1TB>> of disk

storage dedicated to production needs v0
[NFR SLTAC-] The SL-TAC DT/RAN production server shall have more than <<3TB>> of network disk storage dedicated to production needs v0
[NFR SLTAC-] The SL-TAC distribution server shall have more than <<500GB>> of disk storage dedicated to host SL-TAC products v0
[NFR SLTAC-] The backup and archive capacity shall be more than <<8TB>> v0
[NFR SLTAC-23] Continuity, Backup / recovery requirements: v0
[NFR SLTAC-] All software, configuration files and database files used by the Near Real Time SL-TAC system shall be included in the backup of CLS' operational servers: incremental backup on a daily basis, and full backup every week. v0
[NFR SLTAC-] Restoration tests shall be performed once per year to ensure that the backup system is functional. v0
[NFR SLTAC-] Every year, the latest version of the SL-TAC software and configuration files shall be duplicated on the major disaster recovery archive (stored in CLS' a safe-deposit box) v0
[NFR SLTAC-] If CLS' SL-TAC production server suffers from a major failure, and the redundant datacenter is still working, the SL-TAC system shall be able to restart production activities within <<one working day>> after the initial event v0
[NFR SLTAC-] If CLS' primary data center (or the SL-TAC FTP/OpenDAP servers) suffers from a major failure, and the redundant system is still working, the SL-TAC system shall be able to restart distribution activities within <<five working days>> after the initial event v0
[NFR SLTAC-] If both CLS' primary and redundant data centers suffer from a major failure, the SL-TAC system shall be able to restart production activities within <<one month>> after the initial event v2
[NFR SLTAC-24] Legal and regulatory requirements: v0
[NFR SLTAC-] The SL-TAC shall be compliant with INSPIRE European Directive. v0
[NFR SLTAC-] The SL-TAC shall be compliant with CNES' SALP project rules and guidelines. If there is a discrepancy between MyOcean requirements and CNES requirements, the problem must be escalated to the Work Package leader v0
[NFR SLTAC-] The SL-TAC shall be compliant with French and European laws on the following topics: privacy and right to own data about one's account (respect to France's CNIL regulations), intellectual property and copyrights, IT fraud control, cryptography and electronic identity, legal duration of data retention. These items are described in CLS' security policy (see DR 2 and DR 3) v0
[NFR SLTAC-25] Other constraints: v0
[NFR SLTAC-] The SL-TAC production system shall expand on the pre-existing CNES/CLS DUACS system (both in DT and NRT) and be compliant with its design interfaces and constraints. If there is a discrepancy between MyOcean requirements and CNES requirements, the problem must be escalated to the Work Package leader v0
[NFR SLTAC-] The SL-TAC distribution system shall expand on the pre-existing CNES AVISO system and be compliant with its design interfaces and constraints. If there is a discrepancy between MyOcean requirements and CNES requirements, the problem must be escalated to the Work Package leader v0
[NFR SLTAC-26] Performances of the Products

[NFR SLTAC-] The SL-TAC products shall respect all specifications from WP17's External Product Specification Table (EPST) and Intermediate Product Specification Table (IPST)

Appendix C - **Traceability of Requirements Groupings to ECSS-E-ST-40C**

SRD Section	ECSS-E-ST-40C Annex D
Applicable to each macro functionality, [8.2] to [8.15]	D.2.1 <5.2>
Applicable to each macro functionality, [8.2] to [8.15]	D.2.1 <5.3>
[8.17] Interface Requirements	D.2.1 <5.4>
[8.16] Operational Requirements	D.2.1 <5.5>
[8.18] Resources Requirements	D.2.1 <5.6>
[8.19] Design Requirements and Implementaiton Constraints	D.2.1 <5.7>
[8.20] Security and Privacy Requirements	D.2.1 <5.8>
[8.21] Portability Requirements	D.2.1 <5.9>
[8.22] Software Quality Requirements	D.2.1 <5.10>
[8.23] Software Reliability Requirements (RAMS)	D.2.1 <5.11>
[8.23] Software Maintainability Requirements (RAMS)	D.2.1 <5.12>
[8.23] Software Safety Requirements (RAMS)	D.2.1 <5.13>
[8.24] Software Configuration and Delivery Requirements	D.2.1 <5.14>
[8.25] Data Definition and Database Requirements	D.2.1 <5.15>
[8.26] Human Factors Related Requirements	D.2.1 <5.16>
[8.27] Adaptation and Installation Requirements	D.2.1 <5.17>

Table 20 - Traceability of Requirements Groupings to ECSS-E-ST-40C