



DOCUMENT

Space Situational Awareness - Space Weather System Requirements Document

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1 INTRODUCTION

This document has been generated with the following Doors module baseline :

SWE SRD : 1.12

SSA SEC SRD : 1.10

1.1 Scope of the document

This document contains the System Requirements for the SWE segment of the SSA system. It is addressing the high-level system requirements derived from the customer requirements.

1.2 The SSA Programme

The objective of the Space Situational Awareness (SSA) programme is to support the European independent utilisation of and access to space for research and services, through timely and quality data, information, services and knowledge regarding the environment, the threats, and the sustainable exploitation of the outer space.

The high-level users' needs for a SSA system, as expressed by the SSA user group can be summarized as follows:

- support safe and secured operation of space assets and related services;
- support risk management (on orbit and during re-entry) and liability assessment;
- assess the status and basic characteristics of space objects (both human-made and natural);
- detect non-compliance with applicable international treaties and recommendations;
- enable the allocation of responsibility for space objects (to launching State) or Organisations (ESA, Member States, etc.), and support confidence building measures (identification of owner and/or operator).

The above translates into a comprehensive knowledge, understanding and maintained awareness of:

- the population of space objects;
- the space environment;



- the existing threats and risks.

The European Space Agency has initiated the SSA Preparatory Programme to define the technical specification and development of the SSA system through to the deployment of an operational system. It is foreseen that the SSA system will comprise three main segments:

- Space Surveillance and Tracking (SST) of man-made space objects;
- Space Weather (SWE) monitoring and forecast;
- Near-Earth Objects (NEO) Surveillance and Tracking;

During the ESA SSA Preparatory Programme, there are two parallel distinct development paths:

- The first path consists in defining the complete future SSA. It includes the definition of the Customer Requirements [AD-10] from which the system requirements (this document) and the overall system architecture and design shall be derived. A first activity to define the system requirements (this document) has been carried out.
- The second path consists in rolling out SSA Precursor Services (i.e. a few representative and essential SSA services) by re-using and federating existing assets in Europe (e.g. expertise, applications) and later extending them. The Precursor Services shall help in federating the SSA user community and shall help in getting practical experience in providing SSA services in the three SSA segments i.e. Space Surveillance and Tracking (SST), Space Weather (SWE) and Near Earth Objects (NEO). This experience is being fed back into the first development path.

1.3 Definitions of terms

This section provides segment specific definitions of terms applicable to the SWE segment and the SWE engineering and development activities. They shall be consistently used throughout the SWE segment documentation. For general definitions of terms see [AD-06].

1.3.1 Definitions

1.3.1.1 Table

Accuracy of data	The closeness of the agreement between the data resulting of a measurement and a true value of the observable being measured. In practice, the accuracy is estimated by the uncertainty taking into account all known and quantifiable sources of error in the data.
Accuracy of service	The closeness of agreement between the service output and the associated observable conditions. In practice, the accuracy is estimated by the uncertainty value based on known performance statistics.



Alarm	near real-time notification issued when a dangerous condition occurs.
Data	Raw or processed measurements of any space weather parameter.
User	An SSA user is anyone, a person or institution or an electronic system that accesses or receives SSA products or services.
Forecast	Description of the space environment at a future date based on actual data, proxies and models.
Indices	A set of derived variables frequently used to parameterise space weather conditions and as input to models. The default sets of indices are: <ul style="list-style-type: none"> Solar Activity and geomagnetism: Ap, AE, Kp, Dst, IG12, R, R12, F10.7, S10, E10, M10, Y10; Ionospheric scintillation: S4, sigma_phi, fading depth, fade duration, time between fades
Micro-particle	Space object with size below one millimetre and above 0.1 micrometer
Near Real-time	Statement that an action is occurring as close as possible to the same rate at which an observable is measured/observed.
No-proton event	No proton event means that the >10 MeV flux in outer magnetosphere (GEO) is below 10 particles cm ⁻² sr ⁻¹ s ⁻¹
Nowcast	Reconstruction in near real-time of one or several parameters based on actual data, proxies and models.
Products	Derived data generated using one or more space weather tools or models. An SSA Product is a digital file(s) delivered to members of a user community from an operational element of the SSA system that has a defined format and is archived and is reproducible. The generation of a product or a family of products is part of a service of the SSA segments. Software tools made available to users or technical reports are not considered as products.
Real-time	Statement that an action is occurring at the same rate at which an observable is measured/observed.
Reliability	The ability of an element of the SWE service network to perform its required functions under its given operational conditions. The reliability of the system is considered "undetermined" until it has been evaluated. When the element fulfils all predetermined criteria it can be considered reliable.
Solar activity	The collective term for all active phenomena observed on the Sun, including sunspots, faculae, active regions, plages, active prominences, coronal mass ejections and flares.
Solar energetic particle event	A solar energetic particle event is a sudden release of particles (protons, electrons and heavy ions) with energy ranging from a few tens of keV to GeV and associated with solar eruptive phenomena or interplanetary coronal mass ejections and/or shocks.
Space Situational Awareness	Comprehensive knowledge, understanding and maintained awareness of the (i) population of space objects, of the (ii) space environment, and of the (iii) existing threats/risks.
Space weather	Conditions on the sun and in the solar wind, magnetosphere, ionosphere, and thermosphere that can influence the performance and reliability of space-borne and ground-based technological systems and can endanger human life or health. Cosmic rays are covered by this definition.
Space Weather Guaranteed Dataset	A set of different variables delivered by an entity that verifies and guarantees, to the extent possible, not only the quality and reliability of each individual datum but also the consistency of the set.
Spacecraft anomaly	Anomalous or unexpected behaviour of a spacecraft or any of its subsystems.



Spacecraft Effects	Effects observed as a result of the interaction of a spacecraft or device with the local space environment. Examples include radiation dose, single event effects, sensor background, surface charging, deep dielectric charging, solar array degradation, spacecraft anomalies and damage caused by micro particle impacts.
SSA Customer	Entity responsible for procuring the establishment and operation of an SSA system.
Susceptibility	<p>The response of a material or substance to a change in conditions. In the spacecraft case, this may be characterised by e.g.</p> <ul style="list-style-type: none"> • SEP susceptibility: Rate of destructive and non-destructive SEEs in specified components under specified shielding levels due to an SEP event • Surface charging susceptibility: Surface potentials of defined materials due to ambient plasma • Internal charging susceptibility: Internal charging levels of specified dielectric components under specified shielding • Degradation due to radiation susceptibility: Dose and NIEL degradation of specified components under specified shielding (including solar cell degradation) • Satellite attitude change susceptibility: Deviations in magnetic torque • Satellite orbit change susceptibility: Orbit alteration due to drag enhancement in LEO • EM interference susceptibility: Telecommunications interference
Third Party Service Provider	Entity (research institute or commercial) developing and establishing a service based on data provided by the foreseen SSA system through an individual customer-service agreement that goes beyond the scope of the other SWE tailored services.
Warning	Near real-time notification of a potentially hazardous situation.

1.4 Acronyms

AD	Applicable Document
CME	Coronal Mass Ejection
COSPAR	Committee on Space Research
CRD	Customer Requirements Document
ECSS	European Cooperation for Space Standardization
ESA	European Space Agency
EVA	Extra-Vehicular Activity
GEN	General Requirement
GEO	Geostationary Earth Orbit
GNSS	Global Navigation Satellite Systems
GSTP	General Support Technology Programme
GTO	Geostationary Transfer Orbit
HEO	highly elliptical orbit
I/F	Interface
ICD	Interface Control Document
IERS	International Earth Rotation systems Service
IG12	12-month-running mean of the ionospheric IG index



IMF	Interplanetary Magnetic Field
ISES	International Space Environment Service
ISO	International Organization for Standardization
ISS	international space station
IT	Information Technology
ITRF	International Terrestrial Reference Frame
L1	first Lagrangian point
L2	second Lagrangian point
LAU	Launch Operation Service
LEO	Low Earth Orbit
LEOP	Launch and Early Operations
MEDS	Mean Elements Data Set
MEO	Medium Earth Orbit
N/A	Not applicable
NASA	National Aeronautics and Space Administration
NIEL	Non ionising energy loss
NOAA	National Oceanic and Atmospheric Administration
NSO	Non-Space System Operators Service
RD	Reference Document
RER	Re-entry Predictions for Risk Objects Service
RMS	Root Mean Square
RSSD	Research and Scientific Support Department
RTK	Real-time kinematic
S/C	Spacecraft
SCD	SpaceCraft Design Service
SCH	Human Space Flight Service
SCO	SpaceCraft Operation Service
SEE	Single Event Effect
SMS	Special Mission Support Service
SEP	Solar energetic particle event
SRD	Segment Requirements Document
SSA	Space Situational Awareness
SSA URG	SSA User Representatives Group
NEO	Near Earth Object
SSN	Smoothed Sunspot Number
SST	Space Surveillance and Tracking
SWE	Space Weather
TBC	To Be Confirmed
TBD	To Be Defined
TEC	Total electronic content
TIO	Transionospheric radio link Service
UTC	Universal Time Coordinated



1.5 Applicable and reference documents

1.5.1 Applicable documents

[AD-03]	ECSS standards documentation	http://www.ecss.nl
[AD-04]	Director General's Office "Space Debris Mitigation for Agency Projects", Paris	
[AD-05]	ISO 24113 "Space Debris Mitigation" standard in development	
[AD-06]	SSA General Definitions of Terms and Acronyms	SSA-DC-QA-GLO-0001, Issue 1.1, 05/03/2012
[AD-07]	ECSS-Q-ST-80C Space product assurance – Software product assurance: Tailoring for Ground Segment Systems	QMS-EIMO-GUID-CKL-9501-OPS, Issue 1.2 (September 2011)
[AD-08]	ECSS-E-ST-40C Space engineering – Software: Tailoring for Ground Segment Systems.	QMS-EIMO-GUID-CKL-9500-OPS Issue 1.0, July 2009
[AD-09]	Space Situational Awareness – Space Weather System Requirements Document Annex A - Product Specification	SSA-SWE-RS-SSD-0001, Issue 1.3, 8/07/2013
[AD-10]	SSA SWE Segment Customer Requirements Document	SSA-SWE-RS-CRD-1001, Issue 4.5, 12/7/2013
[AD-11]	Space Situational Awareness – Space Weather System Requirements Document Annex B - Traceability Matrix	Issue 1.0, 8/07/2013
[AD-SEC-01]	Information technology -- Security techniques -- Evaluation criteria for IT security	ISO/IEC 15408
[AD-SEC-02]	ESA Security Regulations	ESA/SEC(2011)/7 Annex 2
[AD-SEC-03]	Information Technology – Security Techniques – Information Security Management Systems Requirements	ISO/IEC 27001
[AD-SEC-04]	CCSDS Recommended Practise for Security Algorithms	CCSDS 353.0-B-1
[AD-SEC-05]	Programme Security Instructions for the ESA Space Situational Awareness Programme	ESA-LEX-S-9/02, Issue 1.0, 10/10/2011

1.5.2 Reference documents

[RD-01]	ECSS-E-ST-70C European Cooperation for Space Standardisation "Space Engineering - Ground Segment and Operation"	31 July 2008
[RD-02]	Space Weather Study: RAL Consortium. European Space Weather Programme System Requirements Definition	ESA Contract Number 14069/99/NL/SB. ESWP-DER-SR-0001
[RD-03]	Space Weather Study: RAL Consortium. Space Weather Space Segment Options	ESA Contract Number 14069/99/NL/SB. WP420
[RD-04]	Space Weather Study: RAL Consortium. Interface between Spacecraft Ground Segment and Space Weather Measurement	ESA Contract Number 14069/99/NL/SB. ESWP-RAL-TN-0002, WP431
[RD-05]	Space Weather Study: RAL Consortium. Interface between	ESA Contract Number



	Spacecraft Ground Segment and Space Weather Service	14069/99/NL/SB. ESWS-RAL-TN-0002, WP432
[RD-06]	Space Weather Study: Alcatel-LPCE Consortium. Space Segment - Measurement and System Requirements	ESA Contract Number 14070/99/NL/SB. WP2200, WP2300
[RD-07]	Space Weather Study: Alcatel-LPCE Consortium. Space Segment - Measurement and System Requirements, Ground based Measurements	ESA Contract Number 14070/99/NL/SB. WP3120
[RD-08]	CDF Study Report: Space Weather - 3 Elements Monitoring the Solar-Terrestrial Environment as Part of a Service	CDF-11(A), December 2001
[RD-09]	Space Weather Pilot Project Cost and Benefit Analysis - Final Report	SEA/06/TN/5482, Issue 3, October 2006
[RD-10]	Space Environment Information System to support Satellites Operations (SEISOP) System Requirements Documents	Issue 1.0 Februray 2009
[RD-11]	Nanosatellite Beacons for Space Weather Monitoring: System and Mission Analysis.	ESA Contract number 18474/04/NL/LvH
[RD-50]	ESA SSA Application Security Framework	Issue 1.0, rev 1, 19/07/2011

2 SWE SEGMENT SYSTEM OVERVIEW

This section gives a general overview of the SWE segment in terms of its services, the products and main functions.

2.1 SWE Segment System Context

The purpose of the SSA SWE segment is to provide for its customers and end users a source of space weather data and processed information based on relevant ground based and space based sensors and appropriate data processing elements. Space weather effects addressed include for example space radiation and spacecraft charging hazards, spacecraft drag, ionospheric perturbations on transionospheric radio links, aircraft radiation hazards, geomagnetic disturbances and currents induced in large conductive networks such as power lines and pipelines. Micro-particle effects addressed include impacts of small space debris and meteoroid particles, impacts of debris cloud particles and impacts of meteoroid stream particles. SWE segment also provides its customers an access to archives of space weather data and all products generated by the SSA SWE system and a latest data service including data service for third party service providers.

The following figure 1 is the functional breakdown for the SWE segment. The diagram serves to structure this document by grouping requirements by functional block.

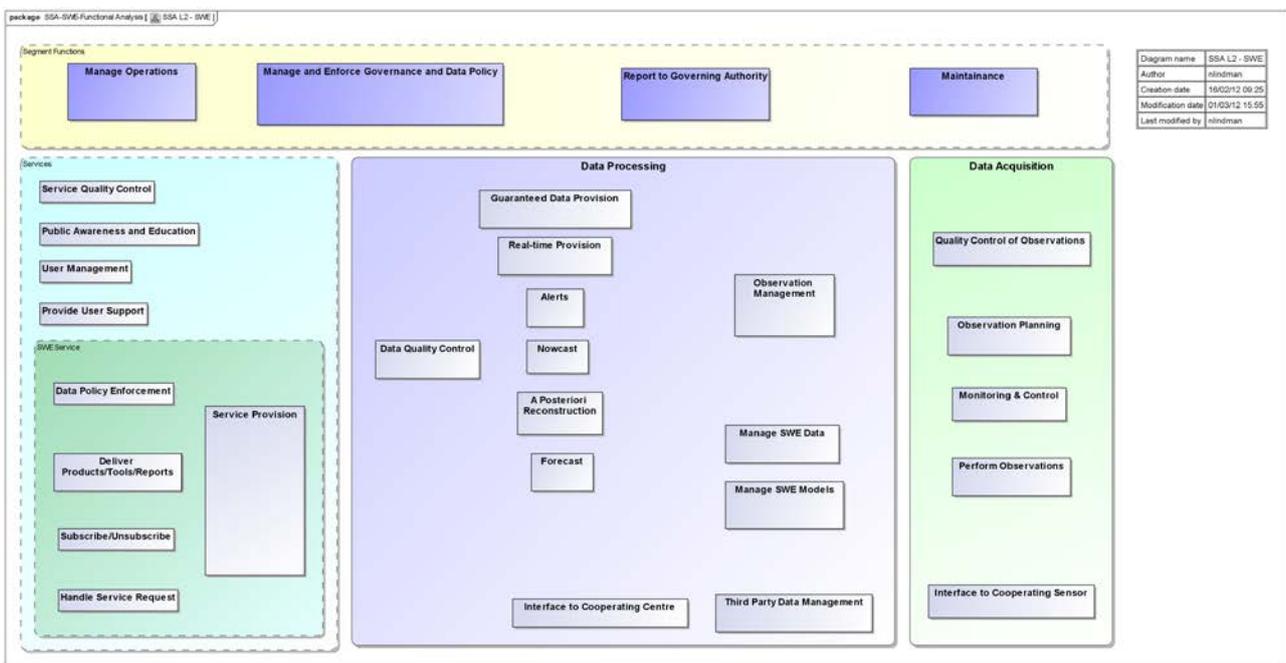


Figure 1: High level Space Weather Segment functional breakdown diagram.



2.1.1 International Context

Due to the nature of Space Weather events, global coverage from ground based and space borne observation systems is essential for providing operational services. International collaboration is a well established tradition in the area of space weather research, providing access to geographically distributed measurements. International service coordination is currently implemented within the framework of the International Space Environment Service (ISES).

The development of the SSA SWE shall take into account existing collaborations and partnerships and aim to establish new agreements where necessary. Coordination will further be discussed within International frameworks such as the UN Committee on the Peaceful Uses of Outer Space (COPUOS), the World Meteorological Organisation (WMO) the inter-agency International Living with a Star (ILWS) programme and COSPAR.

2.2 SWE Sensors

2.2.1 Observation Requirements

A comprehensive space weather observation network will include ground based and spaceborne observatories. In particular, ground based ionospheric sensors, tailored GNSS receivers, and magnetometers are key elements to be considered to support the provision of information on the ionospheric and the geomagnetic environments. Space based measurements of the ionosphere and of the geomagnetic field will enhance the measurement coverage to a planetary scale. Detailed information on local aerospace vehicle environments can only be obtained from spaceborne observations especially of ionising radiation and magnetospheric plasma. The exception for this is the atmospheric drag, which can be deduced from ground based satellite tracking systems or from the data from onboard orbit determination instruments.

The forecast of all these environments is enabled by monitoring precursor phenomenon that take place on the Sun and propagate in the interplanetary medium before reaching Earth. This should be based on the detection of eruptive and pre-eruptive structures on the solar disk, as derived from measurements made at visible light, (E)UV and X-ray wavelengths, and of the plasma density along with speed and magnetic field in the solar wind which flows out from the solar surface, eventually impacting the Earth's geomagnetic field. Monitoring of energetic particles in the solar wind is also very important. Solar wind measurements and solar observations in the X-ray and (E)UV wavelength ranges can only be performed from space. Solar observations at radio wavelengths (e.g. F10.7) may also be made from the ground.

2.2.2 Space Segment Sensors

The three main system requirements drivers for the SWE Segment spaceborne sensors are:

- Physical quantities to measure,
- Continuity of observation (with only gaps that are compatible with service requirements),
- Near real-time data access for nowcasting and forecasting.

2.2.2.1 Solar Activity Monitoring

For solar disk imagers and coronagraphs the crucial design drivers are the continuity of the observation and pointing to the Sun. These imagers also produce large amount of data requiring high data download rates. From the pointing and continuity point of view the vicinity of the L1 point would be a good location for these types of sensors. However, the requirement for near real-time data implies that as minimum three ground stations equally distributed in longitude or a data relay via a geostationary or a geo-transfer spacecraft will be required. A Sun-synchronous orbit would also be an option for solar imaging instruments, but this option requires a trade-off between the number of ground stations and the number of spacecraft to ensure near real-time data download and continuous observations. Recent results with the STEREO mission have shown that heliospheric imaging from a vantage point away from the Sun-Earth line offers potentially significant benefits in solar monitoring and space weather forecasting. STEREO has also provided the capacity for stereographic heliospheric imaging from two spacecraft located outside of the Sun-Earth line with a wide angle visibility over the space between the Sun and the Earth.

Spaceborne sensors will have to be used for observations of the solar radio wave spectra below ionospheric cut-off frequency.

2.2.2.2 Solar Wind Monitoring

For measurements of the solar wind plasma and the interplanetary magnetic field the best option is by far a spacecraft orbiting around the first Lagrangian point, L1, because it is a unique location for a spacecraft remaining at a stable, intermediate distance between the Sun and the Earth. Required data rates and masses of instruments are low but near real-time data download would require at least 3 ground stations or data relay via a geostationary or geo-transfer spacecraft. Additional options for a spacecraft location closer to the sun would provide potential benefits as the warning time before geomagnetic impacts would increase. The station keeping for a spacecraft between the L1 point and the Sun is naturally a major challenge and the complexity of the mission against the potential benefits would have to be carefully assessed before implementing a mission like this is considered.



2.2.2.3 Space Radiation Environment Monitoring

Sensors will measure both trapped radiation and solar energetic particles. Sensors will have to cross the radiation belts to measure the trapped radiation. A geo-transfer orbit (GTO) provides a comprehensive sampling of the trapped radiation environment. In contrast, SEP monitoring should be done either at GEO or from a location outside the magnetosphere. Combination of sensor locations can provide feasible observation scenarios especially when hosted payload opportunities are utilised. Naturally all in-situ observations of space radiation environment need to include spacecraft orbit information at the times of the data sampling. This applies also to cases where radiation data is collected by sensors that are part of the spacecraft bus and the data is considered as part of the spacecraft telemetry.

2.2.2.4 Geomagnetic Environment Monitoring

Spaceborne sensors are required for in-situ observations of the local magnetic field. Global coverage is required at altitude ranges from LEO to GEO. Spaceborne sensors are also needed for the observations of the low frequency magnetospheric radio wave spectra. They are also required for particle precipitation measurement (fluxes and average energies) and the plasma environment.

Spaceborne Auroral observations require sensors for auroral visible and UV imaging and auroral kilometric radiation.

2.2.2.5 Upper Atmosphere Monitoring

Planetary coverage of ionospheric monitoring can be achieved by polar orbiting satellites. The number of sensors needed depends on the continuity and sampling requirements. Timeliness requirements are the driver for the number of ground based stations and/or relay satellites needed in the system.

Spaceborne thermospheric neutral wind and density observations are the only way to achieve global measurement coverage as ground based FPI observations only allow local sampling. Space based radio occultation measurements can provide global measurements of the ionospheric electron density profiles.

2.2.2.6 Microparticle Monitoring

Sensor data about the microparticle flux as a function of size, velocity and angular distribution is required from spaceborne sensors. Coverage of GEO, polar LEO, and ISS flight altitudes are required.

2.2.3 Ground Based Sensors

The main system requirements drivers for the SWE Segment ground based sensors are the same as for the spaceborne sensors. The main limitation for ground based observations is the filtering of the atmosphere for the solar EM and particle radiation. Global coverage in ground based observations typically requires either establishing sensors outside the ESA Member States or international collaboration with sensor owners outside Europe.

2.2.3.1 Solar Activity Monitoring

The basic ground based observations for solar activity include solar radio observations, white light imaging, H-alpha imaging and measurements of the solar surface magnetic field with line-of-sight and vector magnetograph techniques. The solar radio emissions are observed with broad frequency radio spectrographs and radio imaging of the sun.

2.2.3.2 Solar Wind Monitoring

Solar wind observations from the ground are very limited. Potential instruments for estimation of the solar wind characteristics include scatter radars, radio telescopes and muon and neutron monitors.

2.2.3.3 Geomagnetic Environment Monitoring

Observations of geomagnetic field disturbances are required globally using data from networks of ground based magnetometers. Ground based geomagnetic monitoring also includes Auroral imaging by all sky cameras.

2.2.3.4 Upper Atmosphere Monitoring

Ground based observation of the upper atmosphere include ionospheric monitoring by e.g. GNSS receivers, ionospheric scintillation receivers, ionosondes, riometers and scattering radars. Observations of the neutral wind are performed by ground based Fabry-Perot interferometers (FPIs).

2.3 SWE Segment Services

Space weather is a component of the natural environment which induces threats through its effects on human health and technology both in space and on ground. Micro-particles in space of natural or human origin and below 1 millimetre in size similarly constitute an environmental threat to humans and technology in space and related requirements are covered in this document.

The table below summarises the high level SWE users' needs.



2.3.1.1 Table

Identified high level users needs	Possible contribution from a space weather service
Support safe and secured operation of space assets and related services.	Specify, monitor, and predict conditions and risks to space systems (including their ground segment) and transionospheric links affected by space weather.
Support risk management (on orbit, during launch, re-entry and other critical operations) and liability assessment	Specify, monitor, and predict conditions and risks to space systems and transionospheric links affected by space weather. Provide data aimed at identifying the cause of failure of these systems.
Assess the status and basic characteristics of space objects (both human-made and natural).	Support radar data interpretation and correction
Detect non-compliance with applicable international treaties and recommendations;	Provide data and supporting information aimed at identifying whether the cause of an anomalous phenomenon originating from space or occurring in space is environmental.
Enable the allocation of responsibility for space objects (to launching State) or Organisations (ESA, Member States, etc.), and support confidence building measures (identification of owner and/or operator)	Provide data and supporting information aimed at identifying whether the cause of an anomalous phenomenon originating from space or occurring in space is environmental.

The USA has a nearly complete space weather monitoring and data service system operated by NOAA/SWPC in collaboration with USAF. Many of the space weather data products are made available on the web without any restriction. Also, protocols and procedure for international space weather data exchange and service coordination are established and implemented by ISES.

The SSA space weather segment is intended to provide for its customers and end users a non-dependent source of space weather observed data and processed information based on relevant ground based and space based sensors and appropriate data processing elements. Space weather effects explicitly addressed include radiation and spacecraft charging hazards, spacecraft drag, ionospheric perturbations, aircraft radiation hazards, geomagnetic disturbances and current induced in large conductive networks such as power lines and pipelines [AD2]. Micro-particle effects explicitly addressed include impacts of small space debris and meteoroid particles, impacts of debris cloud particles and impacts of meteoroid stream particles.

The following table lists the SWE services described in this document.

List of SWE Services

Service Number	Service Shortname	Service Name
1-1	SCD/ARV	Environment Specification: Data Archive
1-2	SCD/ORB	Environment Specification: In Orbit Verification
1-3	SCD/PST	Post Event Analysis



2-1	SCO/ORB	In Orbit Environment and Effects Monitoring
2-2	SCO/PST	Post Event Analysis
2-3	SCO/FOR	In-orbit Environment and Effects Forecast
2-4	SCO/ANA	Mission Risk Analysis
3-1	SCH/ORB	In-flight Crew Radiation Exposure
3-2	SCH/PST	Cumulative Crew Radiation Exposure
3-3	SCH/FOR	Increased Crew Radiation Exposure Risk
4-1	LAU/ORB	In-flight Monitoring of Radiation Effects in Sensitive Electronics
4-2	LAU/PST	Estimate of Radiation Effects in Sensitive Electronics
4-3	LAU/FOR	Forecast of Radiation Storms
4-4	LAU/DRG	Atmospheric Density Forecast
4-5	LAU/IOS	Risk Estimate of Service Disruption Caused by Ionospheric Scintillations
4-6	LAU/MCP	Risk Estimate of Microparticle Impacts
5-1	TIO/TCR	Near-Real Time TEC Maps
5-2	TIO/TCF	Forecast TEC Maps
5-3	TIO/QUA	Quality Assessment of Ionospheric Correction
5-4	TIO/SCI	Near-Real Time Ionospheric Scintillation Maps
5-5	TIO/FOR	Monitoring and Forecast of Ionospheric Disturbances
6-1	SST/ATM	Atmospheric Estimates for Drag Calculation
6-2	SST/ARV	Archive of Geomagnetic and Solar Indices for Drag Calculation
6-3	SST/FOR	Forecast of Geomagnetic and Solar Indices for Drag Calculation
6-4	SST/ION	Nowcast of Ionospheric Group Delay
7-1	NSO/POW	Services to Power System Operators
7-2	NSO/PPL	Services to Pipeline Operators
7-3	NSO/AIR	Services to Airlines
7-4	NSO/RES	Services to Resource exploitation System Operators
7-5	NSO/TOU	Services to Auroral Tourism Sector



8-1	GEN/ARV	Space Weather Data Archive
8-2	GEN/LST	Latest Data Service
8-3	GEN/FOR	Space Weather Nowcast and Forecast Products
8-4	GEN/ALM	Event Based Alarms
8-5	GEN/MOD	Virtual Space Weather Modelling Service
8-6	GEN/3RD	Guaranteed Data Service for Third-Party/Added-Value Service Providers
8-7	GEN/SPM	Space Weather Support Material

2.4 SWE Segment Products

The following user needs for the space weather segment can be directly taken from the programme proposal:

- provision of comprehensive knowledge, understanding and maintained awareness of the natural space environment and space weather,
- the detection and forecasting of space weather and its effects,
- the detection and understanding of interferences due to space weather,
- the understanding and prediction of the natural meteoroid and small size space debris environment that is not covered by the Space Surveillance and Tracking (SST) Segment, and its effects,
- the prediction and/or detection of permanent or temporary disruption of mission and/or service capabilities due to space weather.
- the monitoring of the Sun, the solar wind, the radiation belts, the magnetosphere and ionosphere to the extent that it supports services related to effects that include radiation and spacecraft charging hazards, spacecraft drag, ionospheric perturbations, aircraft radiation hazards, geomagnetic disturbances and current induced in large conductive networks such as power lines and pipelines.
- the provision of all required predicted local spacecraft and launcher radiation, plasma and electromagnetic environment data.

The requirements have been expanded in this document also taking additional sources into account [RD-01 to RD-11]

The specification and description of the products provided to the SWE services is given in the SWE Products Specification document [AD-09].



2.5 SWE Segment Tools

Some of the services provided by the SWE Segment are based on tools that are made available for the users. These tools allow the users themselves to perform analysis of the potential space weather impact on their infrastructure, post even analysis of a space weather impact and other types of functions. The tools provided by the SWE Segment are rigorously verified and validated. The SWE Segment also ensures the availability of the databases needed for the tools. SWE Segment also provides the first level support for the correct use of the tools and provides the necessary information for the users to be able to find further levels of support, if necessary.



3 SWE SEGMENT SYSTEM REQUIREMENTS

3.1 Functional requirements

3.1.1 Segment Functions

3.1.1.1 Manage Operations

SWE-SRD-9110		Last issued in:	1.12
The SSA SWE system shall make the Space Weather products (including data, models and tools) available for the services of its mandate, either by generating them itself in its centres or by federating cooperating centres that produce those products (including data, models and tools).			
Justification:	Functional analysis of the SWE segment		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-9111		Last issued in:	1.8
The SSA SWE system shall establish and manage a consistent list of the data products needed by its services, and specify them in a way that enables the compliance with the performance requirements of the services, by specifying to the different centres in charge of those data products the nature, physical range, spatial range, spatial resolution, time range, time resolution and cadence, accuracy and reliability.			
Justification:	Analysis of the CRD		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9112		Last issued in:	1.8
The SSA SWE system shall establish and manage a consistent list of the models needed by its services, and specify them in a way that enables the compliance with the performance requirements of the services.			
Justification:	Analysis of the CRD		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9113		Last issued in:	1.8
The SSA SWE system shall establish and manage a consistent list of the tools needed by its services, and specify them in a way that enables the compliance with the performance requirements of the services.			
Justification:	Analysis of the CRD		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9114		Last issued in:	1.8
The SSA SWE system shall establish and manage an applicability matrix of the products (data, models and tools) to its different services, infer the induced interface requirements between the products providers and the services providers, and enforce those interface requirements.			
Justification:	Analysis of the CRD		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11964		Last issued in:	1.12
The system shall monitor and provide the status of own subsystems and assets, including status of external entities, communication links and contributing sensors/centres.			
Justification:	Status of system and devices need to be known.		
Comments:	The system status shall be reported to the governing authority. System status in the context of this requirement mainly refers to availability.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11952		Last issued in:	1.8
The system shall be capable of generating the following types of metrics: - service metrics - data processing metrics - data acquisition metrics			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11953		Last issued in:	1.12
The system shall define the service metrics based on at least the following parameters: - Number of user requests per time period - Number of product deliveries per time period - Service availability			



<ul style="list-style-type: none"> - Number of timeliness violations per time period - Service interrupts - Amount of data delivered - Number of subscriptions - Number of registered users - Number of denied access requests - Number of failed authentication attempts <p>More TBD</p>			
Justification:		In order to monitor the quality of the service provided to the end-user by the system.	
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11954		Last issued in:		1.8
<p>The system shall define the data processing and data acquisition metrics based on at least the following parameters in all the internal interfaces:</p> <ul style="list-style-type: none"> - Data throughput - Sensor performances - Amount of stored data <p>More TBD</p>				
Justification:		In order to monitor the quality of the data processing and data acquisition functions by the operator.		
Comments:		This requirement needs to be further analysed at sub-system and implementation level for each function and interface considered. A trade-off of the cost/benefit function needs to be performed.		
Source Requirements:				
Related Requirements:		Verification Method:	Design Review Test	

SWE-SRD-11955		Last issued in:		1.8
<p>The metrics produced by the system shall quantify the quality of the system data types considering, at least:</p> <ul style="list-style-type: none"> - the reliability of the data - the availability of the data - the accuracy and performances of the data and data sources 				
Justification:		In order to allow efficient monitoring of the system.		
Comments:		The quality will be measured by measuring the reliability, availability, accuracy and performances of the data and data sources.		
Source Requirements:				
Related Requirements:		Verification Method:	Design Review Test	

SWE-SRD-11956		Last issued in:		1.8
The system shall allow the operators to define service metrics computed applying logical and/or				



mathematical functions of metrics.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11957		Last issued in:	1.8
The system shall allow the generation of reports based on the system metrics.			
Justification:	In order to allow to perform metrics trend analyses. Since the service and the data processing and acquisition functions will be continuously available, the general quality, the performances and the specific data produced should be presented to the user in a regular way, particularly when concerning to operational data.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11958		Last issued in:	1.8
The system shall allow monitoring the system metrics and generating alarms based on selectable criteria and thresholds.			
Justification:	There will be some values in metrics which directly drive to generate alarms. These cases need to be configurable. Since the service and the data processing and acquisition functions will be continuously available, the general quality, the performances and the specific data produced should be presented to the user in a regular way, particularly when concerning to operational data.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11959		Last issued in:	1.8
The system shall store the computed metrics and allow to:			
<ul style="list-style-type: none"> - retrieve any past computed metric - generate statistics and evolution in time of the computed metrics 			
Justification:	In order to allow the operator to monitor the state of the system and to analyse tendencies.		
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review Test
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3.1.1.2 Maintenance

SWE-SRD-11860		Last issued in:	1.12
The system shall have an issue tracking system allowing its administrators, operators and end-users to raise problem reports concerning anomalies in the system behaviour, services and products.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11861		Last issued in:	1.12
The system shall log and archive all maintenance activities including procedures and resources used.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11863		Last issued in:	1.12
The system shall be able to produce metrics reports covering the maintenance activities including at least:			
<ul style="list-style-type: none"> - Number of problem reports raised per time period - Number of problems resolved per time period - Effort spent investigating and resolving problems - Perfective maintenance activities performed per time period - Planned perfective and corrective maintenance activities in the upcoming time period - etc. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11862		Last issued in:	1.8
The system shall have the capability to plan the maintenance activities taking the operational needs and availability requirements of the system into account.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



3.1.1.3 Manage and Enforce Governance and Data Policy

SWE-SRD-12875		Last issued in:	1.12
The SSA SWE segment shall receive Data Policy Directives from the SSA Governing Authority.			
Justification:	SSA Governing Authority will drive the Data Policy of the SWE segment.		
Comments:	The terms "Directives" and "SSA Governing Authority" are defined in [AD-06].		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12877		Last issued in:	1.12
The SSA SWE segment shall process the Data Policy Directives defining all the SWE specific Data Policy parameters and rules to be applied by the SWE segment.			
Justification:	SSA Governing Authority will drive the Data Policy of the SWE segment.		
Comments:	The terms "Directives" is defined in [AD-06].		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12878		Last issued in:	1.12
The system shall enforce the Directives.			
Justification:	This is to ensure that the system operates always within the rules & regulations laid down in the Data Policy Directives		
Comments:	The Data Policy should address all data types managed by the system, as well as all the provided services and products. The term "Directives" is defined in [AD-06].		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12879		Last issued in:	1.12
The system shall enforce the Data Policy at the level of each data item and data item attribute.			
Justification:	In order to comply with the Directives.		
Comments:	The term "Directives" is defined in [AD-06].		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12880		Last issued in:	1.12
The system shall allow the Administrator and the Security Officer to configure the Data Policy.			
Justification:	In order to make sure that the Data Policy is maintained and updated according to Data Policy requirements.		
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12881		Last issued in:	1.12
The system shall implement and manage the Data Policy approval cycle established by the SSA Governing Authority.			
Justification:	In order to make sure that a new or an updated version of the Data Policy is properly approved before it is being taken into operation.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12882		Last issued in:	1.12
The system shall accept changes to the Data Policy Directives applicable to the system without requiring modification of the applications (configurability).			
Justification:	In order to make sure that a new or an updated version of the Data Policy is properly approved before it is being taken into operation.		
Comments:	When the limit of the application configurability foreseen by its design will be reached, a change to the s/w applications versus a change of the requirement shall be considered (trade-off). Application is referring to software components. The term "Directives" is defined in [AD-06].		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12883		Last issued in:	1.12
The system shall support investigation of Data Policy incidents.			
Justification:	In order to make sure that Data Policy incidents can be investigated.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9126		Last issued in:	1.12
The SSA SWE system shall have a subsystem in charge of managing the data policy in a coordinated way with the Space Weather contributing centres and sensors.			
Justification:	Functional analysis of the SWE segment		
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review Test
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SWE-SRD-9127		Last issued in:	1.12
The SSA SWE system shall identify Space Weather risks and threats and report it to identified user groups according to data policy.			
Justification:	Functional analysis of the SWE segment		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11966		Last issued in:	1.12
The system shall be capable of enforcing the governance (including priorities) and data policy directives.			
Justification:	This is to ensure that the system operates always within the rules & regulations laid down in the data governance directives.		
Comments:	Directives as defined in [AD-11].		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12098		Last issued in:	1.8
The data policy enforcement shall be audited and approved by the governing authority before the system services are entering into operation.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12099		Last issued in:	1.8
The system shall enforce the versioning of the data policy as a whole as well as any subpart of the data policy arborescence.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12100		Last issued in:	1.8
The system shall allow the user operator to manage (i.e. enter, modify, delete) a version of the data policy.			
Justification:			



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12101		Last issued in:	1.8
The system shall allow to check the consistency of the data policy or any subpart of the data policy arborescence entered into the system.			
Justification:			
Comments:	It is important that the consistency of a newly installed data policy is checked before it is taken into operations. This ensures that no contradicting policies are enforced.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12102		Last issued in:	1.8
The system shall allow to define an approval cycle applicable to the data policy or any subpart of the data policy arborescence.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12103		Last issued in:	1.8
The system shall allow to include as part of the data policy approval cycle individuals belonging to the operating entity as well as individuals from the SSA governing authority.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12104		Last issued in:	1.8
Any change to the system due to the data policy update shall be tested and validated successfully prior to be rolled out in operation.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design



Requirements:		Method:	Review Test
SWE-SRD-12105		Last issued in:	1.8
The system shall not allow to distribute a particular data if its data policy has not been defined.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-12106		Last issued in:	1.8
The operating entity shall be in charge of configuring the system such that it complies with the data policy.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-11968		Last issued in:	1.8
The system shall be to enforce Data Policy at the level of each data item and data item attribute.			
Justification:	In order to associate to any data item/attribute its Data Policy metadata.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-11969		Last issued in:	1.8
The system shall allow the administrator and the security officer to configure the Data policy.			
Justification:	In order to make sure that the data policy is maintained and updated according to data policy requirements.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test
SWE-SRD-11970		Last issued in:	1.8
The system shall implement the data policy approval cycle established by the SSA Governing Authority.			
Justification:	In order to make sure that a new or an updated version of the data policy is properly approved before it is being taken into operation.		
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-11971		Last issued in:	1.8
The system shall allow to change the Data Policy directives applicable to the system without requiring to modify the applications (configurability).			
Justification:	In order to ensure maximum flexibility of the system with respect to changes in the data policy.		
Comments:	When the limit of the application configurability foreseen by its design will be reached, a change to the s/w applications versus a change of the requirement shall be considered (trade-off). Application is referring to software components.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11972		Last issued in:	1.8
The system shall monitor the compliance of the policies and shall be capable of generating reports and warnings when required.			
Justification:	In order to make sure that data policy violations are flagged and the operator is informed.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11974		Last issued in:	1.8
The system shall be able to handle data while maintaining the Intellectual Property Right (IPR) and ownership of the data provider.			
Justification:	In order to ensure that the data owner IPR is not violated.		
Comments:	The SSA data policy will specify the IPR restrictions.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11975		Last issued in:	1.8
The system shall identify the owner of the data from Third Party Providers within the associated meta-data.			
Justification:	This is a key requirement for IPR application.		
Comments:	Note that in some specific cases agreements may be put into place such that input data shall be provided to the system in order to generate products, and not to be provided directly to users. In these cases the data provider may opt not to be identified in the meta data of the final product.		
Source			



Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11976		Last issued in:	1.8
The system shall reference the data policy rules on IPR and ownership of the data provided by Third Party Data Providers in the meta-data associated to that data.			
Justification:	External entities have to provide the attribute for IPR application, independently of the data source.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11977		Last issued in:	1.8
There shall be no limitations (Intellectual Property Rights, etc...) for a possible transfer of the system (excluding contributing sensors and service level agreements with contributing sensors) to Third Party Operators.			
Justification:	In order to ensure the possibility of flexible system handover.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

3.1.1.4 Reporting to Governing Authority

SWE-SRD-11961		Last issued in:	1.8
The system shall continuously monitor the compliance to the directives imposed by the Governing Authority and shall issue reports and warnings when required.			
Justification:	This is to make sure that directives are adhered to at all time by the system and that violations are reported as reports and/or warnings.		
Comments:	Directives are defined in [AD-11].		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12234		Last issued in:	1.12
The system shall provide all metric reports regarding the performance of the system to the Governing Authority upon request as well as periodically.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-11962		Last issued in:	1.8
The system shall archive the reports for the system lifetime.			
Justification:	This is to ensure that a full system audit of all reports is possible for any point in time.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

3.1.2 Services

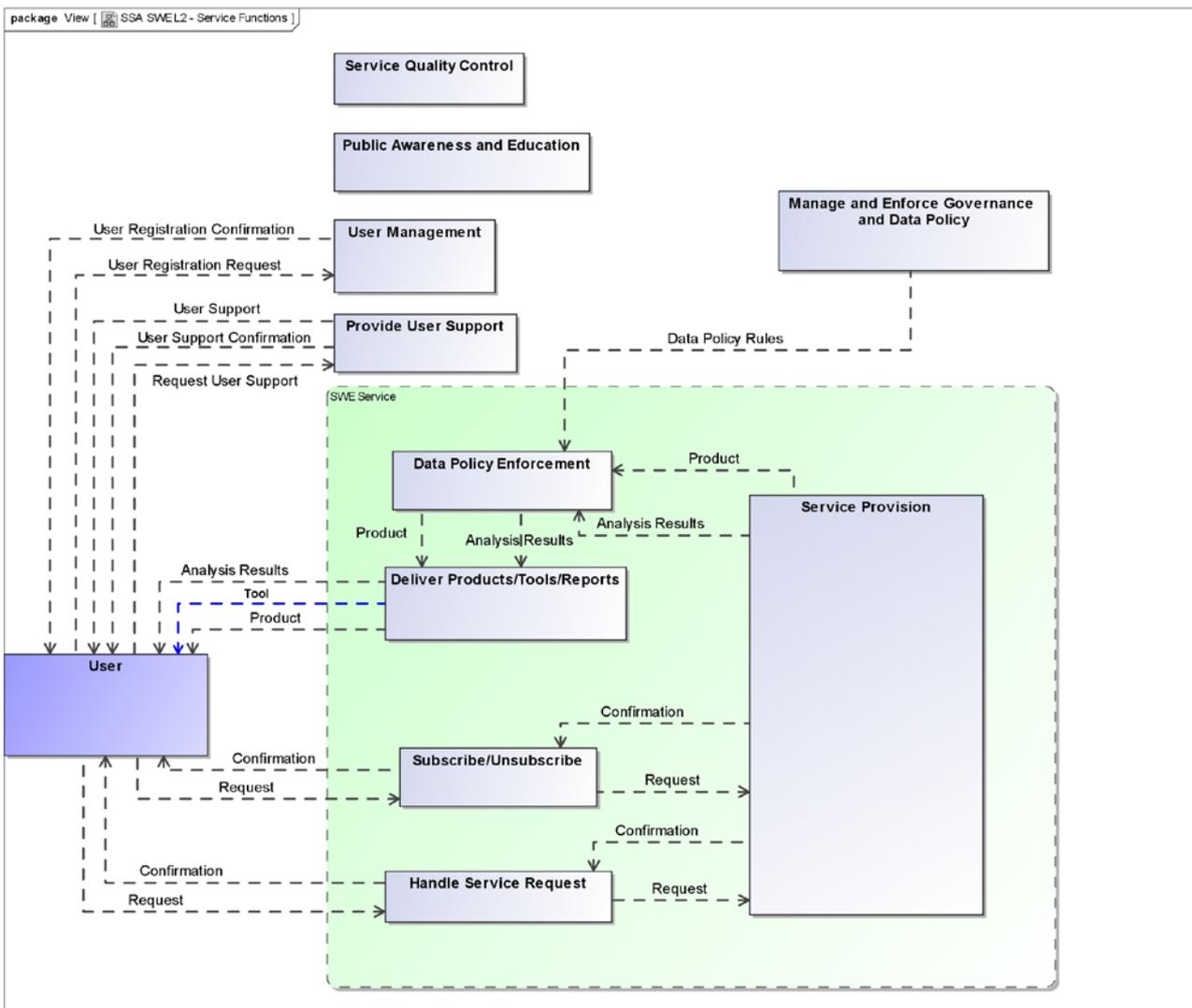




Figure 2: SWE Service Functions

3.1.2.1 General Service Functions

SWE-SRD-10913		Last issued in:	1.12
Each Service shall provide the data products, reports, tools and user manuals requested by the user by means of web-services and mechanisms for file transfer.			
Justification:			
Comments:	The tools may be available for download. Alternatively these may be delivered via a web interface depending on user needs/preference.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10966		Last issued in:	1.12
Each Service shall provide the alert to the user by means of web-services, email and sms.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10880		Last issued in:	1.12
Each Service shall recall in its outputs delivered to the user the input elements that the user has provided and reword/complement them with additional metadata as necessary.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12884		Last issued in:	1.12
The system shall allow to define by configuration, for each service, whether it is to be provided either: <ul style="list-style-type: none"> • "on-demand"; • "on request"; • "by subscription". 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



3.1.2.1.1 SWE Segment Analysis Reports

SWE-SRD-11851		Last issued in:	1.8
The system shall support the automatic generation of analysis reports for a given event and/or period of interest			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11852		Last issued in:	1.8
The system shall support the manual generation of analysis reports for a given event and/or period of interest			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11853		Last issued in:	1.8
The system shall support the manual editing of analysis reports for a given event and/or period of interest			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11854		Last issued in:	1.8
The user shall be able to select the format of the SWE analysis report			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11855		Last issued in:	1.8
The user shall be able to select the content of an analysis report from the service elements available (graphical and numerical outputs shall be supported)			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11856		Last issued in:	1.8
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Analysis reports shall identify the models, input parameters, tools and data used to generate the content (with the exception of cases where an existing agreement to maintain data confidential is in place)			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11857		Last issued in:	1.8
Known limitations arising from data and/or model availability shall be identified and listed			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11858		Last issued in:	1.8
Uncertainties in model and data output shall be listed where available.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.1.2 User management

SWE-SRD-10857		Last issued in:	1.8
All the services of the SSA SWE segment shall be on a subscription basis, i.e. provided to registered users only.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11448		Last issued in:	1.5
The SSA SWE segment shall make available to non registered users general space weather information and sample service outputs in compliance to data policy.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10858		Last issued in:	1.8
An on-subscription service shall offer the possibility to a non-registered user to subscribe to the service in agreement with the Governance and Data Policy.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10867		Last issued in:	1.8
An on-subscription service shall offer the possibility to a registered user to un-subscribe to the service.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10866		Last issued in:	1.8
The services of the SSA SWE segment shall be either on-request or broadcasted.			
Justification:			
Comments:	The broadcast means shall include e-mail, web page or RSS feed.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10865		Last issued in:	1.8
In case of on-request service, the services of the SSA SWE segment shall give the possibility to the user to receive tailored service output based on his/her request.			
Justification:			
Comments:	Examples of tailoring would include setting thresholds on key parameters and the ability to select the frequency at which information is received from a service.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10864		Last issued in:	1.8
In case of on-request service, the services of the SSA SWE segment shall provide to the user with feedback on the feasibility of the request (i.e. availability of the requested data) before the delivery of the service output.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



SWE-SRD-10863		Last issued in:	1.8
In case of on-request services, the services shall recall the input parameters of the request in the provided output.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10862		Last issued in:	1.8
The SSA SWE segment shall inform its users of the limitations of service that may occur due to planned unavailability periods.			
Justification:			
Comments:	For example, scheduled maintenance periods.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11847		Last issued in:	1.12
The SSA SWE segment shall inform users of scheduled maintenance and limitations of service that may occur due to planned unavailability periods 30 days in advance.			
Justification:			
Comments:	For example, scheduled maintenance periods.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10861		Last issued in:	1.8
The SSA SWE segment shall inform its users of any limitations of the service that may occur due to unexpected unavailability with a minimum delay and within a maximum of 1hour from the start of the unavailability.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10860		Last issued in:	1.12
The SSA SWE segment shall inform its users when it is functioning normally following an unavailability period with a minimum delay and within a maximum of 1hour from the end of the unavailability.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



SWE-SRD-10859		Last issued in:	1.8
The SSA SWE segment shall inform its users of the limitations on the provided data due to Governance and Data Policy restrictions.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11450		Last issued in:	1.12
The SSA SWE segment shall define a set of general alarms per service domain.			
Justification:			
Comments:	As applied to data and nowcast products: e.g. in case of data value is crossing a threshold due to environment change.		
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.1.3 Provide User Support

SWE-SRD-10868		Last issued in:	1.8
All services shall provide an on-line help to the users in order to help them provide appropriate inputs and also to explain the format and contents of the service outputs.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10870		Last issued in:	1.8
A service delivering tools to the user shall also deliver the tools user manuals.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10869		Last issued in:	1.8
A service delivering tools to the user shall also provide an on-line help to the user to help him/her use the tools properly.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review
SWE-SRD-11449		Last issued in:	1.6
In case of on-request service, the services of the SSA SWE segment shall give the user the possibility to enter proprietary information with the appropriate security measures.			
Justification:			
Comments:	The user may be encouraged to submit proprietary information about their system in order to support the generation of tailored service output.		
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.1.4 Public awareness and education

SWE-SRD-10871		Last issued in:	1.8
The information generated for public awareness and education shall be handled by a dedicated service, “General data service – Space Weather support material” (number 8-7), that shall provide access to web based content and educational material including tutorials, covering aspects of space weather and micro-particles geared towards users and customers, and include information on the types of products available and associated caveats.			
Justification:			
Comments:	This service shall be web-based and linked from other tailored SWE services as applicable.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10872		Last issued in:	1.8
General information generated to support public awareness and education shall be accessible without registration.			
Justification:			
Comments:	Note that Elements of service 8-7 may be accessible on a registration basis e.g. interactive tutorials.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.1.5 Service quality control

SWE-SRD-10874		Last issued in:	1.8
For the data sources that provide calculated values (whether indices, derived parameters, extrapolations of basic parameters or any result from a calculation process), the SSA System shall provide accurate description of the model and parameters used for their generation as well as which exact information is provided by each parameter and its domain of applicability.			
Justification:			



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10875		Last issued in:	1.12
The SSA system shall make its estimation of the accuracy and confidence of the provided services and make it available to the users.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10876		Last issued in:	1.8
Uncertainties in the presented data shall be quantified in the form of quality metrics.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10888		Last issued in:	1.8
Uncertainties in the model outputs shall be quantified in the form of quality metrics.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10887		Last issued in:	1.8
The SSA SWE segment shall warn the user when the accuracy and confidence of the delivered service products are degraded.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



3.1.2.2 Domain 1 services - Spacecraft design

3.1.2.2.1 Service 1-1: Spacecraft design - Environment specification: data archive

SWE-SRD-10878		Last issued in:	1.12
Service 1-1 shall provide statistical data to derive environments and effects on space systems, including: <ul style="list-style-type: none"> • Statistical information (median and other percentiles) for a spacecraft in any orbit as a function of time (in past and future) and location for the following space environment: ionising radiation, plasma, microparticles, radio flux (F10.7 to be provided as a proxy), atmosphere and UV, • Statistical information (median and other percentiles) for spacecraft in any orbits as a function of time (in past and future) and location for the following space environment <u>effects</u>: dose, single event effects, sensor background, surface charging, deep dielectric charging, solar cell degradation, spacecraft anomalies, effects from micro particle impacts, • Long-term solar cycle prediction (with a quantification of the forecast uncertainties) including at least Sun Spot Number, Solar Flux EUV, F10.7, expected flare activity level, mean and standard deviation of interplanetary magnetic field strength, median and sextiles of solar wind pressure over 2 solar cycles for statistical predictions and 5-6 years for other approaches. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12551		Last issued in:	1.12
The SWE system shall provide a Service 1-1: Spacecraft design - Environment specification: data archive.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.2.1.1 Handle service requests

SWE-SRD-10882		Last issued in:	1.8
The following set of user criteria shall be requested by service 1-1 prior to the generation of the outputs of the service: <ul style="list-style-type: none"> ➢ Orbit or range of orbits for the considered spacecraft ➢ time span of the analyses ➢ parameters to be retrieved from database/predicted. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review
SWE-SRD-10886		Last issued in:	1.8



Service 1-1 shall allow its users to specify freely the orbits and time spans for their historical data retrieval and/or reconstruction requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10885		Last issued in:	1.8
Service 1-1 shall inform its users of the limitations of accuracy and reliability that may result from a specific user request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10884		Last issued in:	1.8
Service 1-1 shall inform its users of the limitations of service that may occur due to variability of effects as a function of the materials and designs actually declared by collaborating spacecraft owners in the spacecraft SSA's database or the applicable models.			
Justification:			
Comments:	Data will come from sensors in-orbit and modelling to fill gaps.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10883		Last issued in:	1.8
Service 1-1 shall inform its users of the limitations on anomalies database that may occur due to data confidentiality.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.2.1.2 Deliver products/tools/reports

SWE-SRD-10879		Last issued in:	1.8
Service 1-1 shall request the user to identify which measured or forecast parameters within the list of data products below the user wants to be delivered, request them from the SSA SWE database, compute the statistics and percentiles, and provide them to the user:			
<ul style="list-style-type: none"> o Radiation and plasma data: <ul style="list-style-type: none"> ▪ High energy >1 MeV protons energy spectrum [product codes L1-001-P, L1-001-F, L1-003-P, L1-003-F, MR-006-P, MR-006-F, MR-008-P, MR-008-F] ▪ High energy (>1 MeV) ions energy spectrum [product codes L1-002-P, L1-002-F, L1- 			



<ul style="list-style-type: none"> 004-P, L1-004-F, MR-007-P, MR-007-F, MR-009-P, MR-009-F] <ul style="list-style-type: none"> ▪ High energy (>30keV) electron energy spectrum [product codes L1-006-P, L1-006-F, L1-007-P, L1-007-F, MR-011-P, MR-011-F] ▪ High energy (> 30 keV and < 1 MeV) ion energy spectrum [product codes L1-005-P, L1-005-F, MR-010-P, MR-010-F,] ▪ Thermal and superthermal electrons energy spectrum (0-30 keV) [product codes MR-012-P, MR-012-F] ▪ Thermal ions density and temperature. [product codes MR-014-P, MR-014-F] ▪ Plasma drift velocity [product code MR-016-M] o microparticles: <ul style="list-style-type: none"> ▪ flux as a function of size, velocity, impact angle distribution [product codes MP-001-P, MP-001-F] ▪ Known periods/events of increased microparticle flux (meteoroid streams, debris clouds) [product code MP-002-P] o atmosphere: <ul style="list-style-type: none"> ▪ Atmospheric density [product codes AG-007-P, AG-007-F] ▪ Atomic oxygen density [product codes IT-010-P, IT-010-F] o UV and soft X-ray, with spectral information [product codes SU-029-P, SU-029-F, SU-027-P] o Sun Spot Number [product codes SU-007-P, SU-007-F], o Solar Flux EUV [product codes SU-028-P, SU-028-F], o F10.7 [product codes SU-008-P, SU-008-F], o expected flare activity level [product codes SU-001-P, SU-001-F], o mean and standard deviation of interplanetary magnetic field strength [product codes L1-008-P, L1-008-F], o median and sextiles of solar wind pressure [to be processed from product codes L1-009-P, L1-009F, L1-010-P, L1-010F, L1-011-P, L1-011F].
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Justification:			
Comments:			
Source Requirements:			
Related Requirements:	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Verification Method:</td> <td style="width: 50%;">Design Review</td> </tr> </table>	Verification Method:	Design Review
Verification Method:	Design Review		

SWE-SRD-10877	Last issued in:	1.12
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<p>Service 1-1 shall request the user to identify which measured or derived parameters within the list of products below (addressing spacecraft effects) the user wants to be delivered, request them from the SSA SWE database, compute the statistics and percentiles, and provide them to the user:</p> <ul style="list-style-type: none"> o statistical dose (equivalent dose, dose equivalent, ambient dose, non-ionising dose), along with associated assumptions including reference material considered [derived from product code SC-005-P] o single event effects and associated probability of occurrence [from product code SC-001-P] o sensor background [product code SC-002-P], o deep dielectric charging [product code SC-006-P], o surface charging [product code SC-007-P], o spacecraft anomalies, for the spacecraft in the SSA database [product code SC-001-P], o anomalies attributed to micro particle impacts [from product code SC-001-P].
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Justification:	
Comments:	This may be archived data or statistics generated based on effect models.
Source Requirements:	



Related Requirements:		Verification Method:	Design Review
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SWE-SRD-10873		Last issued in:	1.8
Service 1-1 shall request the user whether he/she wants a long term solar forecast and if yes, request it from the SSA SWE database [data product codes SU-031-F and L1-012-F] and provide it to the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10914		Last issued in:	1.8
Service 1-1 shall deliver upon user's request a report about the predicted effects from micro particle impacts onto an exposed spacecraft surface that the user will have specified			
Justification:			
Comments:	This report shall be elaborated based on correlated models and shall include the associated assumptions including reference material considered.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12301		Last issued in:	1.8
Service 1-1 shall provide the capability for the user to generate specific reports related to the analysis performed.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12299		Last issued in:	1.8
Service 1-1 shall deliver tools to the user enabling him/her to perform an analysis as a function of orbit and spacecraft type.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.2.2 Service 1-2: Spacecraft design - Environment specification: in orbit verification

SWE-SRD-10889		Last issued in:	1.8
Service 1-2 shall provide a best estimate of the local environment that has been experienced by a spacecraft			



either through measurements or reconstruction (ionising radiation, plasma, micro-particles, atmosphere, UV and local magnetic field variations) for in-flight validation of specifications of environments and effects.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12552		Last issued in:	1.12
The SWE system shall provide a Service 1-2: Spacecraft design - Environment specification: in orbit verification			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.2.2.1 Handle service requests

SWE-SRD-10898		Last issued in:	1.8
The following set of user criteria shall be requested by service 1-2 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ Orbit or range of orbits for the considered spacecraft ➤ time span of the analyses ➤ parameters to be retrieved from database/reconstructed 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10899		Last issued in:	1.8
Service 1-2 shall inform its users of the limitations of accuracy and reliability that may result in the service due to the need to strongly extrapolate from measurements, in particular in regions where measurements are highly variable in space and time: the resulting uncertainties shall be in any case provided to the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.2.2.2 Deliver products/tools/reports

SWE-SRD-10905		Last issued in:	1.8
Service 1-2 shall recall in its outputs delivered to the user the input elements that the user has provided and			



reword/complement them with metadata as follows: <ul style="list-style-type: none"> • Osculating Element Data Set (OEDS) for the considered Orbit • Time span of the required measurement/product data retrieval or a-posteriori analysis • Publication date • Position of spacecraft as a function of time within the specified time span: <ul style="list-style-type: none"> o formally defined in inertial coordinates o but then assessed in terms of magnetospheric coordinate systems (in particular McIlwain L parameter and magnetic field for radiation belt assessment, geomagnetic for near Earth plasma effects and geocentric-solar-magnetospheric coordinates for the outer magnetosphere), • Flag indicating if information from third parties is included. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10906		Last issued in:	1.8
Service 1-2 shall request the user to identify which measured or reconstructed parameters within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user: <ul style="list-style-type: none"> o Radiation and plasma data: <ul style="list-style-type: none"> ▪ High energy >1 MeV protons energy spectrum [product codes L1-001-P, L1-001-M, L1-003-P, L1-003-M, MR-006-P, MR-006-M, MR-008-P, MR-008-MF] ▪ High energy (>1 MeV) ions energy spectrum [product codes L1-002-P, L1-002-M, L1-004-P, L1-004-M, MR-007-P, MR-007-M, MR-009-P, MR-009-M] ▪ High energy (>30keV) electron energy spectrum [product codes L1-006-P, L1-006-M, L1-007-P, L1-007-M, MR-011-P, MR-011-M] ▪ High energy (> 30 keV and < 1 MeV) ion energy spectrum [product codes L1-005-P, L1-005-M, MR-010-P, MR-010-M,] ▪ Thermal and superthermal electrons energy spectrum (0-30 keV) [product codes MR-012-P, MR-012-M] ▪ Data on interplanetary medium outside L1 [product codes IP-001-M, IP-001-P, IP-002-M, IP-002-P] o Thermal ions density and temperature [product codes MR-014-P, MR-014-M] o plasma [product code MR-016-M] o atmosphere: <ul style="list-style-type: none"> ▪ Atmospheric density [product codes AG-007-P, AG-007-M] ▪ Atomic oxygen density [product codes IT-010-P, IT-010-M] o microparticles: <ul style="list-style-type: none"> ▪ flux as a function of size, velocity, impact angle distribution [product codes MP-001-P, MP-001-M] ▪ Known periods/events of increased microparticle flux (meteoroid streams, debris clouds) [product code MP-002-P] o UV and soft X-ray flux [product codes SU-029-P, SU-029-M, SU-027-P] o Solar Flux EUV [product codes SU-028-P, SU-028-M], 			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review
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SWE-SRD-12300		Last issued in:	1.12
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Service 1-2 shall deliver tools to the user that allows him/her to perform an analysis as a function of the orbit and spacecraft type

Justification:

Comments: The tools may be available for download. Alternatively these may be delivered via a web interface depending on user needs/preference.

Source Requirements:

Related Requirements:		Verification Method:	Design Review
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SWE-SRD-12302		Last issued in:	1.8
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Service 1-2 shall provide the capability for the user to generate specific reports related to the analysis performed.

Justification:

Comments:

Source Requirements:

Related Requirements:		Verification Method:	
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Service 1-2 is not required to deliver user's specific reports.

3.1.2.2.3 Service 1-3: Spacecraft design - Post event analysis

SWE-SRD-10893		Last issued in:	1.8
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Service 1-3 shall provide to the user data and tools to analyse the space environment at a given time and/or location, allowing the user to correlate it with effects and anomaly events on specific spacecraft, equipment or components.

Justification:

Comments:

Source Requirements:

Related Requirements:		Verification Method:	Design Review
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SWE-SRD-12553		Last issued in:	1.12
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The SWE system shall provide a Service 1-3: Spacecraft design - Post event analysis.

Justification:

Comments:

Source Requirements:

Related Requirements:		Verification Method:	Design Review
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3.1.2.2.3.1 Handle service requests

SWE-SRD-10918		Last issued in:	1.8
The following set of user criteria shall be requested by service 1-3 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ type of orbit ➤ time span ➤ type of analysis envisaged by the user. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10919		Last issued in:	1.8
Service 1-3 shall inform the user that the environmental data that are needed as input to the tools shall be obtained by the user from Services 1-1 and 1-2, as a preliminary step to the use of the tools provided by this service.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10912		Last issued in:	1.8
Service 1-3 shall inform its users of the limitations of accuracy and reliability that may result from a specific request when using a provided tool.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.2.3.2 Deliver products/tools/reports

SWE-SRD-10920		Last issued in:	1.8
Service 1-3 shall include links to services 1-1 and 1-2, so as to guide the user towards the related environment data generators, if he/she requires so.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10921		Last issued in:	1.12
Service 1-3 shall deliver tools to the user that allows him/her to perform an analysis as a function of the orbit,			



the spacecraft type and the type of analysis envisaged by the user.			
Justification:			
Comments:	The tools may be available for download. Alternatively these may be delivered via a web interface depending on user needs/preference.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10924		Last issued in:	1.5
Service 1-3 shall provide the capability for the user to generate specific reports related to the analysis performed.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.3 Domain 2 services - Spacecraft operations

3.1.2.3.1 Service 2-1: Spacecraft operation - In-orbit environment and effects monitoring

SWE-SRD-10901		Last issued in:	1.8
Service 2-1 shall perform a near real-time estimate of the environment and of its effects by providing: <ul style="list-style-type: none"> • near real-time quantitative assessment of the space environment, • near real-time monitoring of space weather events (including as minimum: magnetic storm, substorms, high-speed streams, solar energetic particle events, Earth-directed CMEs, meteor streams, debris clouds) that can lead to potentially hazardous effects on spacecraft, through a fast first level processing with a qualitative accuracy at least sufficient to assess which type of event is happening) during those events, and with a quantitative accuracy at most 10 minutes after acquisition from sensors according to the performance requirements • the capability to correlate pre-selected subsets of user relevant spacecraft housekeeping data with space environment parameters, in the case the user has agreed to provide those data, • nowcasts of effects on the user spacecraft as a function of time and location, in the case the user has agreed to provide the inputs allowing the modelling of the spacecraft, • reports of S/C anomalies detected across a predefined S/C fleet to a subset of authorised users • near real-time assessment of the effects of ionospheric disturbances on spacecraft operations • nowcast of the atmospheric data required for drag calculation, • nowcast of atmospheric properties for drag calculation on Mars, Venus and other relevant planets, • nowcast of solar and geomagnetic activity indices • nowcast of meteoroid and space debris fluxes, including streams and debris clouds 			
Justification:	<i>For this domain, the space environment data is required in real time so as to relate to sudden effects that could occur on the spacecraft, SEE, ESD, errors in magneto-torquing and sudden drag-induced orbit changes in LEO. Continuous real-time monitoring of space weather environment conditions provides the relevant information to take informed decisions related to S/C operations and help the correlation of results in future analysis.</i>		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12554		Last issued in:	1.12
The SWE system shall provide a Service 2-1: Spacecraft operation - In-orbit environment and effects monitoring.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.3.1.1 Handle service requests

SWE-SRD-10902		Last issued in:	1.8
The following set of user criteria shall be requested by service 2-1 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ orbit ➤ time span ➤ parameters to be requested as measurements / nowcast ➤ spacecraft ID (for effects prediction only) ➤ spacecraft/component characteristics (for effects prediction only) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10903		Last issued in:	1.8
Service 2-1 shall allow its users to specify freely the orbits for their nowcast / near real time requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10904		Last issued in:	1.8
Service 2-1 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review
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SWE-SRD-10890		Last issued in:	1.8
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Service 2-1 shall inform those of its users who require prediction of effects on their spacecraft of the limitations of service that may occur due to variability of effects as a function of the materials and designs actually used, if they could not declare all the materials and designs of his spacecraft due to data confidentiality.

Justification:			
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Comments:			
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Source Requirements:			
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Related Requirements:		Verification Method:	Design Review
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SWE-SRD-10891		Last issued in:	1.8
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Service 2-1 shall inform its users of the limitations on anomalies database that may occur due to data confidentiality.

Justification:	Access to anomaly data may be limited to a subset of users.		
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Comments:			
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Source Requirements:			
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Related Requirements:		Verification Method:	Design Review
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3.1.2.3.1.2 Deliver products/tools/reports

SWE-SRD-10926		Last issued in:	1.8
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Service 2-1 shall request the user to identify which measured and nowcasted parameters within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:

- o Measurements of solar flares [product code SU-001-N], CMEs [product code SU-002-N], solar energetic particle events [product codes IP-001-M, IP-001-N], coronal holes [product code SU-004-N], and solar magnetic fields [product codes SU-005-M, SU-005-N],
- o Data from spacecraft:
 - Measurements from spacecraft radiation monitors [product code SC-002-M],
 - Orbital data of spacecraft carrying space weather instruments [product code SC-003-N],
 - A relevant subset of spacecraft housekeeping telemetry data [product code SC-004-M],
 - Spacecraft anomalies, for the spacecraft in the SSA database [product code SC-001-P],
- o Geomagnetic storm condition [product code MR-001-N],
- o Radiation / Plasma / Magnetospheric and solar energetic particles fluxes (electrons and protons):
 - High energy >1 MeV protons energy spectrum [product codes L1-001-M, L1-003-M, MR-006-M, MR-008-M, L1-001-N, L1-003-N, MR-006-N, MR-008-N]
 - High energy (>1 MeV) ions energy spectrum [product codes L1-002-M, L1-004-M, MR-007-M, MR-009-M, L1-002-N, L1-004-N, MR-007-N, MR-009-N]
 - High energy (>30keV) electron energy spectrum [product codes L1-006-M, L1-007-M, MR-011-M, L1-006-N, L1-007-N, MR-011-N]



- High energy (> 30 keV and < 1 MeV) ion energy spectrum [product codes L1-005-M, MR-010-M, L1-005-N, MR-010-N]
 - Thermal and superthermal electrons energy spectrum (0-30 keV) [product codes MR-012-M, MR-012-N]
 - Data on interplanetary medium outside L1 [product codes IP-001-M, IP-001-N, IP-002-M, IP-002-N]
 - Plasma drift velocity [product code MR-016-M]
- o Thermal ions density and temperature [product codes MR-014-M, MR-014-N]
- o Atmosphere:
 - Atmospheric density [product codes AG-007-M, AG-007-N]
 - Atomic oxygen density [product codes IT-010-M, IT-010-N]
- o Microparticles:
 - flux as a function of size, velocity, impact angle distribution [product codes MP-001-M, MP-001-N]
 - Known periods/events of increased microparticle flux (meteoroid streams, debris clouds) [product code MP-002-N]
- o UV and soft X-ray flux [product codes SU-029-M, SU-029-N, SU-027-M, SU-027-N]
- o Solar Flux EUV [product codes SU-028-M, SU-028-N],
- o Ground based geomagnetic field [product codes AG-005-M, AG-005-N]
- o Cosmic rays energy and ion-species flux spectra [product codes L1-002-M, L1-002-N, MR-007-M, MR-007-N]
- o Ionosphere:
 - Altitude dependent TEC (Total Electron Content) maps [product codes IT-001-M, IT-001-N]
 - Ionosonde measurements [product codes IT-005-M, IT-005-N]
 - Ionospheric scintillation, location and intensity [product codes IT-009-M, IT-009-N]
- o Indices: geomagnetic (Kp, Ap, AE, Dst) [product codes MR-002-N, MR-003-N, MR-004-N], solar (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-N, SU-008-M, SU-008-N, SU-009-N, SU-010-N, SU-011-N, SU-012-N], and other indices (IG12, IMF) [product codes SU-013-N, L1-008-M, L1-008-N],
- o Global and local neutral density and neutral winds as a function of altitude, latitude and longitude (local time) [product codes IT-007-M, IT-007-N, IT-008-M, IT-008-N]
- o Solar Wind velocity, density and magnetic field [product codes L1-008-M, L1-008-N, L1-009-M, L1-009-N, L1-010-M, L1-010-N],
- o Net electrical current to spacecraft surface [product codes SC-006-M, SC-006-N, SC-007-M, SC-007-N, SC-008-M, SC-008-N],

Justification:			
Comments:			
Source Requirements:			
Related Requirements:	<table border="1"> <tr> <td>Verification Method:</td> <td>Design Review</td> </tr> </table>	Verification Method:	Design Review
Verification Method:	Design Review		

SWE-SRD-11782	Last issued in:	1.12
Service 2-1 shall deliver tools to the user that allows him/her to perform an analysis as a function of the orbit and the spacecraft type.		
Justification:		
Comments:	The tools may be available for download. Alternatively these may be delivered via a web interface depending on user needs/preference.	
Source		



Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10932		Last issued in:	1.8
Service 2-1 shall, upon request from a user, provide nowcasts of effects on the user spacecraft as a function of time and location.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10933		Last issued in:	1.8
Service 2-1 shall deliver those nowcasts in the form of an analysis report that shall be based on correlated models and shall include the associated assumptions including the reference materials and geometry considered.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10934		Last issued in:	1.12
Service 2-1 shall provide the spacecraft effects nowcast report to the user by means of web-services and mechanisms for file transfer.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.3.2 Service 2-2: Spacecraft operation - Post event analysis

SWE-SRD-10895		Last issued in:	1.8
Service 2-2 shall correlate a particular spacecraft event with space environment data by providing:			
<ul style="list-style-type: none"> • the capability to correlate pre-selected subsets of user relevant spacecraft housekeeping data with space environment parameters, in the case the user has agreed to provide those data • reports of S/C anomalies detected across a predefined S/C fleet to an authorised subset of users • data for Post Event Analysis by allowing the user to retrieve (or display) Space Weather environmental data and compare them with the S/C conditions (e.g. effects) and data at any past time and S/C location • access to historical Space Weather Environment data, Spacecraft Effects, and Space Weather Events data • data and tools to correlate the space environment with anomaly events on specific spacecraft, equipment or components. 			
Justification:			



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12555		Last issued in:	1.12
The SWE system shall provide a Service 2-2: Spacecraft operation - Post event analysis.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.3.2.1 Handle service requests

SWE-SRD-10938		Last issued in:	1.8
The following set of user criteria shall be requested by service 2-2 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ orbit ➤ time span ➤ parameters to be retrieved from database / reconstructed ➤ spacecraft ID (for effects prediction only) ➤ spacecraft/component characteristics (for effects prediction only) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10939		Last issued in:	1.8
Service 2-2 shall allow its users to specify freely the orbits for their data/product retrieval / a posteriori reconstruction requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10940		Last issued in:	1.8
Service 2-2 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review
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SWE-SRD-10941		Last issued in:	1.8
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Service 2-2 shall inform those of its users who require prediction of effects on their spacecraft of the limitations of service that may occur due to variability of effects as a function of the materials and designs actually used, if they could not declare all the materials and designs of his spacecraft due to data confidentiality.

Justification:	
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Comments:	
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Source Requirements:	
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Related Requirements:		Verification Method:	Design Review
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SWE-SRD-10936		Last issued in:	1.8
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Service 2-2 shall inform its users of the limitations on anomalies database that may occur due to data confidentiality.

Justification:	
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Comments:	
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Source Requirements:	
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Related Requirements:		Verification Method:	Design Review
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3.1.2.3.2.2 Deliver products/tools/reports

SWE-SRD-10943		Last issued in:	1.8
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Service 2-2 shall request the user to identify which measurements and a posteriori reconstruction parameters within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:

- o Measurements of solar flares [product code SU-001-P], CMEs [product code SU-002-P], solar energetic particle events [product code IP-001-P], coronal holes [product code SU-004-P], and solar magnetic fields [product code SU-005-P],
- o Data from spacecraft:
 - Measurements from spacecraft radiation monitors [product code SC-002-P],
 - Orbital data of spacecraft carrying space weather instruments [product code SC-003-P],
 - A relevant subset of spacecraft housekeeping telemetry data [product code SC-004-P],
- o Geomagnetic storm condition [product code MR-001-P],
- o Ionising radiation / Plasma / Magnetospheric and solar energetic particles fluxes (electrons and protons):
 - High energy >1 MeV protons energy spectrum [product codes L1-001-P, L1-003-P, MR-006-P, MR-008-P]
 - High energy (>1 MeV) ions energy spectrum [product codes L1-002-P, L1-004-P, MR-007-P, MR-009-P]
 - High energy (>30keV) electron energy spectrum [product codes L1-006-P, L1-007-P, MR-011-P]
 - High energy (> 30 keV and < 1 MeV) ion energy spectrum [product codes L1-005-P, MR-010-P]



- Thermal and superthermal electrons energy spectrum (0-30 keV) [product codes MR-012-P]
 - Data on interplanetary medium outside L1 [product codes IP-001-P, IP-002-P]
 - Plasma drift velocity [product code MR-016-M]
- o Thermal ions density and temperature [product codes MR-014-M, MR-014-P]
- o Atmosphere:
 - Atmospheric density [product code AG-007-P]
 - Atomic oxygen density [product code IT-010-P]
- o Microparticles:
 - flux as a function of size, velocity, impact angle distribution [product code MP-001-P]
 - Known periods/events of increased microparticle flux (meteoroid streams, debris clouds) [product code MP-002-P]
- o UV and soft X-ray flux [product codes SU-029-P, SU-027-P]
- o Solar Flux EUV [product code SU-028-P],
- o Ground based geomagnetic field [product code AG-005-P]
- o Cosmic rays energy and ion-species flux spectra [product code L1-002-P, MR-007-P]
- o Ionosphere:
 - Altitude dependent TEC (Total Electron Content) maps [product code IT-001-P]
 - Ionosonde measurements [product code IT-005-P]
 - Ionospheric scintillation, location and intensity [product code IT-009-P]
- o Indices: geomagnetic (Kp, Ap, Dst) [product codes MR-002-P, MR-003-P, MR-004-P], solar (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-P, SU-008-P, SU-009-P, SU-010-P, SU-011-P, SU-012-P], and other indices (IG12, IMF) [product codes SU-013-P, L1-008-P],
- o Global and local neutral density and neutral winds as a function of altitude, latitude and longitude (local time) [product codes IT-007-P, IT-008-P]
- o Solar Wind velocity, density and magnetic field [product codes L1-009-P, L1-010-M, L1-010-P],
- o Net electrical current to spacecraft surface [product codes SC-006-P, SC-007-P, SC-008-P],

Justification:			
Comments:			
Source Requirements:			
Related Requirements:	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Verification Method:</td> <td style="width: 50%;">Design Review</td> </tr> </table>	Verification Method:	Design Review
Verification Method:	Design Review		

SWE-SRD-10944	Last issued in:	1.12
Service 2-2 shall request the user to identify which parameters within the list of products below (addressing spacecraft effects) the user wants to be delivered, request them from the SSA SWE database, and provide them to the user:		
<ul style="list-style-type: none"> o statistical dose (equivalent dose, dose equivalent, ambient dose, non-ionising dose), along with associated assumptions including reference material considered [derived from product code SC-005-P] o single event effects and associated probability of occurrence [from product code SC-001-P] o sensor background [product code SC-002-P], o deep dielectric charging [product code SC-006-P], o surface charging [product code SC-007-P], o spacecraft anomalies, for the spacecraft in the SSA database [product code SC-001-P], o anomalies attributed to micro particle impacts [from product code SC-001-P] 		
Justification:		
Comments:		



Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10937		Last issued in:	1.12
Service 2-2 shall deliver tools to the user that allow him/her as a function of the orbit, the spacecraft type and the type of analysis envisaged by the user, so as to enable him/her to correlate the space environment with anomaly events on specific spacecraft, equipment or components.			
Justification:			
Comments:	The tools may be available for download. Alternatively these may be delivered via a web interface depending on user needs/preference.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10950		Last issued in:	1.8
Service 2-2 shall provide the user with the capability to correlate pre-selected subsets of user relevant spacecraft housekeeping data with space environment parameters, in the case the user has agreed to provide those data.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10951		Last issued in:	1.8
Service 2-2 shall provide data for Post Event Analysis by allowing the user to retrieve (or display) Space Weather environmental data and compare them with the S/C conditions (e.g. effects) and data at any past time and S/C location.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10952		Last issued in:	1.8
Service 2-2 shall deliver those a posteriori reconstructions in the form of an analysis report that shall be based on correlated models and shall include the associated assumptions including the reference materials and geometry considered.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



3.1.2.3.3 Service 2-3: Spacecraft operation - In-orbit environment and effects forecast

SWE-SRD-10892		Last issued in:	1.8
Service 2-3 shall provide a forecast of the environment and of its effects by providing: <ul style="list-style-type: none"> forecasts over a user defined period with estimates of probability of occurrence of space weather events (including as a minimum: magnetic storm, solar energetic particle events, Earth-directed CMEs, meteor streams, debris clouds) and of “All quiet conditions”, with users being given the confidence level of the forecast forecasts of effects for the user spacecraft in any orbit as a function of time and location for the following space environment effects: single event effects, expected radiation dose in spacecraft sensitive components, charge build-up, effects from micro particle impacts Atmospheric parameters required for drag calculation Atmospheric parameters required for drag calculation on Mars, Venus and other relevant planets. forecast of solar and geomagnetic activity indices, as per list of indices defined below forecast of meteoroid and space debris fluxes, including streams and debris clouds 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12556		Last issued in:	1.12
The SWE system shall provide a Service 2-3: Spacecraft operation - In-orbit environment and effects forecast.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.3.3.1 Data Policy Enforcement

SWE-SRD-10954		Last issued in:	1.8
Service 2-3 shall be an “on-demand” service for registered users only, delivering its outputs on request for the forecast services, and automatically for the alerts.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.3.3.2 Handle service requests

SWE-SRD-10956		Last issued in:	1.8
The following set of user criteria shall be requested by service 2-2 prior to the generation of the outputs of the service: <ul style="list-style-type: none"> ➤ orbit 			



<ul style="list-style-type: none"> ➤ time span ➤ parameters to be forecasted ➤ spacecraft ID (for effects prediction only) ➤ spacecraft/component characteristics (for effects prediction only) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10957		Last issued in:	1.8
Service 2-3 shall allow its users to specify freely the orbits for their forecast requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10955		Last issued in:	1.8
Service 2-3 shall inform its users of the limitations of accuracy and reliability that may result from a request outside the validated domain of the forecast models.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10962		Last issued in:	1.8
Service 2-3 shall inform those of its users who require prediction of effects on their spacecraft of the limitations of service that may occur due to variability of effects as a function of the materials and designs actually used, if they could not declare all the materials and designs of his spacecraft due to data confidentiality.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10964		Last issued in:	1.8
Service 2-3 shall inform its users of the limitations on anomalies database that may occur due to data confidentiality.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review
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3.1.2.3.3.3 Deliver products/tools/reports

SWE-SRD-10958		Last issued in:	1.8
<p>Service 2-3 shall recall in its outputs delivered to the user the input elements that the user has provided and reword/complement them with metadata as follows:</p> <ul style="list-style-type: none"> • Osculating Element Data Set (OEDS) for the considered Orbit • Time span of the required forecast • Publication date • Position of spacecraft as a function of time within the specified time span: <ul style="list-style-type: none"> o formally defined in inertial coordinates o but then assessed in terms of magnetospheric coordinate systems (in particular McIlwain L parameter and magnetic field for radiation belt assessment, geomagnetic for near Earth plasma effects and geocentric-solar-magnetospheric coordinates for the outer magnetosphere), • Flag indicating if information from third parties is included. • Spacecraft ID and characteristics (for effects prediction only) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10959		Last issued in:	1.8
<p>Service 2-3 shall request the user to identify which forecasted parameters within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:</p> <ul style="list-style-type: none"> o Measurements of solar flares [product code SU-001-F], CMEs [product code SU-002-F], solar energetic particle events [product code IP-001-F], coronal holes [product code SU-004-F], and solar magnetic fields [product code SU-005-F], o Data from spacecraft: <ul style="list-style-type: none"> ▪ Measurements from spacecraft radiation monitors [product code SC-002-F], ▪ Orbital data of spacecraft carrying space weather instruments [product code SC-003-F], ▪ A relevant subset of spacecraft housekeeping telemetry data [product code SC-004-F], o Geomagnetic storm condition [product code MR-001-F], o Ionising radiation / Plasma / Magnetospheric and solar energetic particles fluxes (electrons and protons): <ul style="list-style-type: none"> ▪ High energy >1 MeV protons energy spectrum [product codes L1-001-F, L1-003-F, MR-006-F, MR-008-F] ▪ High energy (>1 MeV) ions energy spectrum [product codes L1-002-F, L1-004-F, MR-007-F, MR-009-F] ▪ High energy (>30keV) electron energy spectrum [product codes L1-006-F, L1-007-F, MR-011-F] ▪ High energy (> 30 keV and < 1 MeV) ion energy spectrum [product codes L1-005-F, MR-010-F] ▪ Thermal and superthermal electrons energy spectrum (0-30 keV) [product codes MR-012-F] 			



<ul style="list-style-type: none"> ▪ Data on interplanetary medium outside L1 [product codes IP-001-F, IP-002-F] o Thermal ions density and temperature [product codes MR-014-M, MR-014-F] o Atmosphere: <ul style="list-style-type: none"> ▪ Atmospheric density [product code AG-007-F] ▪ Atomic oxygen density [product code IT-010-F] o Microparticles: <ul style="list-style-type: none"> ▪ flux as a function of size, velocity, impact angle distribution [product code MP-001-F] ▪ Known periods/events of increased microparticle flux (meteoroid streams, debris clouds) [product code MP-002-F] o UV and soft X-ray flux [product codes SU-029-F, SU-027-F] o Solar Flux EUV [product code SU-028-F], o Ground based geomagnetic field [product code AG-005-F] o Cosmic rays energy and ion-species flux spectra [product code L1-002-F, MR-007-F] o Ionosphere: <ul style="list-style-type: none"> ▪ Altitude dependent TEC (Total Electron Content) maps [product code IT-001-F] ▪ Ionosonde measurements [product code IT-005-F] ▪ Ionospheric scintillation, location and intensity [product code IT-009-F] o Indices: geomagnetic (Kp, Ap, Dst) [product codes MR-002-F, MR-003-F, MR-004-F], solar (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-F, SU-008-F, SU-009-F, SU-010-F, SU-011-F, SU-012-F], and other indices (IG12, IMF) [product codes SU-013-F, L1-008-F], o Global and local neutral density and neutral winds as a function of altitude, latitude and longitude (local time) [product codes IT-007-F, IT-008-F] o Solar Wind velocity, density and magnetic field [product codes L1-009-F, L1-010-M, L1-010-F], o Net electrical current to spacecraft surface [product codes SC-006-F, SC-007-F, SC-008-F], 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

No tools are required to be delivered by this service.

SWE-SRD-10963		Last issued in:	1.12
Service 2-3 shall provide the user with event-based alarms, All-Quiet and End-Of-Quiet alerts. Alerts will be provided with a refreshing period of one minute			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10965		Last issued in:	1.8
Service 2-3 shall allow the user to set thresholds on parameters for real-time notification of conditions.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review
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3.1.2.3.4 Service 2-4: Spacecraft operation - Mission risk analysis

SWE-SRD-10968		Last issued in:	1.12
Service 2-4 shall provide a risk analysis based on expected space environment conditions and an assessment of the mission susceptibility, by providing: <ul style="list-style-type: none"> • access to historical Space Weather Environment data, Spacecraft Effects, and Space Weather Events data and appropriate statistical models • upon request, an assessment of mission/system susceptibility before operations phase for a given spacecraft, defined as per section 1.5.2 • upon request, an assessment of mission/system risks before operations phase for a given spacecraft. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12557		Last issued in:	1.12
The SWE system shall provide a Service 2-4: Spacecraft operation - Mission risk analysis.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.3.4.1 Handle service requests

SWE-SRD-10974		Last issued in:	1.8
The following set of user criteria shall be requested by service 2-4 prior to the generation of the outputs of the service: <ul style="list-style-type: none"> ➤ orbit ➤ time span ➤ parameters to be retrieved from database /reconstructed ➤ spacecraft ID (for effects prediction only) ➤ spacecraft/component characteristics (for effects prediction only) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10975		Last issued in:	1.8
Service 2-4 shall allow its users to specify freely the orbits for their forecast requests, within the maximum ranges covered by the services.			



Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10976		Last issued in:	1.8
Service 2-4 shall inform its users of the limitations of accuracy and reliability that may result from a request outside the validated domain of the reconstruction models.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10972		Last issued in:	1.8
Service 2-4 shall inform those of its users who require prediction of effects on their spacecraft of the limitations of service that may occur due to variability of effects as a function of the materials and designs actually used, if they could not declare all the materials and designs of their spacecraft due to data confidentiality.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10973		Last issued in:	1.8
Service 2-4 shall inform its users of the limitations on anomalies database that may occur due to data confidentiality.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.3.4.2 Deliver products/tools/reports

SWE-SRD-10978		Last issued in:	1.8
Service 2-4 shall request the user to identify which measurements and a posteriori reconstruction parameters within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:			
<ul style="list-style-type: none"> o Measurements of solar flares [product code SU-001-P], CMEs [product code SU-002-P], solar energetic particle events [product code IP-001-P], coronal holes [product code SU-004-P], and solar magnetic fields [product code SU-005-P], o Data from spacecraft: <ul style="list-style-type: none"> ▪ Measurements from spacecraft radiation monitors [product code SC-002-P], 			



- Orbital data of spacecraft carrying space weather instruments [product code SC-003-P],
 - A relevant subset of spacecraft housekeeping telemetry data [product code SC-004-P],
 - o Geomagnetic storm condition [product code MR-001-P],
 - o Ionising radiation / Plasma / Magnetospheric and solar energetic particles fluxes (electrons and protons):
 - High energy >1 MeV protons energy spectrum [product codes L1-001-P, L1-003-P, MR-006-P, MR-008-P]
 - High energy (>1 MeV) ions energy spectrum [product codes L1-002-P, L1-004-P, MR-007-P, MR-009-P]
 - High energy (>30keV) electron energy spectrum [product codes L1-006-P, L1-007-P, MR-011-P]
 - High energy (> 30 keV and < 1 MeV) ion energy spectrum [product codes L1-005-P, MR-010-P]
 - Thermal and superthermal electrons energy spectrum (0-30 keV) [product codes MR-012-P]
 - Data on interplanetary medium outside L1 [product codes IP-001-P, IP-002-P]
 - Plasma drift velocity [product code MR-016-M]
 - o Thermal ions density and temperature [product codes MR-014-M, MR-014-P]
 - o Atmosphere:
 - Atmospheric density [product code AG-007-P]
 - Atomic oxygen density [product code IT-010-P]
 - o Microparticles:
 - flux as a function of size, velocity, impact angle distribution [product code MP-001-P]
 - Known periods/events of increased microparticle flux (meteoroid streams, debris clouds) [product code MP-002-P]
 - o UV and soft X-ray flux [product codes SU-029-P, SU-027-P]
 - o Solar Flux EUV [product code SU-028-P],
 - o Ground based geomagnetic field [product code AG-005-P]
 - o Cosmic rays energy and ion-species flux spectra [product code L1-002-P, MR-007-P]
 - o Ionosphere:
 - Altitude dependent TEC (Total Electron Content) maps [product code IT-001-P]
 - Ionosonde measurements [product code IT-005-P]
 - Ionospheric scintillation, location and intensity [product code IT-009-P]
 - o Indices: geomagnetic (Kp, Ap, Dst) [product codes MR-002-P, MR-003-P, MR-004-P], solar (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-P, SU-008-P, SU-009-P, SU-010-P, SU-011-P, SU-012-P], and other indices (IG12, IMF) [product codes SU-013-P, L1-008-P],
 - o Global and local neutral density and neutral winds as a function of altitude, latitude and longitude (local time) [product codes IT-007-P, IT-008-P]
 - o Solar Wind velocity, density and magnetic field [product codes L1-009-P, L1-010-M, L1-010-P],
 - o Net electrical current to spacecraft surface [product codes SC-006-P, SC-007-P, SC-008-P],

Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10979		Last issued in:	1.12
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Service 2-4 shall request the user to identify which effects parameters within the list of products below (addressing spacecraft effects) the user wants to be delivered, request them from the SSA SWE database, and provide them to the user:			
<ul style="list-style-type: none"> o statistical dose (equivalent dose, dose equivalent, ambient dose, non-ionising dose), along with associated assumptions including reference material considered [derived from product code SC-005-P] o single event effects and associated probability of occurrence [from product code SC-001-P] o sensor background [product code SC-002-P], o deep dielectric charging [product code SC-006-P], o surface charging [product code SC-007-P], o spacecraft anomalies, for the spacecraft in the SSA database [product code SC-001-P], o anomalies attributed to micro particle impacts [from product code SC-001-P] 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12520		Last issued in:	1.12
Service 2-4 shall ask the user to specify which statistical models are to be applied.			
Justification:		The user should be able to select between different models when available. Repeat analysis using alternate models should be possible.	
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

Service 2-4 is not required to deliver tools.

SWE-SRD-10986		Last issued in:	1.8
Service 2-4 shall provide the user with a report on mission/system susceptibility before operations phase for a given spacecraft: the report shall be based on correlated models and shall include the associated assumptions including the reference materials and geometry considered.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10987		Last issued in:	1.8
Service 2-4 shall provide the user with a report on mission/system risks before operations phase for a given spacecraft: the report shall be based on correlated models and shall include the associated assumptions including the reference materials and geometry considered.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review
SWE-SRD-10984		Last issued in:	1.12
Service 2-4 shall provide the reports to the user by means of web-services and mechanisms for file transfer.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.4 Domain 3 services - Human spaceflight

3.1.2.4.1 Service 3-1: Human spaceflight - In-flight crew radiation exposure

SWE-SRD-10991		Last issued in:	1.8
Service 3-1 shall provide near real-time estimate of the radiation dose received by a person in space, including:			
<ul style="list-style-type: none"> • Nowcast estimate of SEP onset with protons/ions in the range 30 MeV to 200 MeV above given flux threshold, with lead times of TBD • Solar activity nowcast 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12558		Last issued in:	1.12
The SWE system shall provide a Service 3-1: Human spaceflight - In-flight crew radiation exposure.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.4.1.1 Data Policy Enforcement

SWE-SRD-10994		Last issued in:	1.8
Service 3-1 shall be an “on-demand” service for registered users only, delivering its outputs on request for the nowcast services, and automatically for the alerts.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review
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3.1.2.4.1.2 Handle service requests

SWE-SRD-10997		Last issued in:	1.8
The following set of user criteria shall be requested by service 3-1 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ orbit ➤ time span ➤ parameters to be measured / nowcasted ➤ manned spacecraft ID (for effects prediction only) ➤ manned spacecraft characteristics (for effects prediction only) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10998		Last issued in:	1.8
Service 3-1 shall allow its users to specify freely the orbits for their nowcast / near real time requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10992		Last issued in:	1.8
Service 3-1 shall inform its users of the limitations of accuracy and reliability that may result from a particular request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10993		Last issued in:	1.8
Service 3-1 shall inform those of its users who require dose estimates of the limitations of service that may occur due to variability of effects as a function of the materials and designs actually used, if they could not declare all the materials and designs of their spacecraft due to data confidentiality.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



3.1.2.4.1.3 Deliver products/tools/reports

SWE-SRD-11001	Last issued in:	1.12
<p>Service 3-1 shall request the user to identify which measured and/or nowcasted parameters within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:</p> <ul style="list-style-type: none"> o Solar disk imaging: X-ray, EUV, visible, including magnetogram [product codes SU-020-M, SU-015-M, SU-021-M, SU-017-M, SU-022-M, SU-020-N, SU-015-N, SU-021-N, SU-017-N SU-022-N], o Wide-angle coronagraph imaging [product codes SU-025-M, SU-025-N], o Measurements of solar flares [product code SU-001-N], CMEs [product code SU-002-N], solar energetic particle events [product codes IP-001-M, IP-001-N], coronal holes [product code SU-004-N], and solar magnetic fields [product codes SU-005-M, SU-005-N], o Data from spacecraft: <ul style="list-style-type: none"> ▪ Measurements from spacecraft radiation monitors [product code SC-002-M] (includes too local area radiation flux and dosimeter measurements) ▪ Orbital data of spacecraft carrying space weather instruments [product code SC-003-N], ▪ A relevant subset of spacecraft housekeeping telemetry data [product code SC-004-M], ▪ Spacecraft anomalies, for the spacecraft in the SSA database [product code SC-001-P], o Geomagnetic storm condition [product code MR-001-N], o Data on Radiation / Plasma / Magnetospheric and solar energetic particles fluxes (electrons and protons), including also Near real-time high energy >10MeV protons and ions in interplanetary medium and Plasma and fields in the interplanetary medium: <ul style="list-style-type: none"> ▪ High energy >1 MeV protons energy spectrum [product codes L1-001-M, L1-003-M, MR-006-M, MR-008-M, L1-001-N, L1-003-N, MR-006-N, MR-008-N] ▪ High energy (>1 MeV) ions energy spectrum [product codes L1-002-M, L1-004-M, MR-007-M, MR-009-M, L1-002-N, L1-004-N, MR-007-N, MR-009-N] ▪ High energy (>30keV) electron energy spectrum [product codes L1-006-M, L1-007-M, MR-011-M, L1-006-N, L1-007-N, MR-011-N] ▪ High energy (> 30 keV and < 1 MeV) ion energy spectrum [product codes L1-005-M, MR-010-M, L1-005-N, MR-010-N] ▪ Thermal and superthermal electrons energy spectrum (0-30 keV) [product codes MR-012-M, MR-012-N] ▪ Data on interplanetary medium outside L1 [product codes IP-001-M, IP-001-N, IP-002-M, IP-002-N] ▪ Plasma drift velocity [product code MR-016-M] o Thermal ions density and temperature [product codes MR-014-M, MR-014-N] o UV and soft X-ray flux [product codes SU-029-M, SU-029-N, SU-027-M, SU-027-N] o Solar Flux EUV [product codes SU-028-M, SU-028-N], o Ground based geomagnetic field [product codes AG-005-M, AG-005-N] o Cosmic rays energy and ion-species flux spectra [product codes L1-002-M, L1-002-N, MR-007-M, MR-007-N] o Indices: geomagnetic (Kp, Ap, Dst) [product codes MR-002-N, MR-003-N, MR-004-N], solar (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-N, SU-008-M, SU-008-N, SU-009-N, SU-010-N, SU-011-N, SU-012-N], and other indices (IG12, IMF) [product codes SU-013-N, L1-008-M, L1-008-N], o Solar Wind velocity, density and magnetic field [product codes L1-008-M, L1-008-N, L1-009-M, L1-009-N, L1-010-M, L1-010-N], 		



Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

Service 3-1 is not required to deliver tools.

SWE-SRD-11006		Last issued in:	1.8
Service 3-1 shall, upon request from a user, provide near real-time estimate of the radiation dose received by a person aboard the user's manned spacecraft as result of SEP onset with protons/ions in the range 30 MeV to 200 MeV above given flux threshold, with lead times of TBD.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11003		Last issued in:	1.12
Service 3-1 shall provide the alerts to the user with a refresh rate of one minute.			
Justification:			
Comments:	Alerts shall be available by means of web-services, email and sms.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.4.2 Service 3-2: Human spaceflight - Cumulative crew radiation exposure

SWE-SRD-11027		Last issued in:	1.8
Service 3-2 shall provide estimate of the past radiation dose accumulated by a person in space, including: <ul style="list-style-type: none"> • Post Event Analysis with the reconstruction of the environment at a given time and location to allow the accurate evaluation of doses inside human bodies • Data on the radiation doses in human bodies accumulated over a TBD period 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12559		Last issued in:	1.12
The SWE system shall provide a Service 3-2: Human spaceflight - Cumulative crew radiation exposure.			
Justification:			



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.4.2.1 Handle service requests

SWE-SRD-11015		Last issued in:	1.8
The following set of user criteria shall be requested by service 3-2 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ orbit ➤ time span ➤ parameters to be retrieved from database / reconstructed ➤ manned spacecraft ID (for effects prediction only) ➤ manned spacecraft characteristics (for effects prediction only) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11016		Last issued in:	1.8
Service 3-2 shall allow its users to specify freely the orbits for their data retrieval / reconstruction requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11017		Last issued in:	1.8
Service 3-2 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11018		Last issued in:	1.8
Service 3-2 shall inform those of its users who require prediction of effects on their spacecraft of the limitations of service that may occur due to variability of effects as a function of the materials and designs actually used, if they could not declare all the materials and designs of their spacecraft due to data confidentiality.			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11012		Last issued in:	1.8
Service 3-2 shall inform its users of any limitations on the database that may occur due to data confidentiality.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.4.2.2 Deliver products/tools/reports

SWE-SRD-11020		Last issued in:	1.12
Service 3-2 shall request the user to identify which parameters to be recovered from archive and/or reconstructed within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:			
<ul style="list-style-type: none"> o Solar disk imaging: X-ray, EUV, visible, including magnetogram [product codes SU-020-P, SU-015-P, SU-021-P, SU-017-P SU-022-P], o Wide-angle coronagraph imaging [product codes SU-025-P], o Measurements of solar flares [product code SU-001-P], CMEs [product code SU-002-P], solar energetic particle events [product codes IP-001-P], coronal holes [product code SU-004-P], and solar magnetic fields [product codes SU-005-M, SU-005-P], o Data from spacecraft: <ul style="list-style-type: none"> ▪ Measurements from spacecraft radiation monitors [product code SC-002-M] (includes too local area radiation flux and dosimeter measurements) ▪ Orbital data of spacecraft carrying space weather instruments [product code SC-003-P], ▪ A relevant subset of spacecraft housekeeping telemetry data [product code SC-004-M], ▪ Spacecraft anomalies, for the spacecraft in the SSA database [product code SC-001-P], o Geomagnetic storm condition [product code MR-001-P], o Data on Radiation / Plasma / Magnetospheric and solar energetic particles fluxes (electrons and protons), including also Near real-time high energy >10MeV protons and ions in interplanetary medium and Plasma and fields in the interplanetary medium: <ul style="list-style-type: none"> ▪ High energy >1 MeV protons energy spectrum [product codes L1-001-P, L1-003-P, MR-006-P, MR-008-P] ▪ High energy (>1 MeV) ions energy spectrum [product codes L1-002-P, L1-004-P, MR-007-P, MR-009-P] ▪ High energy (>30keV) electron energy spectrum [product codes L1-006-P, L1-007-P, MR-011-P] ▪ High energy (> 30 keV and < 1 MeV) ion energy spectrum [product codes L1-005-P, MR-010-P] ▪ Thermal and superthermal electrons energy spectrum (0-30 keV) [product codes MR-012-P] ▪ Data on interplanetary medium outside L1 [product codes IP-001-P, IP-002-P] 			



<ul style="list-style-type: none"> ▪ Plasma drift velocity [product code MR-016-M] o Thermal ions density and temperature [product codes MR-014-P] o UV and soft X-ray flux [product codes SU-029-P, SU-027-P] o Solar Flux EUV [product codes SU-028-P], o Ground based geomagnetic field [product codes AG-005-P] o Cosmic rays energy and ion-species flux spectra [product codes L1-002-P, MR-007-P] o Indices: geomagnetic (Kp, Ap, Dst) [product codes MR-002-P, MR-003-P, MR-004-P], solar (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-P, SU-008-M, SU-008-P, SU-009-P, SU-010-P, SU-011-P, SU-012-P], and other indices (IG12, IMF) [product codes SU-013-P, L1-008-P], o Solar Wind velocity, density and magnetic field [product codes L1-008-P, L1-009-P, L1-010-P], 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
		Design Review	

Service 3-2 is not required to deliver tools.

SWE-SRD-11013		Last issued in:	
		1.8	
Service 3-2 shall, upon request from a user, provide post-event estimate of the radiation dose received by a person aboard the user’s manned spacecraft as result of SEP onset with protons/ions in the range 30 MeV to 200 MeV above given flux threshold.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
		Design Review	

SWE-SRD-11004		Last issued in:	
		1.8	
Service 3-2 shall, upon request from a user, provide data on the radiation doses in human bodies accumulated over a period defined by the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
		Design Review	

3.1.2.4.3 Service 3-3: Human spaceflight - Increased crew radiation exposure risk

SWE-SRD-11014		Last issued in:	
		1.8	
Service 3-3 shall provide estimate of the risk of increased level of radiation along trajectory, including:			
<ul style="list-style-type: none"> • Forecast estimate of SEP onset with protons/ions in the range 30 MeV to 200 MeV above given flux 			



threshold, with lead times of 1-2 days (depending on the type of event). <ul style="list-style-type: none"> • Solar activity forecast • All quiet forecast 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12560		Last issued in:	1.12
The SWE system shall provide a Service 3-3: Human spaceflight - Increased crew radiation exposure risk.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.4.3.1 Data Policy Enforcement

SWE-SRD-11025		Last issued in:	1.8
Service 3-3 shall be an “on-demand” service for registered users only, delivering its outputs on request for the forecast services, and automatically for the alerts.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.4.3.2 Handle service requests

SWE-SRD-11032		Last issued in:	1.8
The following set of user criteria shall be requested by service 3-3 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ orbit ➤ time span ➤ parameters to be forecasted ➤ manned spacecraft ID (for effects prediction only) ➤ manned spacecraft characteristics (for effects prediction only) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11033		Last issued in:	1.8
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Service 3-3 shall allow its users to specify freely the orbits for their forecast requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11034		Last issued in:	1.8
Service 3-3 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11035		Last issued in:	1.8
Service 3-3 shall inform those of its users who require prediction of effects on their spacecraft of the limitations of service that may occur due to variability of effects as a function of the materials and designs actually used, if they could not declare all the materials and designs of his spacecraft due to data confidentiality.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.4.3.3 Deliver products/tools/reports

SWE-SRD-11038		Last issued in:	1.12
Service 3-3 shall request the user to identify which forecasted parameters within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:			
<ul style="list-style-type: none"> o Solar disk imaging: X-ray, EUV, visible, including magnetogram [product codes SU-020-F, SU-015-F, SU-021-F, SU-017-F SU-022-F], o Wide-angle coronagraph imaging [product codes SU-025-F], o Measurements of solar flares [product code SU-001-F], CMEs [product code SU-002-F], solar energetic particle events [product codes IP-001-F], coronal holes [product code SU-004-F], and solar magnetic fields [product codes SU-005-F], o Data from spacecraft: <ul style="list-style-type: none"> ▪ Measurements from spacecraft radiation monitors [product code SC-002-M] (includes too local area radiation flux and dosimeter measurements) ▪ Orbital data of spacecraft carrying space weather instruments [product code SC-003-F], o Geomagnetic storm condition [product code MR-001-F], o Data on Radiation / Plasma / Magnetospheric and solar energetic particles fluxes (electrons and protons), including also Near real-time high energy >10MeV protons and ions in 			



interplanetary medium and Plasma and fields in the interplanetary medium: <ul style="list-style-type: none"> ▪ High energy >1 MeV protons energy spectrum [product codes L1-001-F, L1-003-F, MR-006-F, MR-008-F] ▪ High energy (>1 MeV) ions energy spectrum [product codes L1-002-F, L1-004-F, MR-007-F, MR-009-F] ▪ High energy (>30keV) electron energy spectrum [product codes L1-006-F, L1-007-F, MR-011-F] ▪ High energy (> 30 keV and < 1 MeV) ion energy spectrum [product codes L1-005-F, MR-010-F] ▪ Thermal and superthermal electrons energy spectrum (0-30 keV) [product codes MR-012-F] ▪ Data on interplanetary medium outside L1 [product codes IP-001-F, IP-002-F] ▪ Plasma drift velocity [product code MR-016-M] <ul style="list-style-type: none"> o Thermal ions density and temperature [product codes MR-014-F] o UV and soft X-ray flux [product codes SU-029-F, SU-027-F] o Solar Flux EUV [product codes SU-028-F], o Ground based geomagnetic field [product codes AG-005-F] o Cosmic rays energy and ion-species flux spectra [product codes L1-002-F, MR-007-F] o Indices: geomagnetic (Kp, Ap, Dst) [product codes MR-002-F, MR-003-F, MR-004-F], solar (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-F, SU-008-M, SU-008-F, SU-009-F, SU-010-F, SU-011-F, SU-012-F], and other indices (IG12, IMF) [product codes SU-013-F, L1-008-F], o Solar Wind velocity, density and magnetic field [product codes L1-008-F, L1-009-F, L1-010-F], 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

Service 3-3 is not required to deliver tools.

SWE-SRD-11040		Last issued in:	1.8
Service 3-3 shall, upon request from a user, provide a forecast of the radiation dose expected to be received by a person aboard the user’s manned spacecraft as result of SEP onset with protons/ions in the range 30 MeV to 200 MeV above given flux threshold.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11041		Last issued in:	1.8
Service 3-3 shall, upon request from a user, provide an All-quiet alert with the threshold defined by the user.			
Justification:			
Comments:			
Source Requirements:			
Related		Verification	Design



Requirements:		Method:	Review
SWE-SRD-11044		Last issued in:	1.8
Service 3-3 shall, upon request from a user, provide an End-of-quiet alert with the threshold defined by the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5 Domain 4 services - Launch operation

3.1.2.5.1 Service 4-1: Launch operation - In flight monitoring of radiation effects in sensitive electronics

SWE-SRD-11036		Last issued in:	1.8
Service 4-1 shall provide near real-time estimate of the radiation effects in sensitive electronics along trajectory, including in-flight monitoring.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12561		Last issued in:	1.12
The SWE system shall provide a Service 4-1: Launch operation - In flight monitoring of radiation effects in sensitive electronics.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.1.1 Handle service requests

SWE-SRD-11047		Last issued in:	1.8
The following set of user criteria shall be requested by service 4-1 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ trajectory ➤ time span ➤ parameters to be measured / nowcasted ➤ launcher ID (for effects prediction only) ➤ launcher characteristics (for effects prediction only) 			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11048		Last issued in:	1.8
Service 4-1 shall allow its users to specify freely the trajectories for their nowcast / near real time requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11049		Last issued in:	1.8
Service 4-1 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11050		Last issued in:	1.8
Service 4-1 shall inform users of the limitations of service that may occur due to variability of effects as a function of the materials and designs actually used, if they could not declare all the materials and designs of their launcher due to data confidentiality.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.1.2 Deliver products/tools/reports

SWE-SRD-11055		Last issued in:	1.8
Service 4-1 shall request the user to identify which measured and/or nowcasted parameters within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:			
<ul style="list-style-type: none"> o Solar disk imaging: X-ray, EUV, visible, including magnetogram [product codes SU-020-M, SU-015-M, SU-021-M, SU-017-M, SU-022-M, SU-020-N, SU-015-N, SU-021-N, SU-017-N SU-022-N], o Wide-angle coronagraph imaging [product codes SU-025-M, SU-025-N], o Measurements of solar flares [product code SU-001-N], CMEs [product code SU-002-N], solar energetic particle events [product codes IP-001-M, IP-001-N], coronal holes [product code SU-004-N], and solar magnetic fields [product codes SU-005-M, SU-005-N], o Data from spacecraft: 			



- Measurements from spacecraft radiation monitors [product code SC-002-M] (includes too local area radiation flux and dosimeter measurements)
 - Orbital data of spacecraft carrying space weather instruments [product code SC-003-N],
 - A relevant subset of spacecraft housekeeping telemetry data [product code SC-004-M],
 - Spacecraft anomalies, for the spacecraft in the SSA database [product code SC-001-P],
- o Geomagnetic storm condition [product code MR-001-N],
- o Data on Radiation / Plasma / Magnetospheric and solar energetic particles fluxes (electrons and protons), including also Near real-time high energy >10MeV protons and ions in interplanetary medium and Plasma and fields in the interplanetary medium:
 - High energy >1 MeV protons energy spectrum [product codes L1-001-M, L1-003-M, MR-006-M, MR-008-M, L1-001-N, L1-003-N, MR-006-N, MR-008-N]
 - High energy (>1 MeV) ions energy spectrum [product codes L1-002-M, L1-004-M, MR-007-M, MR-009-M, L1-002-N, L1-004-N, MR-007-N, MR-009-N]
 - High energy (>30keV) electron energy spectrum [product codes L1-006-M, L1-007-M, MR-011-M, L1-006-N, L1-007-N, MR-011-N]
 - High energy (> 30 keV and < 1 MeV) ion energy spectrum [product codes L1-005-M, MR-010-M, L1-005-N, MR-010-N]
 - Thermal and superthermal electrons energy spectrum (0-30 keV) [product codes MR-012-M, MR-012-N]
 - Data on interplanetary medium outside L1 [product codes IP-001-M, IP-001-N, IP-002-M, IP-002-N]
 - Plasma drift velocity [product code MR-016-M]
- o Thermal ions density and temperature [product codes MR-014-M, MR-014-N]
- o Atmosphere:
 - Atmospheric density [product codes AG-007-M, AG-007-N]
 - Atomic oxygen density [product codes IT-010-M, IT-010-N]
- o Microparticles:
 - flux as a function of size, velocity, impact angle distribution [product codes MP-001-M, MP-001-N]
 - Known periods/events of increased microparticle flux (meteoroid streams, debris clouds) [product code MP-002-N]
- o UV and soft X-ray flux [product codes SU-029-M, SU-029-N, SU-027-M, SU-027-N]
- o Solar Flux EUV [product codes SU-028-M, SU-028-N],
- o Ground based geomagnetic field [product codes AG-005-M, AG-005-N]
- o Cosmic rays energy and ion-species flux spectra [product codes L1-002-M, L1-002-N, MR-007-M, MR-007-N]
- o Ionosphere:
 - Altitude dependent TEC (Total Electron Content) maps [product codes IT-001-M, IT-001-N]
 - Ionosonde measurements [product codes IT-005-M, IT-005-N]
 - Ionospheric scintillation, location and intensity [product codes IT-009-M, IT-009-N]
- o Indices: geomagnetic (Kp, Ap, Dst) [product codes MR-002-N, MR-003-N, MR-004-N], solar (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-N, SU-008-M, SU-008-N, SU-009-N, SU-010-N, SU-011-N, SU-012-N], and other indices (IG12, IMF) [product codes SU-013-N, L1-008-M, L1-008-N],
- o Global and local neutral density and neutral winds as a function of altitude, latitude and longitude (local time) [product codes IT-007-M, IT-007-N, IT-008-M, IT-008-N]
- o Solar Wind velocity, density and magnetic field [product codes L1-008-M, L1-008-N, L1-



009-M, L1-009-N, L1-010-M, L1-010-N]			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

Service 4-1 is not required to deliver tools.

SWE-SRD-11056		Last issued in:	1.8
Service 4-1 shall, upon request from a user, provide near real-time estimate of the effects observed in electronics aboard the user's launcher.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.2 Service 4-2: Launch operation - Estimate of radiation effects in sensitive electronics

SWE-SRD-11051		Last issued in:	1.8
Service 4-2 shall provide an estimate of past radiation effects in sensitive electronics along trajectory by carrying out a Post Event Analysis and recreating the environment at a given time and location to accurately evaluate SEE in launcher's electronics.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12562		Last issued in:	1.12
The SWE system shall provide a Service 4-2: Launch operation - Estimate of radiation effects in sensitive electronics.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.2.1 Handle service requests

SWE-SRD-11058		Last issued in:	1.8
The following set of user criteria shall be requested by service 4-2 prior to the generation of the outputs of the service:			



<ul style="list-style-type: none"> ➤ trajectory ➤ time span ➤ parameters to be recovered from archive and/or reconstructed ➤ launcher ID (for effects prediction only) ➤ launcher/component characteristics (for effects analysis only) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11059		Last issued in:	1.8
Service 4-2 shall allow its users to specify freely the trajectories for their archive recovery / reconstruction requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11026		Last issued in:	1.8
Service 4-2 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11067		Last issued in:	1.8
Service 4-2 shall inform those of its users who require prediction of effects on their launcher of the limitations of service that may occur due to variability of effects as a function of the materials and designs actually used, if they could not declare all the materials and designs of their launcher due to data confidentiality.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.2.2 Deliver products/tools/reports

SWE-SRD-11062		Last issued in:	1.8
Service 4-2 shall request the user to identify which parameter to be recovered from archive and/or reconstructed within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user: <ul style="list-style-type: none"> o Solar disk imaging: X-ray, EUV, visible, including magnetogram [product codes SU-020-P, 			



- SU-015-P, SU-021-P, SU-017-P SU-022-P],
- o Wide-angle coronagraph imaging [product codes SU-025-P],
- o Measurements of solar flares [product code SU-001-P], CMEs [product code SU-002-P], solar energetic particle events [product codes IP-001-P], coronal holes [product code SU-004-P], and solar magnetic fields [product codes SU-005-M, SU-005-P],
- o Data from spacecraft:
 - Measurements from spacecraft radiation monitors [product code SC-002-M] (includes too local area radiation flux and dosimeter measurements)
 - Orbital data of spacecraft carrying space weather instruments [product code SC-003-P],
 - A relevant subset of spacecraft housekeeping telemetry data [product code SC-004-M],
 - Spacecraft anomalies, for the spacecraft in the SSA database [product code SC-001-P],
- o Geomagnetic storm condition [product code MR-001-P],
- o Data on Radiation / Plasma / Magnetospheric and solar energetic particles fluxes (electrons and protons), including also Near real-time high energy >10MeV protons and ions in interplanetary medium and Plasma and fields in the interplanetary medium:
 - High energy >1 MeV protons energy spectrum [product codes L1-001-P, L1-003-P, MR-006-P, MR-008-P]
 - High energy (>1 MeV) ions energy spectrum [product codes L1-002-P, L1-004-P, MR-007-P, MR-009-P]
 - High energy (>30keV) electron energy spectrum [product codes L1-006-P, L1-007-P, MR-011-P]
 - High energy (> 30 keV and < 1 MeV) ion energy spectrum [product codes L1-005-P, MR-010-P]
 - Thermal and superthermal electrons energy spectrum (0-30 keV) [product codes MR-012-P]
 - Data on interplanetary medium outside L1 [product codes IP-001-P, IP-002-P]
 - Plasma drift velocity [product code MR-016-M]
- o Thermal ions density and temperature [product codes MR-014-P]
- o Atmosphere:
 - Atmospheric density [product codes AG-007-P]
 - Atomic oxygen density [product codes IT-010-P]]
- o Microparticles:
 - flux as a function of size, velocity, impact angle distribution [product codes MP-001-P]
 - Known periods/events of increased microparticle flux (meteoroid streams, debris clouds) [product code MP-002-P]
- o UV and soft X-ray flux [product codes SU-029-P, SU-027-P]
- o Solar Flux EUV [product codes SU-028-P],
- o Ground based geomagnetic field [product codes AG-005-P]
- o Cosmic rays energy and ion-species flux spectra [product codes L1-002-P, MR-007-P]
- o Ionosphere:
 - Altitude dependent TEC (Total Electron Content) maps [product codes IT-001-P]
 - Ionosonde measurements [product codes IT-005-P]
 - Ionospheric scintillation, location and intensity [product codes IT-009-P]
- o Indices: geomagnetic (Kp, Ap, Dst) [product codes MR-002-P, MR-003-P, MR-004-P], solar (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-P, SU-008-M, SU-008-P, SU-009-P, SU-010-P, SU-011-P, SU-012-P], and other indices (IG12, IMF) [product codes SU-013-P, L1-008-P],
- o Global and local neutral density and neutral winds as a function of altitude, latitude and



longitude (local time) [product codes IT-007-P, IT-008-P]			
o Solar Wind velocity, density and magnetic field [product codes L1-008-P, L1-009-P, L1-010-P],			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

Service 4-2 is not required to deliver tools.

SWE-SRD-11064		Last issued in:	1.8
Service 4-2 shall, upon request from a user, provide a post-event reconstruction of the environment supporting the evaluation of SEEs experienced by an electronic unit aboard the user's launcher.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.3 Service 4-3: Launch operation - Forecast of radiation storms

SWE-SRD-11070		Last issued in:	1.8
This service shall provide an estimate of the risk of increased level of radiation along trajectory by forecasting: <ul style="list-style-type: none"> An estimate of Solar Particle Event onset with ions (including protons and heavy ions) with energy above pre-defined threshold in the range 10MeV to 300MeV Solar activity All quiet conditions 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12563		Last issued in:	1.12
The SWE system shall provide a Service 4-3: Launch operation - Forecast of radiation storms.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.3.1 Data Policy Enforcement

SWE-SRD-11072		Last issued in:	1.8
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Service 4-3 shall be an “on-demand” service for registered users only, delivering its outputs on request for the forecast services, and automatically for the alerts.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.3.2 Handle service requests

SWE-SRD-11074		Last issued in:		1.8
The following set of user criteria shall be requested by service 4-3 prior to the generation of the outputs of the service:				
<ul style="list-style-type: none"> ➤ trajectory ➤ time span ➤ parameters to be forecasted ➤ thresholds to be considered for all-quiet and end-of-quiet alerts ➤ energy thresholds for the forecast request of high-energy protons and ions ➤ launcher ID (for effects prediction only) ➤ launcher/component characteristics (for effects prediction only) 				
Justification:				
Comments:				
Source Requirements:				
Related Requirements:		Verification Method:	Design Review	

SWE-SRD-11075		Last issued in:		1.8
Service 4-3 shall allow its users to specify freely the trajectories for their forecast requests, within the maximum ranges covered by the services.				
Justification:				
Comments:				
Source Requirements:				
Related Requirements:		Verification Method:	Design Review	

SWE-SRD-11071		Last issued in:		1.8
Service 4-3 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.				
Justification:				
Comments:				
Source Requirements:				
Related Requirements:		Verification Method:	Design Review	

SWE-SRD-11073		Last issued in:		1.8
Service 4-3 shall inform those of its users who require prediction of effects on their launcher of the limitations				



of service that may occur due to variability of effects as a function of the materials and designs actually used, if they could not declare all the materials and designs of their launcher due to data confidentiality.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.3.3 Deliver products/tools/reports

SWE-SRD-11077		Last issued in:	1.8
<p>Service 4-3 shall request the user to identify which forecasted parameters within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:</p> <ul style="list-style-type: none"> o Solar disk imaging: X-ray, EUV, visible, including magnetogram [product codes SU-020-F, SU-015-F, SU-021-F, SU-017-F SU-022-F], o Wide-angle coronagraph imaging [product codes SU-025-F], o Measurements of solar flares [product code SU-001-F], CMEs [product code SU-002-F], solar energetic particle events [product codes IP-001-F], coronal holes [product code SU-004-F], and solar magnetic fields [product codes SU-005-F], o Data from spacecraft: <ul style="list-style-type: none"> ▪ Measurements from spacecraft radiation monitors [product code SC-002-M] (includes too local area radiation flux and dosimeter measurements) ▪ Orbital data of spacecraft carrying space weather instruments [product code SC-003-F], o Geomagnetic storm condition [product code MR-001-F], o Data on Radiation / Plasma / Magnetospheric and solar energetic particles fluxes (electrons and protons), including also Near real-time high energy >10MeV protons and ions in interplanetary medium and Plasma and fields in the interplanetary medium: <ul style="list-style-type: none"> ▪ High energy >1 MeV protons energy spectrum [product codes L1-001-F, L1-003-F, MR-006-F, MR-008-F] ▪ High energy (>1 MeV) ions energy spectrum [product codes L1-002-F, L1-004-F, MR-007-F, MR-009-F] ▪ High energy (>30keV) electron energy spectrum [product codes L1-006-F, L1-007-F, MR-011-F] ▪ High energy (> 30 keV and < 1 MeV) ion energy spectrum [product codes L1-005-F, MR-010-F] ▪ Thermal and superthermal electrons energy spectrum (0-30 keV) [product codes MR-012-F] ▪ Data on interplanetary medium outside L1 [product codes IP-001-F, IP-002-F] ▪ Plasma drift velocity [product code MR-016-M] o Thermal ions density and temperature [product codes MR-014-F] o Atmosphere: <ul style="list-style-type: none"> ▪ Atmospheric density [product codes AG-007-F] ▪ Atomic oxygen density [product codes IT-010-F]] o Microparticles: <ul style="list-style-type: none"> ▪ flux as a function of size, velocity, impact angle distribution [product codes MP-001-F] ▪ Known periods/events of increased microparticle flux (meteoroid streams, debris clouds) [product code MP-002-F] o UV and soft X-ray flux [product codes SU-029-F, SU-027-F] 			



<ul style="list-style-type: none"> o Solar Flux EUV [product codes SU-028-F], o Ground based geomagnetic field [product codes AG-005-F] o Cosmic rays energy and ion-species flux spectra [product codes L1-002-F, MR-007-F] o Ionosphere: <ul style="list-style-type: none"> ▪ Altitude dependent TEC (Total Electron Content) maps [product codes IT-001-F] ▪ Ionosonde measurements [product codes IT-005-F] ▪ Ionospheric scintillation, location and intensity [product codes IT-009-F] o Indices: geomagnetic (Kp, Ap, Dst) [product codes MR-002-F, MR-003-F, MR-004-F], solar (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-F, SU-008-M, SU-008-F, SU-009-F, SU-010-F, SU-011-F, SU-012-F], and other indices (IG12, IMF) [product codes SU-013-F, L1-008-F], o Global and local neutral density and neutral winds as a function of altitude, latitude and longitude (local time) [product codes IT-007-F, IT-008-F] o Solar Wind velocity, density and magnetic field [product codes L1-008-F, L1-009-F, L1-010-F] 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

Service 4-3 is not required to deliver tools.

SWE-SRD-11081		Last issued in:	1.8
Service 4-3 shall, upon request from a user, provide a forecast of the radiation environment expected in the vicinity of the launcher as the result of Solar Particle Event onset with ions (including protons and heavy ions) with energy above pre-defined threshold in the range 10MeV to 300MeV.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11082		Last issued in:	1.8
Service 4-3 shall, upon request from a user, provide an All-Quiet forecast			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.4 Service 4-4: Launch operation - Atmospheric density forecast

SWE-SRD-11084		Last issued in:	1.8
Service 4-4 shall provide an estimate of the neutral density along trajectory, including an atmospheric density forecast along the trajectory of the launcher up to 1500 km altitude.			
Justification:			



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11085		Last issued in:	1.8
Service 4-4 shall use as inputs the data products and atmosphere models needed for the application of the predictions to the specific trajectory of the launcher.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12564		Last issued in:	1.12
The SWE system shall provide a Service 4-4: Launch operation - Atmospheric density forecast.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.4.1 Handle service requests

SWE-SRD-11088		Last issued in:	1.8
The following set of user criteria shall be requested by service 4-4 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ trajectory ➤ time span 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11089		Last issued in:	1.8
Service 4-4 shall allow its users to specify freely the trajectories for their forecast requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



SWE-SRD-11087		Last issued in:	1.8
Service 4-4 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.4.2 Deliver products/tools/reports

Service 4-4 is not required to deliver tools.

SWE-SRD-11091		Last issued in:	1.8
Service 4-4 shall produce and deliver to the user: <ul style="list-style-type: none"> • The forecasted estimate of the neutral density along trajectory, including an atmospheric density forecast along the trajectory of the launcher up to 1500km complying with the Products Specification for product code IT-007-F • The assumptions and inputs obtained from the data products used for the establishment of the prediction, • A description of the model used, • For all provided forecasted parameters: associated accuracy and reliability 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.5 Service 4-5: Launch operation - Risk estimate of service disruption caused by ionospheric scintillations

SWE-SRD-11098		Last issued in:	1.8
Service 4-5 shall provide an estimate of the level of ionospheric scintillations between ground station and launch vehicle along the trajectory, by reporting an ionospheric scintillation forecast/nowcast.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11079		Last issued in:	1.8
Service 4-5 shall use as inputs the data products (nowcast and forecast) and ionosphere models needed for the application of the predictions to the specific trajectory of the launcher.			
Justification:			
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12565		Last issued in:	1.12
The SWE system shall provide a Service 4-5: Launch operation - Risk estimate of service disruption caused by ionospheric scintillations.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.5.1 Handle service requests

SWE-SRD-11101		Last issued in:	1.8
The following set of user criteria shall be requested by service 4-5 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ trajectory ➤ time span 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11102		Last issued in:	1.8
Service 4-5 shall allow its users to specify freely the trajectories for their forecast/nowcast requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11100		Last issued in:	1.8
Service 4-5 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



3.1.2.5.5.2 Deliver products/tools/reports

Service 4-5 is not required to deliver tools

SWE-SRD-11104		Last issued in:	1.8
Service 4-5 shall produce and deliver to the user: <ul style="list-style-type: none"> • Nowcasted/forecasted estimate of ionospheric scintillations (scintillations indices and parameters: S4, sigma_phi, fading depth, fade duration, time between fades) between ground station and launch vehicle along the trajectory, complying with the Products Specification for product codes IT-009-N and IT-009-F • The assumptions and inputs obtained from the data products used for the establishment of the prediction, • A description of the model used • For all provided nowcasted/forecasted parameters: associated accuracy and reliability 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.6 Service 4-6: Launch operation - Risk estimate of micro-particle impacts

SWE-SRD-11109		Last issued in:	1.8
Service 4-6 shall provide an estimate of the risk of impacts by objects with sizes below 1 mm, by establishing a locally relevant nowcast and forecast of micro-particles fluxes, including streams and debris clouds.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11110		Last issued in:	1.8
Service 4-6 shall use as inputs the data products (nowcast and forecast) needed for the application of the predictions to the specific trajectory of the launcher.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12566		Last issued in:	1.12
The SWE system shall provide a Service 4-6: Launch operation - Risk estimate of micro-particle impacts.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review
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3.1.2.5.6.1 Handle service requests

SWE-SRD-11115		Last issued in:	1.8
The following set of user criteria shall be requested by service 4-6 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ trajectory ➤ time span 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11116		Last issued in:	1.8
Service 4-6 shall allow its users to specify freely the trajectories for their forecast/nowcast requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11117		Last issued in:	1.8
Service 4-6 shall inform its users of the limitations of accuracy and reliability that may result from a request outside the validated domain of the forecast/nowcast models.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.5.6.2 Deliver products/tools/reports

Service 4-6 is not required to deliver tools.

SWE-SRD-11119		Last issued in:	1.8
Service 4-6 shall produce and deliver to the user:			
<ul style="list-style-type: none"> • Nowcast and forecast of micro-particle fluxes, including streams and debris clouds along the trajectory, complying with the Products Specification for product codes MP-001-N and MP-001-F • The assumptions and inputs obtained from the data products used for the establishment of the prediction, • A description of the model used, • The resulting nowcasted/forecasted estimate of the risk of impacts by objects with sizes below 1 mm, 			



<ul style="list-style-type: none"> For all provided nowcasted/forecasted parameters: associated accuracy and reliability 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.6 Domain 5 services - Transionospheric radio link

3.1.2.6.1 Service 5-1: Transionospheric radio link - Near-real time TEC maps

SWE-SRD-11124		Last issued in:	1.8
Service 5-1 shall provide near real-time TEC maps, including near real-time TEC core products and GNSS satellites Inter-frequency biases core products for the following service users:			
<ul style="list-style-type: none"> Users of GNSS Single frequency services with average accuracy, no integrity (e.g. typical GNSS mass market user) Users of GNSS Single frequency services with average accuracy, using integrity (e.g. EGNOS user) Users or multi-frequency GNSS systems with very high accuracy (e.g. GNSS geodetic users, RTK) Other transionospheric radio systems such as radars 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12567		Last issued in:	1.12
The SWE system shall provide a Service 5-1: Transionospheric radio link - Near-real time TEC maps.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11125		Last issued in:	1.8
The GNSS satellites Inter-frequency biases core products shall be provided with update rates required by the different service users.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



SWE-SRD-11126		Last issued in:	1.8
Service 5-1 shall use as inputs the data products (nowcast) concerning TEC needed for the delivery of the nowcasts to the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.6.1.1 Handle service requests

SWE-SRD-11132		Last issued in:	1.8
The following set of user criteria shall be requested by service 5-1 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ Location / area ➤ Altitude domain ➤ Time span ➤ Parameters to be nowcasted 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11133		Last issued in:	1.8
Service 5-1 shall allow its users to specify freely the location and time frame for his/her nowcast requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11111		Last issued in:	1.8
Service 5-1 shall inform its users informed of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.6.1.2 Deliver products/tools/reports

SWE-SRD-11135		Last issued in:	1.8
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Service 5-1 shall request the user to identify which parameter to be nowcasted or forecasted within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:

- Nowcast of TEC core products including **TEC maps and 3D electron density grids**, complying with the Products Specification for product code IT-001-N, IT-001-F, IT-002-N, IT-002-F (includes too Height of maximum electron density in F2 layer)
- Nowcast of GNSS satellites Inter-frequency biases core products
- The assumptions and inputs obtained from the data products used for the elaboration of the prediction delivered to the user,
- A description of the model used,
- More generally, nowcast parameters as per user’s request within the list below that encompasses the assessed ionosphere properties but too some of the inputs to the ionosphere models that the user may be interested in:
 - o Ionosphere:
 - Riometer data / Ionosonde measurements [product codes IT-005-N , IT-005-F]
 - URSI ionospheric parameter values [product codes IT-006-N, IT-006-F]
 - Ionospheric scintillation, location and intensity [product codes IT-009-N, IT-009-F]
 - o Geomagnetic storm indices: global, auroral, mid-latitude and ring current [product codes MR-001-N, MR-001-F]
 - o Vector measurements of local geomagnetic field [product codes AG-005-N, AG-006-N, AG-005-F, AG-006-F]
 - o Solar data:
 - SSN [product codes SU-007-N, SU-007-F]
 - Solar index F10.7 [product codes SU-008-N, SU-008-F]
 - X-ray flares [product codes SU-001-N, SU-001-F]
 - SEP fluxes [product codes SU-027-N, SU-027-F, SU-028-N, SU-028-F, SU-029-N, SU-029-F]

Justification:			
Comments:			
Source Requirements:			
Related Requirements:	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Verification Method:</td> <td style="width: 50%;">Design Review</td> </tr> </table>	Verification Method:	Design Review
Verification Method:	Design Review		

Service 5-1 is not required to deliver tools.

3.1.2.6.2 Service 5-2: Transionospheric radio link - Forecast TEC maps

SWE-SRD-1113		Last issued in:	1.8
Service 5-2 shall provide longer term forecasts of TEC maps, including 7 day forecast of the TEC core products with prediction of geomagnetic storms.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review
SWE-SRD-12568		Last issued in:	1.12
The SWE system shall provide a Service 5-2: Transionospheric radio link - Forecast TEC maps.			



Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-1114		Last issued in:	1.8
The service shall use as inputs the data products (nowcast and forecast) concerning TEC needed for the delivery of the forecasts to the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.6.2.1 Handle service requests

SWE-SRD-11123		Last issued in:	1.8
The following set of user criteria shall be requested by service 5-2 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ Location / area ➤ Altitude domain ➤ Time span ➤ Parameters to be forecasted 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11141		Last issued in:	1.8
Service 5-2 shall allow its users to specify freely the location and time frame for his/her forecast requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11147		Last issued in:	1.8
Service 5-2 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.6.2.2 Deliver products/tools/reports

SWE-SRD-11806		Last issued in:	1.7
<p>Service 5-2 shall request the user to identify which parameter to be forecasted within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:</p> <ul style="list-style-type: none"> • 7 day forecast of TEC core products including TEC maps and 3D electron density grids, complying with the Products Specification for product code IT-001-N, IT-001-F, IT-002-N, IT-002-F (includes too Height of maximum electron density in F2 layer) • The assumptions and inputs obtained from the data products used for the elaboration of the prediction delivered to the user, • A description of the model used, • More generally, forecasted parameters as per user's request within the list below that encompasses the assessed ionosphere properties but too some of the inputs to the ionosphere models that the user may be interested in: <ul style="list-style-type: none"> o Ionosphere: <ul style="list-style-type: none"> ▪ Riometer data / Ionosonde measurements [product codes IT-005-F] ▪ URSI ionospheric parameter values [product codes IT-006-F] ▪ Ionospheric scintillation, location and intensity [product codes IT-009-F] o Geomagnetic storm indices: global, auroral, mid-latitude and ring current [product code MR-001-F] o Vector measurements of local geomagnetic field [product codes AG-005-F, AG-006-F] o Solar data: <ul style="list-style-type: none"> ▪ SSN [product code SU-007-F] ▪ Solar index F10.7 [product code SU-008-F] ▪ X-ray flares [product code SU-001-F] ▪ SEP fluxes [product codes SU-027-F, SU-028-F, SU-029-F] 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

Service 5-2 is not required to deliver tools.

Service 5-2 is not required to deliver user's specific reports.

3.1.2.6.3 Service 5-3: Transionospheric radio link - Quality assessment of ionospheric correction

SWE-SRD-11148		Last issued in:	1.8
<p>Service 5-3 shall provide information on whether standard corrections to GNSS signal are applicable, including for the TEC Core products a-posteriori and estimated parameters and near real-time alarms to indicate the level of degradation of ionospheric correction models with respect to the actual state of the ionosphere. This latter assessment shall be established by considering the update rate for the different service</p>			



users among the following (defined in CRD by SWE-CRD-TIO-1650, SWE-CRD-TIO-1651 and SWE-CRD-TIO-1652):			
<ul style="list-style-type: none"> • Users of GNSS Single frequency services with average accuracy, no integrity (e.g. typical GNSS mass market user) • Users of GNSS Single frequency services with average accuracy, using integrity (e.g. EGNOS user) • Users or multi-frequency GNSS systems with very high accuracy (e.g. GNSS geodetic users, RTK) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12569		Last issued in:	1.12
The SWE system shall provide a Service 5-3: Transionospheric radio link - Quality assessment of ionospheric correction.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11149		Last issued in:	1.8
Service 5-3 shall use as inputs the data products (archived/a posteriori reconstruction, and nowcast) concerning TEC needed for the delivery of the archived data/products and nowcast to the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.6.3.1 Data Policy Enforcement

SWE-SRD-11152		Last issued in:	1.8
Service 5-3 shall be an “on-demand” service for registered users only, delivering its outputs on request for the reconstruction/nowcast services, and automatically for the alerts.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.6.3.2 Handle service requests

SWE-SRD-11154		Last issued in:	1.8
The following set of user criteria shall be requested by service 5-3 prior to the generation of the outputs of the			



service:			
<ul style="list-style-type: none"> ➤ Location / area ➤ Altitude domain ➤ Time span ➤ Parameters to be recovered from archives / reconstructed / nowcasted 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11155		Last issued in:	1.8
Service 5-3 shall allow its users to specify freely the location and time frame for his/her reconstruction/nowcast requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11160		Last issued in:	1.8
Service 5-3 shall inform its users informed of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.6.3.3 Deliver products/tools/reports

SWE-SRD-11156		Last issued in:	1.8
Service 5-3 shall recall in its outputs delivered to the user the input elements that the user has provided and reword/complement them with metadata as follows:			
<ul style="list-style-type: none"> • Considered geographical area and altitude domain • Time span • Publication date • Flag indicating if information from third parties is included 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11157		Last issued in:	1.8
Service 5-3 shall request the user to identify which parameter to be recovered from archive, reconstructed a			



posteriori or nowcasted, within the list of data products below, the user wants to be delivered, request them from the SSA SWE database and provide them to the user:

- Recovery from archive, a posteriori reconstruction and nowcast of TEC core products including **TEC maps and 3D electron density grids**, complying with the Products Specification for product code IT-001-N, IT-001-P, IT-002-N, IT-002-P (includes too Height of maximum electron density in F2 layer)
- The assumptions and inputs obtained from the data products used for the elaboration of the prediction delivered to the user,
- A description of the model used,
- More generally, nowcasted/reconstructed parameters as per user’s request within the list below that encompasses the assessed ionosphere properties but too some of the inputs to the ionosphere models that the user may be interested in:
 - o Ionosphere:
 - Riometer data / Ionosonde measurements [product codes IT-005-N , IT-005-P]
 - URSI ionospheric parameter values [product codes IT-006-N, IT-006-P]
 - Ionospheric scintillation, location and intensity [product codes IT-009-N, IT-009-P]
 - o Geomagnetic storm indices: global, auroral, mid-latitude and ring current [product codes MR-001-N, MR-001-P]
 - o Vector measurements of local geomagnetic field [product codes AG-005-N, AG-006-N, AG-005-P, AG-006-P]
 - o Solar data:
 - SSN [product codes SU-007-N, SU-007-P]
 - Solar index F10.7 [product codes SU-008-N, SU-008-P]
 - X-ray flares [product codes SU-001-N, SU-001-P]
 - SEP fluxes [product codes SU-027-N, SU-027-P, SU-028-N, SU-028-P, SU-029-N, SU-029-P]

Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12304		Last issued in:	1.12
Service 5-3 shall provide the alerts to the user by means of web-services with a refresh rate of one minute. Alerts shall be provided also by email and/or sms on request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

Service 5-3 is not required to deliver tools.

3.1.2.6.4 Service 5-4: Transionospheric radio link - Near real-time ionospheric scintillation maps

SWE-SRD-11246		Last issued in:	1.6
Service 5-4 shall provide near real-time estimate of the scintillation maps, including near real time and			



forecast of ionospheric scintillations Index (S4) and sigma phase error (Sphi) for frequencies from UHF to C band (30 MHz to 5 GHz), and this for the following service users:			
<ul style="list-style-type: none"> • Users of GNSS Single frequency services with average accuracy, no integrity (e.g. typical GNSS mass market user) • Users of GNSS Single frequency services with average accuracy, using integrity (e.g. EGNOS user) • Users or multi-frequency GNSS systems with very high accuracy (e.g. GNSS geodetic users, RTK) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12570		Last issued in:	1.12
The SWE system shall provide a Service 5-4: Transionospheric radio link - Near real-time ionospheric scintillation maps.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11346		Last issued in:	1.5
Service 5-4 shall use as inputs the data products (nowcast and forecast) needed for the delivery of the nowcasts and forecasts to the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.6.4.1 Data Policy Enforcement

SWE-SRD-11248		Last issued in:	1.6
The following set of user criteria shall be requested by service 5-4 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ Location / area ➤ Altitude domain ➤ Time span ➤ Parameters to be provided as nowcast /forecast 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11347		Last issued in:	1.5
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Service 5-4 shall allow its users to specify freely the location and time frame for his/her nowcast/forecast requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11348		Last issued in:	1.6
Service 5-4 shall inform its users informed of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.6.4.2 Handle service requests

3.1.2.6.4.3 Deliver products/tools/reports

SWE-SRD-11250		Last issued in:	1.7
Service 5-4 shall request the user to identify which parameter to be nowcasted or forecasted, within the list of data products below, the user wants to be delivered, request them from the SSA SWE database and provide them to the user:			
<ul style="list-style-type: none"> • Nowcast and forecast of scintillation maps including the following scintillation indices and parameters: S4, sigma_phi, fading depth, fade duration, time between fades, in compliance with the Products Specification for product codes IT-009-N, IT-009-F, • The assumptions and inputs obtained from the data products used for the elaboration of the prediction delivered to the user, • A description of the model used, • More generally, nowcasted/reconstructed parameters as per user's request within the list below that encompasses the assessed ionosphere properties but too some of the inputs to the ionosphere models that the user may be interested in: <ul style="list-style-type: none"> o Ionosphere: <ul style="list-style-type: none"> ▪ Riometer data / Ionosonde measurements [product codes IT-005-N , IT-005-F] ▪ URSI ionospheric parameter values [product codes IT-006-N, IT-006-F] ▪ TEC maps and 3D electron density grids, [product codes IT-001-N, IT-001-F, IT-002-N, IT-002-F] (includes too Height of maximum electron density in F2 layer) o Geomagnetic storm indices: global, auroral, mid-latitude and ring current [product codes MR-001-N, MR-001-F] o Vector measurements of local geomagnetic field [product codes AG-005-N, AG-006-N, AG-005-F, AG-006-F] o Solar Data: <ul style="list-style-type: none"> ▪ SSN [product codes SU-007-N, SU-007-F] ▪ Solar index F10.7 [product codes SU-008-N, SU-008-F] ▪ X-ray flares [product codes SU-001-N, SU-001-F] ▪ SEP fluxes [product codes SU-027-N, SU-027-F, SU-028-N, SU-028-F, SU-029-N, 			



SU-029-F]			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

Service 5-4 is not required to deliver tools.

Service 5-4 is not required to deliver user's specific reports.

3.1.2.6.5 Service 5-5: Transionospheric radio link - Monitoring and forecast of ionospheric disturbances

SWE-SRD-11255		Last issued in:	1.6
Service 5-5 shall provide an estimate of the occurrence risk of ionospheric disturbances, including monitoring and detection of ionospheric phenomena causing local disturbances of electron density and detection of geomagnetic storms. Ionospheric phenomena shall explicitly include: trough, Travelling Ionospheric Disturbances (TIDs), patches, depletions and D-region absorption.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12571		Last issued in:	1.12
The SWE system shall provide a Service 5-5: Transionospheric radio link - Monitoring and forecast of ionospheric disturbances.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11350		Last issued in:	1.5
Service 5-5 shall use as inputs the data products (nowcast and forecast) needed for the delivery of the nowcasts and forecasts to the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.6.5.1 Data Policy Enforcement



SWE-SRD-11260		Last issued in:	1.8
Service 5-5 shall be an “on-demand” service for registered users only, delivering its outputs on request for the nowcast/forecast services, and automatically for the alerts.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.6.5.2 Handle service requests

SWE-SRD-11262		Last issued in:	1.6
The following set of user criteria shall be requested by service 5-5 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ Location / area ➤ Altitude domain ➤ Time span ➤ Parameters to be provided as nowcast /forecast 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11263		Last issued in:	1.5
Service 5-5 shall allow its users to specify freely the location and time frame for his/her nowcast/forecast requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11252		Last issued in:	1.6
Service 5-5 shall inform its users informed of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.6.5.3 Deliver products/tools/reports

SWE-SRD-11265		Last issued in:	1.7
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Service 5-5 shall request the user to identify which parameter to be nowcasted or forecasted, within the list of data products below, the user wants to be delivered, request them from the SSA SWE database and provide them to the user:

- **Monitoring and detection of:**
 - o **Trough,**
 - o **Travelling Ionospheric Disturbances (TIDs),**
 - o **Patches,**
 - o **Depletions**
 - o **D-region absorption**
 - o complying with the Products Specification in compliance with the Products Specification for product codes IT-011-N, IT-011-F.
- The assumptions and inputs obtained from the data products used for the elaboration of the prediction delivered to the user,
- More generally, nowcasted/reconstructed parameters as per user’s request within the list below that encompasses the assessed ionosphere properties but too some of the inputs to the ionosphere models that the user may be interested in:
 - o Ionosphere:
 - Riometer data / Ionosonde measurements [product codes IT-005-N , IT-005-F]
 - URSI ionospheric parameter values [product codes IT-006-N, IT-006-F]
 - Ionospheric scintillation, location and intensity [product codes IT-009-N, IT-009-F]
 - TEC maps and 3D electron density grids, [product codes IT-001-N, IT-001-F, IT-002-N, IT-002-F] (includes too Height of maximum electron density in F2 layer)
 - o Geomagnetic storm indices: global, auroral, mid-latitude and ring current [product codes MR-001-N, MR-001-F]
 - o Vector measurements of local geomagnetic field [product codes AG-005-N, AG-006-N, AG-005-F, AG-006-F]
 - o Solar Data:
 - SSN [product codes SU-007-N, SU-007-F]
 - Solar index F10.7 [product codes SU-008-N, SU-008-F]
 - X-ray flares [product codes SU-001-N, SU-001-F]
 - SEP fluxes [product codes SU-027-N, SU-027-F, SU-028-N, SU-028-F, SU-029-N, SU-029-F]

Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

Service 5-5 is not required to deliver tools.

SWE-SRD-11358		Last issued in:	1.12
Service 5-5 shall provide the alerts to the user by means of web-services with a refresh rate of one minute. Alerts shall also be provided by email and/or sms on request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



3.1.2.7 Domain 6 services - Space surveillance and tracking

3.1.2.7.1 Service 6-1: Space Surveillance and Tracking – Atmospheric estimates for drag calculation

SWE-SRD-11281		Last issued in:	1.6
Service 6-1 shall provide an estimate of the atmospheric density including: <ul style="list-style-type: none"> • high altitude atmospheric density estimate for the past year • high altitude atmospheric density forecast • relevant environmental data for the user to compute drag of spacecraft in the altitude range below 1500* km. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12572		Last issued in:	1.12
The SWE system shall provide a Service 6-1: Space Surveillance and Tracking – Atmospheric estimates for drag calculation.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11359		Last issued in:	1.7
Service 6-1 shall use as inputs the data products (archived/a posteriori reconstruction, and forecast) concerning atmospheric density needed for the delivery of the archived data/products and forecast to the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.7.1.1 Handle service requests

SWE-SRD-11360		Last issued in:	1.6
The following set of user criteria shall be requested by service 6-1 prior to the generation of the outputs of the service: <ul style="list-style-type: none"> ➢ Location / area ➢ Altitude domain ➢ Time span ➢ Parameters to be recovered from archive / reconstructed / forecast 			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11361		Last issued in:	1.5
Service 6-1 shall allow its users to specify freely the location and time frame for his/her requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11366		Last issued in:	1.6
Service 6-1 shall inform its users informed of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.7.1.2 Deliver products/tools/reports

SWE-SRD-11363		Last issued in:	1.5
Service 6-1 shall request the user to identify which parameter to be to be recovered from archives or reconstructed or forecasted within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:			
<ul style="list-style-type: none"> • Recovery from archives, a posteriori reconstruction and forecast of atmospheric density complying with the Products Specification for product code AG-007-P, AG-007-F • The assumptions and inputs obtained from the data products used for the elaboration of the prediction delivered to the user, • A description of the model used, • More generally, parameters to be recovered from archives, reconstructed or forecasted as per user’s request within the list below that encompasses the assessed atmosphere properties but too some of the inputs to the drag calculation models that the user may be interested in: <ul style="list-style-type: none"> o Indices: geomagnetic (Kp, Ap, Dst) [product codes MR-002-P, MR-003-P, MR-004-P, MR-002-F, MR-003-F, MR-004-F], solar (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-P, SU-008-P, SU-009-P, SU-010-P, SU-011-P, SU-012-P, SU-006-F, SU-008-F, SU-009-F, SU-010-F, SU-011-F, SU-012-F], and other indices (IG12, IMF) [product codes SU-013-P, L1-008-P, SU-013-F, L1-008-F], o Ionospheric electron density as a function of altitude: TEC maps and 3D electron density grids, [product codes IT-001-P, IT-001-F, IT-002-P, IT-002-F] (includes too Height of maximum electron density in F2 layer) 			
Justification:			
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	

Service 6-1 is not required to deliver tools.

Service 6-1 is not required to deliver user's specific reports.

3.1.2.7.2 Service 6-2: Space Surveillance and Tracking – Archive of geomagnetic and solar indices for drag calculation

SWE-SRD-11286		Last issued in:	1.5
Service 6-2 shall provide the user with values that the service will extract from the database of past values of solar and geomagnetic indices relevant to drag calculation.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12573		Last issued in:	1.12
The SWE system shall provide a Service 6-2: Space Surveillance and Tracking – Archive of geomagnetic and solar indices for drag calculation.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11370		Last issued in:	1.7
Service 6-2 shall use as inputs the data products needed for the delivery of the archived index data to the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.7.2.1 Handle service requests

SWE-SRD-11373		Last issued in:	1.8
The following set of user criteria shall be requested by service 6-2 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ Location / area ➤ Time span ➤ Parameters to be recovered from archive / reconstructed 			



Justification:	
Comments:	
Source Requirements:	
Related Requirements:	Verification Method:

SWE-SRD-11374		Last issued in:	1.5
Service 6-2 shall allow its users to specify freely the location and time frame for his/her requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.7.2.2 Deliver products/tools/reports

SWE-SRD-11376		Last issued in:	1.6
Service 6-2 shall request the user to identify which parameter will be recovered from archives within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user:			
<ul style="list-style-type: none"> o geomagnetic indices (Kp, Ap, Dst) [product codes MR-002-P, MR-003-P, MR-004-P], o solar indices (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-P, SU-008-M, SU-008-P, SU-009-P, SU-010-P, SU-011-P, SU-012-P], o and other indices (IG12, IMF) [product codes SU-013-P, L1-008-P]. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

Service 6-2 is not required to deliver tools.

Service 6-2 is not required to deliver user's specific reports.

3.1.2.7.3 *Service 6-3: Space Surveillance and Tracking – Forecast of geomagnetic and solar indices for drag calculation*

SWE-SRD-11291		Last issued in:	1.6
Service 6-3 shall provide forecast of geomagnetic and solar indices for drag calculation.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-12574		Last issued in:	1.12
The SWE system shall provide a Service 6-3: Space Surveillance and Tracking – Forecast of geomagnetic and solar indices for drag calculation.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11407		Last issued in:	1.5
Service 6-3 shall use as inputs the data products (forecast) needed for the delivery of the data to the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.7.3.1 Handle service requests

SWE-SRD-11381		Last issued in:	1.8
The following set of user criteria shall be requested by service 6-3 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ Location / area ➤ Time span ➤ Parameters to forecasted 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11380		Last issued in:	1.5
Service 6-3 shall allow its users to specify freely the location and time frame for his/her requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11382		Last issued in:	1.6
Service 6-3 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.7.3.2 Deliver products/tools/reports

SWE-SRD-11384		Last issued in:	1.5
Service 6-3 shall request the user to identify which parameter to be forecasted within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user: <ul style="list-style-type: none"> o geomagnetic indices (Kp, Ap, Dst) [product codes MR-002-F, MR-003-F, MR-004-F], o solar indices (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-F, SU-008-M, SU-008-F, SU-009-F, SU-010-F, SU-011-F, SU-012-F], o and other indices (IG12, IMF) [product codes SU-013-F, L1-008-F]. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

Service 6-3 is not required to deliver tools.

Service 6-3 is not required to deliver user's specific reports.

3.1.2.7.4 *Service 6-4: Space Surveillance and Tracking – Nowcast of ionospheric group delay*

SWE-SRD-11296		Last issued in:	1.5
Service 6-4 shall provide nowcast of ionospheric group delay to estimate effects on radar signal including: <ul style="list-style-type: none"> • relevant environmental data to estimate ionospheric refraction of radio waves • relevant environmental data to estimate ionospheric group delay 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12575		Last issued in:	1.12
The SWE system shall provide a Service 6-4: Space Surveillance and Tracking – Nowcast of ionospheric group delay.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



SWE-SRD-11411		Last issued in:	1.5
Service 6-4 shall use as inputs the data products (nowcast) needed for the delivery of the data to the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.7.4.1 Handle service requests

SWE-SRD-11389		Last issued in:	1.6
The following set of user criteria shall be requested by service 6-4 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ Location / area ➤ Altitude domain ➤ Time span ➤ Parameters to nowcast 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11390		Last issued in:	1.5
Service 6-4 shall allow its users to specify freely the location and time frame for his/her requests, within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11388		Last issued in:	1.6
Service 6-4 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.7.4.2 Deliver products/tools/reports

SWE-SRD-11392		Last issued in:	1.6
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Service 6-4 shall request the user to identify which parameter to be nowcasted within the list of data products below the user wants to be delivered, request them from the SSA SWE database and provide them to the user: <ul style="list-style-type: none"> • Nowcast of ionospheric group delay complying with the Products Specification for product codes IT-001-N, IT-002-N • The assumptions and inputs obtained from the data products used for the elaboration of the prediction delivered to the user, • A description of the model used, • More generally, nowcast parameters as per user’s request within the list below that encompasses some of the inputs to the ionospheric group delay calculation models that the user may be interested in: <ul style="list-style-type: none"> o geomagnetic indices (Kp, Ap, Dst) [product codes MR-002-N, MR-003-N, MR-004-N], o solar indices (R, F10.7, S10, E10, M10, Y10) [product codes SU-006-N, SU-008-M, SU-008-N, SU-009-N, SU-010-N, SU-011-N, SU-012-N], o and other indices (IG12, IMF) [product codes SU-013-N, L1-008-N]. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

Service 6-4 is not required to deliver tools.

Service 6-4 is not required to deliver user’s specific reports.

3.1.2.8 Domain 7 services - Non space systems operations

3.1.2.8.1 Service 7-1: Non-space systems operations – Service to power system operators

SWE-SRD-11301		Last issued in:	1.8
Service 7-1 shall provide nowcast and forecast of GIC in power systems based on local magnetometer networks and solar wind data (in case of forecasts), including: <ul style="list-style-type: none"> • A tailored service for generating Network maps showing geomagnetically induced currents throughout the power system including plotting local E-field and GIC by substation for registered users • A tailored service for specific users providing a table of modelled GIC values for the Users network in the last minute and peak GIC in the last 60 mins • Global forecast of geomagnetic activity from 15 min ahead up to 27 days ahead. • Local forecast of geomagnetic activity from 15 min ahead up to 27 days ahead. • A post-event analysis toolkit shall also be provided 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12576		Last issued in:	1.12
The SWE system shall provide a Service 7-1: Non-space systems operations – Service to power system			



operators.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11415		Last issued in:	1.5
Service 7-1 shall use as inputs the data products needed for the delivery of the data required by the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.1.1 Data Policy Enforcement

SWE-SRD-11395		Last issued in:	1.8
Service 7-1 shall be an “on-demand” service for registered users only, delivering its outputs on request for the archive/reconstruction/nowcast/forecast services and the tools, and automatically for the alerts.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.1.2 Handle service requests

SWE-SRD-11397		Last issued in:	1.8
The following set of user criteria shall be requested by service 7-1 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ Location / area ➤ Time span ➤ Parameters to be recovered from archive / reconstructed / nowcasted / forecasted ➤ Information on user's system (e.g. network map for tailored service) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11398		Last issued in:	1.5
Service 7-1 shall allow its users to specify freely the location and time frame for their request within the maximum ranges covered by the services.			
Justification:			



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11396		Last issued in:	1.6
Service 7-1 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11807		Last issued in:	1.6
Service 7-1 shall inform the user of any limitations to the service that may occur if they are unable to provide system specific information for service tailoring purposes.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.1.3 Deliver products/tools/reports

SWE-SRD-11400		Last issued in:	1.8
Service 7-1 shall request the user to identify which parameters to be recovered from archive, reconstructed, nowcasted or forecasted, within the list of data products below, the user wants to be delivered, request them from the SSA SWE database and provide them to the user:			
<ul style="list-style-type: none"> o Geomagnetic field disturbances (including from Network of magnetometer measurements in vicinity of customer, including dB/dt) [product codes AG-005-P, AG-005-M, AG-005-N, AG-005-F], o Local geoelectric field on ground [product codes AG-006-P, AG-006-N, AG-006-F], o Solar Wind velocity, density and magnetic field at L1 [product codes L1-008-P, L1-009-P, L1-010-P, L1-008-M, L1-009-M, L1-010-M, L1-008-N, L1-009-N, L1-010-N, L1-008-F, L1-009-F, L1-010-F], o Solar disk and coronal imaging (coronagraph) [including product codes SU-022-P, SU-025-P, SU-022-M, SU-025-M, SU-022-N, SU-025-N, SU-022-F, SU-025-F], 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11401		Last issued in:	1.12
Service 7-1 shall deliver tools to power grid operators for post-event analysis: those tools shall provide the			



capability to show geomagnetically induced currents on a network map throughout the power system and generate tables of modelled GIC values for the users network.			
Justification:			
Comments:	The tools may be available for download. Alternatively these may be delivered via a web interface depending on user needs/preference.		
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11420		Last issued in:	1.6
Service 7-1 shall, upon request from a user and with the thresholds defined by the user, provide a forecast of geomagnetic activity for 15minutes to 27 days ahead.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11421		Last issued in:	1.12
Service 7-1 shall provide the alerts to the user by mean of web-services with a refresh rate less than 15mins. Alerts shall also be provided by email and/or sms on request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.2 Service 7-2: Non-space systems operations – Service to pipeline operators

SWE-SRD-11306		Last issued in:	1.6
Service 7-2 shall provide nowcast and forecast of the Geoelectric field in vicinity of pipelines based on local magnetometer networks and solar wind data, and:			
<ul style="list-style-type: none"> • a tailored service for specific users providing Pipe-to-soil potential difference (PSP) variations in the users pipe network • a tailored service for specific users providing a table of modelled GIC values for the users network in the last minute and peak GIC in the last 60 mins • global forecast of geomagnetic activity from 15 min ahead up to 27 days ahead. • local forecast of geomagnetic activity from 15 min ahead up to 27 days ahead. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12577		Last issued in:	1.12
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The SWE system shall provide a Service 7-2: Non-space systems operations – Service to pipeline operators.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11417		Last issued in:	1.5
Service 7-2 shall use as inputs the data products needed for the delivery of the data required by the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.2.1 Data Policy Enforcement

SWE-SRD-11426		Last issued in:	1.8
Service 7-2 shall be an “on-demand” service for registered users only, delivering its outputs on request for the nowcast/forecast services and the tools, and automatically for the alerts.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.2.2 Handle service requests

SWE-SRD-11428		Last issued in:	1.6
The following set of user criteria shall be requested by service 7-2 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ Location / area ➤ Time span ➤ Parameters to be nowcast / forecast ➤ Specific technical characteristics of pipeline 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11429		Last issued in:	1.5
Service 7-2 shall allow its users to specify freely the location and time frame for their request within the maximum ranges covered by the services.			
Justification:			



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11430		Last issued in:	1.6
Service 7-2 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11808		Last issued in:	1.6
Service 7-2 shall inform the user of any limitations to the service that may occur if they are unable to provide system specific information for service tailoring purposes.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.2.3 Deliver products/tools/reports

SWE-SRD-11432		Last issued in:	1.8
Service 7-2 shall request the user to identify which parameters to nowcasted or forecasted, within the list of data products below, the user wants to be delivered, request them from the SSA SWE database and provide them to the user:			
<ul style="list-style-type: none"> o Geomagnetic Field disturbances (including from Network of magnetometer measurements in vicinity of customer, including dB/dt) [product codes AG-005-M, AG-005-N, AG-005-F], o Local geoelectric field on ground [product codes AG-006-N, AG-006-F], o Solar Wind velocity, density and magnetic field at L1 [product codes L1-008-N, L1-009-N, L1-010-N, L1-008-F, L1-009-F, L1-010-F], o Solar disk and coronal imaging (coronagraph) [including product codes SU-022-N, SU-025-N, SU-022-F, SU- SU-025-F], 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11437		Last issued in:	1.12
Service 7-2 shall deliver tools to pipeline operators for post-event analysis: those tools shall compute the Pipe-to-soil potential difference (PSP) variations in the users pipe network, and shall generate the tables of modelled PSP values for the network.			



Justification:	
Comments:	The tools may be available for download. Alternatively these may be delivered via a web interface depending on user needs/preference.
Source Requirements:	
Related Requirements:	Verification Method:

SWE-SRD-11438		Last issued in:	1.6
Service 7-2 shall, upon request from a user and with the thresholds defined by the user, provide a local and global forecast of geomagnetic activity from 15min ahead to 27 days ahead.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11439		Last issued in:	1.12
Service 7-2 shall provide the alerts to the user by means of web-services with a refresh rate less than 15minutes. Alerts shall also be provided by email and/or sms on request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11440		Last issued in:	1.5
Service 7-2 shall offer a tailored service for specific users providing time-dependent maps of geoelectric field variations for the users' ground infrastructure, in compliance with the Products Specification requirements applicable to product codes AG-006-P, AG-006-N, AG-006-F.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.3 Service 7-3: Non-space systems operations – Service to airlines

SWE-SRD-11311		Last issued in:	1.6
Service 7-3 shall provide data relating to increased radiation levels at aircraft altitudes and degraded communications, in particular for high-latitude routes, including:			
<ul style="list-style-type: none"> • cosmic ray dose forecasts of up to one year for a given airline flight defined by the user. • forecast of radiation storms with energies affecting crew and passengers (6, 12, 18 hours ahead). • short term (<30mins) warnings of radiation storms with energies affecting crew and passengers. • post event information on radiation levels on a series of pre-defined routes used by commercial airlines (<1 week delay if significant activity). • graphical forecast including intensity, onset, duration and boundary of degraded 			



communications for polar routes (12-24 hours) in accordance with international standards. <ul style="list-style-type: none"> • global ionospheric scintillation maps, and nowcast and forecast alerts and data • global near real-time and forecast TEC maps on medium and large scales • statistical information on radiation environment at aircraft altitude for avionics • radiation and ionospheric data for post-event analyses 		
Justification:		
Comments:		
Source Requirements:		
Related Requirements:		Verification Method:

SWE-SRD-12578		Last issued in:	1.12
The SWE system shall provide a Service 7-3: Non-space systems operations – Service to airlines.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11442		Last issued in:	1.5
Service 7-3 shall use as inputs the data products needed for the delivery of the data required by the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.3.1 Data Policy Enforcement

SWE-SRD-11418		Last issued in:	1.6
Service 7-3 shall be an “on-demand” service for registered users only, delivering its outputs on request for the archive/reconstruction/nowcast/forecast services, and automatically for the alerts.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.3.2 Handle service requests

SWE-SRD-11427		Last issued in:	1.8
The following set of user criteria shall be requested by service 7-3 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➢ Location / area / route ➢ Time span 			



➤ Parameters to be recovered from archive / reconstructed / nowcasted / forecasted			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11419		Last issued in:	1.5
Service 7-3 shall allow its users to specify freely the location and time frame for their request within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11422		Last issued in:	1.6
Service 7-3 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.3.3 Deliver products/tools/reports

SWE-SRD-11444		Last issued in:	1.6
Service 7-3 shall request the user to identify which parameters to be recovered from archive, reconstructed, nowcasted or forecasted, within the list of data products below, the user wants to be delivered, request them from the SSA SWE database and provide them to the user:			
<ul style="list-style-type: none"> o Solar X-ray flux [product codes SU-027-P, SU-027-M, SU-027-N, SU-027-F] o Near real-time and archived measurements of atmospheric neutrons [product codes AG-008-P, AG-008-M] o Near real-time and archive of measurements of interplanetary 1 MeV to >100 MeV protons [product codes L1-001-P, L1-003-P, L1-001-M, L1-003-M] o Ionospheric data: <ul style="list-style-type: none"> ▪ Riometer data / Ionosonde measurements [product codes IT-005-N , IT-005-F] ▪ URSI ionospheric parameter values [product codes IT-006-N, IT-006-F] ▪ Ionospheric scintillation, location and intensity [product codes IT-009-N, IT-009-F] ▪ TEC maps and 3D electron density grids on medium and large scales, [product codes IT-001-N, IT-001-F, IT-002-N, IT-002-F] (includes too Height of maximum electron density in F2 layer) 			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
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Service 7-3 is not required deliver tools

SWE-SRD-11454		Last issued in:	1.8
Service 7-3 shall offer a tailored service for its users by providing according to their route: <ul style="list-style-type: none"> o cosmic ray dose forecasts of up to one year for a given airline flight defined by the user. o forecast of radiation storms with energies affecting crew and passengers (6, 12, 18 hours ahead). o short term (<30mins) warnings of radiation storms with energies affecting crew and passengers (radiation end-of-quiet and all quiet alerts). o post event information on radiation levels (atmospheric neutrons) on a series of pre-defined routes used by commercial airlines (<1 week delay if significant activity). o statistical information on radiation environment at aircraft altitude for avionics 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11809		Last issued in:	1.6
Service 7-3 shall offer a tailored service for its users by providing according to their route: <ul style="list-style-type: none"> o graphical forecast including intensity, onset, duration and boundary of degraded communications for polar routes (12-24 hours) in accordance with international standards, and for the following communication types/ frequency ranges: TBD 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.4 Service 7-4: Non-space systems operations – Service to resource exploitation system operators

SWE-SRD-11316		Last issued in:	1.8
Service 7-4 shall provide forecast and nowcast of disturbed magnetic conditions in the vicinity of high latitude magnetometer stations, coupled with precise information on position, and including: <ul style="list-style-type: none"> • nowcast and forecast (0-6hr, 24-48hr) of local geomagnetic activity for directional drilling at customer-specified locations with amplitude greater than 1-10 nT • global ionospheric scintillation maps, and nowcast and forecast alerts and data • global near real-time and forecast TEC maps on medium and large scales • nowcast and forecast (0-6hr, 24-48hr) of local geomagnetic activity for aeromagnetic surveys at customer-specified locations with amplitude greater than 1-10 nT. 			
Justification:			
Comments:	Service shall be tailored to resource exploitation system operators include geomagnetic prospecting and surveying companies		



	or organisations require near real-time data on geomagnetic disturbances together with precise positioning location from GNSS services.		
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12579		Last issued in:	1.12
The SWE system shall provide a Service 7-4: Non-space systems operations – Service to resource exploitation system operators.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11447		Last issued in:	1.5
Service 7-4 shall use as inputs the data products needed for the delivery of the data required by the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.4.1 Data Policy Enforcement

SWE-SRD-11456		Last issued in:	1.8
Service 7-4 shall be an “on-demand” service for registered users only, delivering its outputs on request for the nowcast/forecast services and the tools, and automatically for the alerts.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.4.2 Handle service requests

SWE-SRD-11458		Last issued in:	1.8
The following set of user criteria shall be requested by service 7-4 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ Location / area ➤ Time span ➤ Parameters to be nowcasted / forecasted / reconstructed 			
Justification:			
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11459		Last issued in:	1.5
Service 7-4 shall allow its users to specify freely the location and time frame for their request within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11457		Last issued in:	1.6
Service 7-4 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.4.3 Deliver products/tools/reports

SWE-SRD-11461		Last issued in:	1.12
Service 7-4 shall request the user to identify which parameters to nowcasted or forecasted, within the list of data products below, the user wants to be delivered, request them from the SSA SWE database and provide them to the user:			
<ul style="list-style-type: none"> o Geomagnetic field disturbances (including from Network of magnetometer measurements in vicinity of customer, including dB/dt) [product codes AG-005-M, AG-005-N, AG-005-F], o Local geoelectric field on ground [product codes AG-006-N, AG-006-F], o Solar Wind velocity, density and magnetic field at L1 [product codes L1-008-N, L1-009-N, L1-010-N, L1-008-F, L1-009-F, L1-010-F], o Solar disk and coronal imaging (coronagraph) [including product codes SU-022-N, SU-025-N, SU-022-F, SU- SU-025-F], o TEC maps and 3D electron density grids, [product codes IT-001-N, IT-001-F, IT-002-N, IT-002-F] (includes too Height of maximum electron density in F2 layer) o Local magnetospheric magnetic field for aeromagnetic surveys at customer-specified locations with amplitude greater than 1-10 nT (including from Network of magnetometer measurements in vicinity of customer, including dB/dt) [product codes AG-005-P, AG-005-M, AG-005-N, AG-005-F], o Local geoelectric field for aeromagnetic surveys at customer-specified locations with amplitude greater than 1-10 nT [product codes AG-006-P, AG-006-N, AG-006-F], 			
Justification:			
Comments:			
Source Requirements:			
Related		Verification	



Requirements:		Method:	
SWE-SRD-11463		Last issued in:	1.12
Service 7-4 shall deliver tools to drilling operators: those tools shall compute the consequences of the local fluctuations of the geomagnetic field on the accuracy of the drilling.			
Justification:			
Comments:	The tools may be available for download. Alternatively these may be delivered via a web interface depending on user needs/preference.		
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11468		Last issued in:	1.5
Service 7-4 shall offer a tailored service for specific users providing nowcast and forecast (0-6hr, 24-48hr) of local geomagnetic activity for directional drilling at customer-specified locations with amplitude greater than 1-10 nT, in compliance with the Products Specification requirements applicable to product codes AG-005-N, AG-005-F, AG-006-N, AG-006-F.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.5 Service 7-5: Non-space systems operations – Service to auroral tourism sector

SWE-SRD-11321		Last issued in:	1.5
Service 7-5 shall provide a regional auroral forecast coupled with meteorological forecast (cloud cover) geared towards tourism sector, including a forecast of the probability of visible auroras (>12hours, >6hours).			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12580		Last issued in:	1.12
The SWE system shall provide a Service 7-5: Non-space systems operations – Service to auroral tourism sector.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11472		Last issued in:	1.5
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Service 7-5 shall use as inputs the data products needed for the delivery of the data required by the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.5.1 Handle service requests

SWE-SRD-11473		Last issued in:	1.8
The following set of user criteria shall be requested by service 7-5 prior to the generation of the outputs of the service:			
<ul style="list-style-type: none"> ➤ Location / area ➤ Time span ➤ Parameters to be recovered from archive / reconstructed / nowcasted / forecasted 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11474		Last issued in:	1.5
Service 7-5 shall allow its users to specify freely the location and time frame for their request within the maximum ranges covered by the services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11475		Last issued in:	1.6
Service 7-5 shall inform its users of the limitations of accuracy and reliability that may result from a specific request.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.8.5.2 Deliver products/tools/reports

SWE-SRD-11476		Last issued in:	1.6
Service 7-5 shall recall in its outputs delivered to the user the input elements that the user has provided and reword/complement them with metadata as follows:			
<ul style="list-style-type: none"> • Considered geographical area and altitude domain 			



<ul style="list-style-type: none"> • Time span • Publication date • Flag indicating if information from third parties is included 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11810		Last issued in:	1.8
<p>Service 7-5 shall request the user to identify which parameters to be recovered from archive, reconstructed, nowcasted or forecasted, within the list of data products below, the user wants to be delivered, request them from the SSA SWE database and provide them to the user:</p> <ul style="list-style-type: none"> o Auroral visible imaging (archives and nowcast) [product codes AG-001-P, AG-001-M, AG-001-N, AG-002-P, AG-002-M, AG-002-N,], o Probability of visible auroras (forecast) [product code AG-001-F], o Geomagnetic Field Disturbances (including from Network of magnetometer measurements in vicinity of customer, including dB/dt) [product codes AG-005-P, AG-005-M, AG-005-N, AG-005-F], o Local geoelectric field at ground level due to dB/dt [product codes AG-006-P, AG-006-N, AG-006-F], o Solar Wind velocity, density and magnetic field at L1 [product codes L1-008-P, L1-009-P, L1-010-P, L1-008-M, L1-009-M, L1-010-M, L1-008-N, L1-009-N, L1-010-N, L1-008-F, L1-009-F, L1-010-F], o Solar disk and coronal imaging (coronagraph) [including product codes SU-022-P, SU-025-P, SU-022-M, SU-025-M, SU-022-N, SU-025-N, SU-022-F, SU-025-F], 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

Service 7-5 is not required to deliver tools.

Service 7-5 is not required to deliver user’s specific reports.

3.1.2.9 Domain 8 services - General data service

3.1.2.9.1 Service 8-1: General data service – Space Weather data archive

SWE-SRD-11326		Last issued in:	1.5
<p>Service 8-1 shall provide an archive of all available Space Weather data of relevance for European SSA users and service providers, consisting in a long term database repository for space weather data from all relevant domains that shall:</p> <ul style="list-style-type: none"> • include sensor data and derived products including model runs and event catalogue, • be compatible and cross-referenceable with VO activities (e.g. VSO, Virbo), 			



<ul style="list-style-type: none"> support generation of new indices and further understanding of long term trends, supporting development of improved models and forecast tools. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12581		Last issued in:	1.12
The SWE system shall provide a Service 8-1: General data service – Space Weather data archive.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.9.1.1 Handle service requests

SWE-SRD-11485		Last issued in:	1.6
The following set of user criteria shall be requested by service 8-1 prior to access the data and be modulated depending upon on each dataset:			
<ul style="list-style-type: none"> ➤ Time ➤ Source/sensor ➤ Location ➤ Domain ➤ Metadata (parameter dependent) ➤ Parameter to be retrieved 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11486		Last issued in:	1.5
Service 8-1 shall allow its users to retrieve data through a web interface.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11484		Last issued in:	1.5
Service 8-1 shall allow its users to access data through automated tools/interfaces.			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.9.1.2 Deliver products/tools/reports

SWE-SRD-11490		Last issued in:	1.6
Service 8-1 shall request the user to identify which parameters to be recovered from archive the user wants to be delivered, request them from the SSA SWE database and provide the relevant information/metadata to the user for each dataset.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11491		Last issued in:	1.5
The data managed by Service 8-1 shall cover all domains and encompass all the products specified by the Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11478		Last issued in:	1.5
Service 8-1 shall make the list of data tables and columns available.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11492		Last issued in:	1.6
Service 8-1 shall make the list of data tables and columns available according to a standard format.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12305		Last issued in:	1.12
Service 8-1 shall provide tools to access data			
Justification:			



Comments:	The tools may be available for download. Alternatively these may be delivered via a web interface depending on user needs/preference.		
Source Requirements:			
Related Requirements:		Verification Method:	

Service 8-1 is not required to deliver user's specific reports.

3.1.2.9.2 Service 8-2: General data service – Latest Data Service

SWE-SRD-11331		Last issued in:	1.8
Service 8-2 shall provide an agreed set of data required as input to tailored and non-tailored customer service available on a registration basis.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12582		Last issued in:	1.12
The SWE system shall provide a Service 8-2: General data service – Latest Data Service.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.9.2.1 Handle service requests

SWE-SRD-11497		Last issued in:	1.5
The following set of user criteria shall be requested by service 8-2 prior to access the data:			
<ul style="list-style-type: none"> ➤ Dataset ➤ Time Period 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11498		Last issued in:	1.5
Service 8-2 shall allow its users to select the dataset of interest to them.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
SWE-SRD-11499		Last issued in:	1.5
Service 8-2 shall allow its users to select the frequency with which the data is provided, either as regular intervals (e.g. daily) or as soon as it is available.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11500		Last issued in:	1.5
Service 8-2 shall allow its users to select how far back the data shall be provided either since last provision or within a specific timeframe (e.g. last day).			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.9.2.2 Deliver products/tools/reports

SWE-SRD-11502		Last issued in:	1.5
Service 8-2 shall request the user to identify which latest data he/she wants to be delivered, request them from the SSA SWE database and provide: <ul style="list-style-type: none"> • The latest data itself as per user's request concerning any Space weather data in the CRD • The corresponding metadata for each dataset • The corresponding metadata for each data source 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

Service 8-2 is not required to deliver tools.

Service 8-2 is not required to deliver user's specific reports.

3.1.2.9.3 Service 8-3: General data service – Space Weather nowcast and forecast products

SWE-SRD-11336		Last issued in:	1.8
Service 8-3 shall provide nowcast and forecast of space weather parameters, including: <ul style="list-style-type: none"> • Nowcast products based on data and modelling, • Forecast products based on data and modelling, 			



<ul style="list-style-type: none"> • Daily Forecast (1 day, 2 days, weekly outlook), • Daily activity report (plus last 24 hours), • weekly or monthly report, • "all quiet conditions" indications, • Long term solar cycle forecast, • A general set of alarms for nowcasts defined by Service Domain, with the start and termination thresholds configurable as per user domain and as per space environment parameters. This will include "all quiet" and "end of quiet" alarms. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12583		Last issued in:	1.12
The SWE system shall provide a Service 8-3: General data service – Space Weather nowcast and forecast products.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.9.3.1 Data Policy Enforcement

SWE-SRD-11507		Last issued in:	1.5
Service 8-3 shall be accessible as a broadcast for the list of data products for which free broadcast is authorized by the Data Policy, and for the other data an "on-demand" service for registered users only.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.9.3.2 Handle service requests

SWE-SRD-11511		Last issued in:	1.5
The following set of user criteria shall be requested by service 8-3 prior to access a dataset: <ul style="list-style-type: none"> ➤ required data products ➤ required update rate ➤ expected time lag in respect to "now" specified ➤ specific information related to the service 			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
SWE-SRD-11512		Last issued in:	1.5
The following set of user criteria shall be requested by service 8-3 as part of a specific report request: <ul style="list-style-type: none"> ➢ Expected report type ➢ Datasets to be included ➢ Trigger for release or frequency 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.9.3.3 Deliver products/tools/reports

SWE-SRD-11516		Last issued in:	1.5
Service 8-3 shall provide a nowcast of a variable list of data products, upon User’s request but within the list of all Space Weather data in the Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11517		Last issued in:	1.5
Service 8-3 shall provide its data outputs as datasets with date, source and other relevant information and/or metadata.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11518		Last issued in:	1.6
Service 8-3 shall provide its data outputs by grouping the nowcast parameters with at least the following categories: <ul style="list-style-type: none"> • solar activity, • solar wind key parameters (density, magnetic field), • geomagnetic • radiation environment at GEO, MEO, LEO, • ionospheric propagation conditions, • neutral density, • indices, • micro particle flux and known periods of increased flux intensity. 			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11513		Last issued in:	1.5
Service 8-3 shall inform its users on the source of the dataset and receive information on the used models.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11514		Last issued in:	1.5
Service 8-3 shall provide its users access to quality metrics for the forecasts/nowcast models.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

Service 8-3 is not required to deliver tools.

SWE-SRD-11534		Last issued in:	1.6
Service 8-3 shall provide its reports by detailing a given set of data and forecasts, with at least the following reports produced:			
<ul style="list-style-type: none"> o Daily Forecast (1 day, 2 days, weekly outlook) o Daily activity report (plus last 24 hours) o weekly or monthly report o "All quiet conditions" o "End of All quiet conditions" o Long term solar cycle forecast 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11535		Last issued in:	1.5
Service 8-3 shall generate its user's specific reports at predefined intervals and made available through various channels:			
<ul style="list-style-type: none"> • Published on relevant Web portals. • Distributed to registered users • Made accessible on the SWE Archive 			
Justification:			
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11536		Last issued in:	1.8
Service 8-3 shall provide its users with information on the quality/reliability of the nowcast and/or forecast			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.9.4 Service 8-4: General data service – Event based alarms

SWE-SRD-11341		Last issued in:	1.12
Service 8-4 shall provide alarms on: <ul style="list-style-type: none"> • an as-needed basis for specific datasets and events, • based on relevant data and where feasible rapid model outputs indicating likely consequences (e.g. time of interplanetary shock reaching Earth), • on the datasets defined and used by the following services: <ul style="list-style-type: none"> ➢ Latest Data Service (service #8-2) ➢ Nowcast and Forecast Products Service (service #8-3). 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12584		Last issued in:	1.12
The SWE system shall provide a Service 8-4: General data service – Event based alarms.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11537		Last issued in:	1.5
Service 8-4 shall include two components: <ul style="list-style-type: none"> ➢ An agreed set of default alarms defined for the SSA system and made available to all users or visitors of the system. The alarm thresholds are defined by the SSA system and are common at least for each domain. These Alarms will be provided to the users registered for the default SSA alarm service and made visible on the SWE Portals. Additionally the current status of these alarms will also be available in the data archive. ➢ A subscription service will allow for tailored automated alarms on a particular parameter/dataset. Each user will be able to configure the alarm thresholds for specific datasets of interest to him/her. 			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.9.4.1 Handle service requests

SWE-SRD-11519		Last issued in:	1.8
The following set of user criteria shall be requested by the subscription service 8-4 during an alert request: <ul style="list-style-type: none"> ➤ Dataset or Event ➤ Threshold for alarm (start and termination if applicable) ➤ Threshold crossing direction (i.e. is the alarm triggered when the threshold is crossed from a lower to a higher value or the other way round?) ➤ Retrieval/reception method(e.g. Email, display in user area) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.9.4.2 Deliver products/tools/reports

SWE-SRD-12306		Last issued in:	1.8
Service 8-4 shall deliver alarms as data products			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

Service 8-4 is not required to deliver tools.

SWE-SRD-11523		Last issued in:	1.5
Service 8-4 shall allow the user to define her/his own event based alarms for nowcasts (registered users only).			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11524		Last issued in:	1.6
Service 8-4 shall provide the alarms to the users that have been requested.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
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SWE-SRD-11525		Last issued in:	1.6
Service 8-4 shall inform its users of the source of the dataset producing the alarm.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11526		Last issued in:	1.8
Service 8-4 shall provide its users with information on the quality/reliability of the alarm (e.g. for a forecast or nowcast).			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.2.9.5 Service 8-5: General data service – Virtual space weather modelling system

SWE-SRD-11555		Last issued in:	1.8
Service 8-5 shall: <ul style="list-style-type: none"> • Provide Model integration and validation as part of a coordinated framework. • Allow coupling of European modelling assets and data in order to simulate propagation of space weather phenomena from the Sun to the Earth. (both users and developers shall benefit from this service as incorporation of models into a coherent framework will stimulate further targeted model development). • Provide an interface allowing graphical visualisation (3-D visualisation, 2-D maps and time animation) of combined results of model simulation outputs and subsets thereof, as the scales and complexity of the models involved in an end-to-end simulation make it difficult to grasp from tabulated data the scope of the simulation outcomes. • Provide easy to use visualisation tools • Provide tools for validating the respective models based measurements and other means. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12585		Last issued in:	1.12
The SWE system shall provide a Service 8-5: General data service – Virtual space weather modelling system.			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.9.5.1 Handle service requests

SWE-SRD-11559		Last issued in:	1.8
The following set of user criteria shall be requested to the user by service 8-5: <ul style="list-style-type: none"> ➤ Model run ID ➤ Model or region of interest ➤ Visualisation criteria: appropriate visualisation method according to the specific product. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.9.5.2 Deliver products/tools/reports

Service 8-5 is not required to deliver data products.

SWE-SRD-11561		Last issued in:	1.8
Service 8-5 shall request the user to identify which model outputs the user wants to be delivered, request them from the SSA SWE database and provide them to the user.			
Justification:			
Comments:	Those shall be offered to the user as series of relevant models grouped by categories e.g. domains, regions.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11562		Last issued in:	1.12
Service 8-5 shall request the user to identify which tools (for validating the respective models based measurements and other means) the user wants to be delivered, request them from the SSA SWE database and provide them to the user.			
Justification:			
Comments:	The tools shall be available for download.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11565		Last issued in:	1.12
Service 8-5 shall provide the model outputs and tools to the users by means of web-services and mechanisms for file transfer.			



Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

Service 8-5 is not required to deliver user's specific reports.

3.1.2.9.5.3 Subscribe/Unsubscribe to service

SWE-SRD-11564		Last issued in:	1.8
Service 8-5 shall offer the possibility to a non-registered user (if authorized by the Data Policy) to subscribe to a report containing results from the Virtual space weather modelling system (TBC): the report shall be emitted on user demand, as per its set of user criteria.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.9.5.4 Upload models from developers

SWE-SRD-11597		Last issued in:	1.8
Service 8-5 shall request the developer to identify which models and tools the developer wants to upload, request them from the developer, upload them into the SSA SWE database and submit them to the Quality Control for validation.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.9.6 *Service 8-6: General data service – Guaranteed data service for third party/added-value service providers*

SWE-SRD-11567		Last issued in:	1.8
Service 8-6 shall provide data to services to be built by service providers (commercial/non-commercial) external to SSA in order to develop customer-focused products (e.g., for airlines, power industry, prospecting, auroral tourism). The service shall include:			
<ul style="list-style-type: none"> • An agreed set of guaranteed data required in order to provide input to tailored service and non-tailored customer service available on a registration basis. Expect to include SSA-SWE proprietary data & partner data (e.g. NOAA/SWPC) for full coverage, • Options for the user to configure automated data retrieval/distribution requests to allow adaptation to evolving user needs. 			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12586		Last issued in:	1.12
The SWE system shall provide a Service 8-6: General data service – Guaranteed data service for third party/added-value service providers.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.9.6.1 Handle service requests

SWE-SRD-11571		Last issued in:	1.8
In addition to the requested parameters, the following set of criteria shall be requested from the user by service 8-6:			
<ul style="list-style-type: none"> ➢ Definition of the requested configuration for automated retrieval ➢ Definition of the conditions under which the data provision shall be guaranteed: <ul style="list-style-type: none"> • Timeliness • Reliability • Accuracy • Availability 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11572		Last issued in:	1.8
Service 8-6 shall offer to the user the capability to configure automated data retrieval/distribution requests.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11568		Last issued in:	1.8
Service 8-6 shall offer to the user the capability to find information on which datasets can be provided as part of this service.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review
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SWE-SRD-11598		Last issued in:	1.8
Service 8-6 shall offer to the user the capability to request the provision of additional datasets if these are not part of the service.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11599		Last issued in:	1.8
Service 8-6 shall offer to the user the capability to obtain information on the data that is provided and on how it is made available.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.9.6.2 Deliver products/tools/reports

SWE-SRD-11573		Last issued in:	1.8
Service 8-6 shall request the user to identify which data he/she wants to be delivered within the list of data agreed in the contract between the user and SSA, request them from the SSA SWE database and provide them to the user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

Service 8-6 is not required to deliver tools.

Service 8-6 is not required to deliver user's specific reports.

3.1.2.9.7 *Service 8-7: General data service – Space Weather support material*

SWE-SRD-11579		Last issued in:	1.8
Service 8-7 shall provide access to web based content and educational material, (including tutorials) covering aspects of space weather and micro-particles geared towards users and customers, including information on the types of products available and associated caveats.			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12587		Last issued in:	1.12
The SWE system shall provide a Service 8-7: General data service – Space Weather support material.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.9.7.1 Data Policy Enforcement

SWE-SRD-11581		Last issued in:	1.8
Service 8-7 shall be accessible to all users as a “broadcast” service, available on the web (e.g. through the SWE portals) as information websites.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.9.7.2 Handle service requests

SWE-SRD-11583		Last issued in:	1.8
Service 8-7 shall also offer the user access to an information package upon user’s demand, and shall then requested the user to provide the type of data requested as input.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11811		Last issued in:	1.6
Service 8-7 shall offer interactive web based space weather tutorials.			
Justification:			
Comments:	Limited registration needed for usage statistics		
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11584		Last issued in:	1.8
The support websites of service 8-7 shall not only be static but shall also provide up-to-date information on			



the SWE conditions retrieved from other services (mainly the SWE Archive).			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11580		Last issued in:	1.8
The educational material presented by service 8-7 shall be written for students and professionals with limited SWE background.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11582		Last issued in:	1.8
Service 8-7 shall offer the user the capacity to find background information on SWE physics, effects and applications.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11604		Last issued in:	1.8
Service 8-7 shall offer the user the capacity to search for specific topics.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11605		Last issued in:	1.8
Service 8-7 shall offer the user the capacity to find information in direct relation to the SWE services (e.g. when describing flares, links should be provided to actual images and reports from the SWE archive).			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.2.9.7.3 Deliver products/tools/reports



SWE-SRD-11587		Last issued in:	1.8
Service 8-7 shall provide the user in a visual and user-friendly way with Space Weather support material contents: <ul style="list-style-type: none"> o Websites explaining online the physical terms, acronyms and scales. o Information package 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

Service 8-7 is not required to deliver tools.

Service 8-7 is not required to deliver user’s specific reports.

3.1.2.9.7.4 Subscribe/Unsubscribe to service

SWE-SRD-11591		Last issued in:	1.8
Service 8-7 shall be offered without subscription.			
Justification:			
Comments:	Limited registration needed for usage statistics		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.3 Data Processing

The SWE observations are produced by the sensor network and then passed to the Data Processing functions. The essential function of the data processing system is to manage the sensor data and produce higher level data products. All sensor data and SWE Segment products are archived permanently. Figure 3 depicts the main Data Processing functions.

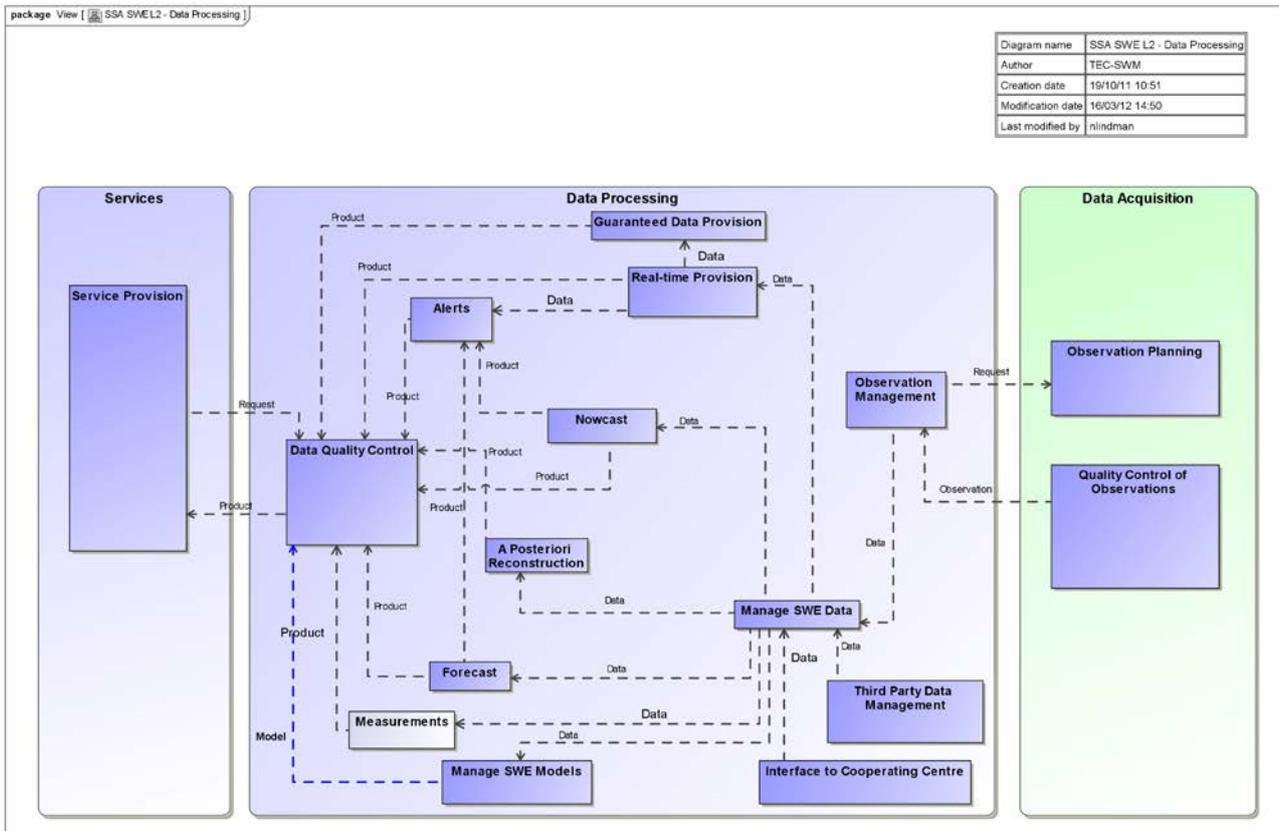


Figure 3: SWE Data Processing Functions

3.1.3.1 Data Quality Control

SWE-SRD-10309		Last issued in:	1.5
For the data sources that provide calculated values (whether indices, derived parameters, extrapolations of basic parameters or any result from a calculation process), the SSA System shall provide accurate description of the model and parameters used for their generation as well as which exact information is provided by each parameter and its domain of applicability.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10310		Last issued in:	1.5
The SSA system shall make its estimation of the accuracy of the provided data and make it available to the users.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
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SWE-SRD-10311		Last issued in:	1.8
Uncertainties in the presented data shall be quantified in the form of quality metrics.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10312		Last issued in:	1.5
Uncertainties in the model outputs shall be quantified in the form of quality metrics.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10313		Last issued in:	1.5
The SSA SWE segment shall warn the user when the accuracy and confidence of the delivered data products are degraded.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.2 Alerts

SWE-SRD-9128		Last issued in:	1.8
The SSA system shall provide alarms based on events (e.g. flare alert (without spatial info), flare alert (with spatial info), Halo CME alert, CME warning, coronal hole alert, CIR alert, geomagnetic storm onset alert, geomagnetic warning etc) for an agreed set of defaults. The accompanying alarm message shall incorporate relevant data and, whenever feasible, likely consequences (e.g. time of interplanetary shock reaching Earth).			
Justification:	Alarms on an as-needed basis (e.g. flare, CME, SPE, magnetic storm onset, increased microparticle flux). Incorporate relevant data and where feasible rapid model run outputs indicating likely consequences (e.g. time of interplanetary shock reaching Earth). Agreed set of default alarms. Subscription service will allow for tailored automated alarms on a particular parameter/dataset.		
Comments:			
Source Requirements:	SWE-CRD-SEG-1677		
Related Requirements:		Verification Method:	Design Review



			Test
SWE-SRD-10517		Last issued in:	1.5
The SWE segment shall provide the product ' All quiet alert - Archives' (product code AL-001-P) as per the requirements in the SWE Products Specification.			
Justification:	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads Useful also to plan critical orbital manoeuvres including at end of launch operations. Indication of long (several days) periods of low activity applicable to several user domains including spacecraft operators and human spaceflight		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10518		Last issued in:	1.5
The SWE segment shall provide the product ' End-of-quiet alert - Archives' (product code AL-002-P) as per the requirements in the SWE Products Specification.			
Justification:	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads Useful also to plan critical orbital manoeuvres including at end of launch operations. Indication of long (several days) periods of low activity applicable to several user domains including spacecraft operators and human spaceflight		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10519		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - All archive' (product code AL-022-P) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10603		Last issued in:	1.5
The SWE segment shall provide the product 'All quiet alert' (product code AL-001-N) as per the requirements in the SWE Products Specification.			
Justification:	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads Useful also to plan critical orbital manoeuvres including at end of launch operations. Indication of long (several days) periods of low activity applicable to several		



	user domains including spacecraft operators and human spaceflight.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10604		Last issued in:	1.5
The SWE segment shall provide the product 'End-of-quiet alert ' (product code AL-002-N) as per the requirements in the SWE Products Specification.			
Justification:	To put staff on alert, and consequently help to lower the risk for spacecraft and payloads Useful also to plan critical orbital manoeuvres including at end of launch operations. Indication of long (several days) periods of low activity applicable to several user domains including spacecraft operators and human spaceflight.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10605		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - Solar Flare Detection' (product code AL-010-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10606		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - Solar Flare Detection and location' (product code AL-011-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10607		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - CME Onset' (product code AL-012-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



Requirements:		Method:	
SWE-SRD-10608		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - Halo CME Onset' (product code AL-013-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10736		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - Coronal Hole Notification' (product code AL-014-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10737		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - CIR Alert' (product code AL-015-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10738		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - Solar Particle Event Onset' (product code AL-016-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10739		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - Geomagnetic Storm Warning/solar wind shock arrival' (product code AL-017-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
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SWE-SRD-10740		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - Geomagnetic Storm Onset' (product code AL-018-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10741		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - Ionospheric Disturbance Detection' (product code AL-019-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10742		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - Meteoroid Stream Warning' (product code AL-020-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10743		Last issued in:	1.5
The SWE segment shall provide the product 'Event Based Alarm - Debris Cloud Warning' (product code AL-021-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12606		Last issued in:	1.12
The SWE segment shall provide the product 'Event Based Alarm - Ground Level Enhancement (GLE) Detection' (product code AL-023-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	

3.1.3.3 Measurements

3.1.3.3.1 Solar Data

SWE-SRD-10320		Last issued in:	1.5
The SWE segment shall provide the product 'Solar disc magnetic fields - Measurements' (product code SU-005-M) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10321		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index F10.7 (F10)' (product code SU-008-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10322		Last issued in:	1.5
The SWE segment shall provide the product 'EUV images of Sun' (product code SU-015-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10323		Last issued in:	1.5
The SWE segment shall provide the product 'White light solar imaging' (product code SU-017-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
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SWE-SRD-10324		Last issued in:	1.5
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The SWE segment shall provide the product 'H-alpha images of Sun' (product code SU-019-M) as per the requirements in the SWE Products Specification.

Justification:

Comments:

Source Requirements:

Related Requirements:		Verification Method:	
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SWE-SRD-10325		Last issued in:	1.5
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The SWE segment shall provide the product 'Soft X-ray images of the Sun' (product code SU-020-M) as per the requirements in the SWE Products Specification.

Justification:

Comments:

Source Requirements:

Related Requirements:		Verification Method:	
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SWE-SRD-10326		Last issued in:	1.12
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The SWE segment shall provide the product 'Solar EUV images outside of Sun-Earth line ' (product code SU-021-M) as per the requirements in the SWE Products Specification.

Justification: From location at L5 or equivalent, identify potentially eruptive solar features prior to their rotation into an Earth-facing position.

Comments:

Source Requirements:

Related Requirements:		Verification Method:	
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SWE-SRD-10327		Last issued in:	1.5
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The SWE segment shall provide the product 'Solar coronagraphic images outside of Sun-Earth line (for stereoscopic imaging of CMEs/CIRs) ' (product code SU-022-M) as per the requirements in the SWE Products Specification.

Justification:

Comments:

Source Requirements:

Related Requirements:		Verification Method:	
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SWE-SRD-10328		Last issued in:	1.5
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The SWE segment shall provide the product 'Solar far-side maps (using helioseismology technique)' (product code SU-023-M) as per the requirements in the SWE Products Specification.

Justification:

Comments:



Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10329		Last issued in:	1.5
The SWE segment shall provide the product 'Ly-alpha images (for measure of solar far-side activity)' (product code SU-024-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10330		Last issued in:	1.5
The SWE segment shall provide the product 'White-light wide-angle coronagraph images' (product code SU-025-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10332		Last issued in:	1.8
The SWE segment shall provide the product 'Solar radiospectrographic observations (for monitoring of radio bursts)' (product code SU-026-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10333		Last issued in:	1.5
The SWE segment shall provide the product 'Solar X-ray flux' (product code SU-027-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10334		Last issued in:	1.5
The SWE segment shall provide the product 'Solar EUV integrated flux' (product code SU-028-M) as per the requirements in the SWE Products Specification.			
Justification:			



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10335		Last issued in:	1.5
The SWE segment shall provide the product 'Solar UV flux' (product code SU-029-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10336		Last issued in:	1.5
The SWE segment shall provide the product 'Heliospheric imaging of Sun-Earth line (tracking of Earth-directed CMEs)' (product code SU-032-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.3.2 Data on interplanetary medium at L1

SWE-SRD-10339		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10 MeV protons in interplanetary medium - Real-time Measurement' (product code L1-001-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10340		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10 MeV ions in interplanetary medium - Real-time Measurement' (product code L1-002-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10341		Last issued in:	1.5
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The SWE segment shall provide the product '1-to-10 MeV protons in interplanetary medium at L1 - Real-time Measurement' (product code L1-003-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10342		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10 MeV ions in interplanetary medium at L1 - Real-time Measurement' (product code L1-004-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10343		Last issued in:	1.5
The SWE segment shall provide the product '30 keV-to-1 MeV ions in interplanetary medium at L1 - Real-time Measurement' (product code L1-005-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10344		Last issued in:	1.5
The SWE segment shall provide the product '2-50 MeV solar electrons at L1 - Real-time Measurement' (product code L1-006-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10345		Last issued in:	1.5
The SWE segment shall provide the product 'E>30 keV-8 MeV electrons in interplanetary medium at L1 - Real-time Measurement' (product code L1-007-M) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and internal charging related effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10346		Last issued in:	1.12
The SWE segment shall provide the product 'Interplanetary Magnetic field (IMF) at L1 - Real-time Measurement' (product code L1-008-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10347		Last issued in:	1.5
The SWE segment shall provide the product 'Solar wind bulk velocity at L1 - Real-time Measurement' (product code L1-009-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10348		Last issued in:	1.5
The SWE segment shall provide the product 'Solar wind bulk density at L1 - Real-time Measurement' (product code L1-010-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10349		Last issued in:	1.5
The SWE segment shall provide the product 'Solar wind temperature at L1 - Real-time Measurement' (product code L1-011-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.3.3 Data on interplanetary medium outside L1

SWE-SRD-10352		Last issued in:	1.5
The SWE segment shall provide the product 'Measurements of solar energetic particles' (product code IP-001-M) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen		



	from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.3.4 Data for Earth Magnetosphere and Radiation belt

SWE-SRD-10354		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10MeV protons in earth magnetosphere and radiation belt - Measurement' (product code MR-006-M) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10355		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10MeV ions in earth magnetosphere and radiation belt - Measurement' (product code MR-007-M) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10356		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10MeV protons in earth magnetosphere and radiation belt - Measurement' (product code MR-008-M) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10357		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10MeV ions in earth magnetosphere and radiation belt - Measurement' (product code MR-009-M) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10358		Last issued in:	1.5
The SWE segment shall provide the product '30keV-to-1MeV ions in earth magnetosphere and radiation belt - Measurement' (product code MR-010-M) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of degradation effects of surfaces and sensitive components such as CCD's		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10359		Last issued in:	1.5
The SWE segment shall provide the product '30 keV-8 MeV electrons in earth magnetosphere and radiation belt - Measurements' (product code MR-011-M) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and internal charging related effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10360		Last issued in:	1.5
The SWE segment shall provide the product 'Thermal and supra-thermal electron and ion energy spectra in the range 0 to 30 keV - Measurement' (product code MR-012-M) as per the requirements in the SWE Products Specification.			
Justification:	A factor in spacecraft charging and other spacecraft plasma interactions effects		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10361		Last issued in:	1.5
The SWE segment shall provide the product 'Magnetospheric radiowave spectra - Measurement' (product code MR-013-M) as per the requirements in the SWE Products Specification.			
Justification:	For incorporation into end-to-end space weather simulation.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10362		Last issued in:	1.5
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The SWE segment shall provide the product 'Thermal ions density and temperature - Measurement' (product code MR-014-M) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of charging, current collection and surface erosion effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10363		Last issued in:	1.5
The SWE segment shall provide the product 'Local magnetospheric magnetic field in orbit - Measurement' (product code MR-015-M) as per the requirements in the SWE Products Specification.			
Justification:	Monitoring spacecraft environment and disturbances; Monitor disturbances for input to nowcast and forecast models of the magnetosphere and upper atmosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10364		Last issued in:	1.5
The SWE segment shall provide the product 'Plasma drift velocity' (product code MR-016-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.3.5 Data on Earth Ionosphere / Thermosphere

SWE-SRD-10366		Last issued in:	1.5
The SWE segment shall provide the product '3D electron density grids - Measurements' (product code IT-002-M) as per the requirements in the SWE Products Specification.			
Justification:	3D electron density grids (and locally 2D) for GNSS and radio propagation applications and to compute ionospheric effects on radars.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10370		Last issued in:	1.12
The SWE segment shall provide the product 'URSI ionospheric parameters - Measurements' (product code IT-005-M) as per the requirements in the SWE Products Specification.			
Justification:	foF2 and M(3000)F2, fmin, and fbE are important characteristics to accurately estimate transionospheric propagation from URSI		



	recommendations.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10369		Last issued in:	1.5
The SWE segment shall provide the product 'Riometer data - Measurement' (product code IT-006-M) as per the requirements in the SWE Products Specification.			
Justification:	Detect D region absorption events.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10368		Last issued in:	1.5
The SWE segment shall provide the product 'Neutral density in thermosphere - Measurement' (product code IT-007-M) as per the requirements in the SWE Products Specification.			
Justification:	Monitor for input to spacecraft drag calculations.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10367		Last issued in:	1.5
The SWE segment shall provide the product 'Neutral wind velocity in thermosphere - Measurement' (product code IT-008-M) as per the requirements in the SWE Products Specification.			
Justification:	Monitor for input to spacecraft drag calculations.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10371		Last issued in:	1.5
The SWE segment shall provide the product 'Scintillation parameters measurements' (product code IT-009-M) as per the requirements in the SWE Products Specification.			
Justification:	Data required to characterise ionospheric scintillation events allowing to estimate performance degradation due to those events; Measure performance degradation of GNSS due to scintillation. Required by users 003 and 004.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10372		Last issued in:	1.5
The SWE segment shall provide the product 'Atomic Oxygen Density - Measurements' (product code IT-010-M) as per the requirements in the SWE Products Specification.			
Justification:	effects in eroding surfaces on low Earth orbits.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.3.6 Data on Earth atmosphere and geomagnetic environment

SWE-SRD-10374		Last issued in:	1.8
The SWE segment shall provide the product 'Auroral visible imaging - measurement' (product code AG-001-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10375		Last issued in:	1.8
The SWE segment shall provide the product 'Auroral UV imaging - Measurement' (product code AG-002-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10376		Last issued in:	1.8
The SWE segment shall provide the product 'Local magnetospheric magnetic field on ground - Measurement' (product code AG-005-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10377		Last issued in:	1.8
The SWE segment shall provide the product 'Atmospheric density and wind - Measurement' (product code AG-007-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
SWE-SRD-10378		Last issued in:	1.8
The SWE segment shall provide the product 'Measurement of atmospheric neutrons' (product code AG-008-M) as per the requirements in the SWE Products Specification.			
Justification:	Monitor ground level and aircraft altitude level events caused by solar particle events or observe anisotropies in the background distribution caused by CME propagation in the solar wind.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10379		Last issued in:	1.8
The SWE segment shall provide the product 'Measurement of atmospheric muons' (product code AG-009-M) as per the requirements in the SWE Products Specification.			
Justification:	Observe anisotropies in the background distribution caused by CME propagation in the solar wind.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.3.7 Data on microparticles

SWE-SRD-10381		Last issued in:	1.5
The SWE segment shall provide the product 'Micro particle flux as a function of size, velocity, angular distribution' (product code MP-001-M) as per the requirements in the SWE Products Specification.			
Justification:	impacts effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.3.8 Data about spacecraft

SWE-SRD-10735		Last issued in:	1.12
The SWE segment shall provide the product 'Anomalies on spacecraft equipment ' (product code SC-001-M) as per the requirements in the SWE Products Specification.			
Justification:	Measurement of component sensitivity with possibly a variety of causes depending on location; Other S/C anomalies may be used as an estimate of risk of user's spacecraft. In practice, the quality of this proxy may be limited by difference of orbits and of manufacturers; Spacecraft anomalies and events can be cross correlated to the occurrence of Space Weather events. It is required to study cause-effects of space weather events.		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10383		Last issued in:	1.5
The SWE segment shall provide the product 'Data from spacecraft radiation monitors - Monitoring' (product code SC-002-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10384		Last issued in:	1.5
The SWE segment shall provide the product 'Orbital data of spacecraft carrying space weather instruments - Monitoring' (product code SC-003-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10385		Last issued in:	1.5
The SWE segment shall provide the product 'Spacecraft housekeeping telemetry data - Monitoring' (product code SC-004-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10386		Last issued in:	1.5
The SWE segment shall provide the product 'Dose - Measurement' (product code SC-005-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10387		Last issued in:	1.5
The SWE segment shall provide the product 'Deep dielectric charging - Measurement' (product code SC-006-M) as per the requirements in the SWE Products Specification.			



Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10388		Last issued in:	1.5
The SWE segment shall provide the product 'Surface charging - Measurement' (product code SC-007-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10389		Last issued in:	1.5
The SWE segment shall provide the product 'Floating spacecraft potential - Measurement' (product code SC-008-M) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.4 Nowcast

SWE-SRD-10437		Last issued in:	1.8
The SSA SWE data processing shall produce nowcast data products by recovering measurement-derived data products from the data base, feeding them into models and producing a best estimate of the near real time value of variables at a requested location in space.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.4.1 Solar Data

SWE-SRD-10438		Last issued in:	1.8
The SWE segment shall provide the product 'Solar flares - Nowcast' (product code SU-001-N) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen		



	from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10523		Last issued in:	1.5
The SWE segment shall provide the product 'CMEs - Nowcast' (product code SU-002-N) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the farside as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10526		Last issued in:	1.5
The SWE segment shall provide the product 'Coronal holes - Nowcast' (product code SU-004-N) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10527		Last issued in:	1.5
The SWE segment shall provide the product 'Solar disc magnetic fields - Nowcast' (product code SU-005-N) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10524		Last issued in:	1.5
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The SWE segment shall provide the product 'Solar index R -Nowcast' (product code SU-006-N) as per the requirements in the SWE Products Specification.			
Justification:	Input data for atmospheric density estimate via a model.; proportional to level of ionisation in the ionosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10525		Last issued in:	1.5
The SWE segment shall provide the product 'Smoothed Sunspot number (SSN, R12) - Nowcast' (product code SU-007-N) as per the requirements in the SWE Products Specification.			
Justification:	Input data for atmospheric density estimate via a model.; proportional to level of ionisation in the ionosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10528		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index F10.7 (F10) - Nowcast' (product code SU-008-N) as per the requirements in the SWE Products Specification.			
Justification:	Useful for many long term activities including spacecraft design, mission planning, atmosphere drag...Required in orbit determination to desired accuracy. Required for mission planning and scheduling. Also required as input to several forecast models.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10529		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index S10.7 (S10) - Nowcast' (product code SU-009-N) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10530		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index E10.7 (E10) - Nowcast' (product code SU-010-N) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7.		
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10531		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index M10.7 (M10) - Nowcast' (product code SU-011-N) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10532		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index Y10.7 (Y10) - Nowcast' (product code SU-012-N) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10533		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index IG12 - Nowcast' (product code SU-013-N) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10534		Last issued in:	1.5
The SWE segment shall provide the product 'EUV images of Sun - Nowcast' (product code SU-015-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar activity and input to prediction models.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10535		Last issued in:	1.5
The SWE segment shall provide the product 'White light solar imaging - Nowcast' (product code SU-017-N) as per the requirements in the SWE Products Specification.			
Justification:	Input to calculation of international sunspot number.		
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10536		Last issued in:	1.5
The SWE segment shall provide the product 'H-alpha images of Sun - Nowcast' (product code SU-019-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar flare and quiescent filament development for activity prediction.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10537		Last issued in:	1.5
The SWE segment shall provide the product 'Soft X-ray images of the Sun - Nowcast' (product code SU-020-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar activity and input to modelling activities.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10538		Last issued in:	1.8
The SWE segment shall provide the product 'Solar EUV images outside of Sun-Earth line - Nowcast' (product code SU-021-N) as per the requirements in the SWE Products Specification.			
Justification:	Provide early notification of active regions and activity prior to regions rotating into view from the Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10539		Last issued in:	1.8
The SWE segment shall provide the product 'Solar coronagraphic images outside of Sun-Earth line - Nowcast' (product code SU-022-N) as per the requirements in the SWE Products Specification.			
Justification:	Determine CME speed and direction.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10540		Last issued in:	1.5
The SWE segment shall provide the product 'Solar far-side maps (using helioseismology technique) - Nowcast' (product code SU-023-N) as per the requirements in the SWE Products Specification.			



Justification:	Identify formation and evolution of large solar active regions on the far side of the Sun. Extends forecast validity period to up to 14 days.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10541		Last issued in:	1.5
The SWE segment shall provide the product 'Ly-alpha images (for measure of solar far-side activity) - Nowcast' (product code SU-024-N) as per the requirements in the SWE Products Specification.			
Justification:	Identification of solar active regions on the far side of the sun through illumination of interplanetary Hydrogen atoms.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10542		Last issued in:	1.8
The SWE segment shall provide the product 'White-light wide-angle coronagraph images - Nowcast' (product code SU-025-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor coronal mass ejections as they extend from the low corona to the heliosphere (~1-20 solar radii).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10543		Last issued in:	1.8
The SWE segment shall provide the product 'Solar radiospectrographic observations (for monitoring of radio bursts) - Nowcast' (product code SU-026-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar radio bursts as a means of tracking solar activity and input to forecast models.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10544		Last issued in:	1.5
The SWE segment shall provide the product 'Solar X-ray flux - Nowcast' (product code SU-027-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor D-region absorption for communication in HF (shortwave fadeout events) and contribute to SEP and global activity forecast; Monitor full sun integrated X-ray flux at 1-8A, 0.5-4A for monitoring and identifying solar flares		
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10545		Last issued in:	1.5
The SWE segment shall provide the product 'Solar EUV integrated flux - Nowcast' (product code SU-028-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor full sun integrated flux for input to upper atmosphere models.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10546		Last issued in:	1.5
The SWE segment shall provide the product 'Solar UV flux - Nowcast' (product code SU-029-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor full sun integrated flux for input to upper atmosphere models.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10547		Last issued in:	1.5
The SWE segment shall provide the product 'Heliospheric imaging of Sun-Earth line (tracking of Earth-directed CMEs) - Nowcast' (product code SU-032-N) as per the requirements in the SWE Products Specification.			
Justification:	Identified by SN2 as a consequence of CRD requirements SWE-CRD-GEN-1694, SWE-CRD-LAU-1632.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.4.2 Data on interplanetary medium at L1

SWE-SRD-10549		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10 MeV protons in interplanetary medium at L1 - Nowcast' (product code L1-001-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10550		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10 MeV ions in interplanetary medium at L1 - Nowcast' (product code L1-002-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10551		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10 MeV protons in interplanetary medium at L1 - Nowcast' (product code L1-003-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10552		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10 MeV ions in interplanetary medium at L1 - Nowcast' (product code L1-004-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10553		Last issued in:	1.5
The SWE segment shall provide the product '30 keV-to-1 MeV ions in interplanetary medium at L1 - Nowcast' (product code L1-005-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of degradation effects of surfaces and sensitive components such as CCD's.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10554		Last issued in:	1.5
The SWE segment shall provide the product '2-50 MeV solar electrons at L1 - Nowcast' (product code L1-006-N) as per the requirements in the SWE Products Specification.			
Justification:	Shown to precede some solar proton events. Monitor and provide alarm if		



	significant enhancement observed.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10555		Last issued in:	1.5
The SWE segment shall provide the product 'E>30 keV-8 MeV electrons in interplanetary medium at L1 - Nowcast' (product code L1-007-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and internal charging related effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10556		Last issued in:	1.5
The SWE segment shall provide the product 'Interplanetary Magnetic field (IMF) at L1 - Nowcast' (product code L1-008-N) as per the requirements in the SWE Products Specification.			
Justification:	Shock detection in the solar wind in order to advise of upcoming activity.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10557		Last issued in:	1.5
The SWE segment shall provide the product 'Solar wind bulk velocity at L1 - Nowcast' (product code L1-009-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10558		Last issued in:	1.5
The SWE segment shall provide the product 'Solar wind bulk density at L1 - Nowcast' (product code L1-010-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10559		Last issued in:	1.5
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The SWE segment shall provide the product 'Solar wind temperature at L1 - Nowcast' (product code L1-011-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.4.3 Data on interplanetary medium outside L1

SWE-SRD-10560		Last issued in:	1.5
The SWE segment shall provide the product 'Solar energetic particle events - Nowcast' (product code IP-001-N) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10561		Last issued in:	1.5
The SWE segment shall provide the product 'Data on interplanetary medium outside L1 - Nowcast' (product code IP-002-N) as per the requirements in the SWE Products Specification.			
Justification:	Shock detection in the solar wind in order to advise of upcoming activity for spacecraft not orbiting Earth, and nowcast and forecast of atmospheric properties for drag calculation on Mars, Venus and other relevant planets.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.4.4 Data for Earth magnetosphere and radiation belt

SWE-SRD-10562		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic storm condition (indices: global, auroral, mid-latitude and ring current) - Nowcast' (product code MR-001-N) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes.		
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
SWE-SRD-10563		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic indices Kp and K - Nowcast' (product code MR-002-N) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10564		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic index Ap and A - Nowcast' (product code MR-003-N) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10565		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic index Dst - Nowcast' (product code MR-004-N) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10566		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10MeV protons in earth magnetosphere and radiation belt - Nowcast' (product code MR-006-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10567		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10MeV ions in earth magnetosphere and radiation			



belt - Nowcast' (product code MR-007-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10568		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10MeV protons in earth magnetosphere and radiation belt - Nowcast' (product code MR-008-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10569		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10MeV ions in earth magnetosphere and radiation belt - Nowcast' (product code MR-009-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10570		Last issued in:	1.5
The SWE segment shall provide the product '30keV-to-1MeV ions in earth magnetosphere and radiation belt - Nowcast' (product code MR-010-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of degradation effects of surfaces and sensitive components such as CCD's.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10571		Last issued in:	1.5
The SWE segment shall provide the product '30 keV-8 MeV electrons in earth magnetosphere and radiation belt - Nowcast' (product code MR-011-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and internal charging related effects.		
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10572		Last issued in:	1.5
The SWE segment shall provide the product 'Thermal and supra-thermal electron and ion energy spectra in the range 0 to 30 keV - Nowcast' (product code MR-012-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in spacecraft charging and other spacecraft plasma interactions effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10573		Last issued in:	1.5
The SWE segment shall provide the product 'Magnetospheric radiowave spectra - Nowcast' (product code MR-013-N) as per the requirements in the SWE Products Specification.			
Justification:	For incorporation into end-to-end space weather simulation.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10574		Last issued in:	1.5
The SWE segment shall provide the product 'Thermal ions density and temperature - Nowcast' (product code MR-014-N) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of charging, current collection and surface erosion effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10575		Last issued in:	1.5
The SWE segment shall provide the product 'Local magnetospheric magnetic field in orbit - Nowcast' (product code MR-015-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitoring spacecraft environment and disturbances; Monitor disturbances for input to nowcast and forecast models of the magnetosphere and upper atmosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10576		Last issued in:	1.5
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The SWE segment shall provide the product 'Transpolar electric field - Nowcast' (product code MR-017-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10577		Last issued in:	1.5
The SWE segment shall provide the product 'Auroral particle precipitation - Nowcast' (product code MR-018-N) as per the requirements in the SWE Products Specification.			
Justification:	Inputs to upper atmospheric modelling.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10578		Last issued in:	1.5
The SWE segment shall provide the product 'Auroral kilometric radiation (AKR) - Nowcast' (product code MR-018-N) as per the requirements in the SWE Products Specification.			
Justification:	Measurement of disturbance above auroral regions.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10579		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic index AE, AL and AU - Nowcast' (product code MR-019-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10580		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic index PC - Nowcast' (product code MR-020-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



3.1.3.4.5 Data for other planets magnetospheres

SWE-SRD-10581		Last issued in:	1.5
The SWE segment shall provide the product 'Planetary atmospheric properties (other than Earth) - Nowcast' (product code NM-001-N) as per the requirements in the SWE Products Specification.			
Justification:	space weather services around planets other than Earth required to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.4.6 Data on Earth Ionosphere / Thermosphere

SWE-SRD-10582		Last issued in:	1.5
The SWE segment shall provide the product 'Vertical total Electron Content - Nowcast' (product code IT-001-N) as per the requirements in the SWE Products Specification.			
Justification:	An important characteristic for analysis of ionospheric effects; Measure of ionospheric influence on signal for GNSS and SATCOM		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10583		Last issued in:	1.5
The SWE segment shall provide the product '3D electron density grids - Nowcast' (product code IT-002-N) as per the requirements in the SWE Products Specification.			
Justification:	In the future some GNSS and radio propagation applications may need 3D electron density grids.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10584		Last issued in:	1.5
The SWE segment shall provide the product 'URSI ionospheric parameters - Nowcast' (product code IT-005-N) as per the requirements in the SWE Products Specification.			
Justification:	foF2 and M(3000)F2, fmin, and fbE are important characteristics to accurately estimate transionospheric propagation from URSI recommendations.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10585		Last issued in:	1.5
The SWE segment shall provide the product 'Neutral density in thermosphere - Nowcast' (product code IT-007-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor for input to spacecraft drag calculations.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10586		Last issued in:	1.5
The SWE segment shall provide the product 'Neutral wind velocity in thermosphere - Nowcast' (product code IT-008-N) as per the requirements in the SWE Products Specification.			
Justification:	Monitor for input to spacecraft drag calculations.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10587		Last issued in:	1.5
The SWE segment shall provide the product 'Scintillation indices and parameters (S4, sigma_phi, fading depth, fade duration, time between fades) - Nowcast' (product code IT-009-N) as per the requirements in the SWE Products Specification.			
Justification:	Data required to characterise ionospheric scintillation events allowing to estimate performance degradation due to those events; Measure performance degradation of GNSS due to scintillation. Required by users 003 and 004.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10588		Last issued in:	1.5
The SWE segment shall provide the product 'Ionospheric disturbances - Nowcast' (product code IT-011-N) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.4.7 Data on Earth atmosphere and geomagnetic environment

SWE-SRD-10589		Last issued in:	1.5
The SWE segment shall provide the product 'Auroral visible imaging - Nowcast' (product code AG-001-N) as per the requirements in the SWE Products Specification.			



Justification:	Input to tourism oriented services: ground based or space based data applicable; Auroral boundary may be used as input to magnetospheric modelling activities.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10590		Last issued in:	1.5
The SWE segment shall provide the product 'Auroral UV imaging - Nowcast' (product code AG-002-N) as per the requirements in the SWE Products Specification.			
Justification:	Identify strength and extent of auroral region during active periods.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10591		Last issued in:	1.8
The SWE segment shall provide the product 'Local magnetospheric magnetic field on ground - Nowcast' (product code AG-005-N) as per the requirements in the SWE Products Specification.			
Justification:	Determination of dB/dt, monitoring disturbance levels leading to geomagnetically induced currents in power lines. Determination of Earth's electrical conductivity structure from ground magnetotelluric measurements for estimating geomagnetically threats by GICs to power lines.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10592		Last issued in:	1.8
The SWE segment shall provide the product 'Local geomagnetically induced geoelectric field - Nowcast' (product code AG-006-N) as per the requirements in the SWE Products Specification.			
Justification:	Allows monitoring of geomagnetic disturbances level close to affected ground infrastructure; Used in combination with magnetometer measurements to map the spatial variation of the Earth's resistivity; Monitoring plasmasphere and ring-current dynamics. Input to models of inner magnetosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10593		Last issued in:	1.5
The SWE segment shall provide the product 'Atmospheric density and wind - Nowcast' (product code AG-007-N) as per the requirements in the SWE Products Specification.			
Justification:	Principally important because of its effect on launcher and forecast the		



	density for fairing ejection.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.4.8 Data on microparticles

SWE-SRD-10594		Last issued in:	1.5
The SWE segment shall provide the product 'Micro particle flux as a function of size, velocity, angular distribution - Nowcast' (product code MP-001-N) as per the requirements in the SWE Products Specification.			
Justification:	impacts effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10595		Last issued in:	1.5
The SWE segment shall provide the product 'Known periods/events of increased microparticle flux (meteoroid streams, debris clouds).- Nowcast' (product code MP-002-N) as per the requirements in the SWE Products Specification.			
Justification:	Indicate increase risk of impacts by micro-particles.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.4.9 Data about spacecraft

SWE-SRD-10596		Last issued in:	1.5
The SWE segment shall provide the product 'Data from spacecraft radiation monitors - Nowcast' (product code SC-002-N) as per the requirements in the SWE Products Specification.			
Justification:	Provide local spacecraft radiation data (when available) and information on distribution and propagation of solar particle radiations in space.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10597		Last issued in:	1.5
The SWE segment shall provide the product 'Orbital data of spacecraft carrying space weather instruments - Nowcast' (product code SC-003-N) as per the requirements in the SWE Products Specification.			
Justification:	Needed to ingest the data in models with spatial information.		
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10598		Last issued in:	1.5
The SWE segment shall provide the product 'Spacecraft housekeeping telemetry data - Nowcast' (product code SC-004-N) as per the requirements in the SWE Products Specification.			
Justification:	Operators are interested in visual correlation between spacecraft telemetry and space weather environment data; Useful to monitor the S/C health and identify anomalies.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10599		Last issued in:	1.5
The SWE segment shall provide the product 'Dose - Nowcast' (product code SC-005-N) as per the requirements in the SWE Products Specification.			
Justification:	Effect measurement for radiation damage including skin dose for effects in human cells; Monitor and forecast the accumulated radiation dose due to ionising radiation; Provision of energetic particle fluxes and doses inside and outside the spacecraft.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10600		Last issued in:	1.5
The SWE segment shall provide the product 'Deep dielectric charging - Nowcast' (product code SC-006-N) as per the requirements in the SWE Products Specification.			
Justification:	Effect measurement for charging hazards.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10601		Last issued in:	1.5
The SWE segment shall provide the product 'Surface charging - Nowcast' (product code SC-007-N) as per the requirements in the SWE Products Specification.			
Justification:	Effect measurement for charging hazards.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10602		Last issued in:	1.5



The SWE segment shall provide the product 'Floating spacecraft potential - Nowcast' (product code SC-008-N) as per the requirements in the SWE Products Specification.			
Justification:	Effect measurement of spacecraft charging.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.5 A Posteriori Reconstruction

SWE-SRD-10398		Last issued in:	1.8
The SSA SWE segment shall produce a posteriori reconstruction data products by recovering measurement-derived data products from the data base, feeding them into models and producing a best estimate of variables at a given location in space and at a given time in the past.			
Justification:			
Comments:	This shall apply to both NRT and validated data as available.		
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10399		Last issued in:	1.8
The SSA SWE segment shall correlate their a posteriori reconstruction data products with the measurements available in the data base and provide this correlation analysis along with the data product.			
Justification:			
Comments:	This shall apply to both NRT and validated data as available.		
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.5.1 Solar Data

SWE-SRD-10421		Last issued in:	1.5
The SWE segment shall provide the product 'Measurements of solar flares - Archives and A Posteriori Reconstruction' (product code SU-001-P) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10422		Last issued in:	1.5
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The SWE segment shall provide the product 'CMEs - Archives and A Posteriori Reconstruction' (product code SU-002-P) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10423		Last issued in:	1.5
The SWE segment shall provide the product 'Coronal holes - Archives and A Posteriori Reconstruction' (product code SU-004-P) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10424		Last issued in:	1.5
The SWE segment shall provide the product 'Solar disc magnetic fields - Archives and A Posteriori Reconstruction' (product code SU-005-P) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10425		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index R - Archives and A Posteriori Reconstruction' (product code SU-006-P) as per the requirements in the SWE Products Specification.			
Justification:	Input data for atmospheric density estimate via a model.; proportional to level of ionisation in the ionosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



Requirements:		Method:	
SWE-SRD-10426		Last issued in:	1.5
The SWE segment shall provide the product 'Smoothed Sunspot number (SSN, R12) - Archives and A Posteriori Reconstruction' (product code SU-007-P) as per the requirements in the SWE Products Specification.			
Justification:	Input data for atmospheric density estimate via a model.; proportional to level of ionisation in the ionosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10427		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index F10.7 (F10) - Archives and A Posteriori Reconstruction' (product code SU-008-P) as per the requirements in the SWE Products Specification.			
Justification:	Useful for many long term activities including spacecraft design, mission planning, atmosphere drag...Required in orbit determination to desired accuracy. Required for mission planning and scheduling. Also required as input to several forecast models.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10414		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index S10.7 (S10) - Archives and A Posteriori Reconstruction' (product code SU-009-P) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10415		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index E10.7 (E10) - Archives and A Posteriori Reconstruction' (product code SU-010-P) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10416		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index M10.7 (M10) - Archives and A Posteriori Reconstruction' (product code SU-011-P) as per the requirements in the SWE Products Specification.			



Justification:	same as for F10.7		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10417		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index Y10.7 (Y10) - Archives and A Posteriori Reconstruction' (product code SU-012-P) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10418		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index IG12 - Archives and A Posteriori Reconstruction' (product code SU-013-P) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10419		Last issued in:	1.5
The SWE segment shall provide the product 'EUV images of Sun - Archives and A Posteriori Reconstruction' (product code SU-015-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar activity and input to prediction models.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10420		Last issued in:	1.5
The SWE segment shall provide the product 'White light solar imaging - Archives and A Posteriori Reconstruction' (product code SU-017-P) as per the requirements in the SWE Products Specification.			
Justification:	Input to calculation of international sunspot number.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10407		Last issued in:	1.5
The SWE segment shall provide the product 'H-alpha images of Sun - Archives and A Posteriori			



Reconstruction' (product code SU-019-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar flare and quiescent filament development for activity prediction.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10408		Last issued in:	1.5
The SWE segment shall provide the product 'Soft X-ray images of the Sun - Archives and A Posteriori Reconstruction' (product code SU-020-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar activity and input to modelling activities.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10409		Last issued in:	1.8
The SWE segment shall provide the product 'Solar EUV images outside of Sun-Earth line - Archives and A Posteriori Reconstruction' (product code SU-021-P) as per the requirements in the SWE Products Specification.			
Justification:	Provide early notification of active regions and activity prior to regions rotating into view from the Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10410		Last issued in:	1.8
The SWE segment shall provide the product 'Solar coronagraphic images outside of Sun-Earth line - Archives and A Posteriori Reconstruction' (product code SU-022-P) as per the requirements in the SWE Products Specification.			
Justification:	Support to accurate determination of CME speed and direction of propagation.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10411		Last issued in:	1.5
The SWE segment shall provide the product 'Solar far-side maps (using helioseismology technique) - Archives and A Posteriori Reconstruction' (product code SU-023-P) as per the requirements in the SWE Products Specification.			
Justification:	Identify formation and evolution of large solar active regions on the far side of the Sun. Extends forecast validity period to up to 14 days.		
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10412		Last issued in:	1.5
The SWE segment shall provide the product 'Ly-alpha images (for measure of solar far-side activity) - Archives and A Posteriori Reconstruction' (product code SU-024-P) as per the requirements in the SWE Products Specification.			
Justification:	Identification of solar active regions on the far side of the sun through illumination of interplanetary Hydrogen atoms.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10413		Last issued in:	1.8
The SWE segment shall provide the product 'White-light wide-angle coronagraph images - Archives and A Posteriori Reconstruction' (product code SU-025-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor coronal mass ejections as they extend out from the low corona to the heliosphere (~1-20 solar radii).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10400		Last issued in:	1.8
The SWE segment shall provide the product 'Solar radiospectrographic observations (for monitoring of radio bursts) - Archives and A Posteriori Reconstruction' (product code SU-026-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar radio bursts as a means of tracking solar activity and input to forecast models.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10401		Last issued in:	1.5
The SWE segment shall provide the product 'Solar X-ray flux - Archives and A Posteriori Reconstruction' (product code SU-027-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor D-region absorption for communication in HF (shortwave fadeout events) and contribute to SEP and global activity forecast; Monitor full sun integrated X-ray flux at 1-8A, 0.5-4A for monitoring and identifying solar flares.		
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10402		Last issued in:	1.5
The SWE segment shall provide the product 'Solar EUV integrated flux - Archives and A Posteriori Reconstruction' (product code SU-028-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor full sun integrated flux for input to upper atmosphere models.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10403		Last issued in:	1.5
The SWE segment shall provide the product 'Solar UV flux - Archives and A Posteriori Reconstruction' (product code SU-029-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor full sun integrated flux for input to upper atmosphere models.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10404		Last issued in:	1.5
The SWE segment shall provide the product 'Heliospheric imaging of Sun-Earth line (tracking of Earth-directed CMEs) - Archive' (product code SU-032-P) as per the requirements in the SWE Products Specification.			
Justification:	Identified by SN2 as a consequence of CRD requirements SWE-CRD-GEN-1694, SWE-CRD-LAU-1632.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.5.2 Data on interplanetary medium at L1

SWE-SRD-10461		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10 MeV protons in interplanetary medium at L1 - Archives and A Posteriori Reconstruction' (product code L1-001-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10462		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10 MeV ions in interplanetary medium at L1 - Archives and A Posteriori Reconstruction' (product code L1-002-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10463		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10 MeV protons in interplanetary medium at L1 - Archives and A Posteriori Reconstruction' (product code L1-003-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10464		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10 MeV ions in interplanetary medium at L1 - Archives and A Posteriori Reconstruction' (product code L1-004-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10465		Last issued in:	1.5
The SWE segment shall provide the product '30 keV-to-1 MeV ions in interplanetary medium at L1- Archives and A Posteriori Reconstruction' (product code L1-005-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of degradation effects of surfaces and sensitive components such as CCD's.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10466		Last issued in:	1.5
The SWE segment shall provide the product '2-50 MeV solar electrons at L1 - Archives and A Posteriori Reconstruction' (product code L1-006-P) as per the requirements in the SWE Products Specification.			
Justification:	Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10467		Last issued in:	1.5
The SWE segment shall provide the product 'E>30 keV-8 MeV electrons in interplanetary medium at L1- Archives and A Posteriori Reconstruction' (product code L1-007-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and internal charging related effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10468		Last issued in:	1.5
The SWE segment shall provide the product 'Interplanetary Magnetic field (IMF) at L1 - Archives and A Posteriori Reconstruction' (product code L1-008-P) as per the requirements in the SWE Products Specification.			
Justification:	Shock detection in the solar wind in order to advise of upcoming activity.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10469		Last issued in:	1.5
The SWE segment shall provide the product 'Solar wind bulk velocity at L1 - Archives and A Posteriori Reconstruction' (product code L1-009-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10470		Last issued in:	1.5
The SWE segment shall provide the product 'Solar wind bulk density at L1 - Archives and A Posteriori Reconstruction' (product code L1-010-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity.		
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10471		Last issued in:	1.5
The SWE segment shall provide the product 'Solar wind temperature at L1 - Archives and A Posteriori Reconstruction' (product code L1-011-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.5.3 Data on interplanetary medium outside L1

SWE-SRD-10472		Last issued in:	1.5
The SWE segment shall provide the product 'Solar energetic particle events - Archives and A Posteriori Reconstruction' (product code IP-001-P) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10473		Last issued in:	1.5
The SWE segment shall provide the product 'Data on interplanetary medium outside L1 - Archives and A Posteriori Reconstruction' (product code IP-002-P) as per the requirements in the SWE Products Specification.			
Justification:	Potential consequence of SWE-CRD-SCO-1541 /// Justification: Shock detection in the solar wind in order to advise of upcoming activity for spacecraft not orbiting Earth, and nowcast and forecast of atmospheric properties for drag calculation on Mars, Venus and other relevant planets.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.5.4 Data for Earth magnetosphere and radiation belt

SWE-SRD-10474		Last issued in:	1.5
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The SWE segment shall provide the product 'Geomagnetic storm condition (indices: global, auroral, mid-latitude and ring current) - Archives and A Posteriori Reconstruction' (product code MR-001-P) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10475		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic indices Kp and K - Archives and A Posteriori Reconstruction' (product code MR-002-P) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10476		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic index Ap and A - Archives and A Posteriori Reconstruction' (product code MR-003-P) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10477		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic index Dst - Archives and A Posteriori Reconstruction' (product code MR-004-P) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10478		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10MeV protons in earth magnetosphere and radiation belt- Archives and A Posteriori Reconstruction' (product code MR-006-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10479		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10MeV ions in earth magnetosphere and radiation belt- Archives and A Posteriori Reconstruction' (product code MR-007-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10480		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10MeV protons in earth magnetosphere and radiation belt- Archives and A Posteriori Reconstruction' (product code MR-008-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10481		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10MeV ions in earth magnetosphere and radiation belt- Archives and A Posteriori Reconstruction' (product code MR-009-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10482		Last issued in:	1.5
The SWE segment shall provide the product '30keV-to-1MeV ions in earth magnetosphere and radiation belt- Archives and A Posteriori Reconstruction' (product code MR-010-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of degradation effects of surfaces and sensitive components such as CCD's.		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10483		Last issued in:	1.5
The SWE segment shall provide the product '30 keV-8 MeV electrons in earth magnetosphere and radiation belt- Archives and A Posteriori Reconstruction' (product code MR-011-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and internal charging related effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10484		Last issued in:	1.5
The SWE segment shall provide the product 'Thermal and supra-thermal electron and ion energy spectra in the range 0 to 30 keV- Archives and A Posteriori Reconstruction' (product code MR-012-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in spacecraft charging and other spacecraft plasma interactions effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10485		Last issued in:	1.5
The SWE segment shall provide the product 'Magnetospheric radiowave spectra - Archives and A Posteriori Reconstruction' (product code MR-013-P) as per the requirements in the SWE Products Specification.			
Justification:	For incorporation into end-to-end space weather simulation.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10486		Last issued in:	1.5
The SWE segment shall provide the product 'Thermal ions density and temperature - Archives and A Posteriori Reconstruction' (product code MR-014-P) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of charging, current collection and surface erosion effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10487		Last issued in:	1.5
The SWE segment shall provide the product 'Local magnetospheric magnetic field in orbit - Archives and A Posteriori Reconstruction' (product code MR-015-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitoring spacecraft environment and disturbances; Monitor disturbances for input to nowcast and forecast models of the magnetosphere and upper atmosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12271		Last issued in:	1.8
The SWE segment shall provide the product 'Plasma drift velocity - Archives and A Posteriori Reconstruction' (product code MR-016-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitoring spacecraft environment and disturbances; Monitor disturbances for input to nowcast and forecast models of the magnetosphere and upper atmosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10488		Last issued in:	1.5
The SWE segment shall provide the product 'Transpolar electric field - Archives and A posteriori reconstruction' (product code MR-017-P) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10489		Last issued in:	1.5
The SWE segment shall provide the product 'Auroral particle precipitation - Archives and Post-event Reconstruction' (product code MR-018-P) as per the requirements in the SWE Products Specification.			
Justification:	Inputs to upper atmospheric modelling.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10490		Last issued in:	1.5
The SWE segment shall provide the product 'Auroral kilometric radiation (AKR) - Archives and A Posteriori Reconstruction' (product code MR-018-P) as per the requirements in the SWE Products Specification.			
Justification:	Measurement of disturbance above auroral regions.		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10491		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic index AE, AL and AU - Archives and A Posteriori Reconstruction' (product code MR-019-P) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10492		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic index PC - Archives and A Posteriori Reconstruction' (product code MR-020-P) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.5.5 Data for other planets magnetospheres

SWE-SRD-10493		Last issued in:	1.5
The SWE segment shall provide the product 'Planetary atmospheric properties (other than Earth) - Archives and A Posteriori Reconstruction' (product code NM-001-P) as per the requirements in the SWE Products Specification.			
Justification:	space weather services around planets other than Earth required to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.5.6 Data on Earth Ionosphere / thermosphere

SWE-SRD-10494		Last issued in:	1.5
The SWE segment shall provide the product 'Vertical Total Electron Content Map - Archives and A Posteriori Reconstruction' (product code IT-001-P) as per the requirements in the SWE Products Specification.			
Justification:	An important characteristic for analysis of ionospheric effects; Measure of ionospheric influence on signal for GNSS and SATCOM.		
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10495		Last issued in:	1.5
The SWE segment shall provide the product '3D electron density grids - Archives and A Posteriori Reconstruction' (product code IT-002-P) as per the requirements in the SWE Products Specification.			
Justification:	In the future some GNSS and radio propagation applications may need 3D electron density grids.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10496		Last issued in:	1.5
The SWE segment shall provide the product 'URSI ionospheric parameters - Archives and A Posteriori Reconstruction' (product code IT-005-P) as per the requirements in the SWE Products Specification.			
Justification:	foF2 and M(3000)F2, fmin, and fbE are important characteristics to accurate estimate transionospheric propagation from URSI recommendations		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10497		Last issued in:	1.5
The SWE segment shall provide the product 'Neutral density in thermosphere - Archives and A Posteriori Reconstruction' (product code IT-007-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor for input to spacecraft drag calculations.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10498		Last issued in:	1.5
The SWE segment shall provide the product 'Neutral wind velocity in thermosphere - Archives and A Posteriori Reconstruction' (product code IT-008-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor for input to spacecraft drag calculations.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10499		Last issued in:	1.5
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The SWE segment shall provide the product 'Scintillation indices and parameters (S4, sigma_phi, fading depth, fade duration, time between fades) - Archives and A Posteriori Reconstruction' (product code IT-009-P) as per the requirements in the SWE Products Specification.			
Justification:	Data required to characterise ionospheric scintillation events allowing to estimate performance degradation due to those events; Measure performance degradation of GNSS due to scintillation. Required by users 003 and 004.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10500		Last issued in:	1.5
The SWE segment shall provide the product 'Atomic Oxygen Density - Archives and A Posteriori Reconstruction' (product code IT-010-P) as per the requirements in the SWE Products Specification.			
Justification:	effects in eroding surfaces on low Earth orbits.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12272		Last issued in:	1.8
The SWE segment shall provide the product 'Ionospheric disturbance - Archives and A Posteriori Reconstruction' (product code IT-011-P) as per the requirements in the SWE Products Specification.			
Justification:	effects in eroding surfaces on low Earth orbits.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.5.7 Data on Earth atmosphere and Geomagnetic Environment

SWE-SRD-10501		Last issued in:	1.5
The SWE segment shall provide the product 'Auroral visible imaging - Archives' (product code AG-001-P) as per the requirements in the SWE Products Specification.			
Justification:	Input to tourism oriented services: ground based or space based data applicable; Auroral boundary may be used as input to magnetospheric modelling activities.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10502		Last issued in:	1.5
The SWE segment shall provide the product 'Auroral UV imaging - Archives' (product code AG-002-P) as per the requirements in the SWE Products Specification.			



Justification:	Identify strength and extent of auroral region during active periods.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10503		Last issued in:	1.8
The SWE segment shall provide the product 'Local magnetospheric magnetic field on ground - Archives and A Posteriori Reconstruction' (product code AG-005-P) as per the requirements in the SWE Products Specification.			
Justification:	Determination of dB/dt, monitoring disturbance levels leading to geomagnetically induced currents in power lines. Determination of Earth's electrical conductivity structure from ground magnetotelluric measurements for estimating geomagnetically threats by GICs to power lines.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10504		Last issued in:	1.8
The SWE segment shall provide the product 'Local geomagnetically induced geoelectric field - Archives and A Posteriori Reconstruction' (product code AG-006-P) as per the requirements in the SWE Products Specification.			
Justification:	Allows monitoring of geomagnetic disturbances level close to affected ground infrastructure; Used in combination with magnetometer measurements to map the spatial variation of the Earth's resistivity.		
Comments:	Note that this refers to local geoelectric field at ground level due to dB/dt		
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10505		Last issued in:	1.5
The SWE segment shall provide the product 'Atmospheric density and wind - Archives and A Posteriori Reconstruction' (product code AG-007-P) as per the requirements in the SWE Products Specification.			
Justification:	Principally important because of its effect on spacecraft drag; Monitor and forecast the density for fairing ejection; Used to include drag effect in computing objects trajectory back in time.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10506		Last issued in:	1.5
The SWE segment shall provide the product 'Archived measurements of atmospheric neutrons' (product code AG-008-P) as per the requirements in the SWE Products Specification.			
Justification:	Monitor ground level and aircraft altitude level events caused by solar		



	particle events or observe anisotropies in the background distribution caused by CME propagation in the solar wind.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.5.8 Data on microparticles

SWE-SRD-10507		Last issued in:	1.5
The SWE segment shall provide the product 'Micro particle flux as a function of size, velocity, angular distribution - Archives and A Posteriori Reconstruction' (product code MP-001-P) as per the requirements in the SWE Products Specification.			
Justification:	impacts effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10508		Last issued in:	1.5
The SWE segment shall provide the product 'Known periods/events of increased microparticle flux (meteoroid streams, debris clouds).- Archives and A Posteriori Reconstruction' (product code MP-002-P) as per the requirements in the SWE Products Specification.			
Justification:	Indicate increase risk of impacts by micro-particles.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.5.9 Data about spacecraft

SWE-SRD-10509		Last issued in:	1.5
The SWE segment shall provide the product 'Database of anomalies on spacecraft equipment ' (product code SC-001-P) as per the requirements in the SWE Products Specification.			
Justification:	Measurement of component sensitivity with possibly a variety of causes depending on location; Other S/C anomalies may be used as an estimate of risk of user's spacecraft. In practice, the quality of this proxy may be limited by difference of orbits and of manufacturers; Spacecraft anomalies and events can be cross correlated to the occurrence of Space Weather events. It is required to study cause-effects of space weather events.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10510		Last issued in:	1.5
The SWE segment shall provide the product 'Data from spacecraft radiation monitors - Archives' (product code SC-002-P) as per the requirements in the SWE Products Specification.			
Justification:	Provide local spacecraft radiation data (when available) and information on distribution and propagation of solar particle radiations in space.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10511		Last issued in:	1.5
The SWE segment shall provide the product 'Orbital data of spacecraft carrying space weather instruments - Archives' (product code SC-003-P) as per the requirements in the SWE Products Specification.			
Justification:	Needed to ingest the data in models with spatial information.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10512		Last issued in:	1.5
The SWE segment shall provide the product 'Spacecraft housekeeping telemetry data - Archives' (product code SC-004-P) as per the requirements in the SWE Products Specification.			
Justification:	Operators are interested in visual correlation between spacecraft telemetry and space weather environment data; Useful to monitor the S/C health and identify anomalies.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10513		Last issued in:	1.5
The SWE segment shall provide the product 'Dose - Archives' (product code SC-005-P) as per the requirements in the SWE Products Specification.			
Justification:	Effect measurement for radiation damage including skin dose for effects in human cells; Monitor and forecast the accumulated radiation dose due to ionising radiation; Provision of energetic particle fluxes and doses inside and outside the spacecraft.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10514		Last issued in:	1.5
The SWE segment shall provide the product 'Deep dielectric charging - Archives' (product code SC-006-P) as per the requirements in the SWE Products Specification.			
Justification:	Effect measurement for charging hazards.		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10515		Last issued in:	1.5
The SWE segment shall provide the product 'Surface charging - Archives' (product code SC-007-P) as per the requirements in the SWE Products Specification.			
Justification:	Effect measurement for charging hazards.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10516		Last issued in:	1.5
The SWE segment shall provide the product 'Floating spacecraft potential - Archives' (product code SC-008-P) as per the requirements in the SWE Products Specification.			
Justification:	Effect measurement of spacecraft charging.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.6 Forecast

SWE-SRD-10620		Last issued in:	1.8
The SSA SWE segment shall produce forecast data products by recovering measurement-derived data products from the data base, feeding them into models and producing a best estimate of variables at a given location in space and at a given moment in the future.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.6.1 Solar Data

SWE-SRD-10631		Last issued in:	1.5
The SWE segment shall provide the product 'Solar flares - Forecast' (product code SU-001-F) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the farside as seen from Earth.		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10632		Last issued in:	1.5
The SWE segment shall provide the product 'CMEs - Forecast' (product code SU-002-F) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10633		Last issued in:	1.5
The SWE segment shall provide the product 'Coronal holes - Forecast' (product code SU-004-F) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10634		Last issued in:	1.5
The SWE segment shall provide the product 'Solar disc magnetic fields - Forecast' (product code SU-005-F) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10635		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index R - Forecast' (product code SU-006-F) as per the			



requirements in the SWE Products Specification.			
Justification:	Input data for atmospheric density estimate via a model.; proportional to level of ionisation in the ionosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10636		Last issued in:	1.5
The SWE segment shall provide the product 'Smoothed Sunspot number (SSN, R12) - Forecast' (product code SU-007-F) as per the requirements in the SWE Products Specification.			
Justification:	Input data for atmospheric density estimate via a model.; proportional to level of ionisation in the ionosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10637		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index F10.7 (F10) - Forecast' (product code SU-008-F) as per the requirements in the SWE Products Specification.			
Justification:	Useful for many long term activities including spacecraft design, mission planning, atmosphere drag...Required in orbit determination to desired accuracy. Required for mission planning and scheduling. Also required as input to several forecast models.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10638		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index S10.7 (S10)- Forecast' (product code SU-009-F) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10639		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index E10.7 (E10) - Forecast' (product code SU-010-F) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7.		
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
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SWE-SRD-10640		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index M10.7 (M10) - Forecast' (product code SU-011-F) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10641		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index Y10.7 (Y10) - Forecast' (product code SU-012-F) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10642		Last issued in:	1.5
The SWE segment shall provide the product 'Solar index IG12 - Forecast' (product code SU-013-F) as per the requirements in the SWE Products Specification.			
Justification:	same as for F10.7.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10643		Last issued in:	1.5
The SWE segment shall provide the product 'Solar EUV integrated flux - Forecast' (product code SU-028-F) as per the requirements in the SWE Products Specification.			
Justification:	Monitor full sun integrated flux for input to upper atmosphere models.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10644		Last issued in:	1.5
The SWE segment shall provide the product 'Solar UV flux - Forecast' (product code SU-029-F) as per the requirements in the SWE Products Specification.			
Justification:	Monitor full sun integrated flux for input to upper atmosphere models		
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10645		Last issued in:	1.5
The SWE segment shall provide the product 'Long-term solar activity - Forecast' (product code SU-031-F) as per the requirements in the SWE Products Specification.			
Justification:	Several spacecraft effects exhibit solar cycle variation which has a ~11 years timescale.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.6.2 Data on interplanetary medium at L1

SWE-SRD-10658		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10 MeV protons in interplanetary medium at L1 - Forecast' (product code L1-001-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10659		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10 MeV ions in interplanetary medium at L1 - Forecast' (product code L1-002-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10660		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10 MeV protons in interplanetary medium at L1 - Forecast' (product code L1-003-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10661		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10 MeV ions in interplanetary medium at L1 - Forecast' (product code L1-004-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10662		Last issued in:	1.5
The SWE segment shall provide the product '30 keV-to-1 MeV ions in interplanetary medium at L1 - Forecast' (product code L1-005-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of degradation effects of surfaces and sensitive components such as CCD's.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10663		Last issued in:	1.5
The SWE segment shall provide the product '2-50 MeV solar electrons at L1 - Forecast' (product code L1-006-F) as per the requirements in the SWE Products Specification.			
Justification:	Shown to precede some solar proton events. Monitor and provide alarm if significant enhancement observed.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10664		Last issued in:	1.5
The SWE segment shall provide the product 'E>30 keV-8 MeV electrons in interplanetary medium at L1 - Forecast' (product code L1-007-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and internal charging related effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10665		Last issued in:	1.5
The SWE segment shall provide the product 'Interplanetary Magnetic field (IMF) at L1 - Forecast' (product code L1-008-F) as per the requirements in the SWE Products Specification.			
Justification:	Shock detection in the solar wind in order to advise of upcoming activity.		
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10666		Last issued in:	1.5
The SWE segment shall provide the product 'Solar wind bulk density at L1 - Forecast' (product code L1-010-F) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar wind parameters upstream of the Earth / Shock detection in the solar wind, in order to advise of upcoming activity.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10667		Last issued in:	1.5
The SWE segment shall provide the product 'Solar wind bulk velocity at L1 - Forecast' (product code L1-009-F) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10668		Last issued in:	1.5
The SWE segment shall provide the product 'Solar wind temperature at L1 - Forecast' (product code L1-011-F) as per the requirements in the SWE Products Specification.			
Justification:	Monitor solar wind parameters upstream of the Earth as input to nowcast and forecast of upcoming activity.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10720		Last issued in:	1.5
The SWE segment shall provide the product 'Activity at L1 - Long-term Forecast' (product code L1-012-F) as per the requirements in the SWE Products Specification.			
Justification:	Several spacecraft effects exhibit solar cycle variation which has a ~11 years timescale.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



3.1.3.6.3 Data on interplanetary medium outside L1

SWE-SRD-10688		Last issued in:	1.5
The SWE segment shall provide the product 'Solar energetic particle events - Forecast' (product code IP-001-F) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes. Note that space weather services around planets other than Earth require to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10689		Last issued in:	1.5
The SWE segment shall provide the product 'Data on interplanetary medium outside L1 - Forecast' (product code IP-002-F) as per the requirements in the SWE Products Specification.			
Justification:	Shock detection in the solar wind in order to advise of upcoming activity for spacecraft not orbiting Earth, and nowcast and forecast of atmospheric properties for drag calculation on Mars, Venus and other relevant planets.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.6.4 Data for Earth magnetosphere and radiation belt

SWE-SRD-10669		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic storm condition (indices: global, auroral, mid-latitude and ring current) - Forecast' (product code MR-001-F) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10670		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic indices Kp and K - Forecast' (product code MR-002-F) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes.		
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
SWE-SRD-10671		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic index Ap and A - Forecast' (product code MR-003-F) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10672		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic index Dst - Forecast' (product code MR-004-F) as per the requirements in the SWE Products Specification.			
Justification:	Required to predict change in the environment induced by solar eruptive phenomena and coronal holes.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10673		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10MeV protons in earth magnetosphere and radiation belt - Forecast' (product code MR-006-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10674		Last issued in:	1.5
The SWE segment shall provide the product 'High energy >10MeV ions in earth magnetosphere and radiation belt - Forecast' (product code MR-007-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-10675		Last issued in:	1.5



The SWE segment shall provide the product '1-to-10MeV protons in earth magnetosphere and radiation belt - Forecast' (product code MR-008-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. Protons in the range 1-10 MeV affects solar cells.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10676		Last issued in:	1.5
The SWE segment shall provide the product '1-to-10MeV ions in earth magnetosphere and radiation belt - Forecast' (product code MR-009-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and single-event related effects. In addition, there may be special sensitivity of some equipment (e.g. X-ray detectors) to low energy ions (500 keV to 1 MeV).		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10677		Last issued in:	1.5
The SWE segment shall provide the product '30keV-to-1MeV ions in earth magnetosphere and radiation belt - Forecast' (product code MR-010-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of degradation effects of surfaces and sensitive components such as CCD's.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10678		Last issued in:	1.5
The SWE segment shall provide the product '30 keV-8 MeV electrons in earth magnetosphere and radiation belt - Forecast' (product code MR-011-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of dose, NIEL and internal charging related effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10679		Last issued in:	1.5
The SWE segment shall provide the product 'Thermal and supra-thermal electron and ion energy spectra in the range 0 to 30 keV - Forecast' (product code MR-012-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in spacecraft charging and other spacecraft plasma interactions effects.		
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10680		Last issued in:	1.5
The SWE segment shall provide the product 'Thermal ions density and temperature - Forecast' (product code MR-014-F) as per the requirements in the SWE Products Specification.			
Justification:	A factor in a wide range of charging, current collection and surface erosion effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10681		Last issued in:	1.5
The SWE segment shall provide the product 'Local magnetospheric magnetic field in orbit - Forecast' (product code MR-015-F) as per the requirements in the SWE Products Specification.			
Justification:	Monitoring spacecraft environment and disturbances; Monitor disturbances for input to nowcast and forecast models of the magnetosphere and upper atmosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10682		Last issued in:	1.5
The SWE segment shall provide the product 'Transpolar electric field - Forecast' (product code MR-017-F) as per the requirements in the SWE Products Specification.			
Justification:	Inputs to upper atmospheric modelling.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10683		Last issued in:	1.5
The SWE segment shall provide the product 'Auroral particle precipitation - Forecast' (product code MR-018-F) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10684		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic index AE, AL and AU - Forecast' (product code			



MR-019-F) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10685		Last issued in:	1.5
The SWE segment shall provide the product 'Geomagnetic index PC - Forecast' (product code MR-020-F) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12273		Last issued in:	1.8
The SWE segment shall provide the product 'Magnetopause location - Forecast' (product code MR-021-F) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.6.5 Data for other planets magnetospheres

SWE-SRD-10705		Last issued in:	1.5
The SWE segment shall provide the product 'Planetary atmospheric properties (other than Earth) - Forecast' (product code NM-001-F) as per the requirements in the SWE Products Specification.			
Justification:	space weather services around planets other than Earth required to provide information on the longitudinal distribution of activity on the solar surface, including the far side as seen from Earth.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.6.6 Data on Earth Ionosphere / thermosphere

SWE-SRD-10691		Last issued in:	1.5
The SWE segment shall provide the product 'Vertical total Electron Content - Forecast' (product code IT-001-F) as per the requirements in the SWE Products Specification.			
Justification:	An important characteristic for analysis of ionospheric effects; Measure of ionospheric influence on signal for GNSS and SATCOM.		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10692		Last issued in:	1.5
The SWE segment shall provide the product '3D electron density grids - Forecast' (product code IT-002-F) as per the requirements in the SWE Products Specification.			
Justification:	In the future some GNSS and radio propagation applications may need 3D electron density grids.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10693		Last issued in:	1.5
The SWE segment shall provide the product 'Neutral density in thermosphere - Forecast' (product code IT-007-F) as per the requirements in the SWE Products Specification.			
Justification:	Monitor for input to spacecraft drag calculations.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10694		Last issued in:	1.5
The SWE segment shall provide the product 'Neutral wind velocity in thermosphere - Forecast' (product code IT-008-F) as per the requirements in the SWE Products Specification.			
Justification:	Monitor for input to spacecraft drag calculations.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10695		Last issued in:	1.5
The SWE segment shall provide the product 'Scintillation indices and parameters (S4, sigma_phi, fading depth, fade duration, time between fades) - Forecast' (product code IT-009-F) as per the requirements in the SWE Products Specification.			
Justification:	Data required to characterise ionospheric scintillation events allowing to estimate performance degradation due to those events; Measure performance degradation of GNSS due to scintillation. Required by users 003 and 004.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10696		Last issued in:	1.5
The SWE segment shall provide the product 'Ionospheric disturbances - Forecast' (product code IT-011-F) as per the requirements in the SWE Products Specification.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.6.7 Data on Earth atmosphere and geomagnetic environment

SWE-SRD-10698		Last issued in:	1.5
The SWE segment shall provide the product 'Probability of visible auroras - Forecast' (product code AG-001-F) as per the requirements in the SWE Products Specification.			
Justification:	Alert tourists during daylight hours of probability of visible aurora Input to tourism oriented services: ground based or space based data applicable.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10699		Last issued in:	1.8
The SWE segment shall provide the product 'Local magnetospheric magnetic field on ground - Forecast' (product code AG-005-F) as per the requirements in the SWE Products Specification.			
Justification:	Determination of dB/dt, advanced warning of disturbance levels leading to geomagnetically induced currents in power lines. Determination of Earth's electrical conductivity structure from ground magnetotelluric measurements for estimating geomagnetically threats by GICs to power lines.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10700		Last issued in:	1.8
The SWE segment shall provide the product 'Local geomagnetically induced geoelectric field - Forecast' (product code AG-006-F) as per the requirements in the SWE Products Specification.			
Justification:	Allows monitoring of geomagnetic disturbances level close to affected ground infrastructure; Used in combination with magnetometer measurements to map the spatial variation of the Earth's resistivity; Monitoring plasmasphere and ring-current dynamics. Input to models of inner magnetosphere.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10701		Last issued in:	1.5
The SWE segment shall provide the product 'Atmospheric density and wind - Forecast' (product code AG-007-F) as per the requirements in the SWE Products Specification.			
Justification:	Principally important because of its effect on launcher and forecast the density for fairing ejection.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.6.8 Data on microparticles

SWE-SRD-10703		Last issued in:	1.5
The SWE segment shall provide the product 'Micro particle flux as a function of size, velocity, angular distribution - Forecast' (product code MP-001-F) as per the requirements in the SWE Products Specification.			
Justification:	impacts effects.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.7 Real-time Provision

SWE-SRD-12268		Last issued in:	1.12
The system shall have a "latest data" real-time data provision functionality allowing products with stringent timeliness and latency requirements to be provided to the users.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.8 Guaranteed Data Provision

SWE-SRD-12269		Last issued in:	1.12
The production of data products shall be configurable in terms of the product performance and quality parameters.			
Justification:	Provision for specific agreements with individual users where requested on a case-by-case basis as part of the Guaranteed data service for third-party/added-value service providers		
Comments:			
Source Requirements:			

Related Requirements:		Verification Method:	
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3.1.3.9 Manage SWE Models

The generation of many SWE data products relies on SWE models. Figure 4 illustrates the model domains that are foreseen in order to allow the provision of the SWE services listed in this document. For each domain, physics based models are considered along with empirical and semi-empirical models: a final selection will be made according to the underpinning service requirements in each case.

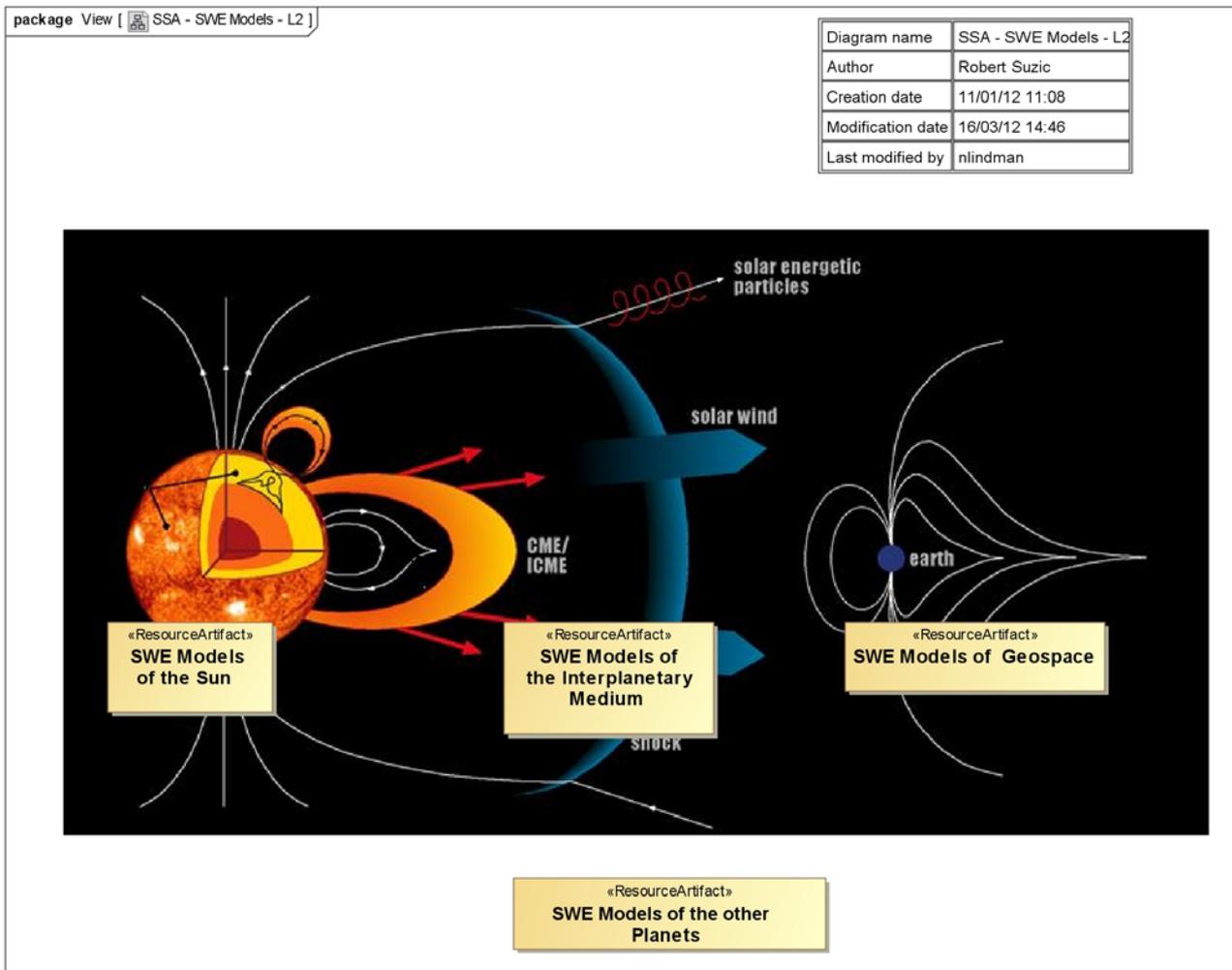


Figure 4: SWE Model Overview

SWE-SRD-12307		Last issued in:	1.8
The SSA SWE segment models shall contain: <ul style="list-style-type: none"> • SWE Models of the Sun • SWE Models of the Interplanetary Medium 			



<ul style="list-style-type: none"> • SWE Models of Geospace • SWE Model of the other Planets 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-12309		Last issued in:	1.8
The system shall have a repository for managing models.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-12310		Last issued in:	1.8
The system shall maintain and improve the models continuously based on new measurements.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-12308		Last issued in:	1.8
The system shall archive all previous versions of models for traceability and history.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-12331		Last issued in:	1.12
The system shall support model and data interfacing			
Justification:	To generate both near real-time and non real-time service products.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-12332		Last issued in:	1.12
The system shall allow interfacing with models hosted at contributing centres			
Justification:	To generate both near real-time and non real-time service products.		
Comments:			

Source Requirements:			
Related Requirements:		Verification Method:	

Within the above described domains a set of SWE models are defined in Figure 5 and subsequent requirements.

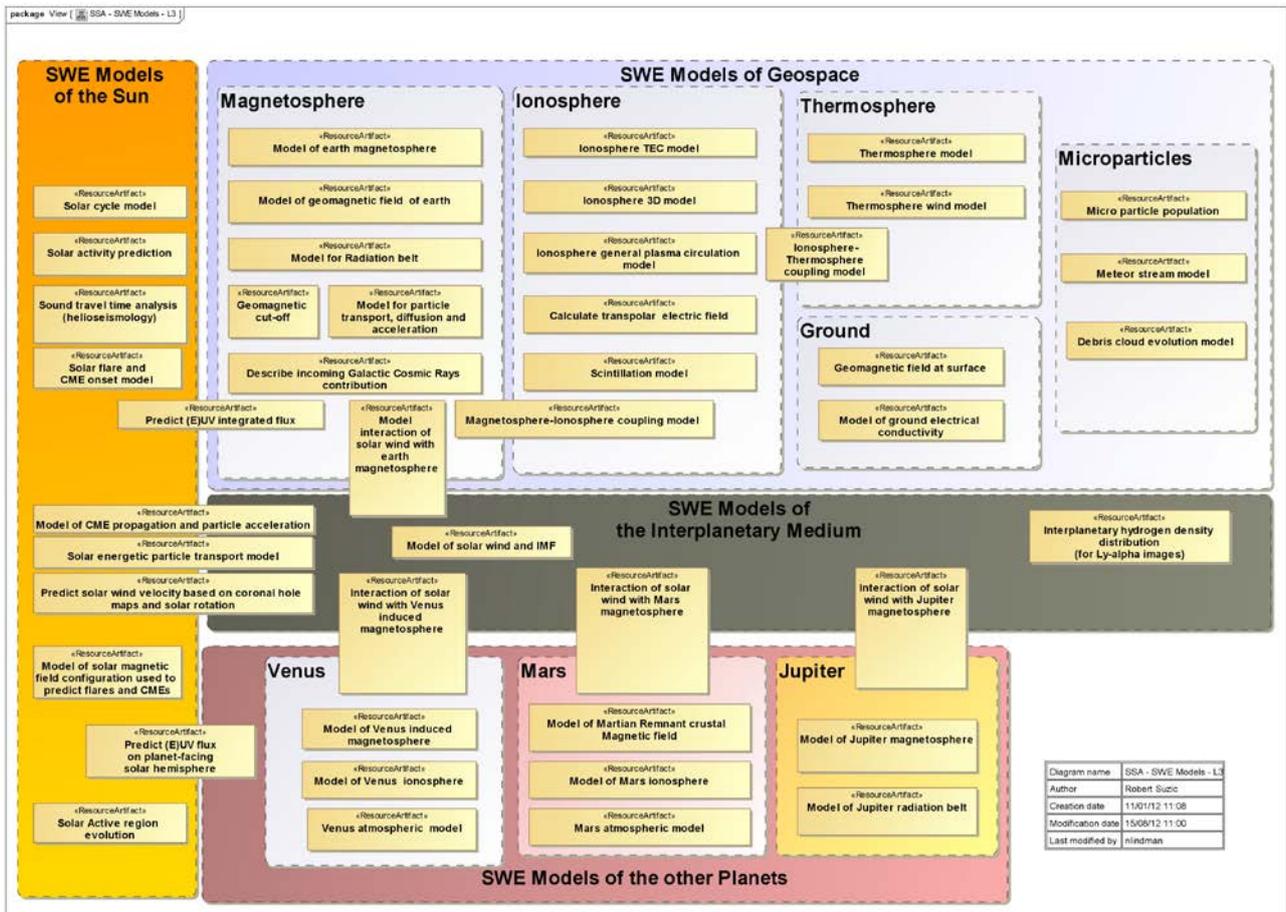


Figure 5: SWE Models per domain

3.1.3.9.1 SWE Models of the Sun

SWE-SRD-10706		Last issued in:	1.5
The SSA SWE segment shall acquire or develop, then maintain, the models of the Sun and of its corona needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10707		Last issued in:	1.12
The SSA SWE segment Sun models shall contain: <ul style="list-style-type: none"> • Solar cycle model • Solar activity prediction • Sound travel time analysis (helioseismology) • Solar flare and CME onset model • Model of solar magnetic field configuration used to predict flares and CMEs • Predict solar wind velocity based on coronal hole maps and solar rotation • Solar active region evolution • Models to predict (E)UV integrated flux • Models to predict (E)UV integrated flux on planet facing solar hemisphere 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.2 Models of the Interplanetary Medium

SWE-SRD-12548		Last issued in:	1.12
The SSA SWE segment shall acquire or develop, then maintain, models of the Interplanetary Medium, as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12549		Last issued in:	1.12
The SSA SWE segment models of the Interplanetary Medium shall contain: <ul style="list-style-type: none"> • Model of Solar Wind and IMF • CME Propagation and Particle Acceleration • Solar Energetic Particle Transport Model • Interplanetary hydrogen density distribution (for Ly-alpha images) 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.3 SWE Models of Geospace

SWE-SRD-10708		Last issued in:	1.8
The SSA SWE segment shall acquire or develop, then maintain, the models of the Geospace needed for the elaboration of the data products they shall produce.			



Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12525		Last issued in:	1.12
The SSA SWE segment Geospace models shall contain: <ul style="list-style-type: none"> • Models of interaction of solar wind with Earth's magnetosphere • Magnetosphere models • Magnetosphere-Ionosphere coupling models • Ionosphere models • Ionosphere-Thermosphere coupling models • Thermosphere models • Ground models • Microparticle models 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.3.1 Solar Wind-Magnetosphere Interaction Models

SWE-SRD-11874		Last issued in:	1.12
The SSA SWE segment shall acquire or develop, then maintain, the models of the coupling of the solar wind to the Earth's Magnetosphere, as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.3.2 Magnetosphere Models

SWE-SRD-12533		Last issued in:	1.12
The SSA SWE segment shall acquire or develop, then maintain, the models of the Earth concerning its magnetosphere, as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12534		Last issued in:	1.12
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The SSA SWE segment Magnetosphere models shall contain:			
<ul style="list-style-type: none"> • Model of the earth magnetosphere • Model of geomagnetic field of earth • Model of Radiation Belt • Geomagnetic cut-off • Model for particle transport, diffusion and acceleration • Model to describe incoming galactic cosmic rays contribution 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.3.3 Magnetosphere-Ionosphere Coupling Models

SWE-SRD-12531		Last issued in:	1.12
The SSA SWE segment shall acquire or develop, then maintain, models of the coupling between the Earth's Magnetosphere and Ionosphere, as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.3.4 Ionosphere Models

SWE-SRD-11877		Last issued in:	1.12
The SSA SWE segment shall acquire or develop, then maintain, models of the Earth's ionosphere, as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:		Global coverage is required	
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11876		Last issued in:	1.12
The SSA SWE segment Ionosphere models shall contain:			
<ul style="list-style-type: none"> • Ionosphere TEC model • Ionosphere 3D model • Ionosphere general plasma circulation model • Calculate transpolar electric field model • Scintillation model 			
Justification:			
Comments:		Global coverage is required	
Source Requirements:			



Related Requirements:		Verification Method:	
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3.1.3.9.3.5 Ionosphere-Thermosphere Coupling Models

SWE-SRD-12536		Last issued in:	1.12
The SSA SWE segment shall acquire or develop, then maintain, models of the coupling between the Earth's Ionosphere and Thermosphere, as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:	Global coverage is required		
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.3.6 Thermosphere Models

SWE-SRD-11878		Last issued in:	1.12
The SSA SWE segment shall acquire or develop, then maintain, models of the Earth's thermosphere, as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:	Global coverage is required		
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11879		Last issued in:	1.12
The SSA SWE segment Thermosphere models shall contain:			
<ul style="list-style-type: none"> • Thermosphere model • Thermosphere wind model 			
Justification:			
Comments:	Global coverage is required		
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.3.7 Ground Models

SWE-SRD-11880		Last issued in:	1.12
The SSA SWE segment shall acquire or develop, then maintain, models of the Earth's ground characteristics, as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-11881		Last issued in:	1.8
The SSA SWE segment Ground models shall contain: <ul style="list-style-type: none"> • Geomagnetic field at surface • Model of ground electrical conductivity 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.3.8 Microparticle Models

SWE-SRD-10710		Last issued in:	1.12
The SSA SWE segment shall acquire or develop, then maintain, the models of the near-Earth microparticle environment, as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11859		Last issued in:	1.12
The SSA SWE segment Microparticle environment models shall contain: <ul style="list-style-type: none"> • Microparticle population model • Meteor stream model • Debris cloud evolution model 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.4 SWE Models of other planets

SWE-SRD-10727		Last issued in:	1.12
The SSA SWE segment shall acquire or develop, then maintain, space weather relevant models of other planets than Earth as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10728		Last issued in:	1.8
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The SSA SWE segment models for other planets shall contain:			
<ul style="list-style-type: none"> • Models of Venus • Models of Mars • Models of Jupiter 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.4.1 Models of Venus

SWE-SRD-11890		Last issued in:	1.8
The SSA SWE segment shall acquire or develop, then maintain, models of Venus as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11891		Last issued in:	1.12
The SSA SWE segment models for Venus shall contain:			
<ul style="list-style-type: none"> • Models of the Solar Wind interaction with Venus • Model of Venus induced magnetosphere • Model of Venus ionosphere • Venus atmospheric model 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.4.2 Models of Mars

SWE-SRD-11892		Last issued in:	1.8
The SSA SWE segment shall acquire or develop, then maintain, models of Mars as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11893		Last issued in:	1.12
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The SSA SWE segment models for Mars shall contain:			
<ul style="list-style-type: none"> • Models of the Solar Wind interaction with Mars • Model of Martian Remnantcrustal magnetic field • Model of Mars ionosphere • Mars atmospheric model 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.9.4.3 Models of Jupiter

SWE-SRD-11894		Last issued in:	1.8
The SSA SWE segment shall acquire or develop, then maintain, models of Jupiter as needed for the elaboration of the data products they shall produce.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11895		Last issued in:	1.12
The SSA SWE segment models for Jupiter shall contain:			
<ul style="list-style-type: none"> • Models of the Solar Wind interaction with Jupiter • Model of Jupiter magnetosphere • Model of Jupiter radiation belt 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.10 Manage SWE Data

SWE-SRD-11940		Last issued in:	1.8
The system shall be capable of providing access to and make available stored data.			
Justification:		In order to allow access to the data during the operational phase of the system.	
Comments:		This requirement should be derived at architectural design level for each data type. A cost-benefit analysis should be performed during the architectural design of the system to determine for each type of data the optimum amount of time that the data should be kept into the system.	
Source Requirements:			
Related		Verification	Design



Requirements:		Method:	Review Test
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SWE-SRD-11941		Last issued in:	1.8
The system shall allow registered users to search and retrieve stored data in compliance with the applicable data policy.			
Justification:	In order to allow registered users access to stored data.		
Comments:	The SSA data policy will specify the user access rights to use the search and retrieval function.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11942		Last issued in:	1.8
The system shall allow the registered users to filter stored data based on any predefined metadata.			
Justification:			
Comments:	The SSA data policy will specify the user access rights to use the browsing function.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-10729		Last issued in:	1.8
The SSA system shall have a SWE database that provides centralised access to Space Weather data.			
Justification:			
Comments:	Note that the access is centralised, but the database itself may consist of multiple federated elements.		
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-9549		Last issued in:	1.4
The SSA SWE system shall provide handling of data user requests for data retrieval and provision.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10732		Last issued in:	1.12
The SSA system shall store all measurements including any meta-data from the sensors in the SWE database.			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10733		Last issued in:	1.5
The SSA SWE segment shall store all the data products in the SWE database.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-9108		Last issued in:	1.12
The SSA SWE system shall store Space Weather Data or federate, in a coordinated way, the storage of the Space Weather data.			
Justification:	Functional analysis of the SWE segment		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-9109		Last issued in:	1.8
The storage function shall be ensured at System level by the relevant services of Domain "General Data Services", and at data centres level by the entities in charge of the considered products.			
Justification:	Analysis of the CRD		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12267		Last issued in:	1.8
The system shall be able to handle both real-time feeds of data to be stored and batch data storage.			
Justification:	Analysis of the CRD		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.1.3.11 Observation Management

SWE-SRD-11935		Last issued in:	1.8
The SWE segment shall request observations by internal or cooperating sensors as necessary to produce the end-user requested products.			
Justification:			



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12237		Last issued in:	1.8
The SWE segment shall receive all observations made by internal or cooperating sensors as necessary to produce the end-user requested products.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12238		Last issued in:	1.8
The SWE segment shall take any directives from the governing authority into account when requesting and prioritising observations by internal or cooperating sensors.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.12 Third Party Data Management

SWE-SRD-12239		Last issued in:	1.8
The system shall ensure end-to-end (from the source to the final product) traceability of the data from Third Party Providers.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12240		Last issued in:	1.8
The system shall be able to receive and process data provided by Third Party Providers.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12241		Last issued in:	1.8
Any information provided by an third party provider shall be flagged as external data and the information of			



the source shall be kept attached.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12242		Last issued in:	1.8
The system shall perform a validation process of all data received from the Third Party Providers to ensure its validity, integrity and quality.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12243		Last issued in:	1.8
The system shall decide, according to Data Policy rules, if either the Third Party Data received or the equivalent set of data computed independently by the system shall be used in subsequent analyses.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12244		Last issued in:	1.8
When Third Party Data is available, the system shall offer the possibility to use this data in any analysis performed by the system.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12245		Last issued in:	1.8
The system shall provide automatic feedback regarding the compliance with the required formats.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12246		Last issued in:	1.8
The system shall make use of Third Party Data for cross-checking the data produced by the system and			



eventually to perform analysis based on this data.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.3.13 Interface to Cooperating Centres

SWE-SRD-11933		Last issued in:	1.8
The SSA SWE system shall be able to receive SWE data from cooperating centres and their services as defined by associated SLAs and ICDs.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11934		Last issued in:	1.12
The SSA SWE system shall be able to monitor the availability and request specific data from cooperating centres and their services as defined by associated SLAs and ICDs.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4 Data Acquisition

The SWE observations are produced by the sensor network. The essential function of the data acquisition system is to perform the observation. Figure 6 and 7 depicts the main Data Acquisition functions.

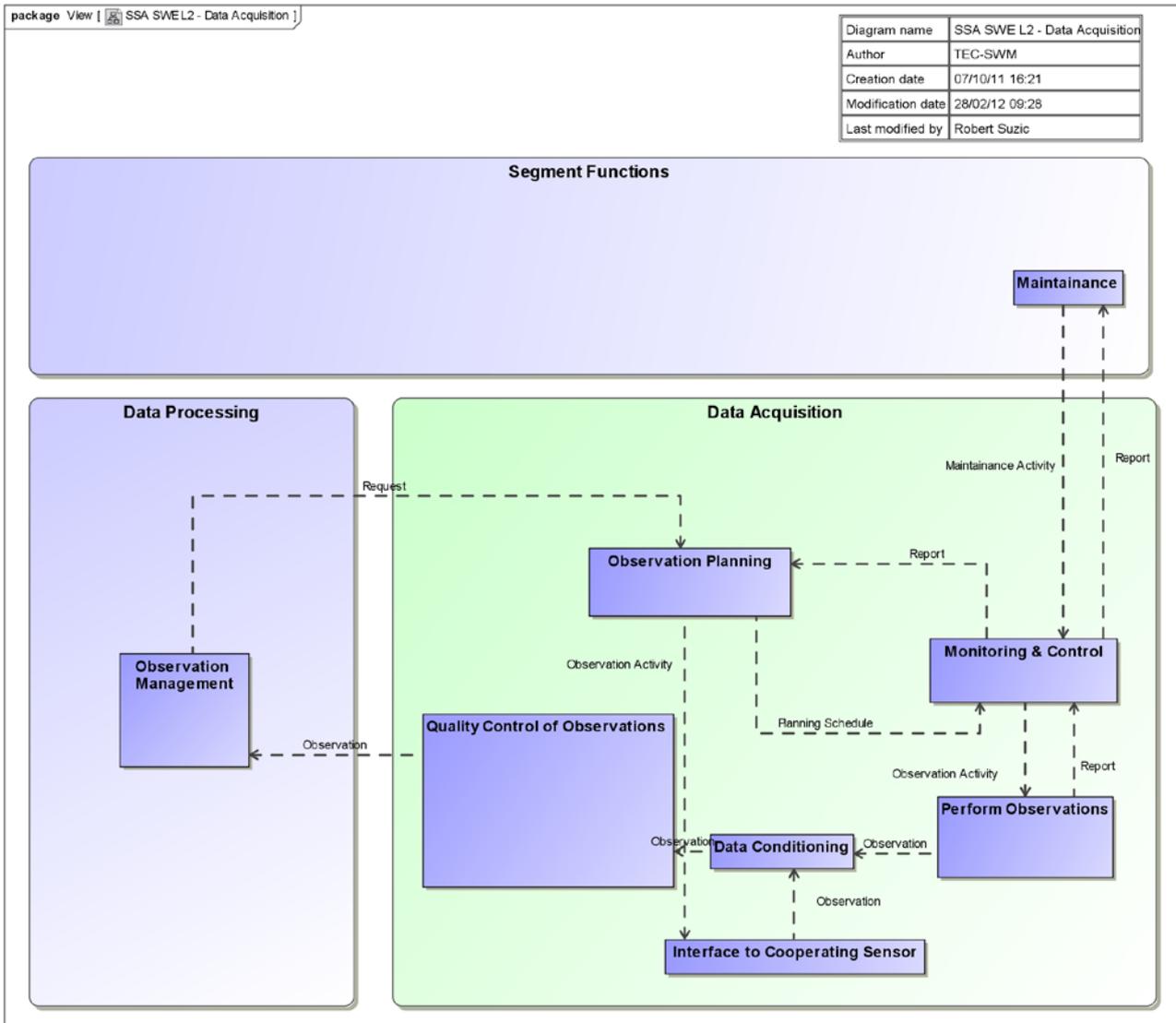


Figure 6: SWE Data Processing Functions

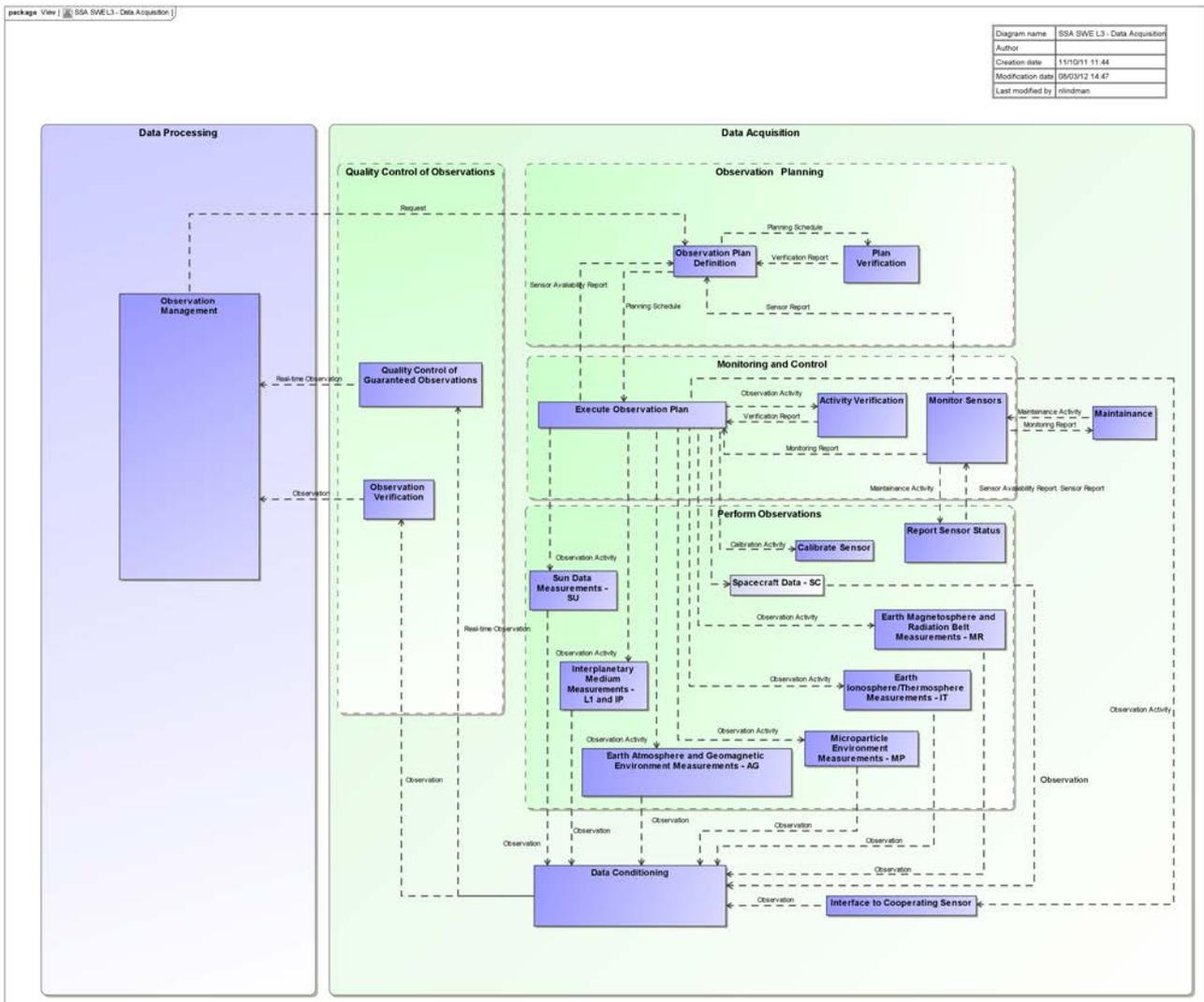


Figure 7: SWE Data Processing Functions

3.1.4.1 Observation Planning

3.1.4.1.1 Observation Plan Definition

SWE-SRD-11825		Last issued in:	1.7
The SSA SWE System shall be able to monitor the status and availability of all SSA or federated SWE sensors			
Justification:	Maintain information about the sensor system status		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11826		Last issued in:	1.12
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The SSA SWE system shall be able to make and maintain a schedule for the planned maintenance of the SSA and federated SWE sensors to ensure continuous availability of the SWE sensor data for the SSA system.			
Justification:	Planned sensor outages should not impact the system performance or at least the impact is minimised.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11827		Last issued in:	1.7
The SSA SWE system shall be able to simulate the impact of one or more missing SSA or federated SWE sensors on the observation system and observation coverage.			
Justification:	This allows assessing the impact of a sensor outage especially because availability of the federated sensors may not be under SSA control.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11829		Last issued in:	1.7
The SSA SWE system shall be able to simulate the impact of replacing one or more SSA or federated SWE sensors with alternative sensors.			
Justification:	This allows advance planning for the loss or replacement of a sensor.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.1.2 Plan Verification

SWE-SRD-11921		Last issued in:	1.8
The SSA SWE segment shall provide means for the verification of the observation plans ensuring:			
<ul style="list-style-type: none"> - no resource conflicts - availability of sensors (taking maintenance, calibration and other observation activities into account) - that the observations can be carried out taking visibility/pointing constraints into account - availability of data processing resources - performance (timeliness and accuracy) of the measurements 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



3.1.4.2 Monitoring and Control

3.1.4.2.1 Execute Observation Plan

SWE-SRD-12252		Last issued in:	1.8
The SWE Segment shall provide means for the verification of the generated commands to monitor and control the SWE sensor network.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.2.2 Activity Verification

SWE-SRD-12251		Last issued in:	1.8
The SWE Segment shall provide means for the verification of the generated commands to monitor and control the SWE sensor network.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.2.3 Monitor Sensors

SWE-SRD-11834		Last issued in:	1.8
The SWE Segment shall systematically and as far as possible automatically monitor the health and status of the SWE sensor network.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12253		Last issued in:	1.8
The SWE Segment shall systematically evaluate the validity of any received sensor data: testing the data format and verifying each parameter versus its validity range.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12248		Last issued in:	1.8
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The SWE segment system shall provide means for the monitoring of the status, configuration, and availability of the SSA Sensors.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12249		Last issued in:	1.12
The SWE segment shall perform periodic assessment of the performance, availability and integrity of the network of SSA Sensors.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12250		Last issued in:	1.12
In order to perform monitoring of the performance of the network of SWE Sensors, the SWE segment shall request calibration activities.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.3 Perform Observations

3.1.4.3.1 General Observation Requirements

SWE-SRD-9107		Last issued in:	1.12
The SSA SWE system shall have a subsystem in charge of managing the timely acquisition of Space Weather measurements from internal sensors or from cooperating sensors.			
Justification:	Functional analysis of the SWE segment		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11944		Last issued in:	1.8
The system shall be able to handle (receive, process and send) sensor data from internal and collaborating sensors.			
Justification:	In order to receive data from sensors (internal and collaborating), process received data, and be capable of forwarding this data.		
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11945		Last issued in:	1.8
The system shall be capable of processing different data streams from sensors: processing the data both from the internal sensors and from cooperating sensors.			
Justification:	In order to be able to handle and process all incoming sensor information to generate products.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11946		Last issued in:	1.8
The system shall provide the necessary functions for translating the data provided by cooperating sensors into a format which is compatible with the internal processing functions.			
Justification:	In order to ensure that data coming from cooperating sensors can be processed by the system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12270		Last issued in:	1.12
The data acquisition shall be configurable in terms of the observation performance and quality parameters.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

3.1.4.3.2 Report Sensor Status

SWE-SRD-12256		Last issued in:	1.8
The system shall systematically report the sensor status to the operators in order to ensure the health and performance of the sensors.			
Justification:	In order to ensure that data coming from cooperating sensors can be processed by the system.		
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review Test
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3.1.4.3.3 Calibrate Sensor

SWE-SRD-12254		Last issued in:	1.8
The system shall be able to calibrate its sensors against known references.			
Justification:	In order to ensure that data coming from cooperating sensors can be processed by the system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12255		Last issued in:	1.8
The system shall ensure that the sensors are systematically calibrated to maintain the system performance.			
Justification:	In order to ensure that data coming from cooperating sensors can be processed by the system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

3.1.4.3.4 Sun Data Measurements - SU

SWE-SRD-10233		Last issued in:	1.7
The SWE segment shall own or federate sensors that provide 'Solar disk magnetic fields - Measurements' as input to product SU-005-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10234		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Solar index F10.7 (F10)' as input to product SU-008-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10235		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'EUV images of Sun' as input to product SU-015-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10236		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'White light solar imaging' as input to product SU-017-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10237		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'H-alpha images of Sun' as input to product SU-019-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10238		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Soft X-ray images of the Sun' as input to product SU-020-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10239		Last issued in:	1.12
The SWE segment shall own or federate sensors that provide 'Solar EUV images outside of Sun-Earth line' as input to product SU-021-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10240		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Solar coronagraphic images outside of Sun-Earth line (for stereoscopic imaging of CMEs/CIRs)' as input to product SU-022-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10241		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Solar far-side maps (using helioseismology technique)' as input to product SU-023-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10242		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Ly-alpha images (for measure of solar far-side activity)' as input to product SU-024-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10243		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'White-light wide-angle coronagraph images' as input to product SU-025-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10244		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Solar radiospectrographic observations (for monitoring of radio bursts)' as input to product SU-026-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10245		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Solar X-ray flux measurement' as input to product SU-027-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10246		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Solar EUV integrated flux measurement' as input to product SU-028-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10247		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Solar UV flux measurement' as input to product SU-029-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10249		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Heliospheric imaging of Sun-Earth line (tracking of Earth-directed CMEs) ' as input to product SU-032-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.3.5 Interplanetary Medium Measurements - L1 and IP

SWE-SRD-10256		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'High energy >10 MeV protons in interplanetary medium - Measurement' as input to product L1-001-M.			
Justification:			
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10259		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'High energy >10 MeV ions in interplanetary medium - Measurement' as input to product L1-002-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10260		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide '1-to-10 MeV protons in interplanetary medium at L1 - Measurement' as input to product L1-003-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10261		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide '1-to-10 MeV ions in interplanetary medium at L1 - Measurement' as input to product L1-004-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10262		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide '30 keV-to-1 MeV ions in interplanetary medium at L1 - Measurement' as input to product L1-005-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10263		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide '2-50 MeV solar electrons at L1 - Measurement' as input to product L1-006-M.			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10264		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'E>30 keV-8 MeV electrons in interplanetary medium at L1 - Measurement' as input to product L1-007-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10265		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Interplanetary Magnetic field (IMF) at L1 - Measurement' as input to product L1-008-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10266		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Solar wind bulk velocity at L1 - Measurement' as input to product L1-009-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10267		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Solar wind bulk density at L1 - Measurement' as input to product L1-010-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10268		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Solar wind temperature at L1 - Measurement' as input to product L1-011-M.			
Justification:			



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10279		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Measurements of solar energetic particles' as input to product IP-001-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.3.6 Earth Atmosphere and Geomagnetic Environment Measurements - AG

SWE-SRD-10300		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Auroral visible imaging - Measurement' as input to product AG-001-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10301		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Auroral UV imaging - Measurement' as input to product AG-002-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10302		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Local Magnetospheric Magnetic Field on ground - Measurement' as input to product AG-005-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10303		Last issued in:	1.12
The SWE segment shall own or federate sensors that provide 'Atmospheric density and wind - Measurement' as input to product AG-007-M			
Justification:	Required for service.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10304		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Measurement of atmospheric neutrons' as input to product AG-008-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10305		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Measurement of atmospheric muons' as input to product AG-009-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.3.7 Microparticle Environment Measurements - MP

SWE-SRD-10306		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Measurements on micro particle flux as a function of size, velocity, angular distribution' as input to product MP-001-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.3.8 Earth Ionosphere/Thermosphere Measurements - IT

SWE-SRD-10293		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide '3D electron density grids - Measurements' as input to product IT-002-M.			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10294		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'URSI ionospheric parameters - Measurements' as input to product IT-005-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10295		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Riometer data - Measurements' as input to product IT-002-M			
Justification:			
Comments:	Product IT-002-M means NRT electron density map calculated by ionospheric tomography. Ground-based and space-borne ionospheric observations are the inputs for the map calculation.		
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10296		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Neutral density in thermosphere - Measurement' as input to product IT-007-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10297		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Neutral wind velocity in thermosphere - Measurement' as input to product IT-008-M			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10298		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Scintillation parameters measurements' as input to product IT-009-M.			



Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10299		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Atomic Oxygen Density - Measurements' as input to product IT-010-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.3.9 Earth Magnetosphere and Radiation Belt Measurements - MR

SWE-SRD-10280		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'High energy >10MeV protons in earth magnetosphere and radiation belt - Measurement' as input to product MR-006-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10281		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'High energy >10MeV ions in earth magnetosphere and radiation belt - Measurement' as input to product MR-007-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10282		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide '1-to-10MeV protons in earth magnetosphere and radiation belt - Measurement' as input to product MR-008-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10283		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide '1-to-10MeV ions in earth magnetosphere and radiation belt - Measurement' as input to product MR-009-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10284		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide '30keV-to-1MeV ions in earth magnetosphere and radiation belt - Measurement' as input to product MR-010-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10285		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide '30keV-to-1MeV ions in earth magnetosphere and radiation belt - Measurement' as input to product MR-011-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10286		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Thermal and supra-thermal electron and ion energy spectra in the range 0 to 30 keV - Measurement' as input to product MR-012-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10287		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Magnetospheric radiowave spectra - Measurement' as input to product MR-013-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-10288		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Thermal ions density and temperature - Measurement' as input to product MR-014-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10289		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Local magnetospheric magnetic field in orbit - Measurement' as input to product MR-015-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10290		Last issued in:	1.5
The SWE segment shall own or federate sensors that provide 'Plasma drift velocity measurement' as input to product MR-016-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.3.10 *Spacecraft Data - SC*

SWE-SRD-12259		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Anomalies on spacecraft equipment' as input to product SC-001-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12260		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Data from spacecraft radiation monitors - Measurement' as input to product SC-002-M.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
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SWE-SRD-12261		Last issued in:	1.12
The SWE segment shall own or federate sensors that provide 'Orbital data of spacecraft carrying space weather instruments - Measurement' as input to product SC-003-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12262		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Spacecraft housekeeping telemetry data - Measurement' as input to product SC-004-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12263		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Dose - Measurement' as input to product SC-005-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12264		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Deep electric charging - Measurement' as input to product SC-006-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12265		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Surface charging - Measurement' as input to product SC-007-M.			
Justification:			
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	
SWE-SRD-12266		Last issued in:	1.8
The SWE segment shall own or federate sensors that provide 'Floating spacecraft potential - Measurement' as input to product SC-008-M.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.4 Data Conditioning

SWE-SRD-11915		Last issued in:	1.8
The SSA SWE system shall condition the data raw data coming from sensors including:			
<ul style="list-style-type: none"> - Formatting/reformatting - Resampling - Debiasing - Calibration - Time stamping 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10318		Last issued in:	1.8
When sensors provide calibrated and instantiated data, the data from the sensor shall be taken by the SSA SWE segment directly without further action.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10319		Last issued in:	1.8
When the sensor provides data that are not calibrated and/or not instantiated, the SSA SWE segment shall process the data from the sensor so as to advance the data, by calibrating and/or complementing with metadata such as location and time of the measurement, asset sensor ID, processing software version etc.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



Requirements:		Method:	
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3.1.4.5 Quality Control of Observations

3.1.4.5.1 General Quality Control Requirements

SWE-SRD-10230		Last issued in:	1.8
The SSA SWE segment shall perform quality control of the observations coming from each sensor.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11920		Last issued in:	1.8
The SSA SWE system shall be able to verify that the quality of the SWE data from cooperating sensors is met as defined by the associated SLA and ICD.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.5.2 Quality Control of Guaranteed Observations

3.1.4.5.3 Observation Verification

SWE-SRD-12257		Last issued in:	1.8
The SSA SWE system shall be able to verify that the observations performed by the SWE sensor meets the quality requirements.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.1.4.6 Interface to Cooperating Sensors

SWE-SRD-9531		Last issued in:	1.8
The SSA SWE system shall be able to receive SWE data from cooperating sensors as defined by associated SLAs and ICDs.			
Justification:			
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	
SWE-SRD-11919		Last issued in:	1.12
The SSA SWE system shall be able to monitor and request data from cooperating sensors as defined by associated SLAs and ICDs.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.2 Performance requirements

Performance requirements which specify a fixed time or rate shall be understood to include any overhead caused by other system functions applicable to that process e.g. overhead induced from security or RAMS requirements.

3.2.1 General Performance requirements

SWE-SRD-12060		Last issued in:	1.8
The development environment shall be able to switch from one version to another of any element of the system in less than one working day.			
Justification:	In order to ensure the flexibility of the development environment.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test

SWE-SRD-12061		Last issued in:	1.8
The AIV environment shall be able to switch from one version to another of any element of the system in less than one working day.			
Justification:	In order to ensure the flexibility of the AIV environment.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test

SWE-SRD-12062		Last issued in:	1.12
The bulk data reprocessing shall not prevent the system to carry out with the normal operations and fulfil the performance requirements of the system.			
Justification:	In order to ensure the flexibility of the bulk data reprocessing.		
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Analysis
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SWE-SRD-12063		Last issued in:	1.8
The bulk data reprocessing shall be able to switch from one version to another of any element of the system in less than two hours.			
Justification:	In order to ensure the flexibility of the bulk data reprocessing.		
Comments:	This assumes that the element is already installed and configured.		
Source Requirements:			
Related Requirements:		Verification Method:	Test

SWE-SRD-12064		Last issued in:	1.8
The system shall be able to provide the services in the temporary absence of external synchronisation reference without degradation of performances.			
Justification:	The system availability must not depend on presence of external service		
Comments:	The system must be able to maintain time synchronization accuracy for a TBD time period without external reference (free run). Any deviation to this requirement shall be duly justified.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12066		Last issued in:	1.12
The system shall be capable to provide reports to SSA Governing Authority at the latest 8 hours after request.			
Justification:	In order to satisfy performance requirements ensure efficient operation of the system.		
Comments:	The time constraint may still be subject to change.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12231		Last issued in:	1.8
The system shall make available any requested data from the off-line archive within 48 hours (TBC) after the request.			
Justification:			
Comments:	The time constraint may still be subject to change.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

3.2.2 Performance requirements for the services of domain 1: Spacecraft design

SWE-SRD-9131		Last issued in:	1.12
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The maximum contiguous downtime of service 1 shall be less than 24 hours with the exception of scheduled maintenance.			
Justification:	One day is the usual time scale to provide first assessment of in-orbit failure analysis.		
Comments:			
Source Requirements:	SWE-CRD-SCD-1527		
Related Requirements:		Verification Method:	Test

SWE-SRD-11838		Last issued in:	1.12
The operational availability for service domain 1 shall be better than 99% per year.			
Justification:	99% is required for the credibility of the service. This allows 3-4 days of downtime a year.		
Comments:			
Source Requirements:	SWE-CRD-SCD-1527		
Related Requirements:		Verification Method:	Test

SWE-SRD-9132		Last issued in:	1.4
Environmental data shall be available for the statistical service products at most 1 month after acquisition from sensors.			
Justification:	Latence time driven by the service for spacecraft anomaly analysis.		
Comments:			
Source Requirements:	SWE-CRD-SCD-1528		
Related Requirements:		Verification Method:	Test

SWE-SRD-9133		Last issued in:	1.12
Environmental data shall be available for the local spacecraft environment products, in near real-time and at most 1 day after acquisition from sensors.			
Justification:	This is to respond to urgent analysis request for critical spacecraft failures.		
Comments:			
Source Requirements:	SWE-CRD-SCD-1529		
Related Requirements:		Verification Method:	Test

3.2.3 Performance requirements for the services of domain 2: Spacecraft operations

SWE-SRD-11610		Last issued in:	1.6
The near real time monitoring of space weather events shall be provided with the following accuracy in table below:			
Event, Accuracy of first fast level processing, Accuracy of fine processing, Time after the event for			



which the fine accuracy is required to be met			
magnetic storm,	70-80%,	TBD,	24 hours
substorms,	70-80%,	TBD,	24 hours
high-speed streams,	TBD,	TBD,	TBD
solar energetic particle events ,	95%,	98%,	TBD
Earth-directed CMEs, Automated detection, significant levels of false events, poor velocity estimation, Human confirmed detection, velocity accurate to within projection limits,12 Hours			
meteor streams,	TBD,	TBD,	TBD
debris clouds,	TBD,	TBD,	TBD
Justification:			
Comments:	Expanded from SWE-CRD-SCO-1531 requirement description.		
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11611		Last issued in:	1.6
The estimates of probability of occurrence of space weather events and of “All quiet conditions” shall be provided with the following warning times and confidence levels in table below:			
Event, Warning times for event forecast, Confidence level (sigma)			
magnetic storm,	1-2 days,	3 s	
solar energetic particle events,	1-2 days,	3 s	
Earth-directed CMEs,	1 – 2 hours (confirmed by L1 measurement),	1 s	
meteor streams,	24 hrs,	3 s	
debris clouds,	24 hrs,	3 s	
Justification:			
Comments:	Expanded from SWE-CRD-SCO-1532 requirement description.		
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-9134		Last issued in:	1.12
The maximum contiguous downtime of service 2 shall be less than 24 hours with the exception of scheduled			



maintenance.			
Justification:	One day is the usual time scale to provide first assessment of in-orbit failure analysis.		
Comments:	This requirement describes how we measure whether the availability of the service is acceptable. Clearly 100% availability is desired but not liable to be achieved.		
Source Requirements:	SWE-CRD-SCO-1575		
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-11839		Last issued in:	1.12
The operational availability for service domain 2 shall be better than 99% per year.			
Justification:	99% is required for the credibility of the service. This allows 3-4 days of downtime a year.		
Comments:	This requirement describes how we measure whether the availability of the service is acceptable. Clearly 100% availability is desired but not liable to be achieved.		
Source Requirements:	SWE-CRD-SCO-1575		
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-11840		Last issued in:	1.12
The operational availability of the solar flare monitoring service shall be better than 99% per year.			
Justification:	99% is required for the credibility of the service. This allows 3-4 days of downtime a year.		
Comments:	This requirement describes how we measure whether the availability of the service is acceptable. Clearly 100% availability is desired but not liable to be achieved.		
Source Requirements:	SWE-CRD-SCO-1575		
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-11844		Last issued in:	1.8
Scheduled maintenance shall be announced to the users with a 30 day forewarning			
Justification:	Advises users of potential unavailability and allows them to take action accordingly.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1575		
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-11842		Last issued in:	1.12
Scheduled maintenance shall be postponed if an event is in progress without impacting service availability requirements.			
Justification:	During short-duration critical periods the users need for up-to-date space weather information is considered to be higher priority than regular		



	maintenance.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1575		
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-11841		Last issued in:	1.12
Missing data shall be recovered after service offline periods.			
Justification:	Complete datasets are required for e.g. post-event analysis and statistical model generation.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1575		
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-11843		Last issued in:	1.8
Interruption of part of the service e.g. if a specific data stream is interrupted, shall be clearly indicated.			
Justification:	The user will need to be informed of a known decrease in accuracy of the service he/she is using.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1575		
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-9135		Last issued in:	1.12
A subset of S/C payload data relevant to Space Weather services (e.g. from radiation monitors) shall be made available to the authorised users within 10 minutes in spacecraft telemetry reception mode.			
Justification:	The usability and usefulness of data correlations (S/C conditions, effects, and space weather environment and events) depends on the timely availability to the final users.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1576		
Related Requirements:		Verification Method:	Analysis Design Review Test

SWE-SRD-9136		Last issued in:	1.8
Space Weather environment data shall be available to the end user in near real time.			
Justification:	To allow -real-time assessment of space weather threats on spacecraft in routine mode.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1577		
Related Requirements:		Verification Method:	Analysis Design



			Review Test
SWE-SRD-9137		Last issued in:	1.8
Data forecasts shall be calculated immediately after reception of the input data that is required for the models.			
Justification:	The usability and usefulness of data forecast depends on the timely availability to the final users.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1578		
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-9138		Last issued in:	1.8
The outputs of the forecasting models shall be made available to users as soon as they can be produced.			
Justification:	The usability and usefulness of the forecasted data depends on the timely availability to the final users.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1579		
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-9139		Last issued in:	1.8
The system shall provide to the user an estimated response delay for each data request that is submitted.			
Justification:	To allow the users to specify their requests according to their data needs vs their timeliness requirements.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1580		
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-9140		Last issued in:	1.8
It shall be possible to retrieve the data already stored in the system at sampling rates lower than the rate at which the primary data is available.			
Justification:	The users will be able to specify their requests according to their data needs vs their timeliness requirements.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1581		
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-9141		Last issued in:	1.8



Any request to retrieve data already stored in the system shall have a maximum response time delay of 10 minutes. This applies only to data that do not require computation after the request.			
Justification:	Performance is a critical requirement for the usefulness of the system.		
Comments:	Requests for small quantities of data should be retrievable faster than the baseline 10 minutes.		
Source Requirements:	SWE-CRD-SCO-1582		
Related Requirements:		Verification Method:	Analysis Design Review Test

SWE-SRD-9142		Last issued in:	1.8
The forecast of "All quiet conditions" and "End-of-quiet" conditions for all space weather parameters shall be provided 3 to 7 days in advance along with their confidence level.			
Justification:	The usability and usefulness of the forecasted data depends on its quality and the timely availability to the final users.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1583		
Related Requirements:		Verification Method:	Analysis Design Review Test

SWE-SRD-9143		Last issued in:	1.8
Nowcasts of Space Weather Events or potentially dangerous conditions shall be provided in near real-time, and with less than the following delays after event occurrence/detection: 6 hours for CME onset, 1 min for SEP, 30 min for radio bursts, 30 min for high-speed streams, 1min for flares, 12 hours for micro-particle generation events. 30 minutes for other L1 in-situ measurements and 1min for nowcasts based on other data measured in the vicinity of the spacecraft.			
Justification:	The usability and usefulness of the data depends on the timely availability to the final users. Current timeliness requirements are assumed for routine spacecraft operations. Stronger timeliness requirements may apply for human space flight, launch operation or some critical operations.		
Comments:	Nowcast delays have to be lower than 30 minutes, CME's observation on the Sun does not require very urgent notice but confirmation from L1 that the CME is actually reaching the Earth is urgent.		
Source Requirements:	SWE-CRD-SCO-1584		
Related Requirements:		Verification Method:	Analysis Design Review Test

SWE-SRD-9144		Last issued in:	1.12
The forecasts or risk estimate of hazardous Space Weather environment conditions and of the atmospheric environment shall be provided for the following days, in advance within the following time ranges: [1-3 days]			



in advance for CME arrival, 1-27 days for coronal holes, 1-27 days for high-speed streams, 1-3 days for flares, 24 hours for SRM firing clouds (in case of known firings) and meteoroid streams etc.			
Justification:	For a forecast service to be useful, the anticipation in time must be longer than the time required to configure the instruments in safe-mode: e.g. for XMM-Newton it means 10-30 minutes.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1585		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9145		Last issued in:	1.8
The forecasts of S/C effects shall be provided as a minimum 1 to 2 days in advance.			
Justification:	The usability and usefulness of the forecasted data depends on the timely availability to the final users.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1586		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9146		Last issued in:	1.8
The anomalies information shall be made available after detection with a target of within 10 minutes.			
Justification:	The usability and usefulness of the forecast data depends on timely availability to the final users.		
Comments:	This relates to SWE-CRD-SCO-1536 and defines the timeliness of accessing the anomaly data. Information on the exact nature of the anomaly may take longer to analyse and report. This requires an agreement with operators who would supply information (in all likelihood anonymously) on actual anomalies, e.g. spurious commands, uncommanded instrument switch-off, increased SEU-induced error rate, spacecraft entering non-nominal states. Depending on the agreement with the operator, the information could be made public or distributed only to authorised recipients. This information is valuable is in near-real time because many spacecraft have similar equipment with similar sensitivities. Although reports received after a day or two would be useful in anomaly diagnosis the event which caused it will generally have passed. This justifies a target requirement for information within 10 minutes but later data would be of some value.		
Source Requirements:	SWE-CRD-SCO-1587		
Related Requirements:		Verification Method:	Analysis Design Review Test

SWE-SRD-9147		Last issued in:	1.8
The nowcast shall be continuous .			
Justification:	Data persistence and the possibility to “replay” past conditions are required		



	to conduct post event analysis and identify possible causes for S/C anomalies and effects.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1588		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9148		Last issued in:	1.8
As a minimum, Space Weather Environmental data covering the time spent from the start of the mission to present shall be available.			
Justification:			
Comments:	New CR created from SWE-CRD-SCO-1588.		
Source Requirements:	SWE-CRD-SCO-2638		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9149		Last issued in:	1.12
The forecast of uncertainties caused by the ionosphere shall be available 1 hour* in advance.			
Justification:	The usability and usefulness of the forecasted data depends on the timely availability to the final users. The uncertainties mean potential problems due to ionosphere, atmospheric scintillation impacting telecommunication with satellites		
Comments:			
Source Requirements:	SWE-CRD-SCO-1589		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9150		Last issued in:	1.8
The ionospheric products used by the domain services shall have 1 day (TEC maps: 5 min) rate updates.			
Justification:	The usability and usefulness of the forecasted data depends on the timely availability to the final users.		
Comments:			
Source Requirements:	SWE-CRD-SCO-1590		
Related Requirements:		Verification Method:	Analysis Design Review Test

SWE-SRD-9151		Last issued in:	1.8
Daily forecasts, 3-days forecast and 27-days forecast of the Atmospheric Environment shall be available.			
Justification:	The usability and usefulness of the forecasted data depends on the timely availability to the final users.		
Comments:			



Source Requirements:	SWE-CRD-SCO-1591		
Related Requirements:		Verification Method:	Design Review Test

3.2.4 Performance requirements for the services of domain 3: Human spaceflight

SWE-SRD-9152		Last issued in:	1.12
During crewed operations, the maximum contiguous downtime of service 3 (forecast and post-event analysis) shall be less than 1 hour.			
Justification:	The max down time is driven by the error acceptable for dose estimate for post-event analysis, by the acceptable dose level that can be received by astronauts in EVA during downtime.		
Comments:			
Source Requirements:	SWE-CRD-SCH-1606		
Related Requirements:		Verification Method:	Analysis Design Review Test

SWE-SRD-12867		Last issued in:	1.12
During crewed operations, the maximum contiguous downtime of service 3 (nowcast of solar energetic particles) shall be less than 5 minutes.			
Justification:	The max down time is driven by the error acceptable for dose estimate for post-event analysis, by the acceptable dose level that can be received by astronauts in EVA during downtime.		
Comments:			
Source Requirements:	SWE-CRD-SCH-1606		
Related Requirements:		Verification Method:	Analysis Design Review Test

SWE-SRD-9153		Last issued in:	1.8
Forecast of SPE onset shall be calculated for the next 72 hours and updated every 30 minutes from 72 hours to 24 hours ahead of launch to 5 minutes during the last 24 hours before launch.			
Justification:	The lead time and update time are driven by the lead time required for taking decision on scheduling EVA.		
Comments:			
Source Requirements:	SWE-CRD-SCH-1607		
Related Requirements:		Verification Method:	Design Review Test



SWE-SRD-9154		Last issued in:	1.12
The maximum contiguous downtime of service 3 (provision of real-time solar X-ray levels, solar X-ray/UV image, and energetic proton/electron fluxes) shall be less than 5 minutes.			
Justification:			
Comments:			
Source Requirements:	SWE-CRD-SCH-1608		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9155		Last issued in:	1.8
The refresh rate of real-time solar X-ray levels, solar X-ray/UV image, and energetic proton/electron fluxes should be higher than any of the input sources data rates.			
Justification:			
Comments:			
Source Requirements:	SWE-CRD-SCH-2681		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9157		Last issued in:	1.8
Information on the local spacecraft energetic proton and electron environment shall be provided every minute.			
Justification:	Interplanetary is not enough because of transport effects through magnetic field (e.g., for LEO) and effects of neighbouring planetary bodies.		
Comments:			
Source Requirements:	SWE-CRD-SCH-1609		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9158		Last issued in:	1.8
The SWE shall provide forecast of solar activity 1 day ahead.			
Justification:	This lead time allows short term planning of human activities in space.		
Comments:			
Source Requirements:	SWE-CRD-SCH-1610		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9159		Last issued in:	1.8
The SWE shall provide the probability of no solar proton events for the next seven days.			
Justification:	This lead time allows medium term planning of human activities in space.		
Comments:			
Source Requirements:	SWE-CRD-SCH-1611		



Related Requirements:		Verification Method:	Design Review Test
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3.2.5 Performance requirements for the services of domain 4: Launcher operations

SWE-SRD-9160		Last issued in:	1.12
The maximum contiguous downtime of service 4 shall be less than 30 minutes.			
Justification:	3 days is the critical period for decision of launching or not pending on space weather condition. A maximum downtime of 30 minutes is compatible with the refreshing rate requirement.		
Comments:			
Source Requirements:	SWE-CRD-LAU-1627		
Related Requirements:		Verification Method:	Analysis Design Review Test

SWE-SRD-12868		Last issued in:	1.12
The operational availability of service 4 shall be better than 99.31% per 72 hours.			
Justification:	3 days is the critical period for decision of launching or not pending on space weather condition. A maximum downtime of 30 minutes is compatible with the refreshing rate requirement.		
Comments:			
Source Requirements:	SWE-CRD-LAU-1627		
Related Requirements:		Verification Method:	Analysis Design Review Test

SWE-SRD-11804		Last issued in:	1.8
The refresh rate for alerts should be higher than any of the input sources' data rates.			
Justification:			
Comments:			
Source Requirements:	SWE-CRD-SCH-2681		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9161		Last issued in:	1.8
Forecast of solar energetic particle event onset shall be calculated for the next 72 hours and updated every 30			



minutes from 72 hours to 24 hours ahead of launch to 5 minutes during the last 24 hours before launch.			
Justification:	The lead time and update time are driven by the lead time required for taking decision on scheduling launch.		
Comments:	A requirement on the avoidance of false alarms may be needed.		
Source Requirements:	SWE-CRD-LAU-1628		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9162		Last issued in:	1.8
Information on current solar activity including interplanetary high energy protons and heavy ions fluxes shall be provided every 30 minute.			
Justification:	The update time is driven by the lead time required for taking decision on scheduling launch. An analysis of the more potentially eruptive active regions at higher resolution than 1 day ideally every 2 hours is relevant when their morphology or structure are changing (surface, magnetic complexity, eruption classification...).		
Comments:			
Source Requirements:	SWE-CRD-LAU-1629		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9163		Last issued in:	1.8
Energetic proton and electron environment shall be monitored with five minute resolution.			
Justification:	Allow accurate identification of the onset time of a solar particle event for post event analysis.		
Comments:			
Source Requirements:	SWE-CRD-LAU-1630		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9164		Last issued in:	1.8
Solar activity shall be forecast 1 day ahead and refined 1 hour ahead prior to launch.			
Justification:	This lead time allows short term planning of launch activities.		
Comments:			
Source Requirements:	SWE-CRD-LAU-1631		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9165		Last issued in:	1.8
Kp and EUV flux forecast shall be available as time series from 48 hours before launch to 3 hours after launch			



using measured data where available and forecast data where not.			
Justification:	This lead time allows updating drag estimate that is available for the launch period.		
Comments:			
Source Requirements:	SWE-CRD-LAU-1632		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9166		Last issued in:	1.8
The accuracy of the provided services and data shall be available to the users.			
Justification:	Required to increase the level of confidence of the users in the system and assess the integrity of data for specific uses. This can be possibly provided through quality flag.		
Comments:			
Source Requirements:	SWE-CRD-LAU-1621		
Related Requirements:		Verification Method:	Analysis Design Review Test

3.2.6 Performance requirements for the services of domain 5: Transionospheric radio link

SWE-SRD-9167		Last issued in:	1.12
The maximum contiguous downtime of service 5 shall be less than 5 minutes with the exception of scheduled maintenance.			
Justification:	The maximum service downtime depends on the users but is driven by the most demanding users.		
Comments:	With a service interruption being defined as the temporary suspension of the capacity to nowcast or forecast the data to the user.		
Source Requirements:	SWE-CRD-TIO-1649		
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-9168		Last issued in:	1.12
The operational availability of service 5 shall be better than 99% per year.			
Justification:	The maximum service downtime depends on the users but is driven by the most demanding users.		
Comments:			
Source Requirements:	SWE-CRD-TIO-1649		
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-9169		Last issued in:	1.8
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For Users of GNSS Single frequency services with average accuracy, no integrity (e.g. typical GNSS mass market user), the data shall be obtained globally with a 5x2.5 degrees longitude-latitude 2D grid with an update not larger than 2 hours.			
Justification:	Takes into account spatial and temporal scales of disturbances affecting the user.		
Comments:	Adaptation of grid resolution in case of data gaps (e.g. for scintillation monitoring).		
Source Requirements:	SWE-CRD-TIO-1650		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9170		Last issued in:	1.8
For Users of GNSS Single frequency services with average accuracy, using integrity (e.g. EGNOS user) and Users of multi-frequency GNSS systems with average accuracy, integrity (aeronautical multifrequency), Data shall be obtained globally with a 1x1 degrees lon-lat 2D grid with an update not larger than 5 minutes.			
Justification:	Takes into account spatial and temporal scales of disturbances affecting the user.		
Comments:			
Source Requirements:	SWE-CRD-TIO-1651		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9171		Last issued in:	1.12
For Users or multi-frequency GNSS systems with very high accuracy (e.g. GNSS geodetic users, RTK), for Users of satellite data communications with high availability / continuity (e.g. Search-and-Rescue, Air Traffic Control/Management via Satellite, high availability/continuity data networks such as Galileo Ground Segment Data Network) and for Other space-based services/products users affected by the ionosphere (UHF - C-band radars, GNSS-R altimetry, UHF/low microwave radioastronomy and deep space communications), Data shall be obtained for specific regions with narrow 3D volumetric grid with a 2°x2° (longitude x latitude)spatial resolution with an update not larger than 30 minutes.			
Justification:	Takes into account spatial and temporal scales of disturbances affecting the user.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9172		Last issued in:	1.8
For Geomagnetic storm indices (global, auroral, mid-latitude and ring current), for Smoothed Sunspot number (SSN) and for Solar flux density from entire solar disk at 10.7 cm (F10.7), the data shall be available daily.			
Justification:	To not reduce data resolution.		
Comments:			
Source	SWE-CRD-TIO-1642		



Requirements:	SWE-CRD-TIO-1643 SWE-CRD-TIO-1644 SWE-CRD-TIO-1653		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9173		Last issued in:	1.8
For Height of maximum electron density in F2 layer, URSI ionospheric parameter values and Vector measurements of local geomagnetic field, the data shall be available with an update not larger than 2 hours.			
Justification:	Takes into account spatial scale of disturbances affecting the user.		
Comments:			
Source Requirements:	SWE-CRD-TIO-1641 SWE-CRD-TIO-1645 SWE-CRD-TIO-1646 SWE-CRD-TIO-1654		
Related Requirements:		Verification Method:	Design Review Test

3.2.7 Performance requirements for the services of domain 6: SST

SWE-SRD-9174		Last issued in:	1.8
Forecast of all specified data for surveillance and tracking centre(s), stations and services users shall be made for days, weeks and months ahead with daily update.			
Justification:	Should be greater or equal to update time of SSA orbit calculation.		
Comments:			
Source Requirements:	SWE-CRD-SST-1667		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9175		Last issued in:	1.8
Forecast of all specified data for spacecraft operators users shall be made from 1 day to 1 year ahead with 1 day resolution and daily update.			
Justification:	Should be greater or equal to update time of SSA orbit calculation.		
Comments:			
Source Requirements:	SWE-CRD-SST-1668		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9176		Last issued in:	1.8
Forecast of all specified data for collision warning services users shall be possible from 1 hour ahead with hourly provision of data to-1 month ahead with daily provision of data.			
Justification:	Should be greater or equal to update time of SSA collision prediction.		
Comments:			



Source Requirements:	SWE-CRD-SST-1669		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9177		Last issued in:	1.8
Forecast of all specified data for re-entry risk assessment services users shall be possible from 1 hour ahead with hourly provision of data to 5 years ahead with daily provision of data.			
Justification:	Time scales of re-entry encompass 1 hour during event to 5 years for prediction.		
Comments:			
Source Requirements:	SWE-CRD-SST-1670		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9178		Last issued in:	1.12
The maximum contiguous downtime of service 6 shall be less than 24 hours with the exception of scheduled maintenance.			
Justification:	Maximum downtime is driven by acceptable error in the drag correction.		
Comments:			
Source Requirements:	SWE-CRD-SST-1671		
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-11845		Last issued in:	1.12
The operational availability of service 6 shall be better than 99% per year.			
Justification:	99% is required for the credibility of the service.		
Comments:			
Source Requirements:	SWE-CRD-SST-1671		
Related Requirements:		Verification Method:	Analysis Test

3.2.8 Performance requirements for the services of domain 7: Non-space operators

SWE-SRD-9180		Last issued in:	1.8
Data relating to airline critical communications shall be obtained for specific regions with an update not larger than 30 minutes.			
Justification:	Takes into account spatial and temporal scales of disturbances affecting the user.		
Comments:			
Source	SWE-CRD-NSO-1773		



Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9181		Last issued in:	1.8
Data relating to precise location determination shall be obtained for specific regions with narrow 3D volumetric grid with an update not larger than 30 minutes			
Justification:			
Comments:	New CR created from SWE-CRD-NSO-1773.		
Source Requirements:	SWE-CRD-NSO-2641		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9182		Last issued in:	1.8
Post-event radiation data shall be available <2 days following crew dose evaluation. Longer than 2 days is applicable if no activity is observed			
Justification:	Radiation data is used in crew rotation planning, so a decision to temporarily ground crew following an event may be taken.		
Comments:			
Source Requirements:	SWE-CRD-NSO-1774		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9183		Last issued in:	1.8
GIC nowcasts shall be provided in as close to near real-time as possible			
Justification:	Operators require maximum time to react following detection of GIC exceeding threshold for safe operation.		
Comments:			
Source Requirements:	SWE-CRD-NSO-1775		
Related Requirements:		Verification Method:	Design Review Test

3.2.9 Performance requirements for the services of domain 8: General data service

SWE-SRD-11846		Last issued in:	1.8
Data and products should be available on as near to a continuous 24-7 basis as possible and any unexpected outages shall be guaranteed to be dealt with in an agreed time period.			
Justification:	The level of guarantee may take into account the limitations of the data source and, where applicable, the requirements of the 3rd party service provider.		
Comments:			



Source Requirements:	SWE-CRD-GEN-1736		
Related Requirements:		Verification Method:	Design Review

SWE-SRD-9185		Last issued in:	1.8
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The services provided by the SSA system shall incorporate strategies for handling gaps in data availability for critical datasets.

Justification:	<p>These services shall be made operationally available both for direct use and for use as input to third party service providers who also need to guarantee the reliability of their service products.</p> <p>The solution shall be selected on a case-by-case basis by considering what is most suitable to each case. The solutions may include: (a) switch to backup sensors, (b) extrapolation from the last measured data value towards values from an appropriate climatological model, with the model being reached over a typical correlation time for data series. The services should include a status flag to indicate the nature of the delivered data.</p> <p>strategies for handling gaps shall be identified as for any data source.</p>
Comments:	strategies for handling gaps shall be identified as for any data source.

Source Requirements:	SWE-CRD-GEN-1737		
Related Requirements:		Verification Method:	Design Review

SWE-SRD-9186		Last issued in:	1.8
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The SSA system shall take measures to ensure that the services can continue to function in all space weather conditions.

Justification:	In particular, space weather sensors should be designed so they continue to provide useful information during solar energetic particle events, and under disturbed ionospheric conditions.
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Comments:	
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Source Requirements:	SWE-CRD-GEN-1738		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9187		Last issued in:	1.8
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Space and ground segments shall include calibration information on SSA-SWE data.

Justification:	Good calibration of data is required with a view to standardisation.
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Comments:	
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Source Requirements:	SWE-CRD-GEN-1739		
Related Requirements:		Verification Method:	Analysis Design Review Inspection

SWE-SRD-9188		Last issued in:	1.8
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The Service shall simulate phenomena faster than real-time to provide forecasts subject to data availability.



Forecasts will be updated nearer the event/disturbance arrival time based on new data such as that detected in-situ at L1.			
Justification:	Running physical models of the solar-interplanetary-magnetospheric-ionospheric environment is required for forecasting and future architecture optimisation		
Comments:			
Source Requirements:	SWE-CRD-GEN-1741		
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-9189		Last issued in:	1.8
The service shall offer browsing facilities and appropriate visualisation tools and functionality in order to view simulation outputs			
Justification:	The scales and complexity of the models involved in an end-to-end simulation make it difficult to grasp from tabulated data, the scope of the simulation outcomes. The service shall provide easy to use visualisation tools to ensure maximum usability of these results.		
Comments:			
Source Requirements:	SWE-CRD-GEN-1742		
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11613		Last issued in:	1.6
Forecasts validity shall depend on the parameter and models applied and shall be as detailed in the Product Specification per parameter.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.3 Security requirements

3.3.1 SWE Specific Security Requirements

SWE-SRD-12515		Last issued in:	1.12
The system shall be able to handle data classified at most ESA Unclassified/ Privileged unless otherwise specified in the present document.			
Justification:	In order to honor data distribution restrictions imposed by data providers and/or users.		
Comments:	It is expected that most of the data handled by the system is ESA Unclassified. Special markings of ESA Unclassified such as "Privileged" may apply to protect commercial or scientific interests of data providers and/or users.		



Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

The further requirements specified in this section are not to be considered part of the civilian and dual SWE system requirements baseline. They reflect only the needs of the military end user community. During architectural design they shall be addressed and costed separately as an add-on functionality.

SWE-SRD-12316		Last issued in:	1.8
The system shall allow to handle service requests from the military end users classified ESA Confidential or Higher.			
Justification:	In order to ensure security i.e. non unauthorised disclosure of classified information originating from military end users submitted to the European SSA for service provision.		
Comments:	This is a military-only requirement and not part of the SWE requirement baseline. It is to be considered as a potential military add-on on top of the SWE system.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12514		Last issued in:	1.12
The system shall be able to handle input data that is classified ESA Confidential.			
Justification:	In order to ensure security i.e. non unauthorised disclosure of classified information originating from classified input sources.		
Comments:	This is considered possible for environment data originating from the Galileo system (TBC).		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

3.3.2 Generic SSA Security Requirements

3.3.2.1 Functional requirements

3.3.2.1.1 Cryptographic Operations

SEC-SRD-3817		Last issued in:	1.10
All cryptographic algorithms used as part of the system for protecting sensitive information and information classified ESA Restricted shall be compliant with [AD-SEC-04] and the applicable security policy.			



Justification:	It needs to be ensured that no insecure crypto algorithms are used as part of the SSA system.		
Comments:	It should be noted that the actual implementation of the cryptographic algorithms could be flawed if not done properly, even if this requirement is fulfilled.		
Source Requirements:	SEC-CRD-11 SEC-CRD-21 SEC-CRD-22 SEC-CRD-23 SEC-CRD-24 SEC-CRD-25 SEC-CRD-26 SEC-CRD-3573 SEC-CRD-3578 SEC-CRD-3598		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3818		Last issued in:	1.10
All cryptographic keying material to be used within the system shall have an appropriate bit length that is directly dependent on its lifetime and use.			
Justification:	It needs to be ensured that the cryptographic keys used within the SSA system are of appropriate length to be resistant to cryptanalysis or brute force attacks.		
Comments:	The actual length should be established as part of a risk assessment		
Source Requirements:	SEC-CRD-11 SEC-CRD-21 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3873		Last issued in:	1.10
All cryptographic keying material to be used within the system shall have a lifetime that is appropriate for its application.			
Justification:	It needs to be ensured that the cryptographic keys used within the SSA are not used for too long a time. Otherwise, the risk resulting from cryptanalysis and/or brute force attacks increases.		
Comments:	The actual lifetime of the cryptographic keys should be established as part of a risk assessment.		
Source Requirements:	SEC-CRD-11 SEC-CRD-21 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test



SEC-SRD-3829		Last issued in:	1.10
The system shall implement and operate a key management system capable of managing all cryptographic keys required for the operation of the system.			
Justification:	Cryptographic keys are required throughout the SSA system for all kind of cryptographic operations.		
Comments:			
Source Requirements:	SEC-CRD-11 SEC-CRD-21 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3883		Last issued in:	1.10
The security level for the key distribution shall be according to the applicable security policy and sensitivity/ classification level of the data to be protected with the keys to be distributed.			
Justification:	Cryptographic keys are required throughout the SSA system for all kind of cryptographic operations.		
Comments:			
Source Requirements:	SEC-CRD-11 SEC-CRD-21 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3828		Last issued in:	1.10
The system shall be capable to securely generate cryptographic keys.			
Justification:	True randomness of keys is required to avoid brute force and key guessing attacks.		
Comments:	A secure real random number generator (RNG) is required for this purpose. In most cases, this is a certified hardware device.		
Source Requirements:	SEC-CRD-11 SEC-CRD-21 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.2 Identification and Authentication

SEC-SRD-3716		Last issued in:	1.10
The system shall have an identity management and authentication system (IAS) that is capable to manage user identities and authenticate SSA users.			
Justification:	The capability to authenticate users is a prerequisite for any access control or accounting that is to be implemented by the SSA system.		
Comments:			



Source Requirements:	SEC-CRD-18 SEC-CRD-26 SEC-CRD-40 SEC-CRD-46		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3718		Last issued in:	1.8
The SSA IAS shall support multiple levels of secure authentication. It shall support at least <ul style="list-style-type: none"> - Password-based authentication - Certificate-based authentication - Authentication using hardware tokens 			
Justification:	SSA will offer services of different sensitivity and classification levels. The security of the authentication system needs to be increased for services of higher sensitivity levels.		
Comments:	This initial list is to be considered non-exhaustive and may be further refined in the course of the SSA architectural design. The SSA data policy will, for each service, define the minimal authentication level required. Authentication of registered users as a prerequisite to access classified information requires special authentication techniques beyond this requirement.		
Source Requirements:	SEC-CRD-27		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3720		Last issued in:	1.8
The SSA IAS shall be able to support multiple authentication levels per registered user.			
Justification:	A registered user may have access to SSA services of different sensitivity levels. He should not be required to use a high security authentication when accessing low sensitivity services only.		
Comments:			
Source Requirements:	SEC-CRD-27		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3614		Last issued in:	1.8
The SSA IAS shall not allow access to any part of the system for registered users without successful authentication unless explicitly specified in the applicable data policy.			
Justification:	Authentication is a prerequisite for access control and thus subsequently for accessing any SSA system or consuming any SSA service.		
Comments:	By not allowing any access to the system without prior authentication, the system is better shielded against denial-of-service attacks. Furthermore, all		



	access to any system resource can be traced if the registered user is authenticated.		
Source Requirements:	SEC-CRD-40		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3616		Last issued in:	1.5
The SSA IAS authentication procedure shall validate the authentication information only on completion of all input data. If an error condition arises, the SSA IAS shall not indicate which part of the data is correct or incorrect.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-40		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3617		Last issued in:	1.8
The SSA IAS shall limit the number of unsuccessful authentication attempts per registered user.			
Justification:	This is a countermeasure to prevent denial-of-service, or other brute force attacks, such as password guessing.		
Comments:	The exact specification of the procedures for handling unsuccessful log-on attempts will be defined at a later stage.		
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3627		Last issued in:	1.8
The SSA IAS shall terminate inactive sessions of registered users after a specified period of inactivity.			
Justification:	This prevents malicious use of sessions that have been inactive for some time and the genuine user is not using it anymore.		
Comments:	The maximum period of inactivity shall be established following the risk assessment and shall be laid down in the applicable SecOps.		
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3628		Last issued in:	1.8
If an IAS account of a registered user is not used during a defined period, the account shall be automatically			



locked.			
Justification:	This shall prevent access to the SSA services by registered or no longer registered users whose credentials have been revoked.		
Comments:			
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3623		Last issued in:	1.8
Upon registration, or upon change of authentication credentials that allow access to sensitive information as specified in the applicable security policy, the SSA AS system shall provide the credentials to registered users in a secure way.			
Justification:	Authentication credentials such as passwords, certificate private keys, and hardware tokens need to be protected when being distributed to the users.		
Comments:	The use of third parties or unprotected (clear text) electronic mail messages for distribution of authentication credentials shall be avoided. Temporary passwords shall be unique to an individual and shall not be guessable.		
Source Requirements:	SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3850		Last issued in:	1.10
Upon registration, or upon change of authentication credentials that allow access to information classified ESA Confidential or higher, the SSA IAS system shall be capable of providing the credentials to registered users in compliance with the applicable security policy.			
Justification:	High-Security Authentication credentials that are a prerequisite for access to classified information shall be protected as foreseen in the ESA Security Directives and the SSA PSI when being distributed to the registered users.		
Comments:			
Source Requirements:	SEC-CRD-25 SEC-CRD-26 SEC-CRD-3598 SEC-CRD-3612		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.2.1 Password-Based Authentication

SEC-SRD-3620		Last issued in:	1.8
The SSA IAS shall never transmit passwords in clear text over an unprotected communication channel.			
Justification:	This prevents password eavesdropping.		
Comments:			



Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3621		Last issued in:	1.8
The SSA IAS shall never store passwords in an unprotected form in an insecure environment.			
Justification:	If an attacker successfully hacks into an SSA system, it is not possible for him to retrieve passwords if they are stored in a secure environment.		
Comments:	An insecure environment is each environment that fails to preserve the confidentiality or integrity of the data stored in it. For example, an unencrypted hard drive is an insecure environment.		
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3849		Last issued in:	1.10
The system shall only store cryptographic hashes of passwords.			
Justification:	This increases the security level, since theft of the stored credentials will not disclose the real passwords, only the hashes.		
Comments:			
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3626		Last issued in:	1.8
The SSA IAS shall force registered users to change passwords on a periodic basis.			
Justification:			
Comments:	The exact period will be established following an information risk assessment and will be laid down in the applicable SecOps.		
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3808		Last issued in:	1.8
The SSA IAS shall not allow registered users to select weak passwords.			
Justification:	Weak passwords may be subject to brute force attacks.		
Comments:	Secure password guidelines should be implemented into the password policies, which are part of the applicable SecOps.		



Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.2.2 Certificate-based Authentication

SEC-SRD-3803		Last issued in:	1.8
The SSA IAS shall be supported by a Public-Key Infrastructure (PKI).			
Justification:	A PKI is required for the generation and maintenance of digital certificates.		
Comments:	Depending on the governance of the system, an external PKI could be used to issue and maintain SSA certificates, or an SSA internal PKI may have to be developed and deployed. This will be decided in a future development phase.		
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3630		Last issued in:	1.8
For certificate-based authentication, the SSA IAS shall only use certificates that are managed by a trusted certificate authority.			
Justification:	The certificate for the authentication needs to originate from a secure source.		
Comments:	The list of trusted certificate authorities will be defined at a later stage.		
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3631		Last issued in:	1.8
The SSA IAS shall not allow authentication using invalid i.e. revoked, unsigned, or expired certificates.			
Justification:	Invalid certificates shall not be accepted for authentication.		
Comments:			
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3846		Last issued in:	1.8
The SSA IAS shall maintain a certificate revocation list (CRL) which is being cross-checked online each time a certificate is used for authentication.			



Justification:	The authentication service needs to know whether a certificate is still valid before authentication can proceed.		
Comments:	This could be achieved for example by means of the OCSP protocol.		
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3811		Last issued in:	1.8
The SSA IAS shall allow revocation of certificates at any time.			
Justification:	If a registered user is no longer authorised to access the SSA system, all his currently valid certificates need to be revoked.		
Comments:			
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.2.3 Authentication using hardware tokens

SEC-SRD-3723		Last issued in:	1.8
The SSA IAS support allow authentication using compliant hardware tokens. They shall be			
<ul style="list-style-type: none"> - FIPS 140-2 compliant for access to sensitive, but unclassified information - Certified according to [AD-SEC-02] for access to classified information 			
Justification:	Certified hardware solutions are required for high security authentication.		
Comments:			
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.2.4 Identity Management

SEC-SRD-3719		Last issued in:	1.8
The SSA IAS shall be able to group registered users into logical configurable groups and maintain these groups in the identity repository.			
Justification:			
Comments:	This is a prerequisite for role-based access control.		
Source Requirements:	SEC-CRD-40		
Related Requirements:		Verification Method:	Review of Design Analysis



			Test
SEC-SRD-3807		Last issued in:	1.8
The SSA IAS shall at least manage the following logical groups of registered users: <ul style="list-style-type: none"> - SSA Operators - SSA End Users - SSA Administrators - SSA Security Officers 			
Justification:	Four main groups of registered users can already be identified and the SSA IAS must be able to handle them.		
Comments:	The listed groups of registered users are currently foreseen. Other groups may be added during the future definition of the SSA system.		
Source Requirements:	SEC-CRD-27 SEC-CRD-3573		
Related Requirements:		Verification Method:	Review of Design Analysis Test
SEC-SRD-3721		Last issued in:	1.8
The SSA IAS shall be able to store user identity information in the identity repository. The exact information to be stored as part of a user's identity information shall be configurable for each authentication level.			
Justification:	More secure authentication systems require more identity information to be present in order to guarantee secure authentication.		
Comments:	The exact information to be stored for each authentication level is TBD and will be defined at a later stage.		
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test
SEC-SRD-3725		Last issued in:	1.8
The SSA IAS shall securely store the identity information of the registered users.			
Justification:	This is required to protect the privacy of the registered users.		
Comments:			
Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test
SEC-SRD-3821		Last issued in:	1.8
The SSA IAS shall provide a registration authority for the registration of new users.			
Justification:	Registration of users is a pre-requisite for authentication & access control.		
Comments:	All operators, administrators, and security officers must be registered. End users may be able to access some SSA services without prior registration.		



Source Requirements:	SEC-CRD-25 SEC-CRD-26		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3820		Last issued in:	1.10
The SSA system shall allow read access to the identity information of a registered user only for the affected user and the System Administrator.			
Justification:	This is required to protect the privacy of the SSA users.		
Comments:			
Source Requirements:	SEC-CRD-12 SEC-CRD-13 SEC-CRD-14 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3819		Last issued in:	1.10
The system shall allow read & write access to identity information of registered users only for the registration authority and the security officer responsible for the SSA IAS.			
Justification:	This is required to protect the privacy of the SSA users.		
Comments:			
Source Requirements:	SEC-CRD-12 SEC-CRD-13 SEC-CRD-14 SEC-CRD-26		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.3 Access Control

SEC-SRD-3726		Last issued in:	1.10
The system shall only perform access control for registered users that have been successfully authenticated by the SSA IAS and whose authentication session is still active in compliance with the applicable security policy.			
Justification:	The access control procedure requires the identity of the registered user as an input parameter.		
Comments:	This implies that access control is only being performed once a registered user has been authenticated.		
Source Requirements:	SEC-CRD-18 SEC-CRD-40 SEC-CRD-46		
Related Requirements:		Verification Method:	Review of Design Analysis Test



SEC-SRD-3729		Last issued in:	1.10
The system shall immediately revoke access rights of registered users whose authentication session has been terminated or expired.			
Justification:	Without valid authentication, a user shall not have access to any SSA system or service that has access control restrictions applied.		
Comments:			
Source Requirements:	SEC-CRD-18 SEC-CRD-40		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3727		Last issued in:	1.8
The access control system shall be based on Role-Based Access Control (RBAC). The roles shall be specified by the SSA IAS.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-37		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3728		Last issued in:	1.10
The SSA access control system shall store rules, rights and roles for each registered user and group in the access control repository.			
Justification:			
Comments:	The access control repository may be co-located with the IAS repository but this is not mandatory.		
Source Requirements:	SEC-CRD-37		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3606		Last issued in:	1.8
The SSA access control system shall only provide registered users with access to the services that they are authorised to consume as specified by the applicable data policy in compliance with the applicable security policy.			
Justification:	Only authorised users shall be able access services. The access control regulations are to be laid down in the applicable data policy and SecOps.		
Comments:			
Source Requirements:	SEC-CRD-18 SEC-CRD-40 SEC-CRD-3572		
Related Requirements:		Verification Method:	Review of Design



			Analysis Test
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SEC-SRD-3854		Last issued in:	1.10
The system shall be capable of enforcing access control to all resources within the system in compliance with the applicable security policy.			
Justification:	All resources within the SSA system must be protected with access control mechanisms.		
Comments:	A resource could be a data type and/or a physical asset.		
Source Requirements:	SEC-CRD-18 SEC-CRD-40 SEC-CRD-3572		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3688		Last issued in:	1.10
The SSA security officer roles shall be defined so that no single user or user group may have a sole responsibility over the security of the system in compliance with the applicable security policy.			
Justification:	This is to ensure that the users or user groups cannot misuse their privilege without being accountable for their actions.		
Comments:			
Source Requirements:	SEC-CRD-3572		
Related Requirements:		Verification Method:	Analysis Test

3.3.2.1.4 Accounting & Logging

SEC-SRD-3646		Last issued in:	1.10
Audit logs recording registered user activities, exceptions, and information security events shall be produced by the system and kept stored for a configurable period of time.			
Justification:	This is to assist in future investigations and access control monitoring. The time period for the storage will be established following a risk assessment and will be documented in the SecOps.		
Comments:			
Source Requirements:	COM-CRD-GEN-2276 SEC-CRD-3574		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3647		Last issued in:	1.10
Any service product being prepared by the system shall be uniquely attributable to the registered user who requested that service.			
Justification:	For proper security logging, it is necessary to know which user requested which service.		
Comments:			



Source Requirements:	COM-CRD-GEN-2277 SEC-CRD-3574		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3648		Last issued in:	1.10
<p>At least, the system shall always record the following events on the auditing log:</p> <ul style="list-style-type: none"> • system and service (re)starts and faults; • user authentication processes and log-off; • creation, deletion or alteration of authentication credentials; • unsuccessful attempts to access resources; • alteration of system date/time; • all security actions, including creation, deletion or alteration of access rights; • the transmission/receipt of information between users and the system; • abnormal usage behaviour; 			
Justification:	This requirement specifies the usual events that are recorded by any logging system.		
Comments:	More logging events may be specified in the future development of the SSA system.		
Source Requirements:	SEC-CRD-3574		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3650		Last issued in:	1.10
<p>The system shall create user activity audit logs that shall include, when relevant:</p> <ul style="list-style-type: none"> • user identity; • dates, times, and details of key events, e.g. authentication and log-off; • records of successful and rejected system access attempts; • records of successful and rejected data and other resource access attempts; • use of privileges; • alarms raised by the access control system; 			
Justification:	This requirement specifies the usual activity events that are recorded by any logging system for any registered user.		
Comments:	More user activity logging events may be specified in the future development of the SSA system.		
Source Requirements:	SEC-CRD-3574		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3651		Last issued in:	1.10
The system shall protect the confidentiality and integrity of the audit logs.			
Justification:	Only security officers shall be able to access these logs. However, they shall		



	not be able to modify them.		
Comments:	The audit logs produced by the ESA SSA system may contain intrusive and confidential personal data which could compromise the privacy of the SSA users if disclosed.		
Source Requirements:	SEC-CRD-13 SEC-CRD-14		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3652		Last issued in:	1.8
Only security officers shall be able to delete any Accounting Log records. Where possible, the security officers shall not have permission to erase or de-activate logs of their own activities.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-3575		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3653		Last issued in:	1.10
The accounting information shall only be removed from any system upon completion of a successful recording into a definitive file on a computer storage media.			
Justification:	It must be ensured that no audit information is lost. It may be required at a future time for tracing a security incident.		
Comments:			
Source Requirements:	SEC-CRD-3575		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3654		Last issued in:	1.10
If accounting information cannot be recorded, the system shall automatically raise an alarm to a security officer.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-3575		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3700		Last issued in:	1.10
The system shall keep records of all suspected or actual faults, and all preventive and corrective maintenance.			



Justification:	This will help to trace sabotage events and support audits.		
Comments:			
Source Requirements:	SEC-CRD-3575		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.5 Auditing

SEC-SRD-3655		Last issued in:	1.10
The system shall ensure that the entries in the SSA IAS repository and the access control repository shall be regularly reviewed and entries updated or revoked when necessary.			
Justification:	It must be ensured that registered users who are no longer active or whose account has been revoked shall be removed from the IAS and access control system repositories.		
Comments:	The procedure and policy for reviewing the IAS entries will be documented in the applicable Security Operations Procedure document (SecOps), as specified in [AD-SEC-02].		
Source Requirements:	SEC-CRD-3575		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3657		Last issued in:	1.10
The clocks of all relevant information processing systems within the system shall be synchronized with an atomic clock server with an allowed jitter of one second.			
Justification:	Time synchronisation is a prerequisite for precise audit logs.		
Comments:	High jitter value is acceptable since it is still sufficient for audit purposes.		
Source Requirements:	SEC-CRD-31 SEC-CRD-3575		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3822		Last issued in:	1.10
The system shall perform regular audits of the need-to-know of registered users with regard to the services to which each user is currently subscribed.			
Justification:	The procedure for this requirement will be specified in the Secure Operating Procedures as required in [AD-SEC-02].		
Comments:			
Source Requirements:	SEC-CRD-31 SEC-CRD-3575		
Related Requirements:		Verification Method:	Review of Design Analysis



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SEC-SRD-3847		Last issued in:	1.10
The system shall ensure regular audits of all audit logs that are created by the system.			
Justification:	This is a prerequisite for precise audit logs.		
Comments:			
Source Requirements:	SEC-CRD-31 SEC-CRD-3575		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3882		Last issued in:	1.10
The system enforce periodic information risk assessment exercises.			
Justification:	In order to assess new and retained risks, to analyze developments and potentially incorporate lessons learnt.		
Comments:	This is required as well should there be the need for an ISO 27001 certification of the system.		
Source Requirements:	SEC-CRD-21 SEC-CRD-22		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3838		Last issued in:	1.10
The system shall ensure regular inspection of all security administration procedures and controls, including			
<ul style="list-style-type: none"> - Configuration control - Maintenance and configuration of equipment and systems - Withdrawal from service and disposal of equipment - Security education and awareness - Security incident handling and reporting 			
Justification:			
Comments:	Regular audits and inspections of all procedures and control put in place to ensure SSA security are vital.		
Source Requirements:	SEC-CRD-3575		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.6 Information and marking handling

SEC-SRD-3659		Last issued in:	1.10
Output from systems containing information that is sensitive or classified shall carry an appropriate classification label as specified in [AD-SEC-02].			
Justification:			
Comments:	Items for consideration include printed reports, screen displays, recorded		



	media (e.g. tapes, disks, CDs), electronic messages, and file transfers.		
Source Requirements:	SEC-CRD-25 SEC-CRD-3576		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3660		Last issued in:	1.10
The change of classification or need-to-know label shall be possible following specified rules laid down in the applicable security policy.			
Justification:			
Comments:	The applicable security policy will be defined in a later stage of the SSA programme.		
Source Requirements:	SEC-CRD-20 SEC-CRD-25 SEC-CRD-33 SEC-CRD-65 SEC-CRD-3576		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3661		Last issued in:	1.10
The originator/creator of classified information shall ensure that the Information Label is present and to give the correct originator/creator, classification and diffusion as specified in [AD-SEC-02].			
Justification:			
Comments:	The applicable data policy will be defined in a later stage of the SSA programme.		
Source Requirements:	SEC-CRD-25 SEC-CRD-33 SEC-CRD-3576		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3867		Last issued in:	1.10
All data used within the system shall contain a meta-data tag indicating the data's sensitivity level and required need-to-know label.			
Justification:			
Comments:	The applicable data policy will be defined in a later stage of the SSA programme.		
Source Requirements:	SEC-CRD-25 SEC-CRD-33 SEC-CRD-3576		
Related Requirements:		Verification Method:	Review of Design Analysis



			Test
SEC-SRD-3868		Last issued in:	1.10
The system shall implement effective information flow control that prevents leakage of sensitive information into unsensitive information and/ or service products.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-35 SEC-CRD-3576		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3870		Last issued in:	1.10
The system shall implement effective information flow control that prevents leakage of sensitive information to external information systems or between SSA segments.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-36 SEC-CRD-3578 SEC-CRD-3598 SEC-CRD-3612		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.7 Data Integrity

3.3.2.1.7.1 Input Validation

SEC-SRD-3670		Last issued in:	1.8
All input to and output of all SSA services shall be validated for correctness, harmlessness and meaningfulness before processing and/or distribution.			
Justification:	This ensures that no falsified, harmful, or meaningless information is produced by the SSA services and delivered to the users.		
Comments:			
Source Requirements:	SEC-CRD-21 SEC-CRD-22 SEC-CRD-3579		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3732		Last issued in:	1.8
All input from Third-Party data providers shall be validated for correctness, harmlessness and meaningfulness before processing and/or distribution.			



Justification:	This ensures that no falsified, harmful, or meaningless information is injected into the SSA system.		
Comments:			
Source Requirements:	SEC-CRD-3579		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3845		Last issued in:	1.10
All internal input to and internal output from the system shall be validated for correctness and meaningful semantics and its integrity shall be ensured.			
Justification:	This ensures that no falsified or meaningless information is injected into the SSA system components.		
Comments:			
Source Requirements:	SEC-CRD-3579		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3677		Last issued in:	1.3
The services provided by third parties (external systems) shall be regularly monitored and reviewed, and audits should be carried out regularly. In particular, it shall be reviewed whether security terms and conditions of the agreements are being adhered to, and that information security incidents and problems are managed properly.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-31 SEC-CRD-33		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3678		Last issued in:	1.10
The system shall provide tools to ensure the detection of integrity violations on information and data that is imported into the system.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-3579		
Related Requirements:		Verification Method:	Review of Design Analysis Test



3.3.2.1.7.2 Data Transfer Integrity

SEC-SRD-3733		Last issued in:	1.10
The system shall be capable of detecting integrity violations on SSA service products during transfer in compliance with the applicable security policy.			
Justification:	All recipients of SSA service products shall be able to verify the integrity of the received data.		
Comments:	This can be ensured e.g. by cryptographic hashes.		
Source Requirements:	SEC-CRD-3578 SEC-CRD-3579		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3734		Last issued in:	1.10
The system shall be capable of detecting integrity violations on service requests during transfer in compliance with the applicable security policy.			
Justification:	All SSA services that receive SSA service requests shall be able to verify the integrity of the received data.		
Comments:	This can be ensured e.g. by cryptographic hashes.		
Source Requirements:	SEC-CRD-16 SEC-CRD-3578 SEC-CRD-3579		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3739		Last issued in:	1.10
The system shall be capable of detecting integrity violations on SSA authentication session communication in compliance with the applicable security policy.			
Justification:	All communication between the SSA system and the registered users during the authentication process and the maintenance of the authentication session needs to be integrity protected.		
Comments:	This prevents "hijacking" of authentication sessions.		
Source Requirements:	SEC-CRD-3578 SEC-CRD-3579		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3793		Last issued in:	1.10
The system shall provide anti-replay protection for SSA authentication session communication in compliance with the applicable security policy.			
Justification:	All communication between the SSA system and the registered users during the authentication process and the maintenance of the authentication session needs to be protected against replay attacks.		
Comments:	This prevents replaying of authentication sessions.		
Source	SEC-CRD-3578		



Requirements:			
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3794		Last issued in:	1.10
The system shall be capable of providing anti-replay protection for any data transfer sessions if required in compliance with the applicable security policy.			
Justification:			
Comments:	In some cases, anti-replay protection is required for certain types of SSA data transfers, e.g. service requests.		
Source Requirements:	SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3856		Last issued in:	1.10
The system shall be capable of detecting integrity violations on all SSA data/meta-data that is communicated in compliance with the applicable security policy.			
Justification:	Integrity protection for all communication within the SSA system is critical.		
Comments:			
Source Requirements:	SEC-CRD-16 SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3857		Last issued in:	1.10
The system shall be capable of detecting integrity violations for all data/meta-data that is exchanged between the system and third party data providers in compliance with the applicable security policy.			
Justification:	Integrity protection for all communication between the SSA system and third party data providers is critical.		
Comments:			
Source Requirements:	SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.7.3 Data Storage Integrity

SEC-SRD-3796		Last issued in:	1.10
The system shall be capable of detecting integrity violations for stored data, including in particular raw data.			
Justification:	The integrity of raw data needs to be protected since this data forms the input to further processing and service product generation.		



Comments:	It has to be noted that the raw data storage can reach a substantial size in the range of terabytes. An efficient integrity protection mechanism is thus required.		
Source Requirements:	SEC-CRD-3579		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.8 Data Authentication

3.3.2.1.8.1 Data Transfer Authentication

SEC-SRD-3742		Last issued in:	1.8
The authenticity of SSA service products shall be ensured during transfer in compliance with the applicable security policy.			
Justification:	All users and other SSA services that receive SSA service products shall be able to verify the authenticity of the received data.		
Comments:	All end users that receive SSA service products shall be able to verify the origin of the received data. This can be ensured e.g. by cryptographic hashes.		
Source Requirements:	SEC-CRD-23 SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3743		Last issued in:	1.10
The authenticity of service requests that are received by the system shall be ensured during transfer in compliance with the applicable security policy.			
Justification:	All SSA services that receive SSA service requests shall be able to verify the authenticity of the received data.		
Comments:			
Source Requirements:	SEC-CRD-16 SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3744		Last issued in:	1.10
The system shall protect the authenticity of SSA authentication session communication in compliance with the applicable security policy.			
Justification:	All communication between the SSA system and the registered user during the authentication process and the maintenance of the authentication session needs to be authenticity protected.		
Comments:	This prevents "hijacking" of authentication sessions.		



Source Requirements:	SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3855		Last issued in:	1.8
The authenticity of all SSA data/meta-data that is communicated shall be ensured during transfer in compliance with the applicable security policy.			
Justification:	All communication between the SSA system and the registered user and within the SSA system needs to be authenticated.		
Comments:			
Source Requirements:	SEC-CRD-23 SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3858		Last issued in:	1.10
The system shall be capable of authenticating for all data/meta-data that is exchanged between the system and third party data providers in compliance with the applicable security policy.			
Justification:	All communication between the SSA system and third-party data providers shall be protected.		
Comments:			
Source Requirements:	SEC-CRD-16 SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3884		Last issued in:	1.10
The system shall be capable to ensure the authentication and authorisation of third party data providers.			
Justification:	All communication between third-party data providers and the system and shall be authenticated and authorised.		
Comments:			
Source Requirements:	SEC-CRD-16 SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.8.2 Data Non-Repudiation

SEC-SRD-3749		Last issued in:	1.10
If specified by the service, the system shall be capable to ensure non-repudiation of service requests received from the end user in compliance with the applicable security policy.			



Justification:	This ensures that users are liable for the service requests they make to the SSA system.		
Comments:			
Source Requirements:	SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3834		Last issued in:	1.10
If specified by the service, the system shall be capable to implement accounting in compliance with the applicable security policy.			
Justification:	This ensures that users are liable for the service requests they make to the SSA system.		
Comments:			
Source Requirements:	SEC-CRD-24 SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3750		Last issued in:	1.10
The system shall be capable of time-stamping data such as service products, service requests, and data received from external sources in compliance with the applicable security policy.			
Justification:	Time-stamping is required in case timeliness of data is an issue and e.g. part of a service agreement.		
Comments:			
Source Requirements:	SEC-CRD-24 SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3860		Last issued in:	1.10
The system shall be capable of ensuring non-repudiation of data/meta-data that is exchanged between the system and users as well as third-party data providers in compliance with the applicable security policy.			
Justification:	This is required in case of a service agreement that includes legal agreements or a service agreement that includes legal agreements and important for communication between the system and third-party data providers.		
Comments:	This is particularly relevant for service products delivered to the users.		
Source Requirements:	SEC-CRD-24 SEC-CRD-3578		
Related Requirements:		Verification Method:	Review of Design Analysis Test



3.3.2.1.9 Data Confidentiality

3.3.2.1.9.1 Data Storage Confidentiality

SEC-SRD-3763		Last issued in:	1.10
The system shall be able to ensure the confidentiality of data/ meta-data and service products derived from specific input data according to the publication date or distribution restrictions of that input data or until explicit authorisation from the data provider who provided the input.			
Justification:	Service providers may supply input data only under certain conditions such as: - Limited distribution (need-to-know) - No publication prior a certain publishing date		
Comments:			
Source Requirements:	SEC-CRD-11 SEC-CRD-15 SEC-CRD-3603		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.9.2 Data Transfer Confidentiality

SEC-SRD-3756		Last issued in:	1.10
The system shall be capable of ensuring the confidentiality of user-tailored service products in compliance with the applicable security policy.			
Justification:	SSA service products are often tailored specifically to the registered user who requested the service product. Thus disclosure of these service products would violate the privacy and the interests of the user.		
Comments:			
Source Requirements:	SEC-CRD-11		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3757		Last issued in:	1.10
The system shall be capable of ensuring the confidentiality of data/meta-data that is communicated by the system in compliance with the applicable security policy.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-12 SEC-CRD-16		
Related Requirements:		Verification Method:	Review of Design Analysis Test



SEC-SRD-3758		Last issued in:	1.10
The system shall be capable of protecting the confidentiality of SSA authentication session communication in compliance with the applicable security policy.			
Justification:	All communication between the SSA system and the registered user during the authentication process and the maintenance of the authentication session needs to be confidentiality protected.		
Comments:	This prevents "hijacking" of authentication sessions.		
Source Requirements:	SEC-CRD-11		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3859		Last issued in:	1.10
The system shall be capable of ensuring confidentiality for all data/meta-data that is exchanged between the system and third party data providers in compliance with the applicable security policy.			
Justification:	All communication between the SSA system and third-party data providers shall be protected.		
Comments:			
Source Requirements:	SEC-CRD-11 SEC-CRD-16		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.9.3 Privacy & Anonymity

SEC-SRD-3760		Last issued in:	1.10
The system shall restrict access to the usage statistics to authorised users.			
Justification:	This protects the anonymity of registered users.		
Comments:			
Source Requirements:	SEC-CRD-13		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3761		Last issued in:	1.10
The system shall be capable of preserving the anonymity of registered users and user service requests.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-14 SEC-CRD-19		
Related Requirements:		Verification Method:	Review of Design Analysis Test



SEC-SRD-3762		Last issued in:	1.10
The system shall be capable of preserving the anonymity of data providers.			
Justification:			
Comments:	This means that the SSA system must be capable of ensuring that a data provider's identity cannot be uncovered from the data set originating from the provider, after initial processing. This may also cover providing confidentiality only for part of the data provider information e.g. key performance indicators.		
Source Requirements:	SEC-CRD-17 SEC-CRD-45		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.10 Networks and Data Transfer

SEC-SRD-3684		Last issued in:	1.10
The system shall ensure that the confidentiality and integrity of data passing between different elements of the system over public networks or over wireless networks is ensured.			
Justification:	The SSA system is a distributed one. Communication between two SSA centres via public networks need to be protected. This requirement constitutes a minimum of data protection.		
Comments:	This can be achieved by using e.g. VPN solutions. It should be put in place in compliance to IPV6/IPSec in addition to any application layer security solutions that may be implemented at service level.		
Source Requirements:	SEC-CRD-11 SEC-CRD-16 SEC-CRD-22		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3823		Last issued in:	1.10
The system shall produce and implement secure network policies and associated procedures.			
Justification:	The SSA system is composed of a number of interconnected networks of potentially different sensitivity. It is crucial that appropriate network policies are in place to control the communication between these networks.		
Comments:	The ESA Security Regulations [AD-SEC-02] provide a basic network policy setup.		
Source Requirements:	SEC-CRD-3563		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3824		Last issued in:	1.10
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The system shall maintain the secure network policies and procedures throughout the lifetime of the system.			
Justification:	The network policies are living documentation. They need to be adapted to possible new needs of the system and its users as well as to changing environments.		
Comments:	A network security board should be in charge of the network policy management.		
Source Requirements:	SEC-CRD-3563		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.11 Business continuity

SEC-SRD-3679		Last issued in:	1.10
The system shall establish and maintain a managed process for business continuity that addresses the information security requirements.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-3557 SEC-CRD-3562 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3680		Last issued in:	1.10
The system shall establish plans to maintain or restore operations and ensure availability of information at the required level and in the required time scales following interruption to, or failure of, critical business processes.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-3579		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3681		Last issued in:	1.5
The SSA business continuity plans shall be tested and updated regularly to ensure that they are up to date and effective.			
Justification:			
Comments:			
Source Requirements:	SEC-CRD-3579		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3682		Last issued in:	1.10
The system shall ensure that back-up copies of all security relevant information and software shall be taken and tested regularly in accordance with the agreed security policy.			



Justification:			
Comments:			
Source Requirements:	SEC-CRD-3575		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3833		Last issued in:	1.10
The system shall ensure that a security agreement is put into place and maintained for each external entity (data source) that provides sensitive data as input to the system.			
Justification:	A security service agreement needs to be in place before any sensitive information can be accepted by the SSA system from external entities. This may also be part of the data policy.		
Comments:	[AD-SEC-02] and the applicable security policy describe the classification levels of the data that is handled by the SSA system. As per definition, sensitive data is always classified ESA Unclassified.		
Source Requirements:	SEC-CRD-3562		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3848		Last issued in:	1.10
The system shall put mechanisms in place to reduce the consequences of denial of service (DOS) attacks to an acceptable risk level.			
Justification:	The acceptable risk level will be determined in the context of an information risk assessment.		
Comments:	DOS attacks are the most common attacks on IT systems in open networks and the SSA system must be properly protected against those.		
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.12 Administration of Security

3.3.2.1.12.1 Configuration control

SEC-SRD-3693		Last issued in:	1.10
The system shall apply configuration control to each SSA component throughout its lifecycle.			
Justification:			
Comments:	Configuration includes software, hardware, firmware and all system documentation.		
Source Requirements:	SEC-CRD-3575		



Related Requirements:		Verification Method:	Review of Design Analysis Test
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SEC-SRD-3694		Last issued in:	1.10
All changes to any part of the system shall be proposed, approved, implemented, and recorded in accordance with the applicable System Security Requirements Specification (SSRS) or/and the Security Accreditation Strategy depending on the impact of the configuration change.			
Justification:			
Comments:	The security accreditation strategy is defined in the applicable security policy.		
Source Requirements:	SEC-CRD-3575 SEC-CRD-3598 SEC-CRD-3612		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.12.2 Maintenance of equipment and systems

SEC-SRD-3697		Last issued in:	1.5
It shall be ensured that appropriate security controls are implemented when SSA equipment is scheduled for maintenance, taking into account whether this maintenance is performed by personnel on site or external to the organization.			
Justification:			
Comments:	This means that, where necessary, sensitive information shall be cleared from the equipment or the maintenance personnel shall be sufficiently cleared.		
Source Requirements:	SEC-CRD-3575		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3691		Last issued in:	1.10
The system shall establish Security operating procedures (SecOps).			
Justification:			
Comments:	The contents and structure of the SecOps is defined in [AD-SEC-02].		
Source Requirements:	SEC-CRD-3575		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3671		Last issued in:	1.10
The system shall implement proper detection, prevention, and recovery controls to reduce the risk to SSA software systems resulting from malware to an acceptable level.			
Justification:	Protection of software systems from malware is common practise for every		



	operational software environment.		
Comments:	The acceptable level shall be defined through a risk assessment. A secure software engineering framework will help to identify proper controls. The list of controls to be implemented shall be taken from well-known sources.		
Source Requirements:	SEC-CRD-3557 SEC-CRD-3579 SEC-CRD-3592		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3672		Last issued in:	1.10
Infrastructure baseline applications used within the system shall be configured using applicable security best practices such as - ESACERT CIS-CAT toolset - TBD			
Justification:	Secure configuration of baseline infrastructure such as operating systems is required to ensure the overall security of the SSA system.		
Comments:	The precise specification of best practises to be used depends on the infrastructure baseline applications that will be used for the SSA system. Thus, it will be defined during the architectural design phase.		
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Review of Design Analysis Test

SEC-SRD-3699		Last issued in:	1.8
Only authorized maintenance personnel shall carry out repairs and service SSA equipment.			
Justification:	This ensures that no unauthorized personnel is allowed access to SSA equipment.		
Comments:			
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3701		Last issued in:	1.10
Timely information about technical vulnerabilities of system components being used shall be obtained, the vulnerabilities evaluated and appropriate measures taken to address the associated risk.			
Justification:	This is to ensure that there is no vulnerable component in the SSA system that could endanger the overall security of the system.		
Comments:			
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis



Requirements:		Method:	Test
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3.3.2.1.12.3 Withdrawal from service, disposal of equipment

SEC-SRD-3704		Last issued in:	1.8
Destruction or disposal of storage media containing sensitive or classified information shall be executed in compliance with the applicable security policy.			
Justification:	This ensures that no potentially sensitive or classified information is leaked from disposed storage media.		
Comments:			
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3706		Last issued in:	1.10
The system shall have procedures and controls to ensure that that all employees, contractors, and third-party staff working with the system shall return all of the SSA assets in their possession upon termination of their employment, contract or agreement.			
Justification:	This ensures that no SSA equipment containing potentially sensitive information is kept by personnel no longer associated with the SSA program.		
Comments:			
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3707		Last issued in:	1.10
The system shall have procedures and controls to remove the access rights of all employees, contractors, and third party staff working with the system to SSA information and information processing facilities upon termination of their employment, contract or agreement, or adjusted upon change.			
Justification:	This ensures that all personnel working with the SSA system have only access to parts of the SSA system as allowed by their current status. Upon change of this status, their rights are to be reviewed.		
Comments:			
Source Requirements:	SEC-CRD-27 SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Review of Design Analysis Test

3.3.2.1.12.4 Security education and awareness

SEC-SRD-3709		Last issued in:	1.8
It shall be ensured that all SSA personnel shall receive appropriate awareness training and regular updates in operational policies and procedures, as relevant for their roles and access rights.			



Justification:	SSA personnel need to be able to understand the operational security policies and procedures and their rationale.		
Comments:	Untrained personnel are usually more negligent with respect to security policies and procedures.		
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3710		Last issued in:	1.8
There shall be a formal disciplinary process for employees who have committed a security breach.			
Justification:	This is required to raise awareness of the consequences of committing a security breach.		
Comments:			
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

3.3.2.1.12.5 Security incident handling and reporting

SEC-SRD-3712		Last issued in:	1.8
Formal event reporting and escalation procedures shall be in place for the case of a security incident.			
Justification:	This is required to ensure prompt reaction to any security incident that may occur.		
Comments:			
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3713		Last issued in:	1.10
The system shall have a procedure to make all employees, contractors and third party staff aware of the procedures for reporting the different types of event and weaknesses that might have an impact on the security. The procedure shall personnel to report any information security events and weaknesses as quickly as possible to the designated point of contact.			
Justification:	This reduces the response time between discovery of a weakness and the capability by the SSA system to put in place appropriate mitigation actions.		
Comments:			
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3714		Last issued in:	1.8
A process of continuous improvement shall be applied to the response to, monitoring, evaluating, and overall management of information security incidents.			
Justification:	The processes and procedures related to management of security incidents need to be kept up to date and adapted to changing environments if necessary.		



Comments:			
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

3.3.2.1.13 Physical Security

SEC-SRD-3831		Last issued in:	1.10
The system shall establish and maintain physical security measures at physical SSA entities as appropriate to the applicable classification and/or sensitivity and in compliance with the applicable security policy.			
Justification:	Physical Security Measures provide perimeter protection to prevent access to sensitive SSA systems.		
Comments:	The ESA Security Regulations [AD-SEC-02] provide physical security requirements to be put in place depending on the classification of data.		
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3832		Last issued in:	1.8
The physical security measures for each physical SSA entity shall be specified in the applicable System Security Requirements Statement (SSRS).			
Justification:	Physical Security Measures provide perimeter protection to prevent access to sensitive SSA systems.		
Comments:	The ESA Security Regulations [AD-SEC-02] provide physical security requirements to be put in place depending on the classification of data.		
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

3.3.2.2 Assurance Requirements

SEC-SRD-3879		Last issued in:	1.10
The rules and procedures that govern the security functions of the SSA system shall be laid down in the security policy. The security policy, as a subset of the SSA data policy, shall be composed from the SSA PSI [AD-SEC-05], The ESA Security Regulations [AD-SEC-02], the ESA Security Directives [AD-SEC-04] and applicable SecOps by the governing authority.			
Justification:	Functional security requirements only specify the technical means to enforce security concepts. However the security policy is needed to lay down the rules how these concepts are used in the context of the SSA system.		
Comments:			
Source Requirements:	SEC-CRD-31 SEC-CRD-33 SEC-CRD-35		



	SEC-CRD-36 SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test
SEC-SRD-3766		Last issued in:	1.10
Security sensitive components of the system shall be certified according to [AD-SEC-01] if required by governance & data policy.			
Justification:	This is a pre-requisite for handling classified information and cryptographic material such as keys.		
Comments:	It should be noted that a decision for certification of certain system components shall be taken very early in the development phase since it is a time consuming process.		
Source Requirements:	SEC-CRD-3562		
Related Requirements:		Verification Method:	Analysis Test
SEC-SRD-3767		Last issued in:	1.10
The system shall be developed to be able to handle sensitive information in accordance with [AD-SEC-02].			
Justification:	The SSA system must be capable to provide appropriate protections to: <ul style="list-style-type: none"> - Classified Information according to the classification level - Unclassified, but sensitive information 		
Comments:			
Source Requirements:	SEC-CRD-3562		
Related Requirements:		Verification Method:	Analysis Test
SEC-SRD-3789		Last issued in:	1.10
The system shall be developed in compliance with [AD-SEC-02].			
Justification:	It was decided that the ESA Security Regulations are the reference for development and operation for the SSA system. They are compliant with the EC Security Regulations.		
Comments:	This compliance includes, among others, all regulations related to physical security, information security, and personnel security		
Source Requirements:	SEC-CRD-25 SEC-CRD-33 SEC-CRD-3557		
Related Requirements:		Verification Method:	Analysis Test
SEC-SRD-3806		Last issued in:	1.10
The system shall be operated in compliance with [AD-SEC-02].			
Justification:	It was decided that the ESA Security Regulations are the reference for development and operation for the SSA system. They are compliant with the EC Security Regulations.		
Comments:	This compliance includes, among others, all regulations related to physical security, information security, and personnel security		



Source Requirements:	SEC-CRD-25 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3798		Last issued in:	1.8
All SSA software development processes shall include secure software development lifecycle elements.			
Justification:	Many SSA software components are exposed to the Internet and thus subject to potential attacks. For this reason, the applications need to be developed in a secure way to ensure sufficient robustness against attacks.		
Comments:	[RD-50] provides documentation and tools for this process with regard to secure development of web applications and web services.		
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3804		Last issued in:	1.10
The system shall only use hardware items for cryptographic operations manipulating sensitive and/or information classified ESA Restricted that are certified at least FIPS 140-2 Level 2 and accredited according to the ESA Security Regulations.			
Justification:	Cryptographic hardware (e.g. for random number generation) should be sufficiently secure to be used in the context of SSA.		
Comments:	If information classified ESA Confidential or above, FIPS 140-2 Level 2 no longer the appropriate certification level. More stringent certifications need to be in place for this case.		
Source Requirements:	SEC-CRD-3557 SEC-CRD-3562 SEC-CRD-3592		
Related Requirements:		Verification Method:	Analysis Test

SEC-SRD-3863		Last issued in:	1.10
All security critical system components shall be verified by external entities in compliance with ISO 270001 [AD-SEC-03] series.			
Justification:			
Comments:	Certification of components that handle classified information shall be performed in close collaboration as the above proposed new requirement.		
Source Requirements:	SEC-CRD-3557 SEC-CRD-3592 SEC-CRD-3612		
Related Requirements:		Verification Method:	Analysis Test

3.4 Interface requirements

3.4.1 General Interface requirements

SWE-SRD-12071		Last issued in:	1.8
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Each internal or external interface in the system where there is a one-to-many flow shall include mechanisms that allow the priority to be defined, configured, and implemented.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12074		Last issued in:	1.8
For each internal or external interface in the system, the implementation shall allow the operators to reconfigure the priority handling without interrupting normal operations.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12075		Last issued in:	1.8
For each internal or external interface in the system, the implementation shall allow the active configuration of the priority handling to be readily visualised by the operations teams.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12516		Last issued in:	1.12
The system shall provide, for each service available to the end user, an application-to-application interface.			
Justification:	In order to allow users to automate their use of the system.		
Comments:	Example of possible mechanism: Web Services		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12517		Last issued in:	1.12
The SWE data shall be provided to the user by the system using mechanisms appropriate to each data type and size.			
Justification:	In order to ease the access to the data.		
Comments:	i.e. E-mail for small ASCII files, sftp for binary and large files, etc.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test



3.4.2 Space Environment Data Access

SWE-SRD-10134		Last issued in:	1.4
The SSA SWE segment shall receive SWE information from ground or space based sensors and their associated systems based on agreed SLA (periodicity, format, sources, ...)			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10135		Last issued in:	1.4
The SSA SWE segment shall receive SWE information from ground or space based sensors and their associated systems either via a web interface for user or a web interface for application.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.4.3 Space Environment Data Request

SWE-SRD-10137		Last issued in:	1.4
The SSA SWE segment shall forward to ground or space based sensors and their associated systems the requests for SWE environment information based on agreed SLA.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.4.4 Orbit & Manoeuvre Data Access

SWE-SRD-10139		Last issued in:	1.4
Based on agreed SLA, the SSA SWE segment shall receive requested information from the satellite control centre on orbits and planned or performed spacecraft manoeuvres.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



3.4.5 Satellite Housekeeping & Anomaly Data Access

SWE-SRD-10141		Last issued in:	1.12
Based on agreed SLA, the SSA SWE segment shall receive from the satellite control centres the requested information related to the satellite telemetry, overall equipment status, on-board anomalies detected.			
Justification:			
Comments:	Note that depending on satellite, this information may be received from the control centre or from the data processing centre.		
Source Requirements:			
Related Requirements:		Verification Method:	

3.4.6 Request for Segment Activity Data

SWE-SRD-10120		Last issued in:	1.4
The SSA SWE segment shall receive the 'Request for segment activity data' from the system authority and shall reply to it with a 'Segment activity data'.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10121		Last issued in:	1.7
The SSA SWE segment shall process the 'Request for segment activity data'			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.4.7 Segment Activity Data

SWE-SRD-10123		Last issued in:	1.7
The SSA SWE segment shall reply to the 'Request for segment activity data' by collecting information, assembling it and replying with a 'Segment activity data'.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-10124		Last issued in:	1.4
The SSA SWE segment shall provide a 'Segment activity data' as requested by the 'Request for segment activity data': either periodically and/or on request.			



Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

3.5 Environmental requirements

SWE-SRD-12077		Last issued in:	1.8
The design of the system shall be compliant with the REACH regulation (EC 1907/2006) without using any defence exemption.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection

SWE-SRD-12078		Last issued in:	1.8
The design of the system shall be compliant with European regulations related to electrical and electronic equipment without using the defence exemption.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection

SWE-SRD-12079		Last issued in:	1.8
The design of the system shall minimize the use of the dangerous substances identified by European regulations.			
Justification:	It is included in the CE mark process		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection

SWE-SRD-12080		Last issued in:	1.8
The design of the system shall contain no radioactive source: source containing one or several radionuclides, which emit ionizing radiation.			
Justification:	It is included in the CE mark process		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection



SWE-SRD-12081		Last issued in:	1.8
The system shall be designed to minimize energy consumption. In particular the design shall aim at using ENERGY STAR label qualified equipment or equipment with the equivalent energy consumption performances.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection
SWE-SRD-12082		Last issued in:	1.8
The design of the system shall aim at using ENERGY STAR label qualified equipment or equipment with equivalent energy consumption performances when possible.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection
SWE-SRD-12083		Last issued in:	1.8
Any system asset, including data centres and sensors, shall be compliant with the worst case environmental conditions applicable to the site where they are to be installed.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection
SWE-SRD-12084		Last issued in:	1.8
The system shall be compliant with the relevant national or EU standards and regulations concerning environmental protection (e.g. air conditioning, light, ergonomic conditions).			
Justification:			
Comments:	In case of conflicts between the relevant national and EU standards, the most stringent regulation shall apply.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis



3.6 ICT Environment Requirements

The requirements included in this section refer to the Information and Communication Technology (ICT) system of the SWE segment. The ICT typically includes the computers, software and network that are required to perform the functions of the Services, Data Processing functions and Data Acquisition processing functions. This explicitly excludes the sensor hardware.

3.6.1 General ICT Requirements

SWE-SRD-11981		Last issued in:	1.8
The system shall support the following ICT environments: - Operational - Assembly/Integration/Verification (AIV) - Development - Training			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis

SWE-SRD-11982		Last issued in:	1.8
The system shall ensure that its ICT environments shall be able to operate independently from each other.			
Justification:	In order to honor common network separation practise.		
Comments:	Operation of one environment shall not affect the operation of a different one.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-11983		Last issued in:	1.8
The operational environment shall host the operations of the system.			
Justification:	In order to have one environment only for handling the system operations.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11984		Last issued in:	1.8
The AIV environment shall allow to perform Acceptance, Validation and Integration activities as defined by the ECSS standards.			
Justification:	In order to have one environment only for handling the system Acceptance, Validation and Integration activities.		
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis

SWE-SRD-11985		Last issued in:	1.8
The AIV environment shall be representative of the operational environment.			
Justification:	In order to make sure that the AIV activities are working close to the operational environment.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis

SWE-SRD-11986		Last issued in:	1.8
The system development environment shall allow the development and maintenance of the system.			
Justification:	In order to be able to validate, integrate and accept new system components in the AIV environment and deploy them in the operational environment.		
Comments:	The objective is to have a development and AIV environments representatives of the operational environments.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis

SWE-SRD-11987		Last issued in:	1.8
The training environment shall allow to perform training activities without impact on the operational activities.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis

SWE-SRD-11988		Last issued in:	1.8
The training environment shall accept test data with the same inputs as the operational environment without unnecessary use of classified data.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test



SWE-SRD-11989		Last issued in:	1.8
The training environment shall provide capabilities that are fully representative of the operational environment.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-11990		Last issued in:	1.8
The AIV environment shall allow testing a single component by interfacing with other components of the system being either simulated or real.			
Justification:	This will allow to perform the integration of the different components of the system as well as to perform end-to-end system tests.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-11991		Last issued in:	1.8
The different ICT environments shall be capable of providing functional units that can be integrated and/or deployed at different geographical premises.			
Justification:	To support the distributed nature of the SSA system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-11992		Last issued in:	1.12
The system shall allow data interchange between the different independent ICT environments.			
Justification:	In order to ensure the possibility the transfer data between the different ICT environment.		
Comments:	This should cover different types of data transfer: real-time, deferred-time, etc.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

3.6.2 Operational Environment

The operational environment, in addition to the main objective of allowing the execution of the operations of the system, it should perform the following:

- bulk data pre-processing in order to update operational data in case it is requested by an update of an element of the system.



- qualification of the new elements to be introduced in the operational environment before their operational use.
- back-up of key elements.
- redundancy of critical elements

3.6.2.1 Bulk data reprocessing

This environment allows the bulk reprocessing of data in order to:

- 1) replace past outputs of the operational system that have been erroneously generated
- 2) replace past outputs of the operational system to align them with the current operational baseline (see requirements).

SWE-SRD-11997		Last issued in:	1.8
The operational environment shall provide bulk data reprocessing for massive reprocessing of existing data in order to replace past and still relevant outputs of the operational system.			
Justification:	In order to cope with performance requirements.		
Comments:	This should include the capability to replay operational data stored in the system in real and accelerated time.		
Source Requirements:			
Related Requirements:		Verification Method:	Test

SWE-SRD-11998		Last issued in:	1.12
The bulk data reprocessing function shall allow using different versions of any element of the system.			
Justification:	In order to ensure flexible operations.		
Comments:	By element is meant any SW/HW configuration item of the system.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11999		Last issued in:	1.8
The bulk data reprocessing function shall allow a new version of any element of the system to be installed and configured in less than one working day.			
Justification:	In order to cope with performance requirements.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test

SWE-SRD-12000		Last issued in:	1.8
The bulk data reprocessing shall have all the tools necessary to efficiently cross-compare the results of the			



reprocessing campaign with those previously produced by the operational environment.			
Justification:	In order to cope with performance requirements.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12001		Last issued in:	1.8
The bulk data reprocessing shall have the capacity to operate during the reprocessing campaign at an accelerated rate compared to the operational environment.			
Justification:	In order to cope with performance requirements.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

3.6.2.2 Qualification of new elements

The qualification environment allows new elements to be qualified prior to their deployment for operations. Qualification means that elements are run in parallel with the operational system without contributing to the outputs of the operational system. The main goal is to allow the results of the system to be compared with and without the presence of the element being qualified.

SWE-SRD-12004		Last issued in:	1.8
The operational environment shall provide an operational validation capability to allow the qualification of a new version of a given component by operating it in parallel to its existing counterpart.			
Justification:	In order to allow smooth integration of new versions of operational components.		
Comments:	Qualification is achieved by running the existing and the new version of the component in parallel until successful validation of the results produced by the new component in comparison to the existing one.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12005		Last issued in:	1.8
The operational validation capability shall allow supporting multiple versions of any element of the system.			
Justification:	In order to allow smooth integration of new versions of operational components.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



SWE-SRD-12006		Last issued in:	1.8
The operational validation capability shall allow a new version of any element of the system to be installed and configured in less than one working day.			
Justification:	In order to allow smooth integration of new versions of operational components.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test
SWE-SRD-12007		Last issued in:	1.8
The operational validation capability shall be able to switch from one version to another of any element of the system in less than two hours.			
Justification:	In order to allow smooth integration of new versions of operational components.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test
SWE-SRD-12008		Last issued in:	1.8
The operational validation capability shall have access to sufficient data sources to allow it to run in parallel to the operational system during the period of qualification.			
Justification:	In order to allow smooth integration of new versions of operational components.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test
SWE-SRD-12009		Last issued in:	1.8
The operational validation capability shall have all the access necessary to the outputs of the operational system to allow a cross-comparison to be performed.			
Justification:	In order to allow smooth integration of new versions of operational components.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test
SWE-SRD-12010		Last issued in:	1.8
The operational validation capability shall have all the tools necessary to efficiently cross-compare the results of the qualification campaign with those previously produced by the operational environment.			
Justification:	In order to ensure validation of operational output.		
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	Design Review Test

3.6.2.3 Back-up for key elements

Back-up for some key elements of the operational environment is required in order to switch the operation of such element in case a natural or man-made disaster occurs. The key elements should be identified as part of the architecture and design phase.

The back-up will allow the transfer of the operations for the key element with a short interruption of the operations.

SWE-SRD-12013		Last issued in:	1.8
The operational environment shall contain a back-up environment that serves as a back-up facility for key elements of the operational system.			
Justification:	In order to ensure backup capabilities in case of a system failure.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12014		Last issued in:	1.8
The back-up environment shall maintain the same configuration as that of the operational system.			
Justification:	In order for the back-up system to be representative of the operational system.		
Comments:	Configuration refers to the installed baseline of the elements and not to the operational data of the system.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12015		Last issued in:	1.8
The back-up environment shall be capable of fully replacing the operational environment with an interruption of service that does not exceed three working days.			
Justification:	In order to quickly recover from a failure of the operational environment.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12016		Last issued in:	1.8
The back-up environment shall have the same access to data sources as the operational environment.			
Justification:	In order for the back-up system to be representative of the operational system.		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12017		Last issued in:	1.8
The back-up environment shall be capable of running in parallel to the operational environment.			
Justification:	In order to quickly recover from a failure of the operational environment.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12018		Last issued in:	1.8
The back-up environment shall have all the access necessary to the outputs of the operational environment to allow a cross-comparison to be performed.			
Justification:	In order for the back-up system to be representative of the operational system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12019		Last issued in:	1.8
The back-up environment shall have all the tools necessary to efficiently cross-compare the results with those coming from the operational environment.			
Justification:	In order for the back-up system to be representative of the operational system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12020		Last issued in:	1.8
The back-up environment shall regularly perform a cross-comparison exercise in order to confirm that its output is fully aligned to that of the operational environment.			
Justification:	In order for the back-up system to be representative of the operational system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis



3.6.2.4 Redundancy for critical elements

Redundancy for the critical elements of the operational environment is required in order to switch the operation of such elements in case a natural or man-made disaster occurs. The critical elements should be identified as part of the architecture and design phase.

The redundancy will allow the transfer of the operations for the critical elements with no interruption of the operations.

SWE-SRD-12023		Last issued in:	1.12
The operational environment shall contain a redundancy environment for critical elements of the system.			
Justification:	In order to support continuous operations in case of a failure of a critical component.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12024		Last issued in:	1.8
The redundancy environment shall maintain the same configuration as the operational environment.			
Justification:	In order for the back-up system to be representative of the operational system.		
Comments:	Configuration refers to the installed baseline of the elements and not to the operational data of the system.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12025		Last issued in:	1.12
The redundancy environment shall be capable of fully replacing the critical elements with no interruption of services.			
Justification:	In order to support continuous operations in case of a failure of a critical component.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test

SWE-SRD-12026		Last issued in:	1.8
The redundancy environment shall have the same access to data sources as the operational environment.			
Justification:	In order for the redundancy environment to be representative of the operational system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test



SWE-SRD-12027		Last issued in:	1.8
The redundancy environment shall run in parallel (hot stand-by) to the operational system.			
Justification:	In order for the redundancy environment to be representative of the operational system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test

SWE-SRD-12028		Last issued in:	1.8
The system shall ensure that the redundancy environment and the operational environment are fully identical at any point in time of the operations.			
Justification:	In order for the redundancy environment to be representative of the operational system.		
Comments:	In order to assure that the transfer can be performed at any point of time without impact in the operations.		
Source Requirements:			
Related Requirements:		Verification Method:	Test

3.6.3 AIV Environment

Environment for the testing and validation of elements of the segment prior to their deployment in the operational system. The main goal is to detect problems within an element before they are introduced into the operational system. The element is tested and validated largely independent of other elements in the system. The AIV environment would typically be similar to what the maintainer of the element would have as their maintenance environment and would likely simulate other elements of the segment.

3.6.3.1 Environment for testing and validation

SWE-SRD-12032		Last issued in:	1.8
The AIV environment shall enable the testing and validation of elements of the system prior to their deployment in the operational environment.			
Justification:	In order to be able to validate new system elements before being deployed operational.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12033		Last issued in:	1.8
The AIV environment shall be capable of supporting multiple versions of any element of the system.			
Justification:	In order to provide for efficient testing on multiple versions of a system		



	element.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12034		Last issued in:	1.8
The AIV environment shall allow a new version of any element of the system to be installed and configured in less than one working day.			
Justification:	In order to ensure time efficient testing and validation of new system elements.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12035		Last issued in:	1.8
The AIV environment shall have access to sufficient data sources to allow it to simulate the activity of the operational environment over an extended period of time.			
Justification:	In order to test and validate new system elements in a representative environment.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12036		Last issued in:	1.8
The AIV environment shall have all the tools necessary to efficiently analyse the results and perform a comprehensive assessment.			
Justification:	In order to complete the assessment of new system elements before being introduced into the operational environment.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.6.3.2 System tests

SWE-SRD-12038		Last issued in:	1.12
The deployment of any new or updated functional block for the system shall have a two-step process: 1) Completion of the successful installation and test in the AIV environment, 2) Completion of the successful installation and test in the operational environment (operational validation).			
Justification:	In order to ensure that each new or updated functional block is sufficiently testing and evaluated before being used operationally.		
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12039		Last issued in:	1.8
The testing of any new or updated functional block for the system in the AIV environment shall be representative of the acceptance testing to be performed as part of the operational validation.			
Justification:	In order to ensure successful acceptance testing.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12040		Last issued in:	1.8
The system test shall include:			
<ul style="list-style-type: none"> • Compatibility tests whose aim is to check the two by two coupling and technical interface of any component of the system this includes on board to ground interfaces and centre to centre ground interfaces. • The Technical Qualifications test whose aim is to validate the functional behaviour of the system including: <ul style="list-style-type: none"> o System loops validation o Performance assessment o Sensors compatibility tests • System Validation tests involving the whole set of SSA entities, running long duration tests on realistic and sizing scenarios • The Operational Qualification tests whose aim is to validate the capability of the Operational teams to operate the system and to finalize the operational documentation needed to operate the system • Security Tests to verify and validate the security functions of the SSA system and to satisfy potential security assurance requirements that may be implied by a certification process 			
Justification:	In order to implement standard testing procedures.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

3.6.4 Development Environment

The development environment allows investigation and analysis of problems identified in the operational system. The main goal is to produce enough supporting information to allow someone to identify the cause of a problem.

SWE-SRD-12043		Last issued in:	1.8
The development environment shall enable investigation and analysis of problems identified in the operational environment.			
Justification:	In order to be able to investigate problems without interfering with the performance of the operational system.		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12044		Last issued in:	1.8
The development environment shall allow replaying all system processes using stored data for a configurable period of time.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12045		Last issued in:	1.8
The development environment shall be capable of supporting all previous and still relevant versions of any element of the system.			
Justification:	In order to ensure the capability to develop patches or updates also for previous versions of the system and primarily of course for the current relevant version of the system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12046		Last issued in:	1.8
The development environment shall have access to sufficient data sources to allow it to simulate the activity of the operational environment over an extended period of time.			
Justification:	In order to ensure development against a representative simulation of the operational environment.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test

SWE-SRD-12047		Last issued in:	1.12
The development environment shall have all the tools necessary to efficiently analyse the results in order to identify the problem sources.			
Justification:	In order to be able to quickly identify problem sources and mitigate their impact.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design



Requirements:		Method:	Review Test
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3.6.5 Training Environment

SWE-SRD-12049		Last issued in:	1.8
The training environment shall support the training of the operators.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test

SWE-SRD-12050		Last issued in:	1.8
The training environment shall allow a new version of any element of the segment to be installed and configured in less than one working day.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test

SWE-SRD-12051		Last issued in:	1.8
The training environment shall have access to sufficient data sources to allow it to simulate the activity of the operational environment over an extended period of time.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test

SWE-SRD-12052		Last issued in:	1.8
The training environment shall allow training sessions on different aspects of the system to be performed in parallel.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test

3.6.6 Simulators

SWE-SRD-12054		Last issued in:	1.8
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The simulators shall support the development of the system, including the AIV activities.			
Justification:			
Comments:	This implies that the simulators can be installed and configured as part of the development and AIV environments.		
Source Requirements:			
Related Requirements:		Verification Method:	Test
SWE-SRD-12055		Last issued in:	1.8
The simulators shall support the training of the operators.			
Justification:			
Comments:	This implies that the simulators can be installed and configured as part of the training environment.		
Source Requirements:			
Related Requirements:		Verification Method:	Test
SWE-SRD-12056		Last issued in:	1.8
The simulators shall support the validation of operational procedures.			
Justification:			
Comments:	This implies that the simulators can be installed and configured as part of the operational environment.		
Source Requirements:			
Related Requirements:		Verification Method:	Test
SWE-SRD-12057		Last issued in:	1.8
The ICT environment shall include simulators that allow any part of the operational system to be simulated. These include, but are not limited to, simulators for the following:			
<ul style="list-style-type: none"> • Network of ground based sensors (telescope, radar) • Network of Space-based sensors • Third Party Providers • SST segment interface simulator • SSA Governing Authority 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-12058		Last issued in:	1.8
System testing requires specific tests tool that shall be provided within the frame of the SSA system:			



<ul style="list-style-type: none"> • Sensor simulators shall allow to execute on-board software and simulate the behaviour of the sensors. in their flight environment. It shall be interfaced with the command and control centre. • Sensor/satellite suitcase shall be representative of the sensors (satellites) TM/TC subsystem and allow to execute compatibility tests with the ground stations. • Mission simulators shall be representative of the mission planning process and shall to execute resource sharing tests between the shareholders of programming rights. 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

3.7 Operational Requirements

SWE-SRD-9556		Last issued in:	1.4
The SSA SWE segment shall be operated according to the applicable documents on data governance and cooperation (part of the data policy).			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-9561		Last issued in:	1.4
The SSA SWE segment shall be able to be operated by dedicated personnel, allowing support from external personnel in case some services are outsourced.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12086		Last issued in:	1.8
The system shall have a reduced direct human intervention in the data processing for the sake of rapidity of execution, reliability and repeatability of the results.			
Justification:	Large quantity of data to be processed daily.		
Comments:	Human supervision of the output is always foreseen: human intervention is needed only when error messages are prompted and/or unrealistic results are obtained		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12087		Last issued in:	1.8
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The permanent manpower required to operate the system shall be minimised by optimisation of automatic procedures implementation.			
Justification:	In order to save resources needed for the operation of the system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12088		Last issued in:	1.8
The monitoring information to be generated by the system components shall be configurable.			
Justification:	The operator should be able to configure the monitoring information.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12089		Last issued in:	1.8
All operations and local displays within the system shall be referred to UTC time.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12090		Last issued in:	1.12
The system shall provide periodic reports to the operators on the integrity of its services and its data and products.			
Justification:			
Comments:	For this requirement, integrity is related to the overall integrity of the system at a given time.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12091		Last issued in:	1.8
The system shall generate the reports on operator's demand and periodically.			
Justification:	In order to ensure availability of reports.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test



SWE-SRD-12092		Last issued in:	1.8
The system shall be capable of generating visual and audio alarms to the operator in case an alarm is generated within one segment. The criticality level of the alarms and alarm categories shall be configurable by the user.			
Justification:	Operator need to be warned of alarms.		
Comments:	It should also be possible to disable alarms if deemed necessary.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12093		Last issued in:	1.12
English shall be the official language of all communication within the system.			
Justification:	In order to ensure language consistency across the system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12094		Last issued in:	1.8
All operational staff for the system shall be trained and fully qualified to perform the tasks assigned to them.			
Justification:	In order to ensure efficient operation of the system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12095		Last issued in:	1.8
All operational staff for the system shall have the necessary security clearance to perform the tasks assigned to them.			
Justification:	In order to ensure efficient operation of the classified parts of the system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12096		Last issued in:	1.8
The system shall allow to the operator to request the modification of the configuration of any element of the system.			
Justification:	In order to ensure the flexibility of the system in terms of configuration.		
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review Test
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3.8 Human Computer Interface requirements

SWE-SRD-12108		Last issued in:	1.8
Each element of the system shall include one or more HMIs which present process data to a human operator and through which the human operator fully controls and monitors the process.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12109		Last issued in:	1.8
Each HMI shall present information to the human operator graphically in the form of a mimic diagram such that the operator can see a schematic representation of the process being controlled and monitored.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12110		Last issued in:	1.8
Each HMI shall allow quick access to reference, help, and training materials.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12111		Last issued in:	1.8
Each HMI shall incorporate role based access to information and functionality (eg. for example, the administrator role could change the configuration and see the status of a system via the HMI whereas the operator role could only see the status of a system).			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test



3.9 Integrated logistics support requirements

The system will need to put in place the appropriate integrated logistics support for the relevant phase in its lifecycle (ie. specification, design, validation, operation). At this time, no requirements in this area have been identified.

3.10 Product assurance requirements

3.10.1 Safety requirements

The following failure effect severity categories for safety shall be used in the analysis of SWE system failure modes.

Rationale: Safety shall be understood as safety related to the operation of the SWE system and not to the end use of its services.

Catastrophic (Level 1)	Critical (Level 2)	Major (Level 3)	Minor/Negligible (Level 4)
Loss of life, life permanently disabling injury or occupational illness; Loss of system; Severe detrimental environmental effects.	Temporarily disabling but not lifethreatening injury, or temporary occupational illness; Major damage to ground facilities; Major damage to public or private property; Major detrimental environmental effects.	N/A	N/A

Table TBD - Failure effect severity categories for safety

SWE-SRD-12869		Last issued in:	1.12
No combination of two independent SWE system failures or operator errors shall have catastrophic safety consequences.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection
SWE-SRD-12870		Last issued in:	1.12
No single SWE system failure or single operator error shall have critical or catastrophic safety consequences.			
Justification:			
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection

SWE-SRD-12122		Last issued in:	1.8
All electrical devices that are part of the system shall be certified and labelled with a “CE” marking.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection

SWE-SRD-12123		Last issued in:	1.8
The system shall ensure that all physical assets shall be certified and labelled with a “CE” marking.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection

SWE-SRD-12124		Last issued in:	1.8
The design, the development and operation of the System as well as each of its components shall follow the safety standards applicable to their centres (ESA or local/national regulations) as well as the EU standards and laws, whichever is more stringent.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection

SWE-SRD-12125		Last issued in:	1.8
The system development and its operations shall comply with the safety regulations and standards that are applicable to its centres (e.g. ESA, EU, National, precedence rules).			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection

SWE-SRD-12126		Last issued in:	1.8
All radiating components and their shelters, housings and sites shall follow the applicable national and EU laws and regulations whichever are more stringent.			
Justification:			
Comments:	Physical assets are assets that are actually manufactured. This excludes assets such as software systems, expertise, or people.		



Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection

SWE-SRD-12127		Last issued in:	1.8
The system shall define and implement its own safety procedures for nominal and contingency operations.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Inspection

3.10.2 Maintainability & Availability

3.10.2.1 General

SWE-SRD-9562		Last issued in:	1.12
The operational availability of the SSA SWE system shall be such that all SWE service availability requirements are met.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12863		Last issued in:	1.12
The maximum contiguous downtime of the SSA SWE system shall be such that all required maximum contiguous downtimes of SWE services are met.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-11837		Last issued in:	1.12
The operational availability of the SSA network of sensors shall be such that all SWE service availability requirements are met.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-12864		Last issued in:	1.12
The maximum contiguous downtime of the SSA SWE network of sensors shall be such that all required maximum contiguous downtimes of SWE services are met.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-9563		Last issued in:	1.12
The operational availability of the SSA SWE Data Centre shall be such that all SWE service availability requirements are met.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12865		Last issued in:	1.12
The maximum contiguous downtime of the SSA SWE Data Centre shall be such that all required maximum contiguous downtimes of SWE services are met.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-9567		Last issued in:	1.12
The operational availability of the SSA SWE Service Centre shall be such that all SWE service availability requirements are met.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12866		Last issued in:	1.12
The maximum contiguous downtime of the SSA SWE Service Centre shall be such that all required maximum contiguous downtimes of SWE services are met.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	



SWE-SRD-9564		Last issued in:	1.12
In case of foreseen downtime of an element of the system, the SSA SWE system shall provide the means to inform the customers 5 days in advance.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12129		Last issued in:	1.12
It shall be possible to repair, replace or to upgrade any element of the system without interruption of service provision.			
Justification:	Maintenance or upgrade activities must not impact on normal operation.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis Test

SWE-SRD-12130		Last issued in:	1.12
All the elements of the system shall be designed in a modular way such that it is possible to repair, replace, or upgrade them without affecting the full system.			
Justification:	Modularity helps ensure maintenance will not affect the full element.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis Test

SWE-SRD-12131		Last issued in:	1.8
Each subsystem and asset of the system shall provide test ports and tools allowing monitoring of parameters at any moment, without affecting nominal operations.			
Justification:	This is necessary for AIV and troubleshooting activities.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12132		Last issued in:	1.8
Each subsystem and asset of the system shall log all information that allow to identify the source of errors.			
Justification:	This is necessary for AIV and troubleshooting activities.		
Comments:			
Source			



Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis Test

SWE-SRD-12133		Last issued in:	1.12
The system shall define a maintenance policy including, but not limited to, the number of spares required, location, preventive/corrective maintenance actions and procedures to meet all SWE service availability requirements.			
Justification:	As required by the objective of ensuring maintainability through selection of long-term maintainable components.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12134		Last issued in:	1.8
The subsystems and assets of the system shall be maintainable throughout the lifetime of the service that they are providing.			
Justification:	This is necessary to meet the requirement of having an overall SSA system that can be maintained during its service lifetime.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12135		Last issued in:	1.8
The system shall be able to perform its functionality independently of the availability of the other segments within the SSA.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis

SWE-SRD-12136		Last issued in:	1.8
Adding new functions, services, sensors and external systems shall be managed globally with system parameters reconfiguring the system in order to accept in an easy way the new element.			
Justification:	This requirement is needed in order to ensure the overall SSA system can be maintained through its service lifetime.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



			Analysis
SWE-SRD-12137		Last issued in:	1.12
It shall be possible to upgrade the hardware and update the software of any operational element while still meeting all SWE service availability requirements.			
Justification:	The maintenance of the system should not impact the provision of the services specified in the present document.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis Test
SWE-SRD-12138		Last issued in:	1.8
The system shall be able to cope with changes in data formats of external user products.			
Justification:	The ability to cope with new customer data formats is needed for meeting the specified lifetime of the system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis Test
SWE-SRD-12139		Last issued in:	1.8
It shall be possible to integrate new parts to / remove parts from the system without affecting the operational use of the available parts (growth capability).			
Justification:	Growth capability is necessary for the system to meet its system life goals. The possibility to add or remove parts without affecting operational use is driven by the need to minimise offline time.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis Test
SWE-SRD-12140		Last issued in:	1.8
It shall be possible to open / close the access to external systems (e.g. sensors, external systems) without affecting the operational use of the available parts.			
Justification:	The ability to open/close access to external system without affecting operational use is driven by the need to minimise offline time as well as system maintainability.		
Comments:			
Source Requirements:			



Related Requirements:		Verification Method:	Design Review Analysis Test
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SWE-SRD-12141		Last issued in:	1.8
Without hampering the operational use, the system shall: <ul style="list-style-type: none"> - Provide training and courses for new functionalities; - Provide training tools to optimise the overall use of the SSA system; - Supply all operators with updated documentation. 			
Justification:	This requirement is a by-product of the need to accommodate new functionalities, which in turn is driven by the need for maintainability over an extended lifetime.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12142		Last issued in:	1.12
The system shall adopt/define standards to manipulate the sensors systems data and in particular use a single reference and time frame to facilitate the exchange of data within the own system.			
Justification:	In order to ensure synchronisation of the data received from different sensors.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12143		Last issued in:	1.12
The system shall adopt/define data interface standards to facilitate interoperability.			
Justification:			
Comments:	Any adoptions/deviations/extensions of data interface standards shall also be proposed to the relevant standardisation organisations, in order to maintain interoperability across the boundaries of the ESA SSA system. In case new data interface types are identified where no standard exist yet, these shall also be proposed as new standards.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis

SWE-SRD-12144		Last issued in:	1.8
The unavailability of any element of the system shall not lead to the unavailability of any other element of the system.			
Justification:	In order to ensure that a failure of one part of the system will not lead to a failure of the complete system.		



Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis

SWE-SRD-12145		Last issued in:	1.8
All hardware elements of the system shall be subject to an on-going maintenance agreement with a certified provider. Maintenance shall cover the following types: Corrective (fixing latent errors or failures including temporary patches and work-arounds), Adaptive (responding to external changes), and Preventative (improves future maintainability).			
Justification:	In order to ensure flawless operation of all hardware elements in the system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis

SWE-SRD-12146		Last issued in:	1.8
All software elements of the system shall be subject to an on-going maintenance agreement with a certified provider. Maintenance shall cover the following types: Corrective (fixing latent errors including temporary patches and work-arounds), Adaptive (responding to external changes), Perfective (improving the as-delivered software to address) and Preventative (improves future maintainability).			
Justification:	In order to ensure flawless operation of all software elements in the system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis

3.10.2.2 Service Criticality

This section describes the different failure effect severity categories for dependability applicable to the system. The following definitions are of applicability:

- Mission Critical Service: Service whose unavailability and/or downtime may result in not meeting the segment's mission goals.
- Non Critical Service: Service whose unavailability or downtime will not impact the segment's mission goals.

The terms downtime used above is defined as the period of time when the system/service is unavailable as a result of failure, malfunction, corrective maintenance, preventive maintenance, and/or logistic/administrative delays.

	Catastrophic	Critical	Major	Minor/Negligible
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	(Level 1)	(Level 2)	(Level 3)	(Level 4)
Mission Critical Services	Failure propagation (for analyses lower than SWE system level)	Loss of service	Major service degradation	Minor service degradation
Non-Critical Services	N/A	Failure propagation (for analyses lower than SWE system level)	Loss of service	Major service degradation

Table x - Failure effect severity categories for dependability

No single SWE system failure or single operator error shall have critical or catastrophic dependability consequences.

SWE-SRD-12706		Last issued in:	1.12
No single SWE system failure or single operator error shall have critical or catastrophic dependability consequences.			
Justification:	As requested by the customer requirements document.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Inspection

SWE-SRD-12862		Last issued in:	1.12
Service criticality shall be defined in accordance with table X (TBC).			
Justification:	As requested by the customer requirements document.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Inspection

Service Name	Criticality	Notes
Environment Specification: Data Archive	Non-critical	
Environment Specification: In Orbit Verification	Non-critical	
Post Event Analysis	Non-critical	
In Orbit Environment and Effects Monitoring	Mission critical	
Post Event Analysis	Mission critical	
In-orbit Environment and Effects Forecast	Mission critical	
Mission Risk Analysis	Non-critical	



In-flight Crew Radiation Exposure	Mission critical	
Cumulative Crew Radiation Exposure	Non-critical	
Increased Crew Radiation Exposure Risk	Non-critical	
In-flight Monitoring of Radiation Effects in Sensitive Electronics	Mission critical	Service is mission critical during launch campaigns.
Estimate of Radiation Effects in Sensitive Electronics	Non-critical	
Forecast of Radiation Storms	Mission critical	Service is mission critical during launch campaigns.
Atmospheric Density Forecast	Mission critical	Service is mission critical during launch campaigns.
Risk Estimate of Service Disruption Caused by Ionospheric Scintillations	Mission critical	Service is mission critical during launch campaigns.
Risk Estimate of Microparticle Impacts	Mission critical	Service is mission critical during launch campaigns.
Near-Real Time TEC Maps	Mission critical	
Forecast TEC Maps	Mission critical	
Quality Assessment of Ionospheric Correction	Mission critical	
Near-Real Time Ionospheric Scintillation Maps	Mission critical	
Monitoring and Forecast of Ionospheric Disturbances	Mission critical	
Atmospheric Estimates for Drag Calculation	Mission critical	Service is mission critical during atmospheric re-entries, not for normal orbit propagation.
Archive of Geomagnetic and Solar Indices for Drag Calculation	Non-critical	
Forecast of Geomagnetic and Solar Indices for Drag Calculation	Mission critical	Service is mission critical during atmospheric re-entries, not for normal orbit propagation.
Nowcast of Ionospheric Group Delay	Non-critical	Service is mission critical during atmospheric re-entries, not for normal orbit propagation.
Services to Power System Operators	Mission critical	
Services to Pipeline Operators	Non-critical	
Services to Airlines	Mission critical	
Services to Resource exploitation System Operators	Mission critical	
Services to Auroral Tourism Sector	Mission critical	The service for the Auroral tourism sector is critical during the tourism season roughly September - April.
Space Weather Data Archive	Non-critical	
Latest Data Service	Mission critical	
Space Weather Nowcast and Forecast Products	Mission critical	
Event Based Alarms	Mission critical	
Virtual Space Weather Modelling Service	Non-critical	
Guaranteed Data Service for Third-Party/Added-Value Service Providers	Mission critical	
Space Weather Support Material	Non-critical	



3.10.3 Applicable Standards and Regulations

SWE-SRD-12116		Last issued in:	1.8
The ECSS suite of standards shall apply during the whole system lifecycle.			
Justification:	As requested by the customer requirements document.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Inspection
SWE-SRD-12117		Last issued in:	1.8
All new ground segment operational software implemented for the system shall be developed in accordance with the ECSS-E-40 and ECSS-Q-80 standards as tailored in [AD 54], [AD 55].			
Justification:	The ECSS SW Tailorings for Ground Segment Systems have been approved for all Ground Segment software. Using this set of tailoring guidelines will reduce the documentation need for e.g. SW development in studies or prototypes.		
Comments:	When existing software has been developed according to a specific standard, its maintenance and customisation follows the same standard (PSS-05). This applies to old infrastructure SSA Programme software items.		
Source Requirements:			
Related Requirements:		Verification Method:	Inspection
SWE-SRD-12118		Last issued in:	1.8
The ECSS standard suite shall be tailored for each phase and component of the system during the architectural design phase.			
Justification:	In order to precise the applicable documents among the ECSS standards for each phase and component of the system.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Inspection
SWE-SRD-12119		Last issued in:	1.8
The Development of the system shall be done following ECSS standards tailored to the need of the program.			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12120		Last issued in:	1.12
<p>The system space-based sensors and owned spacecraft shall take into account during their design and operation the following applicable documents and regulations:</p> <ul style="list-style-type: none"> - Space Debris Mitigation for Agency Projects [AD-04]. - ISO standards tailored for space-based components [AD-05]. - National and international applicable regulations available at the time of development and operations. <p>In case of contradiction, the most stringent regulation shall apply.</p>			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.10.4 Reliability of data

SWE-SRD-11950		Last issued in:	1.8
<p>Each product made available by the system shall provide an indication of the reliability and information on the source of the data on which the product is based.</p>			
Justification:	Needed for assessment of quality of services and products		
Comments:	If possible, metadata shall follow standard recommendations, e.g. IERS for Earth Orientation Parameters.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-11948		Last issued in:	1.8
<p>In case the system is using data from external sources that cannot be checked independently (e.g. operational orbit data for planned manoeuvres), it shall flag this data and any by-product as data for which the system cannot be liable for.</p>			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test



3.11 Design requirements

3.11.1 General Design Requirements

SWE-SRD-12148		Last issued in:	1.8
The development environment shall allow a new version of any component of the system to be installed and configured in less than one working day.			
Justification:	In order to ensure efficient and timely installation of a new version of any component.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Test
SWE-SRD-12326		Last issued in:	1.8
The system shall be designed, developed, and operated in compliance with [AD-03].			
Justification:	In order to be compliant with European Standards on Space Systems Development		
Comments:	Where required, tailoring of ECSS standards such as [AD-07] and [AD-08] shall be applied.		
Source Requirements:			
Related Requirements:		Verification Method:	Test
SWE-SRD-12149		Last issued in:	1.8
The redundancy environment shall be geographically separated from the operational environment by a sufficient distance such that in the event of a single natural or man-made disaster, not more than one of the two systems would experience a significant down time.			
Justification:	In order to ensure real redundancy.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis
SWE-SRD-12150		Last issued in:	1.12
The back-up environment shall be geographically separated from the operational environment by a sufficient distance such that in the event of a single natural or man-made disaster, not more than one of the two systems would experience a significant down time.			
Justification:	In order to ensure availability of the back-up environment even after failure of the operational environment.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis



SWE-SRD-12151		Last issued in:	1.8
It shall be possible to develop, maintain and operate the system independently of any other SSA segment.			
Justification:	In order to ensure independence of the SSA segments.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12152		Last issued in:	1.8
The system design shall follow an incremental development approach.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12153		Last issued in:	1.8
During the development phase of the system sensors, the services shall be provided using data from collaborating sensors where possible.			
Justification:			
Comments:	Information from collaborating sensors may not be sufficient to provide the full set of system services. However, a reduced performance is acceptable while the system is still under development.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12154		Last issued in:	1.8
The system shall have a well-defined interface layer that allows to extend the interfaces of the system to interact with additional Third Party Providers minimising the impact on the system.			
Justification:			
Comments:	Third Party Providers are defined in [AD-11].		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12155		Last issued in:	1.8
The design and implementation of the system shall use European technology. Any deviation of this requirement shall be duly justified.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



SWE-SRD-12156		Last issued in:	1.8
Throughout its operational lifetime, each element of the system shall assure that its functions and services are compatible with both the current and all previous applicable input and output data formats.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12157		Last issued in:	1.8
A Standard Man Machine Interface (MMI) guideline shall be defined for the system, assets and subsystems for all SW products to be developed.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12158		Last issued in:	1.8
All processing elements of the system shall be located within the territory of the ESA and European member states including their non-continental extensions. System sensors may be located in non-European states if required.			
Justification:	In order to ensure European control over the system and support for European industry.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12159		Last issued in:	1.8
The system shall allow to enter as configuration the governance established by the SSA Governing Authority, expressed by the directives.			
Justification:	In order to ensure that the system is compliant with the governance directives.		
Comments:	At present time, governance is not defined in detail, but this requirement allows the system to cope with this uncertainty. The system requirements in this area will be refined as the governance specification becomes available. Directives are defined in [AD-11].		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12160		Last issued in:	1.12
The system shall allow to enter as configuration the data policy established by the SSA Governing Authority, expressed by the data policy directives.			
Justification:	In order to ensure that the system is compliant with the data policy		



	directives.		
Comments:	At present time, data policy is not defined in detail, but this requirement allows the system to cope with this uncertainty. The system requirements in this area will be refined as the data policy specification becomes available.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12161		Last issued in:	1.8
The system shall provide their own independent calibration systems or shall establish a coordination mechanism with external calibration systems.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12162		Last issued in:	1.8
The implementation of the data policy shall minimise the overhead on the user of the services and products.			
Justification:			
Comments:	From end-user perspective, minimise the constrains on accessing a service and obtaining a product.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12163		Last issued in:	1.8
The system shall be designed to ensure the traceability, the control, and the validation of all data introduced into the system.			
Justification:	In order to be able to validate which service products have been produced using which data sources (i.e. internal data sources or third-party data provider sources)		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12164		Last issued in:	1.8
The system shall allow to trace and log any change to the data policy.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis



SWE-SRD-12165		Last issued in:	1.8
The developing entity shall design the system such that it complies with the data policy directives.			
Justification:	In order to ensure compliance with data policy directives already in the design phase.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12166		Last issued in:	1.8
The implementation of the data policy shall minimise the operational overhead on the system.			
Justification:	In order to ensure efficient implementation of data policy.		
Comments:	This is to be seen as from the end-user perspective.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12167		Last issued in:	1.8
The SSA governing authority shall ensure that data policy rules apply to the development and operational phases of the system.			
Justification:			
Comments:	From end-user perspective, minimise the constrains on accessing a service and obtaining a product.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12168		Last issued in:	1.8
The system shall be designed to ensure the traceability of the mechanisms that implement and enforce the data policy.			
Justification:	In order to ensure that data policy implementations can be traced.		
Comments:	At any point in time, we should know what are the mechanism enforced in the system and where. How is the data policy designed into the system.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis

SWE-SRD-12169		Last issued in:	1.8
The system shall have the required documentation to maintain and operate it.			
Justification:	In order to ensure easy operations and maintenance using available documentation.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis



Requirements:		Method:	
SWE-SRD-9197		Last issued in:	1.8
The SWE segment shall federate capabilities of already existing systems, include functionalities currently executed by other teams and other agencies (in particular national agencies) and develop new functionalities currently not existing.			
Justification:	SSA mandate is conditional on the efficient reuse of the assets and national centres put at SSA disposal		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review
SWE-SRD-9198		Last issued in:	1.8
The federation of assets shall be manageable in a flexible and dynamic way all along the development, implementation and maintenance phases of SSA.			
Justification:	The list of assets cannot and should not be frozen during these phases.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-9199		Last issued in:	1.12
Dedicated space weather sensors and systems shall be preferred instead of shared systems with other segments.			
Justification:	This requirement is considered in relation to independence of segment architectures and is included to take into account of possible confidentiality/security constraints applying to the SST segment.		
Comments:	Requirement to be applied whenever possible.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review
SWE-SRD-12550		Last issued in:	1.12
The operation of the system shall be automated to the maximum extend possible.			
Justification:	To optimise the operation of the system and to reduce cost.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.11.2 Databases

SWE-SRD-12171		Last issued in:	1.8
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Whenever databases are implemented in the system, mechanisms and interfaces to automate the addition of new elements to the database shall be provided.			
Justification:	In order to ensure the possibility to expand databases with new elements if required.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12172		Last issued in:	1.8
The system databases shall allow: - storage of multiple values for one data field - storage of multiple instances of the same data item - storage of historical sequence of value for one field			
Justification:	In order to ensure that the implemented databases support the minimum necessary features.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12173		Last issued in:	1.8
The system databases shall be searchable according to the most common combination of logical and numerical search criteria. Simple pre-defined searches shall be provided.			
Justification:	In order to ensure that the implemented databases support the minimum necessary features.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

3.11.3 Time reference and synchronisation

SWE-SRD-12175		Last issued in:	1.8
The system shall be synchronised with UTC time.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test



SWE-SRD-12176		Last issued in:	1.8
It shall be possible to receive information from assets using different time references and to use its information by means of reference conversions.			
Justification:	It's not possible to impose reference time to external entities; by other hand, the system has to be able to handle independently of applied reference time		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12177		Last issued in:	1.8
All products resulting in the processing of information shall be time tagged in UTC time and the content shall be referred to UTC.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

3.11.4 Reference frames

SWE-SRD-12179		Last issued in:	1.8
The system shall be able to perform conversions between the system reference coordinate systems and the different coordinate systems used by interfaced external systems.			
Justification:	Interoperability need to be ensured		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12180		Last issued in:	1.8
The reference coordinate system for locations on earth for the system shall be ITRF with WGS84 as a reference for altitude.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

3.11.5 Lifetime

SWE-SRD-12182		Last issued in:	1.8
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The system functionalities shall be available over the system lifetime supposed to be 50 years.			
Justification:	This is a design assumption to allow dimensioning the system.		
Comments:	The lifetime starts with the first SSA service being operational. Other parts of the SSA system may still be under development at this point. The lifetime may still change as result of the architectural design activity.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis

3.11.6 Network design and management

SWE-SRD-12184		Last issued in:	1.12
The network infrastructure shall provide sufficient information to allow the traffic flow throughout the network to be fully administered and monitored in a centralised way.			
Justification:	In order to be able to efficiently administer and monitor the system traffic flow.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12185		Last issued in:	1.8
The design of the network infrastructure shall physically separate systems onto independent networks according to the criticality and security classification of the data moving on that network.			
Justification:	In order to implement multiple levels of security at network level.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

3.12 Verification Requirements

SWE-SRD-9201		Last issued in:	1.8
The system performance requirements shall be validated by test using first simulations, then real evaluation of the data exchanges.			
Justification:	Simulations to be used during the development phase, real test during the implementation and operation phases.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test



SWE-SRD-12187		Last issued in:	1.8
The overall objective of verification shall be to demonstrate, through a dedicated process, that the system meets the specified requirements.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12188		Last issued in:	1.8
The verification process activities shall consist of planning, execution, reporting, control and closeout and its implementation activities shall be documented by means of a specific set of verification documents as defined by ECSS standard.			
Justification:			
Comments:	The Verification Plan and the AIT Plan can be combined in one single AIV Plan (i.e. in this case VP and AIT plans do not exist anymore as single entities)		
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12189		Last issued in:	1.8
The system shall be subjected to AIV activities at increasing level of detail. At least the following level shall be considered:			
<ul style="list-style-type: none"> • Segment level • Sensor network level • Data centre level • Service centre level • Sub-system level 			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	

SWE-SRD-12190		Last issued in:	1.8
The system requirements traceability shall be verified by checking at least the following fields			
<ul style="list-style-type: none"> o Requirement identifier, o Requirement text o Levels of verification, o Methods of verification o Link to the relevant section of the verification plan and verification report o Status of Compliance (yes, no, partial), o Close-out status (open / closed), 			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	

3.13 Data Policy Requirements

SWE-SRD-10915		Last issued in:	1.12
Each SWE Service shall offer the possibility to a non-registered user to subscribe to the service if this is authorized by the Data Policy.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-10916		Last issued in:	1.12
Each SWE Service shall offer the possibility to a registered user to un-subscribe from the service.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review

SWE-SRD-12192		Last issued in:	1.8
<p>For each data type, the SSA system shall maintain at least the following meta data describing the data:</p> <ul style="list-style-type: none"> • Unique data item identifier • Type of data • Data quality/status • Physical location of data in archive • Time-tag, both source time-tag and the time-tag added on reception of the SDM • Data ownership • Experiment session identification • Sensor identification • Relation to higher level data i.e. for derived products a relation to the raw data from which the new data is created. • Data source identification • Optional user provided key/value pairs • Mission modes (OPS/SIM) • Sensing date, • keywords, • data classification/ need-to-know 			
Justification:			
Comments:	The number of attributes may differ from data type to data type, though the list represents a starting point for meta data		
Source Requirements:			
Related Requirements:		Verification Method:	Design



Requirements:		Method:	Review Analysis Test
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SWE-SRD-12193		Last issued in:	1.8
SSA segments shall configure and apply the “Data policy directives” for security as part of the security policy.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis Test

SWE-SRD-12194		Last issued in:	1.8
The security policy shall be a sub-set of the data policy.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis Test

SWE-SRD-12195		Last issued in:	1.8
The security policy shall be defined taking into account:			
a. ESA Security Regulation;			
b. Programme Security Instructions document;			
c. 3rd party data policy constrains;			
d. TBD.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis Test

SWE-SRD-12196		Last issued in:	1.8
The security policy shall be enforced by means of:			
e. System Security Requirement Statements (SSRS);			
f. Security Procedures (SecOps).			
Justification:			
Comments:			
Source Requirements:			
Related		Verification	Design



Requirements:		Method:	Review Analysis Test
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SWE-SRD-12197		Last issued in:	1.8
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The SSA security policy shall address at least the following aspects: <ul style="list-style-type: none"> a. Physical and infrastructure Security b. Data security c. Security of users, data providers and external entities d. SSA Service security e. Definition of responsibilities for data handling and data security f. Security Management g. Definition of security governance structures h. Definition of required security management documentation (e.g. CSRS/SSRS/SecOps..) i. Personnel Security Management 			
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Justification:			
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Comments:			
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Source Requirements:			
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Related Requirements:		Verification Method:	Design Review Analysis Test
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SWE-SRD-12198		Last issued in:	1.8
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The security policy shall allow for at least the following levels of security: <ul style="list-style-type: none"> a. Open; b. Controlled (i.e. for sensitive information but unclassified); c. Classified as defined in ESA Security Directives. 			
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Justification:			
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Comments:			
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Source Requirements:			
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Related Requirements:		Verification Method:	Design Review Analysis Test
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SWE-SRD-12199		Last issued in:	1.8
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The system shall allow to manage the data policy as an arborescence of sub-data policies.			
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Justification:			
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Comments:			
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Source Requirements:			
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Related Requirements:		Verification Method:	Design Review Test
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SWE-SRD-12200		Last issued in:	1.8
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The system shall allow to specify a period of time for the applicability of a classification level associated to a			
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data item (respectively data item attribute).			
Justification:			
Comments:	The period of time should be defined as a closed time interval in the form [start date and time, end-date and time] in which either time and date shall be optional. Omitted start date and time means immediate effect of the associated classification level as when the data policy becomes applicable; omitted end date and time means endless applicability of the associated classification level.		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12201		Last issued in:	1.8
The data policy directives shall be defined and approved by the governing authority.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12202		Last issued in:	1.8
The data policy shall address the civilian and dual use needs of the user community.			
Justification:	The needs of the user community shall be expressed through the SSA governing authority.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12203		Last issued in:	1.8
The governing authority shall be responsible to define and approve the civil and military needs of the system.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12204		Last issued in:	1.8
The data policy shall establish the rules for the acquisition of, production, access to, dissemination and use of the various data types managed by the system.			
Justification:			
Comments:			



Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12205		Last issued in:	1.8
The data policy shall comply with EU applicable regulations on privacy and personal data protection			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12206		Last issued in:	1.8
The data policy shall comply with applicable regulations on privacy and personal data protection of the country in which the system is operated.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12207		Last issued in:	1.8
The data policy shall cover the whole life cycle of the system including the development, maintenance, operation and retirement phases.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12208		Last issued in:	1.8
The data policy shall define the liability boundaries of the operating entity with respect to the provision of services and products.			
Justification:	Liability is a critical aspect of the system. Furthermore, liability information must be communicated as part of the data policy related attributes of service product data.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review



			Test
SWE-SRD-12209		Last issued in:	1.8
The data policy shall define the liability boundaries of the SSA governing authority with respect to the provision of services and products.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-12210		Last issued in:	1.8
The data policy shall define the liability boundaries of the developing entity with respect to the provision of services and products.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-12211		Last issued in:	1.8
The data policy shall define the thresholds for identified security risks to decide whether risks shall be mitigated or be accepted.			
Justification:	Periodic information risk assessments are executed and may uncover new risks or risks with a changing acceptability threshold.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-12212		Last issued in:	1.8
The data policy shall establish rules and procedures for the interaction and data exchange with any Third Party Provider.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test
SWE-SRD-12213		Last issued in:	1.8
The data policy shall establish rules and procedures for the interaction between the SSA governing authority, operating entity, any third party provider and the developing entity.			



Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12214		Last issued in:	1.8
The data policy shall establish rules and procedures for the interaction between the entities participating to the SSA governing authority.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12215		Last issued in:	1.8
The data policy shall establish charging model and condition for the products and services.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12216		Last issued in:	1.8
The data policy shall establish the end-user license terms and conditions that shall be applicable to the data and service provision.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12217		Last issued in:	1.8
The end-user license terms and conditions shall address the liability of both, the operating entity and the end-user.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test



SWE-SRD-12218		Last issued in:	1.8
The end-user license terms and conditions shall address the conditions for the end-user use of the data including but not limited to commercialisation of the product or derived products.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12219		Last issued in:	1.8
The data policy shall define the data interchange standards to be used within the system as well as between the system and third party providers.			
Justification:	The system is distributed. It requires interaction between different components and systems. A well-established set of interoperability standards is required in order to ensure smooth integration of all these components.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12220		Last issued in:	1.8
The data policy shall mandate, during the whole life cycle of the system, periodical information risk assessments according to well established and recognised standards.			
Justification:	This is according to the iterative principle for risk assessment.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12221		Last issued in:	1.8
The data policy shall mandate, during the whole life cycle of the system, every time the system's requirements, design, implementation or environment changes information risk assessments according to well established and recognised standards.			
Justification:	This is according to the iterative principle for risk assessment.		
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12222		Last issued in:	1.8
The data policy shall ensure that all components that process classified information are not taken into			



operation before a security accreditation has been granted by the SSA governing authority or any other authorised entity (defined as part of the governance).			
Justification:			
Comments:	In many cases National Security Authorities are also required to grant a security accreditation before the system can be taken into operation		
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12223		Last issued in:	1.8
The data policy shall address the handling of commercially sensitive third party or end-user data.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12224		Last issued in:	1.8
The data policy shall implement a capability to enforce non-repudiation for products that are distributed by the system.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12225		Last issued in:	1.8
The system shall implement a capability to enforce non-repudiation for data that is received from third-party data providers and end-users.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12226		Last issued in:	1.8
Each product/service provided by the system shall have its associated data policy defined and approved by the SSA Governing Authority.			
Justification:			
Comments:	Unless the data policy has been established, the product/service cannot be provided during the operations of the system.		
Source			



Requirements:			
Related Requirements:		Verification Method:	Design Review Test

SWE-SRD-12227		Last issued in:	1.8
Data policy shall take into account data policy coming from Third Parties.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Design Review Analysis Test

SWE-SRD-12228		Last issued in:	1.12
The data policy shall take into account the SLAs established with Third Party Providers.			
Justification:			
Comments:	This means that the system should guarantee that the SLAs applicable to the system (when interfacing to Third Party Providers) are correctly applied and should monitor its application.		
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12229		Last issued in:	1.8
The SLAs established with Third Party Providers shall be approved by the SSA Governing Authority.			
Justification:			
Comments:			
Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test

SWE-SRD-12230		Last issued in:	1.8
The Data Policy shall address the following data types: - Sensor Data - Third Party Data - Intermediate Data - System Control Data - System Metric Data - System Usage Data - User Data - Product Data - Management Data - Development/Maintenance Data			
Justification:			
Comments:	The list of data types provided in this requirement is in line with [AD-11].		



Source Requirements:			
Related Requirements:		Verification Method:	Analysis Test



4 ANNEX A - PRODUCTS DESCRIPTION

This annex contains a textual description of the Products to be generated by the SWE segment of the SSA.

The content of the annex has been included in [AD-09].



5 ANNEX B - TRACEABILITY MATRIX

This annex contains traceability between the SSA Customer Requirements and this System Requirements Document.

The content of the annex has been included in [AD-11].



6 ANNEX C - LIST OF CHANGE REQUESTS

The present version of the document implements the approved change requests (CR) listed thereunder resulting from the CO-II RR under the Astrium contract.

The complete description of each of these CR is available in IBM Change Management system database named ssaco2_r.

RID No.	Title	Document
ssaco2_r#10	incomplete list of spacecraft effects	SWE SRD 1.3
ssaco2_r#101	Definition of SWE System and its Components	SWE SRD 1.3
ssaco2_r#102	SLA	SWE SRD 1.3
ssaco2_r#103	Interface Requirements	SWE SRD 1.3
ssaco2_r#11	Use of environment and effects models	SWE SRD 1.3
ssaco2_r#113	Service Data Policy Enforcement: Repetition	SWE SRD 1.3
ssaco2_r#114	Service Handle Service Requests: Repetition	SWE SRD 1.3
ssaco2_r#115	Service Deliver Products / Tools / Reports: Repetition	SWE SRD 1.3
ssaco2_r#116	Service Deliver Products / Tools / Reports: Repetition	SWE SRD 1.3
ssaco2_r#117	Service Subscribe / Un-subscribe to Service: Repetition	SWE SRD 1.3
ssaco2_r#12	surface effects not included	SWE SRD 1.3
ssaco2_r#120	Service Deliver Products / Tools / Reports: Repetition	SWE SRD 1.3
ssaco2_r#121	Service Handle Service Requests: Repetition	SWE SRD 1.3
ssaco2_r#122	Add Definition for 'Data Policy'	SWE SRD 1.3
ssaco2_r#123	Refer consistently to 'Data Policy'	SWE SRD 1.3
ssaco2_r#124	SST Segment Request for SWE Data and Products	SWE SRD 1.3
ssaco2_r#125	Service Coordination Requirements	SWE SRD 1.3
ssaco2_r#126	General Design Requirements	SWE SRD 1.3
ssaco2_r#127	General Design Requirements	SWE SRD 1.3
ssaco2_r#129	Archiving	SWE SRD 1.3
ssaco2_r#13	list of measurements too long	SWE SRD 1.3
ssaco2_r#14	data policy	SWE SRD 1.3
ssaco2_r#15	typo	SWE SRD 1.3
ssaco2_r#216	RAMS requirements of SWE segment	SWE SRD 1.3
ssaco2_r#295	Wrong AD References	SWE SRD 1.3
ssaco2_r#302	SWE: Reports for SSA Governing Authority	SWE SRD 1.3
ssaco2_r#306	SWE Traceability Matrix to Appendix	SWE SRD 1.3
ssaco2_r#308	SWE: Applicable Documents Organisation	SWE SRD 1.3
ssaco2_r#454	Update SWE SRD to include links to the new event based alert (AL-021-N) as part of Service 8-4 (Gen Data) and 7-3 (aviation)	SWE SRD 1.3
ssaco2_r#5	SEP monitoring should be done outside the magnetosphere or at least not below GEO	SWE SRD 1.3
ssaco2_r#6	"Service 1-1 shall provide the data products, tools ..."	SWE SRD 1.3
ssaco2_r#7	"shall deliver tools"	SWE SRD 1.3
ssaco2_r#8	Alerts via web services	SWE SRD 1.3
ssaco2_r#9	Incomplete specification	SWE SRD 1.3



RID No.	Title	Document
ssaco2_r#96	Data from Existing SWE Instruments	SWE SRD 1.3
ssaco2_r#98	Definition of Measurement Requirements	SWE SRD 1.3
ssaco2_r#99	Physical Models for Processing the Observation Data	SWE SRD 1.3
ssaco2_r#2	Wrong statement for unregistered users	SWE SRD 1.3
ssaco2_r#274	SEC-CRD-21, SEC-CRD-22: Regular Risk Assessment Activities	SWE SRD 1.3
ssaco2_r#276	External Data Policy and Governance Authorities	SWE SRD 1.3
ssaco2_r#277	Consistent use of term "The System"	SWE SRD 1.3
ssaco2_r#278	Distribution of cryptographic keys	SWE SRD 1.3
ssaco2_r#279	SEC-SRD-3717: SSA IAS, Independence of segments	SWE SRD 1.3
ssaco2_r#280	SEC-SRD-3820: access of user profile information	SWE SRD 1.3
ssaco2_r#281	SEC-SRD-3854: access control to all resources	SWE SRD 1.3
ssaco2_r#282	SEC-SRD-3728: Storage of User/Group/Role information	SWE SRD 1.3
ssaco2_r#283	SEC-SRD-3747 and SEC-SRD-3860: ensuring non-repudiation of data/meta-data	SWE SRD 1.3
ssaco2_r#284	SEC-SRD-3858: authentication of 3rd party provider	SWE SRD 1.3
ssaco2_r#285	Missing Performance Requirements	SWE SRD 1.3
ssaco2_r#286	SEC-SRD-3757: confidentiality of data/meta-data not applicable to NEO	SWE SRD 1.3
ssaco2_r#287	SEC-SRD-3879: Security Policy not applicable to NEO	SWE SRD 1.3
ssaco2_r#288	SEC-SRD-3766: Certification of security sensitive components not applicable to NEO	SWE SRD 1.3
ssaco2_r#297	Standard for VPN	SWE SRD 1.3
ssaco2_r#3	Double mentioning of SSA systems in requirement	SWE SRD 1.3
ssaco2_r#300	SEC-CRD-3576: Incomplete coverage to this requirement from SRD's	SWE SRD 1.3
ssaco2_r#128	Archives and a Posteriori Reconstruction	SWE PSD 1.2
ssaco2_r#130	Proposed updates to IT-001-P Vertical Total Electron Content Map - Archive	SWE PSD 1.2
ssaco2_r#131	Proposed updates to IT-001-N Vertical Total Electron Content Map - Nowcast	SWE PSD 1.2
ssaco2_r#132	Proposed updates to IT-001-F Vertical Total Electron Content Map - Forecast	SWE PSD 1.2
ssaco2_r#133	Proposed updates to IT-002-M 3D Electron Density Grids - Measurements	SWE PSD 1.2
ssaco2_r#134	Proposed updates to IT-002-P 3D Electron Density Grids - Archive	SWE PSD 1.2
ssaco2_r#135	Proposed updates to IT-002-N 3D Electron Density Grids - Nowcast	SWE PSD 1.2
ssaco2_r#136	Proposed updates to IT-002-F 3D Electron Density Grids - Forecast	SWE PSD 1.2
ssaco2_r#137	Proposed updates to IT-005-M URSI Ionospheric Parameters - Measurements	SWE PSD 1.2
ssaco2_r#138	Proposed updates to IT-005-P URSI Ionospheric Parameters - Archive	SWE PSD 1.2
ssaco2_r#139	Proposed updates to IT-005-N URSI Ionospheric Parameters - Nowcast	SWE PSD 1.2
ssaco2_r#140	Proposed updates to IT-006-M Riometer Data - Measurement	SWE PSD 1.2
ssaco2_r#141	Proposed updates to IT-007-M Neutral Density in Thermosphere - Measurement	SWE PSD 1.2
ssaco2_r#142	Proposed updates to IT-007-P Neutral Density in Thermosphere - Archive	SWE PSD 1.2
ssaco2_r#143	Proposed updates to IT-007-N Neutral Density in Thermosphere - Nowcast	SWE PSD 1.2
ssaco2_r#144	Proposed updates to IT-007-F Neutral Density in Thermosphere - Forecast	SWE PSD 1.2
ssaco2_r#145	Proposed updates to IT-008-M Neutral Wind Velocity in Thermosphere -	SWE PSD 1.2



RID No.	Title	Document
	Measurement	
ssaco2_r#146	Proposed updates to IT-008-P Neutral Wind Velocity in Thermosphere - Archive	SWE PSD 1.2
ssaco2_r#147	Proposed updates to IT-008-N Neutral Wind Velocity in Thermosphere - Nowcast	SWE PSD 1.2
ssaco2_r#148	Proposed updates to IT-008-F Neutral Wind Velocity in Thermosphere - Forecast	SWE PSD 1.2
ssaco2_r#149	Proposed updates to IT-009-M Scintillation Parameters - Measurements	SWE PSD 1.2
ssaco2_r#150	Proposed updates to IT-009-P Scintillation Parameters - Archive	SWE PSD 1.2
ssaco2_r#151	Proposed updates to IT-009-N Scintillation Parameters - Nowcast	SWE PSD 1.2
ssaco2_r#152	Proposed updates to IT-009-F Scintillation Parameters - Forecast	SWE PSD 1.2
ssaco2_r#153	Proposed updates to IT-010-M Atomic Oxygen Density - Measurements	SWE PSD 1.2
ssaco2_r#154	Proposed updates to IT-010-P Atomic Oxygen Density - Archive	SWE PSD 1.2
ssaco2_r#155	Proposed updates to IT-011-P Ionospheric Disturbances - Archive	SWE PSD 1.2
ssaco2_r#156	Proposed updates to IT-011-N Ionospheric Disturbances - Nowcast	SWE PSD 1.2
ssaco2_r#157	Proposed updates to IT-011-F Ionospheric Disturbances - Forecast	SWE PSD 1.2
ssaco2_r#158	Proposed updates to AG-001-P Auroral Visible Imaging - Archive	SWE PSD 1.2
ssaco2_r#159	Proposed updates to AG-001-M Auroral Visible Imaging - Measurements	SWE PSD 1.2
ssaco2_r#16	use of F10.7	SWE PSD 1.2
ssaco2_r#160	Proposed updates to AG-001-N Auroral Visible Imaging - Nowcast	SWE PSD 1.2
ssaco2_r#161	Proposed updates to AG-001-F Auroral Visible Imaging - Forecast	SWE PSD 1.2
ssaco2_r#162	Proposed updates to AG-002-P Auroral UV Imaging - Archives	SWE PSD 1.2
ssaco2_r#163	Proposed updates to AG-002-M Auroral UV Imaging - Measurements	SWE PSD 1.2
ssaco2_r#164	Proposed updates to AG-002-N Auroral UV Imaging - Nowcast	SWE PSD 1.2
ssaco2_r#165	Proposed updates to AG-005-P Local External Magnetic Field on Ground - Archives	SWE PSD 1.2
ssaco2_r#166	Proposed updates to AG-005-M Local External Magnetic Field on Ground - Measurements	SWE PSD 1.2
ssaco2_r#167	Proposed updates to AG-005-N Local External Magnetic Field on Ground - Nowcast	SWE PSD 1.2
ssaco2_r#168	Proposed updates to AG-005-F Local External Magnetic Field on Ground - Forecast	SWE PSD 1.2
ssaco2_r#169	Proposed updates to AG-006-P Local Geomagnetic Induced Geoelectric Field - Archives	SWE PSD 1.2
ssaco2_r#17	ion energy units	SWE PSD 1.2
ssaco2_r#170	Proposed updates to AG-006-N Local Geomagnetic Induced Geoelectric Field - Nowcast	SWE PSD 1.2
ssaco2_r#171	Proposed updates to AG-006-F Local Geomagnetic Induced Geoelectric Field - Forecast	SWE PSD 1.2
ssaco2_r#172	Proposed updates to AG-007-P Neutral Density and Wind - Archives	SWE PSD 1.2
ssaco2_r#173	Proposed updates to AG-007-M Neutral Density and Wind - Measurement	SWE PSD 1.2
ssaco2_r#174	Proposed updates to AG-007-N Neutral Density and Wind - Nowcast	SWE PSD 1.2
ssaco2_r#175	Proposed updates to AG-007-F Neutral Density and Wind - Forecast	SWE PSD 1.2
ssaco2_r#176	Proposed updates to AG-008-P Archived Measurements of Atmospheric Neutrons	SWE PSD 1.2



RID No.	Title	Document
ssaco2_r#177	Proposed updates to AG-008-M Measurement of Atmospheric Neutrons	SWE PSD 1.2
ssaco2_r#178	Proposed updates to AG-009-M Measurement of Atmospheric Muons	SWE PSD 1.2
ssaco2_r#18	solar wind pressure	SWE PSD 1.2
ssaco2_r#188	Proposed updates to SU-001-P Solar Flares - Archive; also -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#189	Proposed updates to SU-001-F Solar Flares - Forecast	SWE PSD 1.2
ssaco2_r#19	AE index missing	SWE PSD 1.2
ssaco2_r#190	Proposed updates to SU-002-P CMEs - Archive; also -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#191	Proposed updates to SU-004-P Coronal holes - Archive; also -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#192	Proposed updates to SU-005-Solar disk magnetic fields - Archive; also -N Nowcast and -M Measurement	SWE PSD 1.2
ssaco2_r#193	Proposed updates to SU-005-Solar disk magnetic fields - Forecast	SWE PSD 1.2
ssaco2_r#194	Proposed updates to SU-006-Solar index R - Archive; also -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#195	Proposed updates to SU-007-Smoothed Sunspot number (SSN, R12) - Archive ; also -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#196	Proposed updates to SU-008-Solar index F10.7 (F10) (Measurement); also -P Archive, -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#197	Proposed updates to SU-009-Solar index S10.7 (S10) - Archive; also -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#198	Proposed updates to SU-010-Solar index E10.7 (E10) - Archive; also -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#199	Proposed updates to SU-011-Solar index M10.7 (M10) - Archive; also -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#20	low energy resolution for proton spectra	SWE PSD 1.2
ssaco2_r#200	Proposed updates to SU-012-Solar index Y10.7 (Y10) - Archive; also -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#201	Proposed updates to SU-012-Solar index IG12 - Archive; also -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#203	Proposed updates to SU-015-M EUV images of Sun - Measurements; also -P Archive and -N Nowcast	SWE PSD 1.2
ssaco2_r#204	Proposed updates to SU-017-M White light solar imaging - Measurements; also -P Archive and -N Nowcast	SWE PSD 1.2
ssaco2_r#205	Proposed updates to SU-019-M H-alpha images of Sun - Measurements; also -P Archive and -N Nowcast	SWE PSD 1.2
ssaco2_r#206	Proposed updates to SU-020-M Soft X-ray images of Sun - Measurements; also -P Archive and -N Nowcast	SWE PSD 1.2
ssaco2_r#207	Proposed updates to SU-021-M Solar EUV images outside of Sun-Earth line - Measurements; also -P Archive and -N Nowcast	SWE PSD 1.2
ssaco2_r#208	Proposed updates to SU-022-M Solar coronagraphic images outside of Sun-Earth line - Measurements; also -P Archive and -N Nowcast	SWE PSD 1.2
ssaco2_r#209	Proposed updates to SU-025-M White-light wide-angle coronagraphic images - Measurements; also -P Archive and -N Nowcast	SWE PSD 1.2



RID No.	Title	Document
ssaco2_r#21	attitude information missing	SWE PSD 1.2
ssaco2_r#210	Proposed updates to SU-027-M Solar X-ray flux- Measurement; also -P Archive and -N Nowcast	SWE PSD 1.2
ssaco2_r#211	Proposed updates to SU-028-M Solar EUV flux- Measurement; also -P Archive, -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#212	Proposed updates to SU-029-M Solar UV flux- Measurement; also -P Archive, -N Nowcast and -F Forecast	SWE PSD 1.2
ssaco2_r#213	Proposed updates to MP-001 Micro Particle Flux as a Function of Size, Velocity, Angular Distribution	SWE PSD 1.2
ssaco2_r#214	Proposed updates to MP-002 Known Periods/events of Increased Microparticle Flux (meteoroid streams, debris clouds) - Archives and A Posteriori Reconstruction	SWE PSD 1.2
ssaco2_r#215	Proposed updates to AL-021-N Event Based Alarm – Debris Cloud/Meteoroid Stream Warning	SWE PSD 1.2
ssaco2_r#219	Proposed updates to L1-001 High Energy >10 MeV Protons in Interplanetary Medium at L1	SWE PSD 1.2
ssaco2_r#220	Proposed updates to L1-002 High Energy >10 MeV Ions in Interplanetary Medium at L1	SWE PSD 1.2
ssaco2_r#221	Proposed updates to L1-003-P 1-to-10 MeV Protons in Interplanetary Medium at L1	SWE PSD 1.2
ssaco2_r#222	Proposed updates to L1-004-M 1-to-10 MeV/nucl Ions in Interplanetary Medium at L1	SWE PSD 1.2
ssaco2_r#223	Proposed updates to L1-005-M 30 keV-to-1 MeV/n Ions in Interplanetary Medium at L1	SWE PSD 1.2
ssaco2_r#224	Proposed updates to L1-006 2-50 MeV Solar Electrons at L1	SWE PSD 1.2
ssaco2_r#225	Proposed updates to MR-001-NF Geomagnetic Storm Condition (indices: global, auroral, mid-latitude and ring current)	SWE PSD 1.2
ssaco2_r#226	Proposed updates to MR-002-NF Geomagnetic Indices Kp and K	SWE PSD 1.2
ssaco2_r#227	Proposed updates to MR-003-P Geomagnetic Index Ap and A - Archives and A Posteriori Reconstruction	SWE PSD 1.2
ssaco2_r#228	Proposed updates to MR-004-PNF Geomagnetic Index Dst	SWE PSD 1.2
ssaco2_r#229	Proposed updates to MR-006-MPNF High Energy >10MeV Protons in Earth Magnetosphere and Radiation Belt	SWE PSD 1.2
ssaco2_r#230	Proposed updates to MR-007-MPNF High Energy >10MeV/n Ions in Earth Magnetosphere and Radiation Belt	SWE PSD 1.2
ssaco2_r#231	Proposed updates to MR-008 MPNF 1-to-10MeV Protons in Earth Magnetosphere and Radiation Belt	SWE PSD 1.2
ssaco2_r#232	Proposed updates to MR-009-MPNF 1-to-10 MeV/n Ions in Earth Magnetosphere and Radiation Belt	SWE PSD 1.2
ssaco2_r#233	Proposed updates to MR-010 MPNF 30 keV/n-to-1 MeV/n Ions in Earth Magnetosphere and Radiation Belt	SWE PSD 1.2
ssaco2_r#234	Proposed updates to MR-011-MPNF 30 keV-8 MeV Electrons in Earth Magnetosphere and Radiation Belt	SWE PSD 1.2
ssaco2_r#235	Proposed updates to MR-015-MPNF Local Magnetospheric Magnetic Field in Orbit	SWE PSD 1.2



RID No.	Title	Document
ssaco2_r#236	Proposed updates to MR-019-PNF Geomagnetic Index AE, AL and AU	SWE PSD 1.2
ssaco2_r#452	A new product AG-008-N in the SWE PSD needs to added to complete the SWE product logic	SWE PSD 1.2
ssaco2_r#453	A new alert should be created (New Ref: AL-021-N) taking account of GLE alert detected by ground based neutron monitor data	SWE PSD 1.2
ssaco2_r#55	Definition of Product Types	SWE PSD 1.2
ssaco2_r#56	Orbit Data and Spacecraft Housekeeping Data	SWE PSD 1.2
ssaco2_r#57	EUV and X-ray Imaging	SWE PSD 1.2
ssaco2_r#58	deleted (covered by new definition provided in CR#80)	SWE PSD 1.2
ssaco2_r#60	Solar Observations in the (E)UV Spectral Range	SWE PSD 1.2
ssaco2_r#61	Imaging of Solar Corona from outside of Sun-Earth Line	SWE PSD 1.2
ssaco2_r#62	Imaging of Solar Corona within Sun-Earth Line	SWE PSD 1.2
ssaco2_r#63	Satellite Constellation for Particle Measurements	SWE PSD 1.2
ssaco2_r#64	Number of Channels needed for Particle Measurements in the Magnetosphere and at L1	SWE PSD 1.2
ssaco2_r#65	Measurement of Differential Particle Fluxes	SWE PSD 1.2
ssaco2_r#66	Ascertainment of High Energy Interplanetary Particle Flux Measurements	SWE PSD 1.2
ssaco2_r#67	TEC Measurements	SWE PSD 1.2
ssaco2_r#68	URSI Parameters and Riometer Measurements	SWE PSD 1.2
ssaco2_r#69	Neutral Density and Wind in the Thermosphere	SWE PSD 1.2
ssaco2_r#70	Clarify Range Requirements for Neutral Density and Wind	SWE PSD 1.2
ssaco2_r#71	Clarify Range Requirements for Atmospheric Neutron Flux	SWE PSD 1.2
ssaco2_r#72	Scintillation Parameters	SWE PSD 1.2
ssaco2_r#73	Clarify Range Requirements of Atmospheric Muon Flux Measurement	SWE PSD 1.2
ssaco2_r#74	Auroral Imaging in VIS and UV	SWE PSD 1.2
ssaco2_r#75	Justification of Auroral Imaging	SWE PSD 1.2
ssaco2_r#76	Local External Magnetic Field on Ground	SWE PSD 1.2
ssaco2_r#77	Quasi-continuous Coverage and System Availability	SWE PSD 1.2
ssaco2_r#78	Circular References	SWE PSD 1.2
ssaco2_r#79	S (Sensor-based) vs P (model-based/Processed data)	SWE PSD 1.2
ssaco2_r#80	Timeliness Requirements	SWE PSD 1.2
ssaco2_r#81	deleted (replaced by CR#80)	SWE PSD 1.2
ssaco2_r#82	deleted (replaced by CR#80)	SWE PSD 1.2
ssaco2_r#83	deleted (covered by new definition provided in CR#80)	SWE PSD 1.2
ssaco2_r#84	deleted (covered by new definition provided in CR#80)	SWE PSD 1.2
ssaco2_r#85	deleted (covered by new definition provided in CR#80)	SWE PSD 1.2
ssaco2_r#86	deleted (replaced by CR#80)	SWE PSD 1.2
ssaco2_r#87	deleted (replaced by CR#80)	SWE PSD 1.2
ssaco2_r#88	deleted (covered by new definition provided in CR#80)	SWE PSD 1.2
ssaco2_r#89	Order of Requirements	SWE PSD 1.2
ssaco2_r#90	Solar Index Y10.7 (Y10)	SWE PSD 1.2
ssaco2_r#91	Solar Wind Bulk Velocity at L1	SWE PSD 1.2
ssaco2_r#92	Wrong Entries in the Dynamic Range Field	SWE PSD 1.2
ssaco2_r#93	“Use official sources” as Input Data	SWE PSD 1.2
ssaco2_r#94	Input Data Missing	SWE PSD 1.2



RID No.	Title	Document
ssaco2_r#95	Neutral Density and Wind	SWE PSD 1.2
ssaco2_r#97	Measurement of Total Ionising Dose (TID), Deep Dielectric Charging, Surface Charging and Floating Spacecraft Potential	SWE PSD 1.2