RPW Operations Centre

ROC Software System Specification

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Change Record

Issue	Rev.	Date	Authors	Modifications
1	0	09/01/2017	X.Bonnin	First issue (incomplete: only first list of interface and capability requirements).
1	1	17/11/2017	X.Bonnin	Add reference to the PLID Major updates in the requirements
1	2	14/10/2019	X.Bonnin	Update AD and RD Update requirements

Acronym List

Acronym	Definition
AIT	Assembly, Integration and Test
AIV	Assembly, Integration and Validation
ANC	Ancillary (data)
CCSDS	Consultative Committee for Space Data Systems
CDF	Common Data Format
CP	Cruise Phase
CUC	CCSDS Unsegmented time Code
DDS	Data Dissemination System
DPS	Data Processing System
EDDS	EGOS Data Dissemination System
EGOS	ESA Ground Operation System
FAUST	Flight operAting Request Editor
FIGARO	Flight Operation Procedure Editor
GSE	Ground Support Equipment

GUI	Graphical User Interface
HF	High Frequency
HK	HouseKeeping
ICD	Interface Control Document
ID	Identifier
IOR	Instrument Operation Request
IT	Instrument Team
I/O	Input / Output
LESIA	Laboratoire d'Etudes Spatiales et d'Instrumentation en Astrophysique
LF	Low Frequency
LLD	Low Latency Data
LLVM	Low Latency VM
MCS	Monitoring and Control System
MDOR	Memory Direct Operation Request
MEB	Main Electronic Box
MOC	Mission Operation Centre
MUSIC	MCS User Interface
NECP	Near Earth Commissioning Phase
NMP	Nominal Mission Phase
OPERA	Operation Planning IntERfAce
PDOR	Payload Direct Operation Request
RCS	RPW Calibration Software
RLLP	RPW Low Latency Pipeline
ROC	RPW Operation Centre
ROADS	ROC Operations And Data System
RODP	RPW Operations and Data Pipeline
RPW	Radio and Plasma Waves instrument
RSS	ROC Software System
SAVS	SBM Algorithm Validation Software
SBM	Selected Burst Mode
SCM	Search Coil Magnetometer
SGS	Science Ground Segment
SGSE	Software Ground Support Equipment
SHA	Secure Hash Algorithm

SISSI	SBM Interactive Selection System Interface
SOAP	Simple Access Object Protocol
SOC	Science Operation Centre
SolO	Solar Orbiter
SSS	Software System Specification
TBC	To Be Confirmed
TBD	To Be Defined
TBW	To Be Written
TC	Tele-command
TDS	Time Domain Sampler
THR	Thermal Noise and High Frequency Receivers
TM	Telemetry
SCET	Spacecraft Elapsed Time
SWF	Snapshot Waveform
UTC	Coordinated Universal Time
VM	Virtual Machine
XML	eXtended Markup Language

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1 GENERAL

1.1 Scope of the Document

This document is the Software System Specification (SSS) of the RPW Operations Centre (ROC), in charge of the ground segment activities for the RPW experiment [RD1].

The SSS contains the customer's requirements (capabilities requirements, interface requirements, performances requirements, design requirements, etc.) generated by the system engineering process related to software. It is the highest-level description of the software products and of the software interfaces. It is part of the requirement baseline. It provides the criteria that are used to validate and accept the software.

Especially, the present document must cover the specification requirements for the following ROC software equipment:

- RPW Operations and Data Pipeline (RODP)
- RPW Calibration Software (RCS)
- RPW Low Latency Virtual Machine (LLVM)
- Monitoring and control sub-system USer InterfaCe (MUSIC)
- ROC Software Ground Support Equipment (ROC-SGSE)

The user requirements related to these software units are listed in the ROC User Requirements document (URD) [RD2].

The specification defined in the present document must comply with the high-level implementation requirements defined in the "ROC Concept and Implementation Requirements Document" (CIRD) [AD1] and the technical specification defined at Solar Orbiter levels [RD18, RD19, RD20, RD21, RD22, RD23, RD24, RD25, RD26, RD27, RD28, RD29].

1.2 Applicable Documents

This document responds to the requirements of the documents listed in the following table:

Mark	Reference/Iss/Rev	Title of the document	Authors	Date
AD1	ROC-GEN-SYS-PLN-00002-LES/2/0	ROC Concept and Implementation Requirements Document (CIRD)	Y. de Conchy X. Bonnin	07/05/2019
AD2				
AD3				
AD4				
AD5				
AD6				
AD7				
AD8				
AD9				
AD10				

AD11				
AD12				

1.3 Reference Documents

This document is based on the documents listed in the following table:

Mark	Reference/Iss/Rev	Title of the document	Authors	Date
RD1	SOLO-RPWSY-IF-55-CNES/5/3	Experiment Interface Document Part B for RPW (EID-B)	RPW team	07/10/2015
RD2	ROC-GEN-OTH-SPC-00064-LES/1/0	ROC User Requirements Document (URD)	ROC Team	14/10/2019
RD3	ROC-GEN-OTH-NTT-00045-LES/1/1	ROC Glossary of terms	X. Bonnin	08/11/2018
RD4	ROC-PRO-DAT-NTT-00006-LES/1/2	ROC Data Products (RDP)	X.Bonnin	18/04/2019
RD5	ROC-PRO-PIP-ICD-00037-LES/1/2	RPW Calibration Software Interface Control Document (RCS ICD)	Manuel Duarte, Xavier Bonnin	05/06/2019
RD6	ROC-GEN-SYS-PLN-00015-LES/2/3	ROC Software Development Plan (SDP)	X.Bonnin	17/11/2017
RD7	SOL-ESC-TN-12000/1/2	Solar Orbiter Mission Planning Concept (MPC)	Flight Control Team	27/06/2014
RD8	ROC-GEN-MGT-PLN-00013-LES/1/4	ROC Project Management Plan (PMP)	Y. de Conchy X. Bonnin	17/11/2017
RD9	ROC-TST-GSE-SWU-00003-LES/1/2	RPW Calibration Data Visualization User Requirements	X.Bonnin	12/02/2016
RD10	RPW-SYS-MEB-GSE-SPC-00125-LES/1/1	MEB GSE Description	L.Gueguen	26/11/2012
RD11	RPW-SYS-MEB-GSE-NTT-000792-LES/1/0	C-SGSE User Manual	A.Gaget	22/05/2014
RD12	SOL-ESC-PL-100001/1/0	Solar Orbiter FOP preparation plan	B.Sousa	05/09/2013
RD13	SOL-ESC-PL-00001/1/1	Solar Orbiter Mission Implementation Plan (MIP)	I.Tanco	31/01/2013
RD14	SOL-SGS-TN-0017-ANCData/0/2	SOC-provided Ancillary Data for Solar Orbiter	A.Walsh	18/09/2017
RD15	SOL-ESC-TN-12000/1/2	Solar Orbiter – Mission Planning Concept (MPC)	SOL FCT	27/06/2014
RD16	EDDS_interfec_spec_V5.docx/5/0	EDDS instrument client specification	Spice ground segment team at IAS	30/05/2018

			RPW ground segment team at LESIA	
RD17	ROC-PRO-DAT-NTT-00075-LES/1/0	RPW Data Product Description Document (DPDD)	X.Bonnin	23/11/2018
RD18	SOL-SGS-ICD-0003/1/0	Solar Orbiter Instrument Operation Request Interface Control Document (IOR ICD)	C. Watson	13/03/2017
RD19	SOL-SGS-TN-0006/1/2	SOC Engineering Guidelines for External Users (SEGU)	R. Carr	03/08/2017
RD20	SOL-SGS-ICD-0004/1/3	Solar Orbiter Interface Control Document for Low Latency Data CDF files (LLCDFICD)	A. Walsh	09/02/2017
RD21	SOL-ESC-IF-05011/1/0	Solar Orbiter Data Delivery Interface Control Document	L. Michienzi	10/09/2013
RD22	SOL-ESC-IF-10002/2/0	Solar Orbiter Instrument FOP Procedure Input Interface Control Document	D. Lakey	12/06/2014
RD23	SOL-ESC-IF-05010/1/2	Planning Interface Control Document (PLID)	L. Michienzi	07/2015
RD24	SOL-SGS-ICD-0009/1/0	Solar Orbiter File-Transfer SOC<-> Instrument Teams ICD	E Salazar, C.Watson	24/03/2017
RD25	SOL-SGS-PL-0009/2/0	Solar Orbiter Archive Plan (SOAP)	P. Osuna	01/09/2017
RD26	SOL-SGS-ICD-0006/1/2	Solar Orbiter Enhanced-Flight Events Communications Skeletons Interface Control Document (E-FECS ICD)	C. Watson	31/10/2017
RD27	SOL-SGS-TN-0009/2/3	Metadata Definition for Solar Orbiter Science Data	Solar Orbiter MADAWG	24/09/2018
RD28	SOL-SGS-ICD-0007/1/0	Solar Orbiter Telemetry Corridor Interface Control Document (TMC ICD)	C. Watson	14/03/2017
RD29	SOL-SGS-TN-0007/0/2	SOC-Provided Ancillary Data for Solar Orbiter	A.Walsh	18/09/2017
RD30	ROC-GEN-OTH-REQ-00081-LES/1/0	ROC Requirements	M.Maksimovic	11/01/2019
RD31	ROC-OPS-LLD-NTT-00028-LES/01/02	Dataset Description Document for RPW Low Latency CDF Files	X.Bonnin	06/03/2017
RD32	SOL-SGS-ICD-0012/0/2	Solar Orbiter Observation Timeline Export ICD	Thanos Tsounis, Chris Watson, David Williams	04/10/2019

1.4 About this document

1.4.1 Access policy

The present document is accessible without any restriction.

Any modification of this document must be approved by the RPW Ground Segment Project Manager (GSPM) before publication.

1.4.2 Terminology

Except if it is explicitly noticed, the definitions of terms used in the present document can be found in [RD3].

1.4.3 Requirement identification

According to the ROC Project Management Plan (PMP) [RD8], every requirement defined in this document shall be assigned a requirement identifier (ID) of the form "**REQ-ROC-SSS-XXXX"**, where "REQ=Requirement", "SSS"=Software System Specification" and "XXXX" is a 4-digits number starting at 0001, and that must be incremented by 1 each time a new requirement is provided (e.g., the first requirement identifier found in the document will be "REQ-ROC-SSS-0001", the second one "REQ-ROC-SSS-0002", etc.). The structure of the requirements shall comply the definition given in [RD8].

1.4.4 Naming convention in the document

The *generic variables* are used in the document to define parameters that have no fixed value, or that need to be identified easily from a requirement to another. They can be typically: file/directory names or paths, software configuration values, interfaces, sets of data, etc.

The generic variables are represented in the document using capital letters between chevrons. They must contain alphanumerical and underscore "_" characters only (e.g., <DDS_TR_HIGH_START>).

2 INTRODUCTION

2.1 Context & philosophy

The ROC is in charge of the ground segment activities of the RPW experiment on-board the Solar Orbiter spacecraft.

As listed in the ROC Concept and Implementation Requirements Document (CIRD) [AD1], it consists mainly of:

- Preparing and submitting the instrument operations, in agreement with the planning and constraints at the spacecraft level
- Analysing the instrument behaviour from incoming data, and optimizing the science return
- Ensuring the instrument maintenance, including flight software patching
- Retrieving, processing (e.g., calibrating) and delivering to the ESA data archive centre, the RPW science data.
- Being able to support the analysis of instrument data generated on-ground through Ground Support Equipment (GSE).

The centre has thus to develop and maintain up-and-running a dedicated ROC software system (RSS) to support these tasks during the mission.

2.2 Concepts and definitions

2.2.1 Mission planning concept

The mission planning concept is given in [RD7].

2.2.2 Terms definition

The terms definition related to the RSS can be found in [RD3].

3 GENERAL DESCRIPTION

3.1 ROC Software System (RSS) product perspective

3.1.1 RSS design overview

Figure 1 shows the main components and interfaces of the RSS. The RSS overall design is presented in more details in the ROC Software Development Plan" (SDP) [RD6], an overview is however presented for convenience in the next sections.

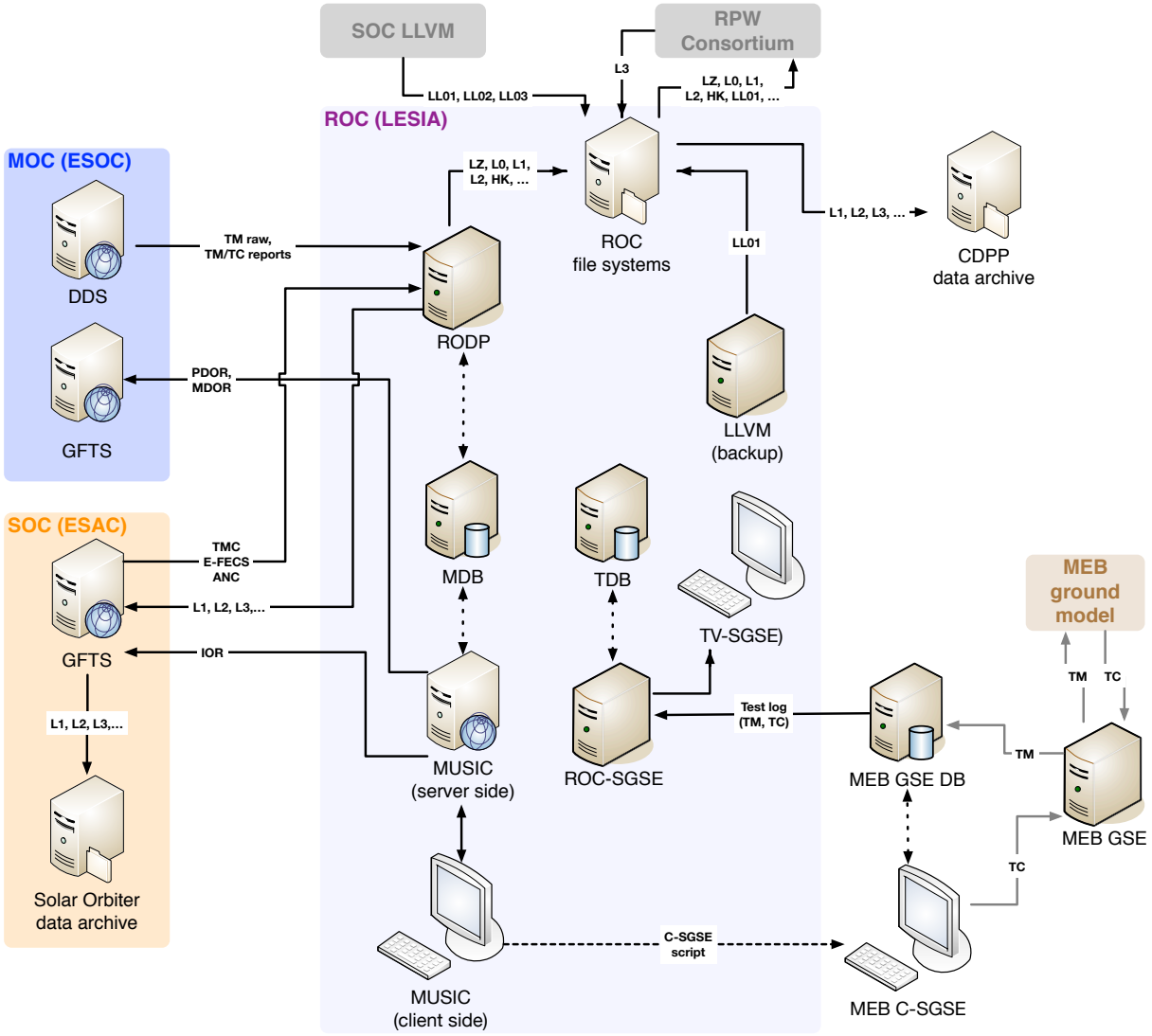

Figure 1. RSS overall design.

3.1.2 ROC Operations And Data System (ROADS) design overview

The ROADS gathers the following main software units, in support to the ROC activities during the Solar Orbiter mission:

- The RPW Operations and Data Pipeline (RODP), in charge of producing RPW data, as defined in the "RPW Data Product Description Document" (DPDD) document [RD17].
- The RPW Calibration Software (RCS), which produce RPW science calibrated data files. In practice, the RCS are planned to be run by the RODP
- The Monitoring and control subsystem User Interfaces (MUSIC), a suite of application for RPW operation activities and data visualization.
- The RPW Low Latency Virtual Machine (LLVM), a virtual appliance containing the RPW Low Latency data Pipeline (LLDP) that generates RPW Low Latency data (LLD) products at LL01 level [RD31]. The primary instance of the RPW LLVM will be hosted and run on a dedicated SOC server at ESAC. Nevertheless, a backup

instance of this LLVM will be also deployed at LESIA, in order to analyse and compare LLD from both sites.

- The ROC Mission Database (MDB), the main database used by the RODP and MUSIC components.

An overview of the ROADS software design can be found in the SDP.

3.1.3 ROADS external interfaces overview

3.1.3.1 Interface with the Solar Orbiter Mission Operations Centre (MOC)

The ROC will maintain two types of interface with the Solar Orbiter MOC based at Darmstadt (Germany):

- The Data Dissemination System (DDS) [RD21] for Solar Orbiter is a Web service based on the SOAP protocol. It will be used by the ROC to retrieve RPW TM raw data during the mission. Additional data, such as the catalogues of executed/received TC/TM, i.e., TC/TM reports, and the TC raw data uplinked by the MOC, will be also available through the DDS.
- A Generic File Transfer System (GFTS) node, used to exchange non-routine RPW commanding-related files with MOC, i.e., PDOR, MDOR, CRR [RD23].

The DDS server will be hosted and maintained by the MOC. The GFTS node on the ROC side will be maintained by the LESIA as a local SFTP server.

3.1.3.2 Interface with the Solar Orbiter Science Operations Centre (SOC)

In the framework of the science operations and data archiving, the ROC will keep up-and-running a specific GFTS node between the LESIA site and the Solar Orbiter SOC located at Madrid (Spain). Especially, this GFTS node will be used to exchange:

- Science operation requests, submitted by the IT to the SOC, using the dedicated instrument operation request (IOR) format [RD18].
- Input files, provided by the SOC, to plan the operations timeline and prepare the IOR for the Medium and Short Term Planning (the MTP and STP concept are described in the MPC [RD15]), namely: Extended Flight Event Communication Skeletons (E-FECS) [RD26], Telemetry Corridors (TMC) [RD28] and orbit/attitude/time/frames in the SPICE kernels and CDF formats [RD29].
- Instrument science data to be archived at ESAC [RD25].

The GFTS node on the ROC side will be maintained by the LESIA as a local SFTP server.

Additionally, the ROC will have to upload its RPW LLVM appliance and related test data files through a dedicated SFTP server hosted and maintained on the SOC site.

3.1.3.3 Interfaces with the Ground Support Equipment (GSE) facilities

3.1.3.3.1 Interface with the MEB GSE

Direct interface between the ROADS and the MEB GSE [RD10] is not currently planned. Nevertheless, the ROADS tools shall have the capability to export sequences of TCs in the C-SGSE script format. This format can be then used into the MEB GSE C-SGSE tool [RD11],

in order to run sequences on a RPW instrument engineering or "spare"-like model available on-ground at LESIA site.

The mechanism to automatically validate the sequences in such a way is not yet fully known. In all cases, the RSS will have to integrate a dedicated interface with the MEB GSE.

No direct interface between the ROADS and the RPW E-GSE is planned.

3.1.4 ROC GSE design overview

The ROC GSE application firstly concerns RPW instrument tests performed on-ground before launch, namely: EM2/PFM instrument calibrations at system level and RPW DPU SBM1/SBM2 detection algorithm validation campaigns. Nevertheless, dedicated instances of this software equipment will be used during the Solar Orbiter mission, in order to support possible GSE activities on the instrument.

Two main components are supplied:

- The ROC Software Ground Support Equipment (ROC SGSE), which provides SGSE to analyse RPW packet data during the EM2/PFM ground calibration tests at system level. An instance of the ROC-SGSE will also be deployed at LESIA and used to support the ground test activities during the mission (e.g., TCs sequences validation and anomalies investigation on a RPW "spare" model). The ROC-SGSE metadata are stored in a dedicated "Test" database (TDB).
- The SBM Algorithm Validation software (SAVS), supplying software to support the validation of the Selected Burst Modes (SBM) algorithms of the RPW DPU. Tailored instances of the SAVS will be used to analyse and optimize the detection rate of the on-board SBM algorithms during the Cruise Phase (CP).

3.1.5 ROC GSE external interfaces overview

3.1.5.1 Interface with the MEB GSE database

The ROC SGSE shall be able to request, retrieve and process test log data stored into the MEB GSE database.

This interface will have to be up-and-running during the ground system calibration campaigns driven by the CNES AIT/AIV prior to the instrument delivery. It shall also maintain during the solar Orbiter mission in order to analyse RPW TM data in case of anomaly investigation or TC sequences verification runs.

3.1.5.2 Interface with the RPW E-GSE file system

The ROC SGSE shall be able to retrieve and process the RPW E-GSE output data files, generated during a test.

This interface will have to be up-and-running during the ground system calibration campaigns driven by the CNES AIT/AIV prior to the instrument delivery. It should also maintain during the solar Orbiter mission in the case where E-GSE capabilities are required for investigation.

3.1.5.3 Interface with the Airbus Defence and Space (ADS) GSE database

Although ROC is not directly involved in the AIT/AIV activities driven by ADS at S/C level, the ROC-SGSE should be able to process the text format file exported by the ADS GSE and containing the RPW TM packet data generated during the tests.

3.2 Software covered by the ROC Software System Specification

The diagram below presents the software covered by the RSSS.

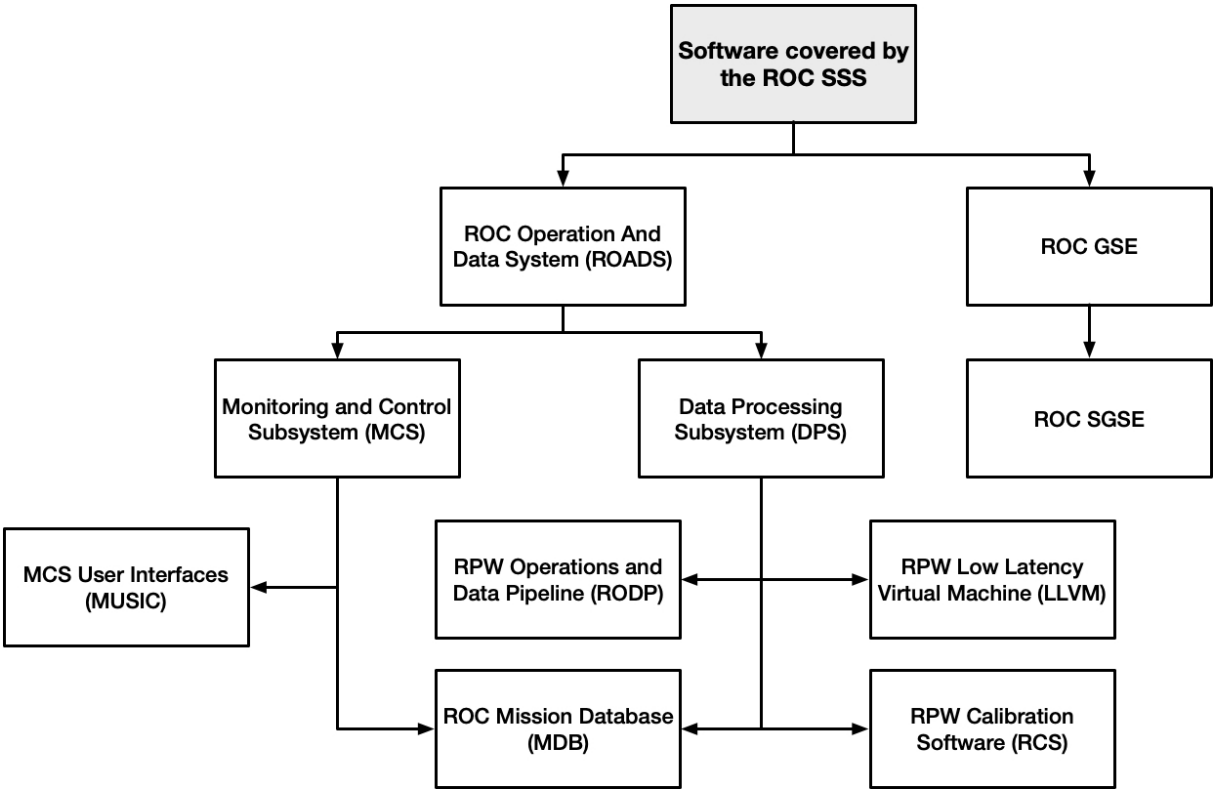

Figure 2. Products covered by the ROC SSS.

3.3 General constraints

3.3.1 Constraints relative to the RSS software development, validation and execution environment at LESIA

The development, validation and execution of the primary instance of the RSS will have to be realized on servers hosted and administrated by the LESIA computing service. See the SDP for more details.

3.3.2 Constraints relative to the RPW commissioning-related operations at MOC

The commissioning of the RPW instrument is under the responsibility of the CNES.

Nevertheless, a part of the ROC team might need to be present at the MOC site, in order to support the RPW CNES team during critical operations activities. In particular, a specific instance of the RSS might be used at the ESOC site in order to receive, process and distribute the RPW data generated on-board during these operations.

It will require having an operational environment suitable enough to install and run this instance, but in agreements with the constraints imposed by the MOC. The expected operational environment is described in the section 3.4.2.

3.3.3 Constraints relative to the Low Latency Virtual Machine (LLVM) development, delivery and execution

The RPW LLVM is the only software equipment that must be delivered and run at the SOC site. In consequence, the ROC team shall ensure that the LLVM has been fully tested and validated in the same environment than at the SOC site.

In the same time, the ROC team shall ensure that the primary instance of the RSS is also able to process the RPW LLD at the LESIA site. The way the LLD processing approach shall be realized shall be as much as possible similar to the LLVM instance at SOC.

The technical specification relative to the LLVM and the operational environment at SOC are given in the SOC Engineering Guidelines for external Users (SEGU) [RD19].

3.3.4 Constraints relative to the MEB GSE usage

The ROC-SGSE will have to be integrated into the CNES GSE facilities to support the ground calibration campaigns at both CNES (Toulouse) and LESIA (Meudon) sites. Especially, the CNES GSE will run on private network without any possibility of using Internet resources. This factor shall be taken into account in the software design and usage.

During the mission the MEB GSE facilities at LESIA may be punctually used to investigate from ground the anomalies detected on-board. The ROADS will not have direct interface with the MEB GSE, the ROC-SGSE will be used instead to retrieve, process and analyse RPW TM data, produced on-ground by the RPW spare model and stored as test logs into the dedicated MEB GSE database.

Nevertheless the ROC team plans to use also the MEB GSE facilities to simulate and validate their operation requests on-ground. It means that the MUSIC software shall offer the capability of exporting ROR in the format that can be ingested and run by the MEB C-SGSE commanding tools.

3.4 RSS operational environment

3.4.1 At the LESIA site

The primary instance of the RSS will be deployed and run on several Linux servers hosted by the LESIA.

ROADS will use the intranet network to exchange data between its software units (RODP, MUSIC, MDB) installed on different servers.

Interfaces with external systems (MOC DDS and MOC/SOC GFTS) will be performed through dedicated proxy servers. Furthermore, the DDS and GFTS data exchange mechanism will require deploying a dedicated ROC SFTP server at the LESIA site. This SFTP server will have to be accessible from the SOC and MOC site, using machines with identified IP.

An illustration of the RSS operational environment at LESIA can be found in the SDP.

3.4.2 At the ESOC site

It is expected that the MOC supplies a so-called “PI Support Area” (PISA), as explained in the “Solar Orbiter Mission Implementation Plan” (MIP) [RD13].

The PISA infrastructure will have to offer the possibility to install dedicated RSS secondary instances on computer equipment brought by the ROC team. This equipment might have to be easily deployable and have to work as stand-alone systems, being able to retrieve in near-real

time RPW data via the MOC DDS and to submit operation requests with the MOC GFTS. Use of laptops - with network access - should be hence privileged.

More details can be found in the SDP.

3.4.3 At the ESAC site

Only the RPW LLVM is planned to run at the SOC site to produce RPW LLD.

The ROC shall deliver a RPW LLVM, which can be deployed and run in the operational environment described in [RD19].

3.5 General capabilities

The nominal use cases relative to the RSS tools are presented in the URD [RD2]. The translation of these use cases in terms of technical specification requirements is then given in the sections 4 to 8.

3.5.1 Use case overview

Table below gives an overview of the RSS main use cases. The column on the right indicates the corresponding software unit(s) involved. Except if it is explicitly said, the use cases only concern the RSS primary instance at LESIA.

Use case	Software in charge
Being able of retrieving the RPW TM raw, TC-reports and ancillary data from the dedicated Solar Orbiter SOC/MOC interface (DDS, GFTS)	RODP
Being able of processing the RPW TM raw packet data in order to produce higher-level science data products (e.g., LZ, L0, L1, L1R, L2, HK, summary plots, ancillary data, LL01 at LESIA).	RODP (for LZ, L0, L1, HK, plots, ancillary data production) RCS (for L1R, L2 data production) LLVM (for LL01 data production at LESIA)
Making available possible the RPW L0, L1, L2, HK data products and quick-looks to the RPW consortium and ESAC	RODP
Retrieving and making available the L3 data products to the RPW consortium and ESAC	RODP
Supporting the archiving of the RPW data products in the Solar Orbiter data archive at ESAC and at the “Centre de Données de Physique des Plasma” (CDPP)	RODP
Giving daily reports of the RSS software activity and data status	RODP
Ensuring the self-deployment, self-test	LLVM, LLDP

validation and the processing of the RPW Low Latency data (LLD) as expected by the SOC [AD3]	
Visualizing the instrument TM/TC flows and statistics, sub-system status, event, HK and science data	RODP for the data retrieval and processing MUSIC for the data visualization
Controlling the on-board data storage and power consumption, according to the TM corridor (TMC) and the power consumption constraints.	The TM Rate Calculator (TRAC) software unit The Power Consumption Analyser (POCA) software unit RODP MUSIC for the TMC constraint verification
Preparing and submitting to the MOC the flight procedures and TC sequences for RPW	MUSIC
Preparing, validating and submitting to ESA the RPW operation requests (IOR, MDOR or PDOR), in agreement with the mission planning and constraints	MUSIC
Viewing the list of SBM1/SBM2 events detected on-board and selecting the events for which data must be downlinked	MUSIC
Retrieving via the MEB GSE, processing and visualizing the RPW science and HK data, generated by an instrument model on-ground	ROC-SGSE for the data processing TV-SGSE for the data visualization
Retrieving, processing and visualizing the stimuli data products, generated by a RPW E-GSE instance on-ground	ROC-SGSE for the data processing TV-SGSE for the data visualization
Retrieving and distributing to the RPW CNES team the instrument data during the commissioning activities operated from MOC at ESOC.	RODP for the data retrieval, processing and distribution MUSIC for the data visualization/analysis

Table 1. RSS general use cases.

4 MONITORING AND CONTROL SUB-SYSTEM USER INTERFACES (MUSIC) REQUIREMENTS

This section presents the technical requirements for the MUSIC application.

The MUSIC user requirements can be found in the URD [RD2].

4.1 Capability requirements

REQ-ROC-SSS-0010	MUSIC GUI logging	Test
The backend server of the MUSIC GUI shall report its processing activity, including failures, into log files in ASCII format.		
MUSIC	**Implements:**	REQ-ROC-CIRD-0420 REQ-ROC-CIRD-0500

REQ-ROC-SSS-0020	MUSIC testing system	Test
MUSIC shall include a self-automated testing system (i.e., unit and integration tests).		
MUSIC	**Implements:**	REQ-ROC-CIRD-0700

4.2 Interface requirements

REQ-ROC-SSS-0030	MUSIC GUI administration	Demo
The MUSIC GUI shall include a dedicated interface from which a ROC administrator can monitor and maintain the software.		
MUSIC	**Implements:**	REQ-ROC-CIRD-0420 REQ-ROC-CIRD-0500

4.3 Implementation and design requirements

REQ-ROC-SSS-0040	MUSIC GUI Client-server design	Review
MUSIC GUI shall be designed using a client-server architecture.		
MUSIC	**Implements:**	REQ-ROC-CIRD-0470

An architecture based on an API REST should be envisaged.

REQ-ROC-SSS-0050	MUSIC GUI user authentication mechanism	Test
MUSIC GUI shall use the same mechanism then the LESIA for its user authentication.		
MUSIC	**Implements:**	REQ-ROC-CIRD-0470

The users should sign in with their LDAP account at LESIA.

The MUSIC primary instance, deployed on the LESIA site, shall only be accessible from the laboratory intranet. It implies that the MUSIC tools are only visible from people who have a valid LDAP user account at the LESIA.

4.4 Resource allocation and performance requirements

MUSIC source files volume shall not exceed 20 Gigabytes.

REQ-ROC-SSS-0060	MUSIC minimum hardware configuration	**Demo**
It shall be able to run MUSIC on a laptop with the following hardware configuration: - 2.3 GHz CPU frequency - 16 Gigabytes of RAM		
MUSIC	**Implements:**	

REQ-ROC-SSS-0070	MUSIC GUI supported instantaneous user connections	**Test**
MUSIC GUI backend server shall support 10 user connections in the same time, without suffering of latency.		
MUSIC	**Implements:**	

4.5 Operational requirements

REQ-ROC-SSS-0080	MUSIC operational environment	**Test**
It shall possible to run MUSIC in the following environments: - On the ROC Web server at LESIA (Meudon, France) - On a laptop at ESOC (Darmstadt, Germany) (TBC)		
MUSIC	**Implements:**	

REQ-ROC-SSS-0090	Run multiple instances	**Test**
It shall be possible to run several instances of MUSIC, with different software environments, in the same machine.		
MUSIC	**Implements:**	

5 RODP REQUIREMENTS

This section presents the technical requirements for the RODP pipeline.

The RODP user requirements can be found in the URD [RD2].

5.1 Capability requirements

5.1.1 Report RODP processing activity

The ROC administrators shall be able to check the RODP processing activities and to investigate in case of anomalies.

Table below gives the list of event severity levels to be reported by the RODP.

Severity level	Definition	Actions to be performed by the RODP
DEBUG	Debug event (only used in debug mode)	No specific action
INFO	Normal event (e.g., RODP start/end times, routine tasks information, etc.)	No specific action
WARNING	Event that requires attention, but does not compromise the software execution or data production	No specific action
ERROR	Event that requires special attention, and compromises the data production or the software execution (e.g., unexpected values in the data, not input data file found,	Stop the software execution and exit with an exception (error code 1)

	env. variable not well defined, etc.)	

Table 2. RODP activity event severity levels.

REQ-ROC-SSS-0100	Report RODP processing activity	**Test**
The RODP shall report its activity events into a “log” file in ASCII format.		
RODP	**Implements:** REQ-ROC-CIRD-0420 REQ-ROC-CIRD-0500	
The RODP log file should be unique for a given instance of the pipeline and saved into a dedicated directory. *Additionally, only the ROC administrators shall have the right to move or delete an existing log file. If the RODP does not found any existing log file, it shall create a new one.*		

REQ-ROC-SSS-0110	Report RODP error	**Test**
The RODP shall catch and store any error event raised during the execution.		
RODP	**Implements:** REQ-ROC-CIRD-0420 REQ-ROC-CIRD-0500	

5.1.2 Retrieve RPW-related data

Before being able to process RPW data and produce science and HK data files, the RODP needs to retrieve RPW data from the MOC and SOC dedicated interfaces.

The specification requirements related to the client used by the RODP to retrieve data from MOC are defined in a separated document [RD16].

REQ-ROC-SSS-0120	Retrieve RPW data	**Test**
The RODP shall be able of retrieving the following RPW data as specified in [SOL-ESC-IF-05011]: - The RPW TM raw data - The RPW TC raw data - The RPW TM report - The RPW TC report For a given APID and time ranges		
RODP	**Implements:** REQ-ROC-CIRD-0010	

The RODP should support TM raw and report data requests by packet creation time or packet storage time. The packet creation time should be used by default.

The RODP shall support TC raw and report data requests by packet execution time.

The RODP should have the capability of perform several tries with timeout option before skipping a step in the data retrieval workflow above. Especially, concerning the DDS interface, which can be busy or answer with latency.

REQ-ROC-SSS-0130	Retrieve E-FECS data	**Test**
The RODP shall be able of retrieving E-FECS data files, as defined in [SOL-SGS-ICD-0006] and using the mechanism specified in [SOL-SGS-ICD-0009].		
RODP	**Implements:**	REQ-ROC-CIRD-0020

REQ-ROC-SSS-0140	Retrieve TMC data	**Test**
The RODP shall be able of retrieving TMC data files, as defined in [SOL-SGS-ICD-0007] and using the mechanism specified in [SOL-SGS-ICD-0009].		
RODP	**Implements:**	REQ-ROC-CIRD-0020

REQ-ROC-SSS-0150	Retrieve SoopKitchen data	**Test**
The RODP shall be able of retrieving SoopKitchen export data files, as defined in [SOL-SGS-ICD-0012] and using the mechanism specified in [SOL-SGS-ICD-0009].		
RODP	**Implements:**	REQ-ROC-CIRD-0020

REQ-ROC-SSS-0160	Retrieve mission ancillary data	**Test**
The RODP shall be able of retrieving mission ancillary data files, as defined in [SOL-SGS-TN-0007] and using the mechanism specified in [SOL-SGS-ICD-0009].		
RODP	**Implements:**	REQ-ROC-CIRD-0030

5.1.3 Pre-process RPW-related data

REQ-ROC-SSS-0170	Convert raw to engineering data	**Test**
The RODP shall be capable of converting “raw” packet parameter values into “engineering” values.		
RODP	**Implements:**	REQ-ROC-CIRD-0060 REQ-ROC-CIRD-0090

It shall be done using the transfer functions in the RPW IDB.

REQ-ROC-SSS-0180	Convert OBT to UTC	**Test**
The RODP shall be able to convert on-board time (OBT) in the RPW packets to UTC time.		
RODP	**Implements:** REQ-ROC-CIRD-0140	
It shall be done using the dedicated SPICE kernels provided by the SOC.		

REQ-ROC-SSS-0190	Convert OBT to TT2000	**Test**
The RODP shall be able to convert on-board time (OBT) in the RPW packets to Terrestrial Time since J2000.		
RODP	**Implements:** REQ-ROC-CIRD-0060 REQ-ROC-CIRD-0090	
It shall be done using the dedicated SPICE kernels provided by the SOC.		

5.1.4 Produce RPW daily data files

This section specifies the RODP capabilities requirements concerning the production of RPW daily files.

REQ-ROC-SSS-0200	Produce RPW LZ daily file	**Test**
The RODP shall be able of producing RPW LZ daily files, as defined in [ROC-DAT-PRO-NTT-00006-LES].		
RODP	**Implements:** REQ-ROC-CIRD-0040	

REQ-ROC-SSS-0210	Produce RPW L0 daily file	**Test**
The RODP shall be able of producing RPW L0 daily files, as defined in [ROC-DAT-PRO-NTT-00075-LES].		
RODP	**Implements:** REQ-ROC-CIRD-0050	

REQ-ROC-SSS-0220	Produce RPW L1 survey data daily files	**Test**
The RODP shall be able of producing RPW L1 survey data daily files, as defined in [ROC-DAT-PRO-NTT-00075-LES].		
RODP	**Implements:** REQ-ROC-CIRD-0060	

REQ-ROC-SSS-0230	Produce RPW HK daily files	**Test**
The RODP shall be able of producing RPW HK daily files, as defined in [ROC-DAT-PRO-NTT-00006-LES].		
RODP	**Implements:**	REQ-ROC-CIRD-0090

REQ-ROC-SSS-0240	Produce RPW L1R survey data daily files	**Test**
The RODP shall be able of calling RPW Calibration Software (RCS), in order to produce RPW L1R survey data daily files as defined in [ROC-DAT-PRO-NTT-00006-LES].		
RODP	**Implements:**	REQ-ROC-CIRD-0070
The production of L1R shall be performed using the RCS.		

REQ-ROC-SSS-0250	Produce RPW L2 survey data daily files	**Test**
The RODP shall be able of calling RPW Calibration Software (RCS), in order to produce RPW L2 survey data daily files, as defined in [ROC-DAT-PRO-NTT-00075-LES].		
RODP	**Implements:**	REQ-ROC-CIRD-0070
The production of L2 shall be performed using the RCS.		

5.1.5 Produce RPW time range data files

This section specifies the RODP capabilities requirements concerning the production of RPW files for a given time range or event (i.e., SBM1/SBM2 events, Bias sweeping and current data, HK dump).

REQ-ROC-SSS-0260	Produce RPW L1 SBM1/SBM2 files	**Test**
The RODP shall be able of producing RPW L1 data file for a given SBM1/SBM2 event, as defined in [ROC-DAT-PRO-NTT-00075-LES].		
RODP	**Implements:**	REQ-ROC-CIRD-0060

REQ-ROC-SSS-0270	Produce RPW L1R SBM1/SBM2 files	**Test**
The RODP shall be able of calling RPW Calibration Software (RCS), in order to produce RPW L1R data file for a given SBM1/SBM2 event, as defined in [ROC-DAT-PRO-NTT-00006-LES].		
RODP	**Implements:**	REQ-ROC-CIRD-0070

REQ-ROC-SSS-0280	Produce RPW L2 SBM1/SBM2 files	**Test**
The RODP shall be able of calling RPW Calibration Software (RCS), in order to produce RPW L2 data file for a given SBM1/SBM2 event, as defined in [ROC-DAT-PRO-NTT-00075-LES].		
RODP	**Implements:**	REQ-ROC-CIRD-0070

REQ-ROC-SSS-0290	Produce RPW L1 Bias sweeping files	**Test**
The RODP shall be able of producing RPW L1 data file for a given Bias sweeping, as defined in [ROC-DAT-PRO-NTT-00075-LES].		
RODP	**Implements:**	REQ-ROC-CIRD-0060 REQ-ROC-CIRD-0590

REQ-ROC-SSS-0300	Produce RPW L1 Bias current files	**Test**
The RODP shall be able of producing RPW L1 monthly data files for Bias current on-board values, as defined in [ROC-DAT-PRO-NTT-00075-LES].		
RODP	**Implements:**	REQ-ROC-CIRD-0060 REQ-ROC-CIRD-0590

5.1.6 Produce RPW report data

REQ-ROC-SSS-0310	Produce RPW report data files	**Test**
The RODP shall be able of producing RPW report data files, as defined in [ROC-DAT-PRO-NTT-00006-LES].		
RODP	**Implements:**	REQ-ROC-CIRD-0340 REQ-ROC-CIRD-0350 REQ-ROC-CIRD-0360

5.1.7 Produce RPW auxiliary data

REQ-ROC-SSS-0320	Check input file existence	**Test**
The RODP shall be able of producing data file [RD?] that can be imported into the CNES data		

visualization and analysis tool [RD?].	
RODP	**Implements:** REQ-ROC-CIRD-0670

5.1.8 Processing RPW L3 data

REQ-ROC-SSS-0321	Processing RPW L3 files	**Test**
The RODP shall be able of processing RPW L3 data files, using the mechanism defined in [RD?].		
RODP	**Implements:** REQ-ROC-CIRD-0080	

5.1.9 Verify RPW data

REQ-ROC-SSS-0330	Check input file existence	**Test**
The RODP shall be capable of checking that the expected input file(s) have been found in the input directory.		
RODP	**Implements:** REQ-ROC-CIRD-0120	

REQ-ROC-SSS-0340	Check output file existence	**Test**
The RODP shall be capable of checking that the expected output file(s) have been found in the output directory.		
RODP	**Implements:** REQ-ROC-CIRD-0120	

REQ-ROC-SSS-0350	Check RPW L0, L1, L2 data file compliance	**Test**
The RODP shall be able of checking that RPW L0, L1 and L2 data files comply with the definition in the [SOL-SGS-TN-0009] document.		
RODP	**Implements:** REQ-ROC-CIRD-0120	

REQ-ROC-SSS-0360	Check RPW LZ, L1R, HK data file compliance	**Test**
The RODP shall be able of checking that RPW LZ, L1R and HK data files comply with the definition in the [ROC-PRO-DAT-NTT-00006-LES] document.		

RODP	**Implements:**	REQ-ROC-CIRD-0120

5.1.10 Re-process RPW data

REQ-ROC-SSS-0370	Re-process RPW data	**Test**
RODP shall be capable of re-processing RPW data.		
RODP	**Implements:**	REQ-ROC-CIRD-0130

RODP should produce a new version of a LZ data file for a given day in the following cases:

- New TM raw data for this day has been received (filling data gap case)
- The current version of the LZ file generated has the extension ".part"

5.1.11 RPW data-related summary plot file production

REQ-ROC-SSS-0380	Produce RPW data summary plots	**Test**
RODP shall be able of generating summary plots, as defined in [ROC-GEN-OTH-REQ-00081-LES].		
RODP	**Implements:**	REQ-ROC-CIRD-0100

5.1.12 RPW data dissemination and archiving capabilities

REQ-ROC-SSS-0390	Store RPW data	**Test**
RODP shall be capable of saving the following data products into to the ROC data server at LESIA: - LZ data files - L0 data files - L1 data files - L1R data files - L2 data files - L3 data files - HK data files - Summary plots files - Report files - SOC-provided mission ancillary data		

RODP	**Implements:**	REQ-ROC-CIRD-0170
RODP shall use the ROC Web site at LESIA to share data.		

REQ-ROC-SSS-0400	Distribute RPW data	**Test**
RODP shall be capable of saving the following data products into to the ROC Web site at LESIA within 48 hours of their generation: - LZ data files - L0 data files - L1 data files - L1R data files - L2 data files - L3 data files (TBC) - HK data files - Summary plots files - Report files - SOC-provided mission ancillary data		
RODP	**Implements:**	REQ-ROC-CIRD-0150 REQ-ROC-CIRD-0160 REQ-ROC-CIRD-0790
RODP shall use the ROC Web site at LESIA to share data.		

REQ-ROC-SSS-0410	Archive RPW data at ESAC	**Test**
RODP shall be able of delivering to the Solar Orbiter Data Archive at ESAC, the RPW data products, as defined in [ROC-DAT-PRO-NTT-00075-LES] within 3 months.		
RODP	**Implements:**	REQ-ROC-CIRD-0180

REQ-ROC-SSS-0420	Archive RPW data at CDPP	**Test**
RODP shall be able of delivering to the Solar Orbiter Data Archive at CDPP, the RPW data products, as defined in [TBC].		
RODP	**Implements:**	REQ-ROC-CIRD-0190

5.2 Interface requirements

5.2.1 Interface between the RODP and the MDB

The RODP shall have the capability to exchange data with the MDB on the LESIA Intranet. Connections via Internet should be forbidden.

5.2.2 Interface between the RODP and MUSIC

The RODP and MUSIC software should not have any direct interface. Nevertheless both shall be have an access to the MDB and the ROC data server at LESIA to share data.

5.2.3 Interface between the RODP and RCS

REQ-ROC-SSS-0430	RODP-RCS interface	**Test**
The RODP shall be able to call the RPW Calibration Software (RCS), in order to generate RPW L1R/L2 data products.		
RODP	**Implements:**	REQ-ROC-CIRD-0070

5.3 Implementation and design requirements

REQ-ROC-SSS-0440	RODP design	**Test**
The RODP shall be designed to work on the ROC data processing servers at LESIA.		
RODP	**Implements:**	

REQ-ROC-SSS-0450	Run multiple instances	**Test**
It shall be able to run several instances of RODP on the same machine.		
RODP	**Implements:**	

REQ-ROC-SSS-0460	RODP testing system	**Test**
The RODP shall include a self-automated testing system (i.e., unit and integration tests).		
RODP	**Implements:**	

The RODP should save “engineering” values in the L1, L1R and HK CDF data files.

5.4 Resource allocation and performance requirements

5.4.1 Software and data storage resource

The RODP source files volume shall not exceed 20 Gigabytes.

5.4.2 Memory and CPU hardware resource

REQ-ROC-SSS-0470	Minimum hardware configuration	Test
It shall be able to run the RODP, on a laptop with a typical hardware configuration (i.e., 2.3 GHz CPU frequency and 16 Gigabytes of RAM).		
RODP	**Implements:**	

5.4.3 Software performance

REQ-ROC-SSS-0480	High cadence RPW data request	Test
The RODP shall be able of requesting for new RPW data at MOC at least every minute.		
RODP	**Implements:** REQ-ROC-CIRD-0780	

In practice the duration of the RPW TM raw data retrieval is limited by the MOC DDS server latency.

REQ-ROC-SSS-0490	RPW raw data processing time	Test
The RODP shall be able to process 60 Megabytes of RPW raw data in less than 1 minutes (TBC). The processing step includes the parsing of RPW raw TM/TC data and the production of LZ, L0, L1 and HK data.		
RODP	**Implements:** REQ-ROC-CIRD-0780	

It should be possible to install an instance of the RODP on a machine in less than 60 minutes. This duration does not include the installation of the production environment: computer system, interfaces, data disks and network access. The installation of the database system is also an independent process.

5.5 Operational requirements

REQ-ROC-SSS-0500	Nominal cadence RPW data request	Test
During the exploitation phase, the RODP shall request for new RPW data at least every 24 hours.		
RODP	**Implements:** REQ-ROC-CIRD-0490	

	REQ-ROC-CIRD-0790

REQ-ROC-SSS-0510	Nominal cadence RPW data production	**Test**
During the exploitation phase, the RODP shall run the production of new RPW data products at least every 24 hours.		
RODP	**Implements:**	REQ-ROC-CIRD-0490 REQ-ROC-CIRD-0790 REQ-ROC-CIRD-0820

REQ-ROC-SSS-0520	Operational environment	**Test**
It shall be able to run the RODP in the following sites: - At LESIA (Meudon, France) - At ESOC (Darmstadt, Germany) (TBC)		
RODP	**Implements:**	

RODP should support the capability of triggering the following processes autonomously:

- Producing a new version of L0 data file, if the parent LZ daily file has been updated
- Producing a new version set of L1 and HK-digest files, if the parent L0 daily file has been updated
- Producing a new version set of L1R/L2 files, if the L1 parent files have been updated. It shall be possible to launch this process file by file.

Additionally, the related summary plots files shall be upgraded too.

The RODP should permit to launch the following processes independently:

- LZ to L0 data files production
- L0 to L1 and/or HK-digest data files production
- L1 to L1R data files production
- L1/L1R to L2 data files production

6 RPW LLVM REQUIREMENTS

REQ-ROC-SSS-0530	RPW low latency delivery specification	**Test**

The RPW Low Latency data pipeline (LLDP) shall be delivered as specified in [AD3].		
LLDP	**Implements:**	REQ-ROC-CIRD-0110

REQ-ROC-SSS-0540	RPW low latency LL01 data production	**Test**
The RPW Low Latency data pipeline (LLDP) shall produce RPW LL01 data files as defined in [AD3]. The format and content of the LL01 data files shall comply with [AD4].		
LLDP	**Implements:**	REQ-ROC-CIRD-0110

7 ROC SGSE REQUIREMENTS

7.1 ROC-SGSE capabilities requirements

7.1.1 MEB GSE test log data retrieval and processing

REQ-ROC-SSS-0550	MEB GSE test log data retrieval	**Test**
The ROC-SGSE shall be able to retrieve and store in its ROC test database, test log data written in a MEB GSE database.		
ROC-SGSE	**Implements:**	REQ-ROC-CIRD-0380 REQ-ROC-CIRD-0390 REQ-ROC-CIRD-0400

REQ-ROC-SSS-0560	MEB GSE test log data processing	**Test**
From a given MEB GSE test log, the ROC-SGSE shall be able to generate the following data products: - RPW LZ data file - RPW L0 data file - RPW HK digest data files - RPW L1 science data files The data produced by the ROC-SGSE shall be compliant with the convention defined in [ROC-TST-GSE-NTT-00017-LES].		
ROC-SGSE	**Implements:**	REQ-ROC-CIRD-0380 REQ-ROC-CIRD-0390 REQ-ROC-CIRD-0400

REQ-ROC-SSS-0570	RPW calibration software calling	Test
The ROC-SGSE shall be able to call RPW Calibration Software (RCS) to produce RPW L1R/L2 science data files.		
ROC-SGSE	**Implements:**	REQ-ROC-CIRD-0390 REQ-ROC-CIRD-0400

REQ-ROC-SSS-0580	MEB GSE test log input format	Test
The ROC-SGSE shall be able to read and process a test log from: - The ROC-SGSE database - A local test log XML format file		
ROC-SGSE	**Implements:**	REQ-ROC-CIRD-0380 REQ-ROC-CIRD-0390 REQ-ROC-CIRD-0400

7.1.2 RPW E-GSE stimuli data processing

REQ-ROC-SSS-0590	RPW E-GSE digest data file	Test
The ROC-SGSE shall be able of producing from a given E-GSE log file, a digest data file in the XML format providing as a function of time: - The E-GSE channel status (ON, OFF, etc.) - The signal configuration (FG, AWG, etc.) and parameters (sampling frequency, amplitude) - The start/stop execution time of the E-GSE script - Extra information such as E-GSE data directory name and date of creation should be also provided.		
ROC-SGSE	**Implements:**	REQ-ROC-CIRD-0380 REQ-ROC-CIRD-0390 REQ-ROC-CIRD-0400

7.1.3 ROC-SGSE data visualization capabilities

REQ-ROC-SSS-0600	Data visualization GUI	Test
The ROC-SGSE shall supply a dedicated “Test Viewer” (TV) GUI in order to: - Retrieve test logs from a given MEB GSE database - Run the test log data processing - View the resulting data as defined in [ROC-TST-GSE-SWU-00003-LES].		

ROC-SGSE	**Implements:**	REQ-ROC-CIRD-0380

7.1.4 ROC-SGSE data dissemination capabilities

REQ-ROC-SSS-0610	ROC-SGSE data dissemination	**Test**
The ROC-SGSE data products shall be saved into a location when it can be retrieved by the RPW teams.		
ROC-SGSE	**Implements:**	REQ-ROC-CIRD-0390 REQ-ROC-CIRD-0400

7.2 ROC-SGSE operational requirements

The ROC-SGSE should not perform requests when the MEB GSE is writing RPW TM packet data into its database.

It shall be able to run several instances of ROC-SGSE, with different software environments, in the same machine.

REQ-ROC-SSS-0630	ROC-SGSE execution environment	**Test**
The ROC-SGSE shall be able to run in the following environments: - at LESIA (Meudon, France), with the MEB GSE facilities deployed during thermal calibration campaign - at CNES (Toulouse, France), with the MEB GSE facilities deployed during the blank test and delta-calibration campaigns - at LESIA (Meudon, France), with the MEB GSE facilities during the mission		
ROC-SGSE	**Implements:**	

In particular, the ROC-SGSE will have to support RPW and E-GSE stimuli data processing and visualization during the ground system calibration campaigns at LESIA (thermal calibrations) and at CNES (blank and delta calibrations).

7.3 ROC-SGSE design requirements and constraints

In order to factorize as much as possible the common functionalities, the RODP and ROC-SGSE shall be built using the same design pattern.

Moreover the way the RODP and ROC-SGSE shall process RPW LZ data files shall be as much as similar of the RPW LLVM. Especially this file system design should be pretty similar of the /rpw/input and /rpw/output concept defined for the LLVM LLD processing in [RD19].

Each instance of the ROC-SGSE shall have distinct input/output data root directories. The

ROC-SGSE shall be tested and validated to run on a Linux Debian Operating System (OS).

7.4 ROC-SGSE resource allocation and performance requirements

The ROC-SGSE source files volume shall not exceed 10 Gigabytes.

In the nominal use case, the ROC-SGSE should be run with sequential jobs, not parallel. However, this functionality is particularly suitable when data over a long period of time need to be re-processed.

The ROC-SGSE shall be able to process a typical MEB GSE test log file of 60 Mbytes in less than 1 minute. The processing definition covers the production of the corresponding L0, L1 and HK data files.

It must be noticed that the duration of the MEB GSE test log data retrieval is limited by the local network and MEB GSE database response latency.

8 RCS REQUIREMENTS

8.1 Capabilities requirements

REQ-ROC-SSS-0640	L1R/L2 production	**Test**
The RCS shall produce the RPW L1R/L2 science data files.		
RCS	**Implements:** **REQ-ROC-CIRD-0070**	

The list of L1R/L2 data files can be found in the RDP.

The list of CDF attributes that shall be updated by the RCS can be found in [RD5].

REQ-ROC-SSS-0650	RCS logging	**Test**
The RCS shall produce a log file in ASCII format.		
RCS	**Implements:**	

8.2 Interface requirements

The RCS will have to implement a specific interface in order to be called in a common way by the ROC pipelines (RODP, ROC-SGSE)

REQ-ROC-SSS-0660	ROC pipelines-RCS interface	**Review**
The interface between the RODP and the RCS shall comply the specification defined in [ROC-PRO-PIP-ICD-00037-LES].		
RCS	**Implements:**	

8.3 Operational requirements

REQ-ROC-SSS-0670	Execution environment	Test
The RCS shall be able to run in the ROC pipelines production environments.		
RCS	**Implements:**	

9 SYSTEM REQUIREMENTS

9.1 Resource allocation and performance requirements

REQ-ROC-SSS-0680	ROC data volume capacity	Review
The ROC shall support at least 32 Terabytes of data volume storage over the whole mission (~10 years). This capacity does not include the ROC databases volumes (i.e., MDB, TDB and ROC MEB GSE databases).		
RSS	**Implements:**	

REQ-ROC-SSS-0690	ROC database volume capacity	Review
The ROC databases shall be able of storing at least 3 Terabytes of data volume over the whole mission (~10 years).		
RSS	**Implements:**	
This capacity concerns the MDB, TDB and ROC MEB GSE databases.		

The whole RSS software infrastructure at LESIA should be designed to be re-deployed in less than 24 hours.

In the case of the ESOC instance, it is expected to be able to re-deployed the infrastructure within 1 hour (TBC).

These durations does not include the interfaces that depend of external site (MOC DDS server, MOC/SOC-side GFTS, MEB GSE databases hosted by external partners).

9.2 Implementation and design requirements

REQ-ROC-SSS-0700	ROC file system server accessibility	Test
The ROC file system server at LESIA shall be split into two areas: - A “private” space only accessible by authenticated people - A “public” area accessible without restriction from Internet. The RSS public data file system server shall accessible in read-only from Internet (HTTPS).		

RSS	**Implements:** REQ-ROC-CIRD-0150

Depending on the needs, the access to the ROC file system server should be possible with Internet HTTPS or SSH protocols.

10 ROC DATABASE REQUIREMENTS

The requirements defined in this section concern the following databases:

- ROC Mission Database (MDB), used by the RODP and MUSIC
- ROC Test Database (TDB), used by the ROC-SGSE

10.1 Design requirements and constraints

REQ-ROC-SSS-0710	Database system	**Review**
The ROC mission (MDB) and test (TDB) databases shall be designed to work with relational database management system (RDBMS) deployed at LESIA.		
MDB	**Implements:**	
PostgreSQL is preferred.		

REQ-ROC-SSS-0720	IDB schema	**Review**
The ROC mission (MDB) and test (TDB) databases shall be designed to store the RPW IDB.		
MDB	**Implements:**	

REQ-ROC-SSS-0730	IDB sources	**Review**
The ROC mission (MDB) and test (TDB) databases shall be designed to store the RPW IDB from the following sources: - MOC Mission information Base (MIB) - RPW flight software team (PALISADE)		
MDB	**Implements:**	

REQ-ROC-SSS-0740	IDB versions	**Review**
The ROC mission (MDB) and test (TDB) databases shall be designed to host several versions of the IDB.		
MDB	**Implements:**	

REQ-ROC-SSS-0750	MUSIC database IDB metadata	Review
The ROC mission (MDB) and test (TDB) databases shall store for each RPW IDB: - The validity range - If the current IDB is the working (i.e., operational) version		
MUSIC	**Implements:** REQ-ROC-CIRD-0330	

12 LIST OF TBC/TBD/TBWS

TBC/TBD/TBW			
Reference/Page/Location	Description	Type	Status

13 DISTRIBUTION LIST

LISTS See Contents lists in "Baghera Web": Project's informations / Project's actors / RPW_actors.xls and tab with the name of the list or NAMES below		
		Tech_LESIA
		Tech_MEB
		Tech_RPW
		[Lead-]CoIs
		Science-CoIs

INTERNAL

LESIA CNRS		

LESIA CNRS		

EXTERNAL (To modify if necessary)

CNES		C. FIACHETTI
		C. LAFFAYE
		R.LLORCA-CEJUDO
		E.LOURME
		M-O. MARCHE
		E.GUILHEM
		J.PANH
		B.PONTET
IRFU		L. BYLANDER
		C.CULLY
		A.ERIKSSON
		SE.JANSSON
		A.VAIVADS
LPC2E		P. FERGEAU
		G. JANNET
		T.DUDOK de WIT
		M. KRETZSCHMAR
		V. KRASNOSSELSKIKH
SSL		S.BALE

AsI/CSRC		J.BRINEK
		P.HELLINGER
		D.HERCIK
		P.TRAVNICEK
IAP		J.BASE
		J. CHUM
		I. KOLMASOVA
		O.SANTOLIK
		J. SOUCEK
		L.UHLIR
IWF		G.LAKY
		T.OSWALD
		H. OTTACHER
		H. RUCKER
		M.SAMPL
		M. STELLER
LPP		T.CHUST
		A. JEANDET
		P.LEROY
		M.MORLOT