RPW Operation Centre

ROC Project Management Plan

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Change Record

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1	0	30/06/2016	X.Bonnin	First release
1	0	08/10/2016	X.Bonnin	Update ROC eng. doctree
1	2	15/11/2016	Y de Conchy	Update milestones Modifications of Institutes responsabilities
1	3	20/12/2016	X.Bonnin	Add SOV/SVT/LL in “Constraints of the project section” Update “ROC staff” and “Configuration” sections

Acronym List

Acronym	Definition
AR	Acceptance Review
CCSDS	Consultative Committee for Space Data Systems
CDF	Common Data Format
CNES	Centre National d'Etudes Spatiales
CP	Cruise Phase
CUC	CCSDS Unsegmented time Code
DA	Data Archive
DAL	Data Access Layer
DAS	DPU Application Software
DIO	Direction Informatique de l'Observatoire
DPM	Ground Segment Deputy Project Manager
DPS	Data Processing System
DPU	Digital Processing Unit
EPD	Energetic Particle Detector
ESA	European Space Agency
ESAC	European Space Astronomy Centre
ESOC	European Space Operation Centre
GIGL	Groupe Informatique Générale du LESIA
GSE	Ground Support Equipment
GUI	Graphical User Interface
HF	High Frequency
HFR	High Frequency Receiver
ICD	Interface Control Document
ID	Identifier
IT	Information Technology / Instrument Team
LEOP	Launch and Early Operation Phase
LESIA	Laboratoire d'Etudes Spatiales et d'Instrumentation en Astrophysique
LF	Low Frequency
LFR	Low Frequency Receiver
LL	Low Latency
MCS	Monitoring and Control System

MEB	Main Electronic Box
MIP	Mission Implementation Plan
MOC	Mission Operation Centre
NECP	Near Earth Commissioning Phase
NEOP	Near Earth Operation Phase
NMP	Nominal Mission Phase
PA	Pre-Amplifier
PDR	Preliminary Design Review
PM	Ground Segment Project Manager
PMP	Project Management Plan
QA/PA	Quality Assurance / Product Assurance
RGS	RPW Ground Segment
RGTS	ROC Ground Test SGSE
RLLP	RPW Low Latency Pipeline
RMU	RPW Monitoring Unit
ROC	RPW Operation Centre
RODS	ROC Operation and Data System
ROI	ROC Operation Interface
ROT	RPW Operation Toolkit
RPW	Radio and Plasma Waves instrument
RSS	ROC Software System
SBM	Selected Burst Mode
SCM	Search Coil Magnetometer
SDD	Software Design Document
SGS	Science Ground Segment
SGSE	Software Ground Support Equipment
SOC	Science Operation Centre
SolO	Solar Orbiter
SRS	Software Requirement Specification
SSS	Software System Specification
TDS	Time Domain Sampler
TNR	Thermal Noise Receiver
TV	TM/TC Viewier

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1 GENERAL

1.1 Scope of the Document

This document is the project management plan (PMP) of the RPW Operation Centre (ROC), which drives the RPW Ground Segment (RGS) activities.

According to [RD3] the PMP presents the main objectives and constraints of the project, and covers the following aspects:

- Project organization
- Project breakdown structures
- Configuration, information and documentation management
- Cost and schedule management
- Integrated logistic support
- Risk management
- Product assurance management
- Engineering management

The PMP shall address a project management in agreement with the requirements defined in the ROC Concept and Implementation Requirements Document (CIRD) [AD1].

The ROC is located at the Laboratoire d'Etudes Spatiales et d'Instrumentation en Astrophysique (LESIA) in Meudon, France.

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/1/3	ROC Concept and Implementation Requirements Document (CIRD)	Y. de Conchy X. Bonnin	15/11/2016
AD2				
AD3				

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	RPW-GEN-PLN-00130-LES/1/0	RPW Operation Concept	M.Maksimovic	08/03/2012
RD2	ECSS-M-ST-10C/3/1	Project planning and implementation	ECSS consoritium	6 March 2009
RD3	ROC-GEN-SYS-	ROC Software Development	X.Bonnin	15/10/2015

	PLN-00015-LES/2/1	Plan		
RD4	ROC-GEN-OTH-BDG-00010-LES/1/6	Proposition Technique et Financière pour le ROC	Y. de Conchy	19/10/2015
RD5	ROC-GEN-SYS-NTT-00008-LES/1/1	ROC Engineering Guidelines	X.Bonnin	18/11/2015
RD6	ROC-GEN-SYS-NTT-00019-LES/1/1	ROC Engineering Guidelines for External Users	X.Bonnin	18/11/2015
RD7	SOL-ESC-PL-00001/1/1	Solar Orbiter Mission Implementation Plan	I.Tanco	31/01/2013
RD8	Marche Subsequent N°2018031	Accord-cadre N°504 relatif à la mise en place d'une assurance qualité et d'une assurance produit pour les laboratoires de l'INSU	N.Mayordomo	04/10/2016
RD9	2A- SOL-ESC-HO-05014/1/1	Instrument Command Workshop, ESOC : Commanding Interface and Testing	I.Tanco	05/09/2016
RD10	SOL-SGS-0006-TS/0/0	Solar Orbiter Instrument Teams – SOC Test Specification	Nana Bach, Chris Watson	25/05/2016
RD11	LL-pipelines at SOC schedule.pptx	LL-Pipelines@SOC Proposed schedule	Chris Watson	06/07/2015
RD12	ROC-TST-GSE-SUM-00035-LES/1/1	POPPy framework User Manual	Manuel Duarte	24/06/2016

1.4 About this document

1.4.1 Access policy

This document is public and can be accessible without any restriction.

Any modification of the present document requires formal approval of the RPW Ground Segment Project Manager (PM) before publication.

This latter shall ensure that the present document is always up-to-date and in accordance with the current project requirements and status.

1.4.2 Terminology

Except the terms listed in the table below, the definitions provided in [RD5] are applicable in the present document.

Name	Definition
(Software) Back-end	The back end part of a software concerns all of the components that do not belong to the front-end part. It can be typically the data processing layer or the controllers/models layers.
(Team) collaboration tools	S/W or interfaces that can be jointly used by teams to collaborate on a document, file, or S/W development. (e.g., SVN, Git, JIRA, etc.)
Device	Hardware equipment such as server, data disk or network interfaces

(Team) development tools	See "(Team) collaboration tools" definition
(Software) Front-end	The front end of a software corresponds to the user/machine interface layer
Hardware logistic support	Logistic support in terms of hardware environment and assistance (e.g., machine/server, network access, etc.)
Post-launch phases	Phases of the Solar Orbiter planned after the launch (i.e., LEOP, NECP, CP, NMP)
Software logistic support	Logistic support in terms of software environment and assistance (e.g., Operating Systems, programming languages, collaboration tools, support software and interfaces, etc.)

Table 1. Terminology.

2 OBJECTIVES AND CONSTRAINTS OF THE PROJECT

2.1 The RPW ground segment main objectives

According to the CIRD [AD1], the RPW Ground Segment (RGS) main objectives are to:

- Support the definition of the science operations.
- Provide inputs for the definition and implementation of the science operation planning, data handling and archiving concepts.
- Supervise the preparation of the instrument operation timelines
- Support the definition and implementation of the Solar Orbiter scientific data archive, as part of the pre-launch tasks.
- Agree on a long-term science activity plan and define the scientific priorities of scientific goals.
- Monitor and analyze instrument behavior in complement to the Solar Orbiter Mission Operation Centre (MOC)
- Optimize instrument performances
- Deliver calibrated and high level data, including relevant calibration products, to the Solar Orbiter scientific archive.
- Provide to ESA unlimited access to all processed and analyzed data for public relation purposes during the 3-months proprietary period.
- Provide summaries of the main scientific results at regular intervals
- Maintain the instrument flight software

All of the activities that support these objectives are under the supervision of the ROC, which has the two-tier function of a data centre and an operation centre for the RPW instrument. However, most of the ROC tasks are carried out in close collaboration with the other parties who have delegated responsibilities for the ground segment and operations.

In the framework of the on-ground calibration tests at RPW system level, the ROC shall also develop, deliver and maintain a SGSE dedicated to post-mortem analysis of data. The so-called ROC SGSE shall support calibration validation, but also be a milestone in the development of ROC infrastructure for in-flight RPW data processing as well as monitoring.

2.2 Constraints of the project

2.2.1 ROC involvement related to the RPW engineering activities before the launch: main milestones

The figure below gives the milestones related to the ROC involvement to the RPW engineering activities before the launch.

RPW engineering activity description	ROC involvement	Schedule / deadline
RPW DPU SBM1 detection algorithm validation campaign	Develop, run and maintain software to support the validation of the SBM1 detection algorithm by the RPW Flight Software team. Especially, this software must be able to simulate the detection and produce input files for the RPW DPU software.	Sept. 2015
RPW DPU SBM2 detection algorithm validation campaign	Develop, run and maintain software to support the validation of the SBM2 detection algorithm by the RPW Flight Software team. Especially, this software must be able to simulate the detection and produce input files for the RPW DPU software.	Sept., 2015

RPW EM2 blank calibration campaign at CNES	Develop, run and maintain a SGSE to support RPW teams in the analysis of the data produced during the EM2 calibration campaign.	April-Sept. 2016
RPW PFM thermal calibration campaign at LESIA	Develop, run and maintain a SGSE to support RPW teams in the analysis of the data produced during the PFM calibration campaign.	Nov. 2016 to Jan. 2017
RPW-MAG time synchro. campaign in U-OTB (TBC)	Perform a post-mortem analysis of the results of the RPW-MAG time sync. test campaign in collaboration with the MAG team	TBD

Table 2. ROC involvement in the RPW engineering activities before the launch: main milestones.

2.2.2 ROC involvement related to the Solar Orbiter MOC/SOC engineering activities before the launch: main milestones

The table below gives the milestones related to the ROC involvement to the Solar Orbiter MOC/SOC engineering activities before the launch. It concerns mainly the System Operations Validation (SOV) [RD9], the System Validation Test (SVT) [RD9], the SOC - Instrument Team (IT) interface tests [RD10], and the Low Latency (LL) engineering activities [RD11].

Solar Orbiter MOC/SOC engineering activity description	ROC involvement	Schedule / deadline
Low Latency Virtual Machine (LLVM) engineering activities		
"Hello World" LLVM version delivery	To provide to the SOC a first "Hello world" version of the LLVM for RPW, that processes fake RPW LL packet data.	January, 31 2016
LL Data Description Document (DDD) delivery	To provide to the SOC the LL Data Description Document (DDD) for RPW.	February 29, 2016
LL Testcard delivery	To provide to the SOC the LL Testcard files for RPW.	March 31, 2016
LLVM processing version delivery	To provide to the SOC a second version of the LLVM that includes real RPW LL packet data processing.	June 30, 2016
LLVM processing + tests version delivery	To provide to the SOC a full version of the LLVM that includes real RPW LL packet data processing and self-testing processes.	August 31, 2016
SOC – IT interface tests		
Compatibility tests	The Compatibility Tests will consist of data exchange and manual check of the formats of the data products.	April – Oct. 2016
Integration tests	Integration Tests will consist on data exchange and running specific Sub-System(s) in order to read and execute some involved parts of the Sub-Systems and in order to be able to evaluate the output.	March – July 2017
Validation tests	The Validation Test Cases will be part of particular System Tests which will involve running the entire System or relevant part of it involving all the data product exchange needed for given Interface Test.	April 2018

System Operation Validation engineering activities		
SOV-0: Data Distribution interface Test	Test the data distribution interfaces between the MOC/SOC and the ROC	Launch – 10 months
SOV-1: MOC/SOC interface Test	Will involve instrument inputs.	Launch – 9 months
SOV-2: Cruise Operations End-to-end Test	Will involve In Situ (IS) instruments, and some limited Remote Sensing (RS) participation	Launch – 6 months
SOV-3: OBSM End-to-End Test	Will involve all instruments	Launch – 6 months
System Validation Test engineering activities		
SVT-0: devoted to unit-level commanding	First set of flight procedures for RPW to be run during the SVT-0	Launch – 18 months
SVT-1: to validate closed loop behaviour	RPW User Manual complete. All the inputs required for Near Earth Commissioning Phase and Cruise Phase (timeline and procedures). Instrument Teams to provide inputs and support iterations as necessary. All inputs required to test on the PFM to validate as far as possible instrument database and procedures. Instrument Teams to provide all test inputs. These inputs are expected to be delivered 3 months before the SVT-1. Instrument Team with decision authority to support test at test site. Up to two instruments tested in parallel.	Launch – 9 months
SVT-2: at the launch site, to perform last minute validation	Retest of any problems found with Instruments during SVT-1	Launch – 4 months

Table 3. ROC involvement in the Solar Orbiter MOC/SOC engineering activities before the launch: main milestones.

2.2.3 ROC key points and formal reviews before the launch

The table below lists the ROC key points to be planned before the launch.

Key points	Purpose	Scheduled date/time
Preliminary Design Key point	Preliminary review of the ROC organization and design by CNES	2017/01/16
Test Readiness Internal Review	Internal software design review (TBC)	Launch – 12 months (TBC)
Acceptance Review (AR)	Final acceptance review by ESA	Launch – 3 months (TBC)

Table 4. ROC main reviews before the launch.

2.2.4 The post-launch phases of the Solar Orbiter mission

Figure 1 indicates the timeline of the different phases of the Solar Orbiter mission and the corresponding operations planned after the launch.

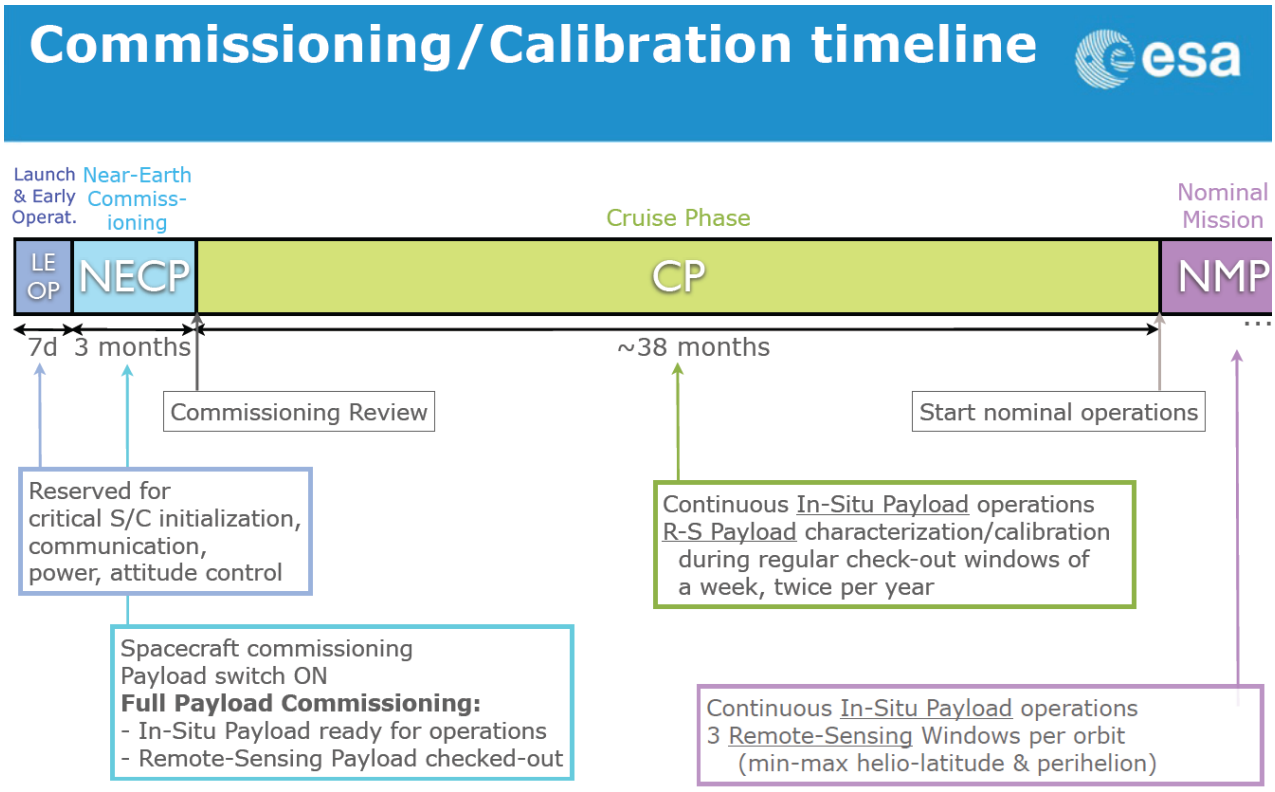

Figure 1. Solar Orbiter mission phases.

2.2.5 The RPW key operations planned during the Solar Orbiter mission

The key operations planned for RPW during the Solar Orbiter mission is defined into the dedicated "RPW Operation Concept" document [RD1].

During Near Earth Commissioning Phase (NECP):

- Deployment
- SCM Deployment
- Interference campaign

During Cruise Phase (CP):

- ANT calibration rolls

During Nominal Mission Phase (NMP) and Extended Mission Phase (EMP):

- The SURVEY "NORMAL" mode
- The SURVEY "BURST" mode
- The detection mode for recording both SBM1 (shock crossings) and SBM2 (in-situ Type III) events

The management of the RPW operations during the Soalr Orbiter shall be described in a dedicated "ROC Operations Management Plan" document.

2.2.6 Main phases of the project

The following table gives the main phases and tasks of the project related to the activities at Solar Orbiter and RPW projects levels.

ROC project phase ID	ROC main tasks	RPW SolO main related activities/phases	
Phase 0	- ROC concept and engineering requirement specification. It shall lead to the release of a first version of the ROC CIRD, PMP, SDP and SSS documents.	N/A	N/A /
Phase 1	- First release of the PTF document - Release of a preliminary version of the RPW packet parsing library for the ROC	EM	N/A
Phase 2	- Release of the SBM validation software and products in support to the validation of the SBM algorithms at the DAS level. - Release of the ROC SGSE versions for the RPW ground calibration activities (EM and PFM) - Release of the preliminary RPW Low Latency Virtual Machine (LLVM) - ROC PDR - Release of the RPW Operations and Data Pipeline (RODP) preliminary version for the test bench activities at SolO level - Release of the ROC Operations And Data System (ROADS) for the ROC activities planned during the SolO mission, including the RLLP.	- EM2 (receiver/sensor stand alone calibrations and blank test calibrations at system level) - PFM (thermal calibrations)	- EM - FM (SolO payload test bench activities)
Phase 3	- ROC AR - RPW commissioning (instrument switch-on and antenna deployment critical operations)	N/A	NEOP
Phase 4	- RPW Cruise Phase operations (instrument performance analysis and optimization) - RPW Nominal and Extended Phases operations (instrument monitoring and commanding activities, science data processing, dissemination and archiving activities)	N/A	CP NMP, EMP

Table 5. ROC main phases.

2.3 The Solar Orbiter mission operations management plan

The management plan for the Solar Orbiter mission operations are described in the "Solar Orbiter Mission Implementation Plan" (MIP) [RD7].

3 ROC PROJECT PRESENTATION

3.1 ROC function tree

Figure 2 presents the ROC function tree. The tree is divided into 6 main branches of activities, which must meet the requirements defined in the CIRD [AD1]:

- **Data processing**, which regroups functions related to the RPW data processing, including Low Latency data production, and the assessment of the science data products quality.
- **In-flight Performance optimization and Calibration**, which gathers functions related to the instrument performance optimization and calibration after the launch.
- **Operations**, which concerns all of the science and engineering activities to be coordinated by the ROC to perform the instrument operations.
- **Ground tests**, which focus on the ROC support related to the tests realized before the launch on-ground (i.e., system calibrations and SBM detection algorithms validations).
- **Project management**, which lists the functions concerning the management of the ROC as a project, including the documentation management and the ROC logistics.
- **Data dissemination and archiving**, which regroups functions related to the RPW data distribution and archiving.

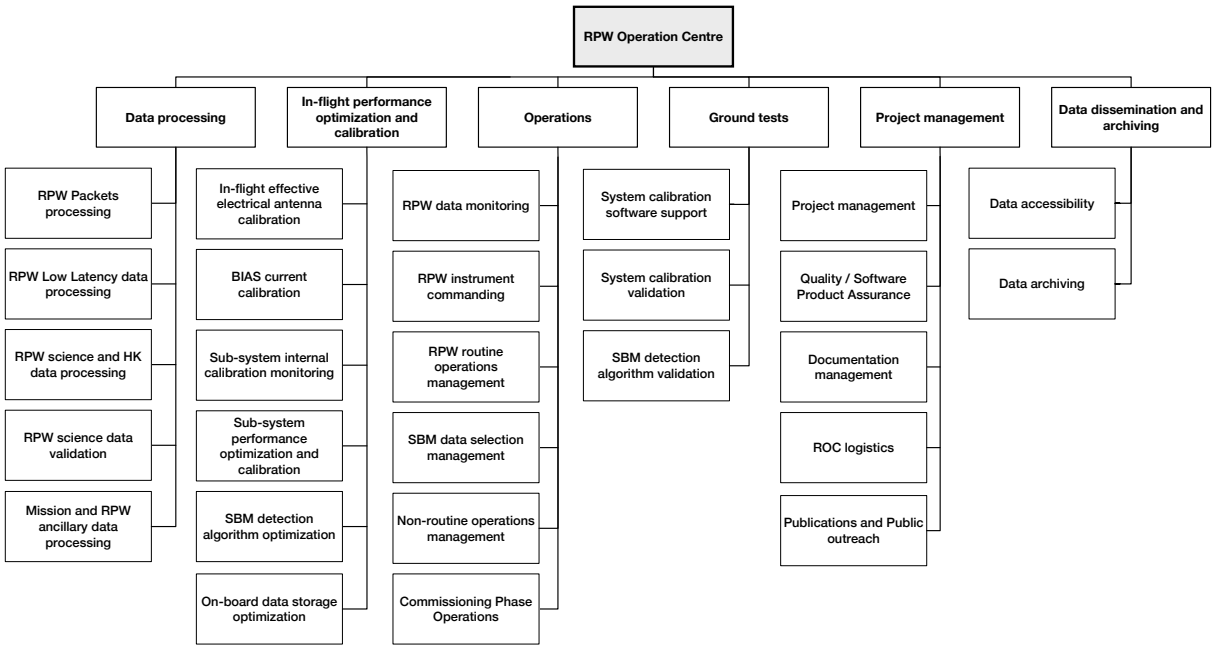

Figure 2. RPW Ground Segment function tree.

The following table gives more details about the functions of each branch.

Functional branch	Function	Description
Data Processing	**RPW Packets processing**	Retrieve from the SOC/MOC, identify and parse correctly the RPW TM packets. Retrieve and analyse the TC history catalogue.
Data Processing	**RPW Low Latency data processing**	Process RPW Low Latency data as required by the SOC.
Data Processing	**RPW science and HK data processing**	Process RPW science and HK data products, including calibrated science data.
Data Processing	**RPW science data validation**	Ensure that the RPW calibrated science data quality is as close as possible from the instrument science requirements
In-flight performance optimization and calibration	**In-flight effective antenna calibration**	Perform the RPW effective electric antenna calibration after the launch.
In-flight performance	**BIAS current calibration**	Ensure the BIAS current calibration from the

optimization and calibration		sweeping data during the whole mission
In-flight performance optimization and calibration	**Sub-system internal calibration monitoring**	Monitor the sub-system internal calibrations
In-flight performance optimization and calibration	**Sub-system performance optimization and calibration**	Optimize the sub-system performance and calibration
In-flight performance optimization and calibration	**SBM detection algorithm optimization**	Optimize the SBM1/SBM2 algorithm detections
In-flight performance optimization and calibration	**On-board data storage optimization**	Optimize the on-board data storage
Operations	**RPW data monitoring**	Monitor the instrument data: TM/TC, HK and science data, the sub-systems status, event reporting, actual TM data rate, on-board memory storage, power consumption
Operations	**RPW instrument commanding**	Prepare and submit instrument operation requests in agreement with the mission operation planning and constraints (e.g., data rate, power consumption, events, etc.) Plan the GSE in support to this activity
Operations	**RPW routine operations management**	Plan and coordinate the RPW routine operations management in terms of procedures, team responsibilities, software and logistics
Operations	**SBM data selection management**	Plan and perform the SBM data selection life cycle
Operations	**Non-routine operations management**	Plan and coordinate the RPW non-routine operations (e.g., FDIR) management in terms of procedures, team responsibilities, software and logistics
Operations	**Commissioning**	Prepare and support the RPW specific operations planned during the commissioning phase
Ground Tests	**System calibration software support**	Provide software support during on-ground calibration tests at system level
Ground Tests	**System calibration validation**	Participate to the system calibration validation during ground calibration campaigns.
Ground Tests	**SBM algorithm validation**	Support RPW flight software team in the SBM detection algorithm test and validation on-ground.
Project management	**Project management**	Manage the ROC project
Project management	**Quality Software Product Assurance**	Ensure the Quality Assurance / Produce Assurance of the ROC project
Project management	**Documentation management**	Ensure that documentation management
Project management	**ROC logistics**	Ensure that ROC logistics (hardware/software support equipment, logistics for meetings, collaboration tools, etc.)
Project management	**Publication and public outreach**	Manage the publication and public outreach activities around RPW
Data Dissemination and Archiving	**Data accessibility**	Ensure that accessibility of RPW data in terms of documentation, user interfaces and software
Data Dissemination and Archiving	**Data archiving**	RPW data archiving activities with ESA and CDPP. Primary data storage at the LESIA.

Table 6. ROC functions.

3.2 ROC product tree

3.2.1 ROC Software System (RSS)

The ROC Software System (RSS) is the top-level system of the ROC. It gathers all of the software systems required to reach the ROC functions. It is divided into two systems:

- The ROC Ground Equipment Support (ROC GSE), which regroups software equipment relative to the instrument tests performed on-ground, before and after the launch.
- The ROC Operations And Data System (ROADS), which concerns software equipment relative to the instrument monitoring, commanding and data processing capabilities.

Figure 3 shows the RSS product tree. The sub-systems of the ROC GSE and ROADS are briefly presented in the next sections.

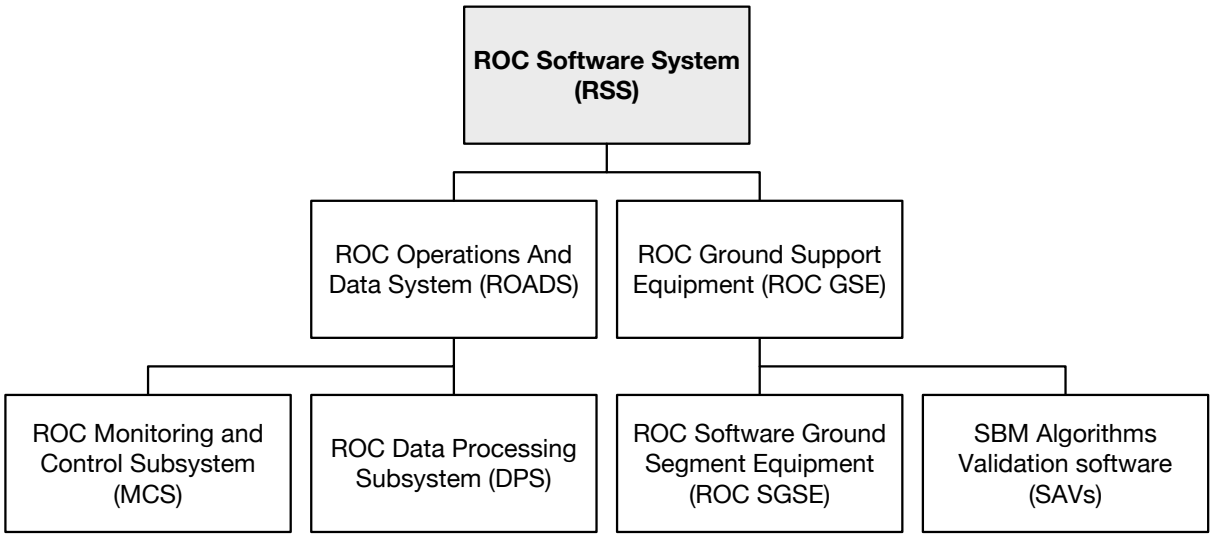

Figure 3. ROC Software System product tree.

3.2.1.1 ROC Operations And Data System (ROADS)

The ROC Operations And Data System (ROADS) is the highest-level software system in support to the RGS activities during the Solar Orbiter mission.

It is composed of the two sub-systems:

- The ROC Monitoring and Control Subsystem (MCS), which contains the software units in charge of the RPW monitoring and commanding.
- The ROC Data Processing Subsystem (DPS), which contains the software units in charge of the RPW data processing, including the dissemination and archiving.

Figure 4 shows the software product tree of the ROADS. The description and functionalities of the MCS and DPS software units, including the data products and databases, are presented in more details in the "ROC Software Development Plan" (SDP) document [RD3].

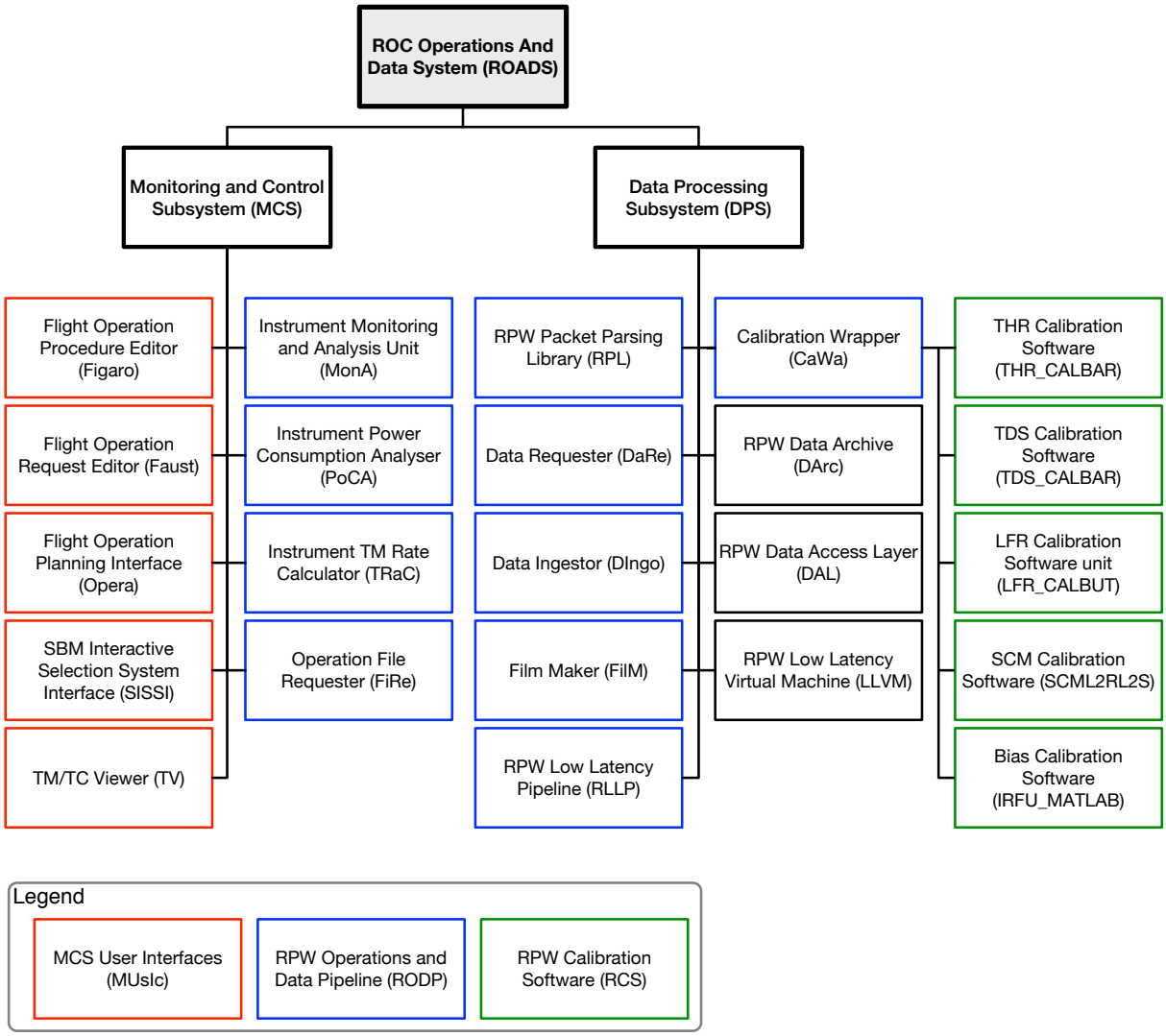

Figure 4. ROADS software product tree.

3.2.2 ROC Ground Support Equipment (ROC GSE)

Figure 5 shows the product tree concerning the ROC Ground Support Equipment (GSE). The ROC GSE application firstly concerns instrument tests performed on-ground before launch, namely: EM2/PFM instrument calibrations and SBM1/SBM2 detection algorithm validation campaigns. Nevertheless some parts of these GSE tools will be re-used during the Solar Orbiter mission to support ROC specific tasks.

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 used to support the on-ground test activities during the mission.
- The SBM Algorithm Validation software (SAVS), supplying software to support the validation of the Selected Burst Modes (SBM) algorithms. Instances of this software will be used to optimize the on-board algorithms during the Cruise Phase (CP).

The functionalities of the GSE units are presented in the SDP [RD3].

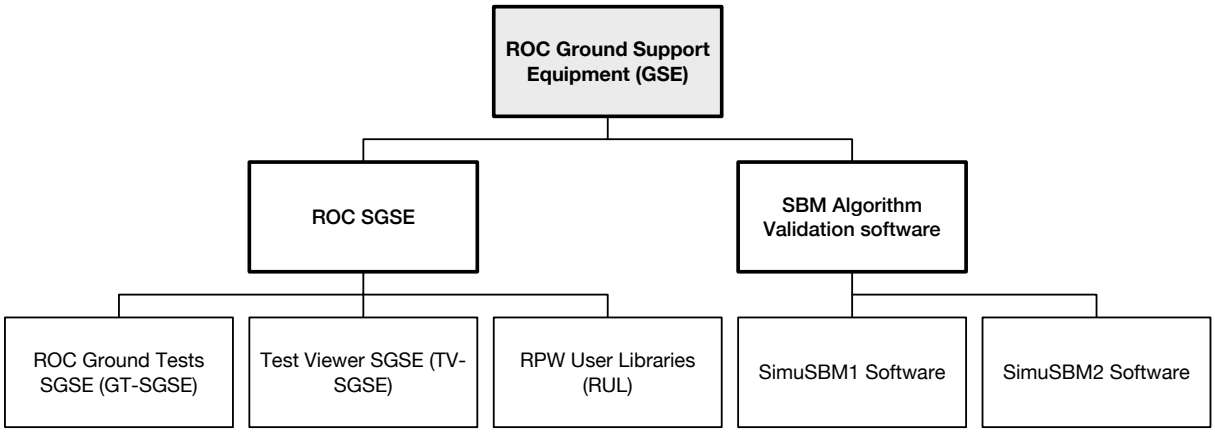

Figure 5. ROC Ground Support Equipment (ROC GSE) related software products.

4 ROC PROJECT ORGANIZATION

4.1 Key personnel responsibilities

The definitions and responsibilities of the key personnel involved in the ROC are established in the CIRD [AD1].

4.2 Institutes responsibilities

The responsibilities of Institutes involved in the RGS are listed in the table below.

Institute	Main responsibilities
LESIA (ROC)	Develop, test, validate, run and maintain software and/or interfaces allowing to: - Monitor the instrument during the mission, starting at the NECP. - Plan the observation campaigns - Prepare the TC requests to be sent to the on-board instrument - Produce and distribute as soon as possible RPW data to the instrument consortium - Produce and deliver RPW calibrated science data to the instrument consortium, the ESAC (Madrid) and CDPP (Toulouse) for archiving - Provide S/W support during the calibration tests at the system level - Deliver and run a low latency pipeline for RPW to the SOC. Write, deliver and keep up-to-date associated documentation
ESOC (MOC) / ESAC (SOC)	Develop, test, validate, run and maintain software and interfaces allowing to: - Uplink instrument TC requests to the S/C - Alert IT for instrument failures/anomalies - Deliver raw TM/TC packet data downlinked/uplinked from/to the S/C to the Solar Orbiter consortium through the EDDS dedicated interface [RD11] - Provide a dedicated interface for IORs. [RD8] - Deliver auxiliary data (e.g., SPICE kernels) to the instrument teams, as well as the inputs for the IOR preparation (TM corridor, Power consumption range, etc.) - Archive Solar Orbiter final data sets - Provide a dedicated interface for data archiving process [RD7] - Run the low latency pipelines [RD5] - Coordinate Solar Orbiter observation campaigns (i.e., SAP, SOOP) - Write, deliver and keep up-to-date associated documentation
CNES	Develop, test, validate, run and maintain software and/or interfaces allowing to: - Provide to the ROC, the calibration data produced by the ROC SGSE at CNES (Toulouse) - Provide to the ROC, the calibration metadata related to the EGSE setup.

	- Supervise the writing of and the deliver of the RPW user manual - Assist the ROC team in the preparation and conduct of the near-Earth commissioning phase operations related to RPW - Performing RPW AIV/AIT activities
LPP (LFR)	-Calibrating LFR sub-system data -Deliver to the ROC the CDF skeletons for LFR data sets. -Develop, test, validate, deliver and maintain LFR software allowing ROC to produce * calibrated LFR science data files at LFR receiver level (L2R) * calibrated LFR science data files at system level (L2S) - Contribute to the validation of the science data produced by the LFR S/W for all products except waveforms : * calibrated LFR science data files at LFR receiver level (L1 to L2R) * calibrated LFR science data files at system level (L1 to L2S) -Write, deliver and keep up-to-date associated documentation
IAP (TDS)	-Calibrating TDS sub-system data -Deliver to the ROC the CDF skeletons for TDS data sets. -Develop, test, validate, deliver and maintain TDS software allowing ROC to produce * calibrated TDS science data files at TDS receiver level (L2R) * calibrated TDS science data files at system level (L2S) - Contribute to the validation of the science data produced by the TDS S/W: for all products except waveforms * calibrated TDS science data files at TDS receiver level (L1 to L2R) * calibrated TDS science data files at system level (L1 to L2S) -Write, deliver and keep up-to-date associated documentation
LESIA (THR)	-Calibrating THR sub-system data -Deliver to the ROC the CDF skeletons for THR data sets. -Develop, test, validate, deliver and maintain THR software allowing ROC to produce * calibrated THR science data files at THR receiver level (L2R) * calibrated THR science data files at system level (L2S) - Contribute to the validation of the science data produced by the THR S/W: * calibrated THR science data files at THR receiver level (L1 to L2R) * calibrated THR science data files at system level (L1 to L2S) -Write, deliver and keep up-to-date associated documentation
LESIA (Flight software)	- Deliver the RPW Instrument Database (IDB) to the ROC - Provide expertise support for the RPW control and monitoring operations (e.g., FDIR, flight software upgrading patch, etc.) Write and deliver the corresponding up-to-date documentation
LESIA (MEB GSE)	- Provide software support to prepare the RPW operations (e.g., interface with the MEB GSE in order to validate the RPW IORs) Write and deliver the up-to-date MEB GSE documentation
IRF Uppsala (BIAS)	-Calibrating BIAS sub-system data -Deliver to the ROC the CDF skeletons for BIAS data sets. -Develop, test, validate, deliver and maintain IRF software allowing ROC to produce for electrical waveforms * calibrated BIAS science data files at BIAS level (L2R to L2S) * calibrated BIAS science data files at system level (L1 to L2S) - Contribute to the validation of the science data produced by the BIAS S/W: * calibrated electrical waveforms -Write, deliver and keep up-to-date associated documentation
LPC2E (SCM)	-Calibrating SCM sub-system data -Deliver to the ROC the CDF skeletons for SCM data sets. -Develop, test, validate, deliver and maintain IRF software allowing ROC to produce for magnetical waveforms * calibrated SCM science data files at SCM level (L2R to L2S) * calibrated SCM science data files at system level (L1 to L2S)

	- Contribute to the validation of the science data produced by the SCM S/W: * calibrated magnetical waveforms -Write, deliver and keep up-to-date associated documentation

Table 7. Institute responsibilities

4.3 ROC staff

This section presents the personnel involved in the ROC project. A detailed list can be found in the table 8.

4.3.1 ROC staff at the LESIA

Figure 6 shows the structure of the ROC science and engineering personnel at the LESIA.

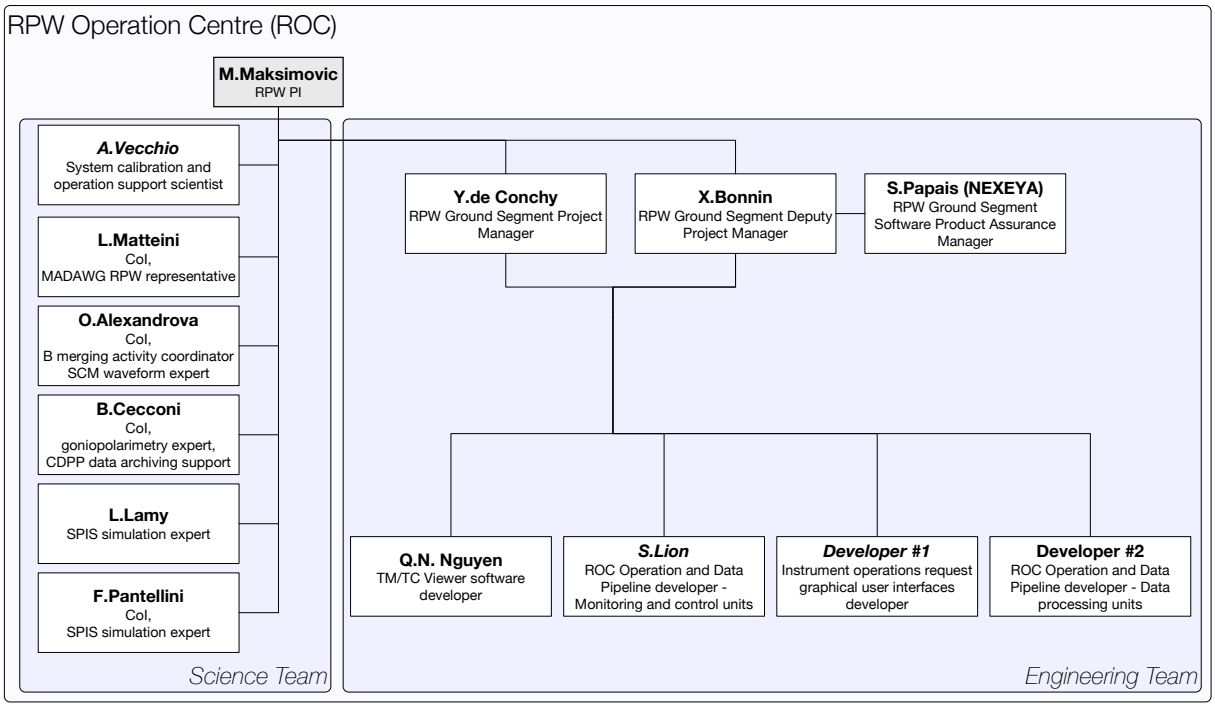

Figure 6. ROC staff at the LESIA.

Details about the tasks of the ROC science and engineering team are listed in the Table 8. The personnel workload is given in the *ROC workload management schedule file* (see section 5.1.1.1).

4.3.2 External staff directly involved in the ROC activities

Figure 7 shows the main teams directly involved in the ROC project. It includes:

- The TDS, LFR, TNR-HFR, BIAS and SCM teams in charge of calibrating their sub-systems and delivering the RPW Calibration Software (RCS) to the ROC.
- The MEB GSE and flight software teams located at the LESIA and that supply to the ROC GSE tools and the instrument database (IDB) respectively.
- The CNES teams in support to the ground segment activities. The participation of the CNES will be effective until the commissioning operations.

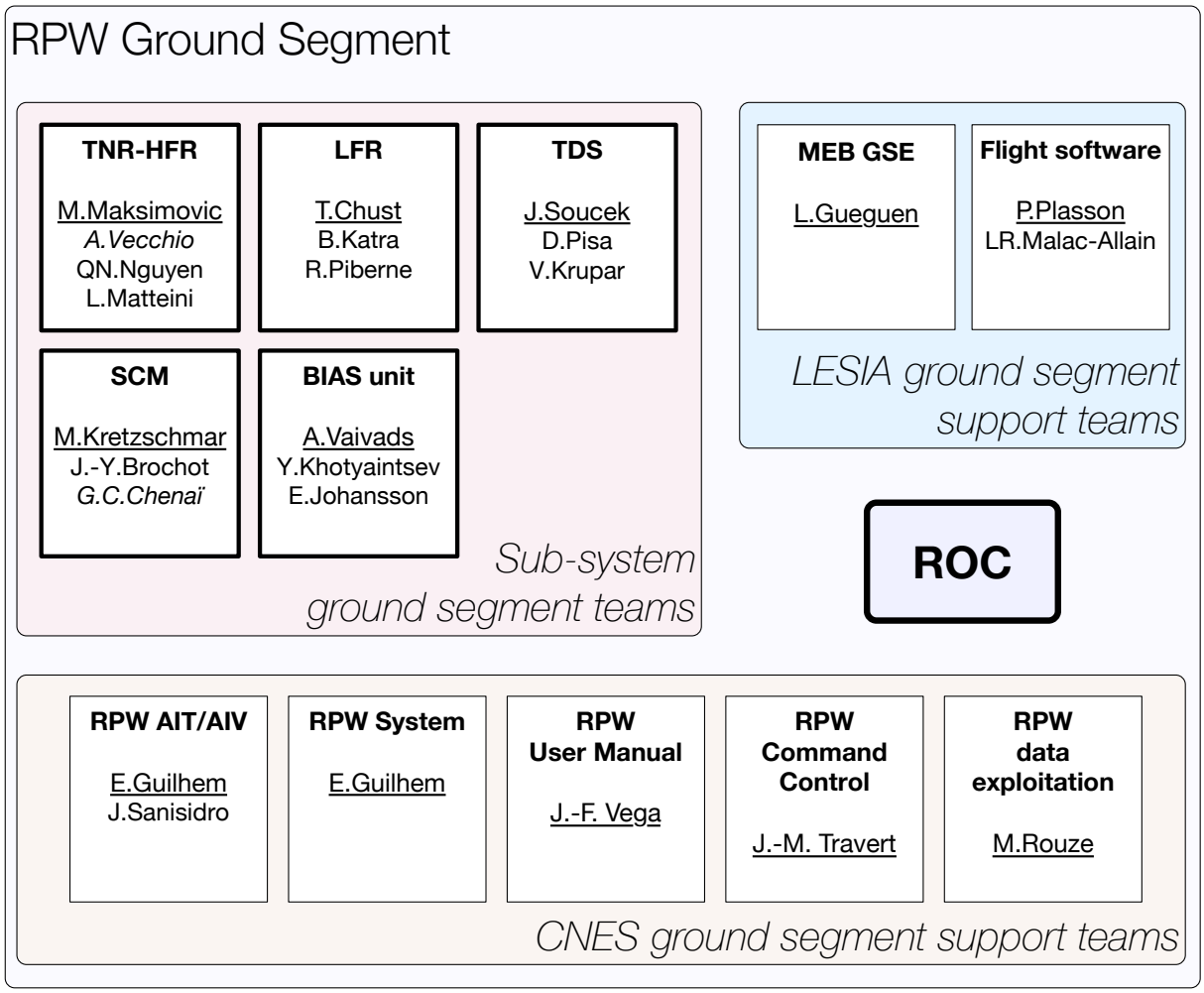

Figure 7. ROC support teams.

4.3.3 List of personnel

The table 8 gives a detailed list of main people involved in or that interact with the ROC. People in bold font are directly involved in the ROC project, people in italic font are contract employees, and people that don't work anymore in the project are indicated in grey.

Name	Function(s)	Institut	Contact
	ROC		
M.Maksimovic	RPW PI	LESIA	milan.maksimovic@obspm.fr
Y.de Conchy	RPW ground segment project manager / ROC budget / operation preparation engineering coordinator (until Sept. 2017)	LESIA	yvonne.deconchy@obspm.fr
X.Bonnin	RPW ground segment deputy project manager / ROC Software System architect and manager	LESIA	xavier.bonnin@obspm.fr
QN.Nguyen	ROC TM-TC Viewer software engineer / RPW user library developer	LESIA	quynh-nhu.nguyen@obspm.fr
E.Holle	ROC S/W engineer	LESIA	eleonore.holle@obspm.fr

A.Vecchio	System calibration / operation preparation science coordinator	*LESIA*	antonio.vecchio@obspm.fr
L.Matteini	CoI, MADAWG RPW representative member	LESIA	lorenzo.matteini@obspm.fr
B.Cecconi	MADAWG RPW member, CDDP data archiving support, Virtual Observatory (OV) expert	LESIA	baptiste.cecconi@obspm.fr
O.Alexandrova	Co-I, B merging activity coordinator, SCM waveform expert	LESIA	olga.alexandrova@obspm.fr
L.Lamy	Spacecraft potential simulation with SPIS tool	LESIA	laurent.lamy@obspm.fr
F.Pantellini	CoI, spacecraft potential simulation with SPIS tool	LESIA	filippo.pantellini@obspm.fr
S.Lion	ROC Operations and Data Pipeline – MCS units software engineer	LESIA	sonny.lion@obspm.fr
Developer #1	MCS User Interfaces Software engineer	LESIA	
Developer #2 (TBC)	ROC Operations and Data Pipeline – DPS units software engineer		
T.Sausiere	RPW Packet parsing library software engineer	LESIA (AVISTO)	thierry.sauziere@obspm.fr
M.Duarte	ROC SGSE and TV SGSE software engineer	LESIA (VIVERIS)	manuel.duarte@obspm.fr
S.Papais	ROC software product assurance manager	*LESIA (Nexeya)*	Stephane.PAPAIS@nexeya.com
TNR-HFR team			
M.Maksimovic	TNR-HFR Lead Co-I	LESIA (ROC)	milan.maksimovic@obspm.fr
QN.Nguyen	TNR-HFR data calibration software engineer	LESIA	quynh-nhu.nguyen@obspm.fr
B.Cecconi	TNR-HFR CoI, goniopolarimetry expert	LESIA	baptiste.cecconi@obspm.fr
A.Vecchio	TNR-HFR data calibration software co-responsible (until April 2017)	LESIA	antonio.vecchio@obspm.fr
L.Matteini	TNR-HFR data calibration software co-responsible (after April, 2017)	LESIA	lorenzo.matteini@obspm.fr
K.Boughedada	TNR-HFR flight software engineer	LESIA	kamal.boughedada@obspm.fr
LFR team			
T.Chust	LFR Lead Co-I	LPP	thomas.chust@lpp.polytechnique.fr
B.Katra	LFR flight et data calibration software engineer	LPP	bruno.katra@lpp.polytechnique.fr
R.Piberne	LFR calibration software support engineer	LPP	rodrigue.piberne@ lpp.polytechnique.fr
TDS team			
J.Soucek	TDS Lead Co-I	IAP	soucek@ufa.cas.cz
D.Pisa	TDS data calibration software engineer	IAP	dp@ufa.cas.cz
V.Krupar	TDS data definition and software support scientist	IAP	vk@ufa.cas.cz
BIAS team			

A.Vaivads	BIAS Lead Co-I	IRF Uppsala	andris@irfu.se
Y.Khotyaintsev	BIAS CoI / RPW data definition support	IRF Uppsala	yuri@irfu.se
E.Johansson	BIAS data calibration software engineer	IRF Uppsala	erik.johansson@irfu.se
SCM team			
M.Kretzschmar	SCM CoI / SCM data calibration and ground segment manager	LPC2E	matthieu.kretzschmar@cnrs-orleans.fr
J.Y.Brochot	SCM data calibration software engineer	LPC2E	Jean-Yves.Brochot@cnrs-orleans.fr
G.C.Chenaï	SCM data calibration software support engineer	LPC2E	Gamil.Cassam-Chenai@cnrs-orleans.fr
G.Jannet	SCM project manager	LPC2E	guillaume.jannet@cnes-orleans.fr
CNES AIT/AIV engineer Team			
E.Guilhem	EMC & Performance Support	CNES (ALTRAN Technology)	emmanuel.guilhem@cnes.fr
J.Sanisidro	EMC & Performance Support	CNES	julien.sanisidro@cnes.fr
J.Segur	EMC & Performance Support	CNES (Sogeti)	jerome.segur@sogeti.com
LESIA AIT/AIV engineer Team			
G.Barbary	MEB AIT Manager	LESIA	gaele.barbary@obspm.fr
S.This	MEB AIT engineer	LESIA	simone.this@obspm.fr
A.Habet	MEB AIT engineer	LESIA	abderrahmane.habet@obspm.fr
Flight software / Control command Team (LESIA)			
P.Plasson	Command and Control Architect / Flight Software Manager	LESIA	philippe.plasson@obspm.fr
L.R. Malac-Allain	Command and Control Architect / Flight Software manager support	LESIA	leeroy.malac-allain@obspm.fr
Command control / ground segment engineering support (CNES)			
J.M. Travert	Command control / ground segment engineering support	CNES	jean-michel.travert@cnes.fr
RPW User Manual (CNES)			
J.F Vega	CDR actions, ICDS, User Manual, harness, system budgets	CNES	jean-françois.vega@cnes.fr
System			
S.Chaintreuil	RPW System Manager	LESIA	sylviane.chaintreuil@obspm.fr
Bernard Pontet	RPW System engineer	CNES	bernard.pontet@cnes.fr
E.Guilhem	RPW System engineer	CNES (ALTRAN Technology)	emmanuel.guilhem@cnes.fr
MEB			
M.Dekkali	MEB/PA Project Manager	LESIA	moustapha.dekkali@obspm.fr
MEB GSE			
L.Gueguen	MEB GSE Software Manager	LESIA	loic.gueguen@obspm.fr
MEB EGSE			
D.Dias	RPW E-GSE software support	LESIA	daniel.dias@obspm.fr
K.Boughedada	RPW E-GSE software support	LESIA	kamal.boughedada@obspm.fr
Project (CNES)			
C.Laffaye	RPW Project Manager	CNES	catherine.laffaye@cnes.fr

E.Bellouard	RPW Project Manager	CNES	elise.bellouard@cnes.fr
I.Fratter	Solar Orbiter Project Manager (French contribution)	CNES	isabelle.fratter@cnes.fr
M.Rouze	RPW Project exploitation Manager	CNES	michel.rouze@cnes.fr
FIELDS / Solar Probe Plus (NASA)			
S.Bale	FIELDS PI / RPW Lead Co-I	SSL	bale@ssl.berkeley.edu
M.Pulupa	FIELDS ground segment lead	SSL	pulupa@berkeley.edu
K.Goetz	FIELDS system	University of Minnesota	goetz@umn.edu
STIX team (LESIA)			
N.Vilmer	STIX CoI	LESIA	nicole.vilmer@obspm.fr

Table 8. Key personnel involved in the RPW Ground Segment activities.

5 CONFIGURATION, INFORMATION AND DOCUMENTATION MANAGEMENT

5.1 Configuration management plan

5.1.1 Project management files and tools

5.1.1.1 ROC workload management schedule file

The workload management schedule of the ROC shall be written in a dedicated file in the Excel© 2007 format. Especially it shall provide the workload for each agent of the ROC: its name, its agent category (e.g., "engineer", "researcher"), its function (e.g., "developer", "Project Manager", etc.) and its percentage of workload for each year of the project.

The file naming convention shall be:

"Plan_de_charge_ROC_IssueXX_RevYY.xlsx"

Where "XX" and "YY" are respectively the issue and revision of the document. The PM shall ensure that this document is always up-to-date.

5.1.1.2 ROC project planning file

The ROC project planning shall be written in a dedicated file in the Microsoft Project© file format. This file shall contain the detailed planning of the project, including the phases of software development, validation tests and delivery deadlines. It shall also permit to identify the origin and contribution of the person in charge.

The file naming convention shall be:

"ROC_Planning_IssueXX_RevYY.mpp"

Where "XX" and "YY" are respectively the issue and revision of the document. The PM shall ensure that this document is always up-to-date.

5.1.1.3 Mailing lists

In addition to the RPW mailing lists, the ROC project relies on the following lists:

- **roc.cal** – List of people involved in the instrument calibration activities

- **roc.sgse** – List of people involved in the ROC-SGSE development, interface and data product definition
- **roc.lesia** – Internal list used by the ROC team at the LESIA only.
- **roc.teams** – List of all of the personnel directly concerned by the ROC activities.
- **rpw-roc.recrut** – Internal mailing-list dedicated to the ROC hiring.

Additional lists will have to be created in order to prepare and manage the instrument monitoring and operations.

All of these lists shall be moderated by the PM and DPM.

5.1.1.4 Issue tracker tool

The JIRA tool is used as an issue tracker by the ROC team. The JIRA projects are:

- **ROC-ADMIN** – Administration of the ROC project
- **ROC-DATAPROD** – Issues about the data production
- **ROC-OPERATIONS** – Issues relative to the instrument operations
- **ROC-PIPELINE** – RSS pipelines development (RODP)
- **ROC-RPWLIB** – Issues relative to the instrument packet analysis
- **RPW-TESTS-SOL** – Issues relative to the ROC GSE

5.1.2 Software development files and tools

The files and tools in support to the software development are listed in the SDP.

5.2 Information management plan

5.2.1 Regular meetings involving the ROC

The following table gives the list of regular meetings planned during the project. The latest column on the right gives the approximate cadence of the meetings. This cadence is likely to change depending of the phases of the project.

Meeting name	Purpose	Participants	Approx. Cadence
Science Working Team (SWT) Meeting	Discussions and decision about the scientific objectives to reach during the Solar Orbiter mission	SOC + MOC + IT	Every 6 months
Science Operation Working Group (SOWG) Meeting	Preparation of the mission operations according to the science objectives and operational constraints	SOC + MOC + IT	Every 6 months
Modelling and Data Analysis Working Group (MADAWG) Meeting	Discussion concerning data format, science data analysis tools and models for	SOC + MOC + IT	Every 6 months

	Solar Orbiter		
RPW Consortium Meeting	Discussions inside the RPW consortium about the instrument manufacturing, performance, calibration and ground segment activities	RPW consortium	Every 6 months
ROC – CNES Telecon	Discussions between the ROC and CNES teams in order to take stock of the progress of the ROC objectives	ROC + CNES RPW manager team	Every month
ROC internal meeting	Discussions inside the ROC team at LESIA about the status and tasks of the project	ROC team	Every 2 weeks
RPW Ground Segment telecon	Discussions about the RPW Ground Segment activities with RPW teams involved	ROC team + RPW analyser/sensor teams	Every month
RPW calibration telecon	Discussions about RPW calibrations	ROC + AIT CNES + RPW consortium	Every month
ROC SGSE telecon	Discussions about the ROC SGSE implementation	ROC team + RPW analyser/sensor teams	Every month
RPW SBM telecon	Discussion to decide the SBM event data to downlink	ROC + RPW PI + TBD	TBD
Low latency working group telecon	Discussion concerning the low latency data processing implementation	ROC + SOC + other IT	Every month

Table 9. ROC regular meetings.

5.2.1.1 RPW Web portal

The ROC team shall develop and maintain a Web portal to provide information concerning the instrument and the project.

5.2.1.2 ROC Wiki

The ROC team shall develop and maintain Wiki pages to provide information to the people involved in the project:

- The **RPW Ground Segment** Wiki is a public page that can be visualized by the teams involved.
- The **ROC** Wiki is a private page for the ROC team at the LESIA only.

5.3 Documentation management plan

5.3.1 ROC documentation organization

The following table gives the list of allowed Object ("Objet") and Type of document for the ROC project, with the corresponding node trees and acronyms.

Rubriques Arbre OT pour le projet ROC					
Objet			Type		
1	GEN	General	1.1	MGT	Management
1	GEN	General	1.2	SYS	System
1	GEN	General	1.3	SCI	Science
1	GEN	General	1.4	QAP	Quality Assurance Produit
1	GEN	General	1.5	DPK	Datapackage
1	GEN	General	1.6	OTH	Other
2	PRO	Processing	2.1	CAL	Calibration
2	PRO	Processing	2.2	DAT	Data all levels
2	PRO	Processing	2.3	SFT	Software all levels
2	PRO	Processing	2.4	PIP	Pipeline
2	PRO	Processing	2.5	OTH	Other
3	OPS	Operations	3.1	SBM	Selected Burst Mode
3	OPS	Operations	3.2	SYS	System
3	OPS	Operations	3.3	ANA	Analysis
3	OPS	Operations	3.4	COM	Commissionning
3	OPS	Operations	3.5	LLD	Low Latency Data
3	OPS	Operations	3.6	OTH	Other
4	TST	Tests	4.1	GSE	Ground Support Equip.
4	TST	Tests	4.2	SBM	Selected Burst Mode
4	TST	Tests	4.3	OTH	Other

Table 10. ROC documentation objects and types.

5.3.2 ROC document file naming convention

The ROC documentation management inherits the RPW project convention in terms of reference and file naming convention.

Each ROC document shall be referenced with a unique ID number. The naming convention shall be as followed:

ROC-*Object*-*Type*-*DocType*-*XXXXX*-*Provider*_Iss*YY*_Rev*ZZ*(*Title_of_the_doc*).*ext*

, where *Object*, *Type* and *DocType* fields are the Object, Type and Type of document (see next section for the list of possible Object and Type). *XXXXX* is the ID number, *YY* and *XX* are respectively the issue and revision numbers. *Title_of_the_doc* corresponds to the title of the document and *ext* is the extension of the file.

5.3.3 ROC project management main documentation tree

Figure 9 shows the current management main documentation tree of the ROC project. It provides the main deliverable documents that shall ensure the project activities are fully covered.

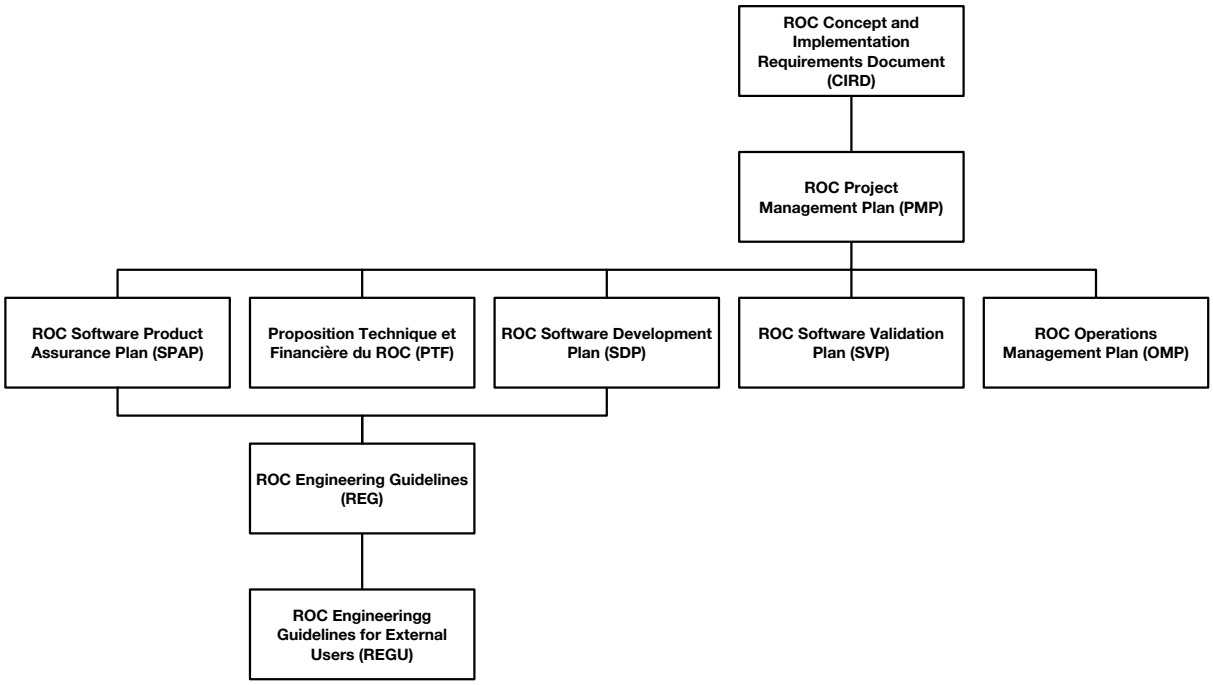

Figure 8. ROC project management main documentation tree.

Table below gives the reference and a short description of the ROC project management documentation.

Document	Reference	Description
ROC Concept and Implementation Requirements Document (CIRD)	ROC-GEN-SYS-PLN-00002-LES	- Presents the concept of the ROC. - Lists the science and operational activities as well as the engineering capabilities implementation requirements, in agreement with requirements defined at RPW and Solar Orbiter system levels. - Lists the responsibilities of the key personnel
ROC Project Management Plan (PMP)	ROC-GEN-MGT-PLN-00013-LES	- Presents the project management plan of the ROC to be followed for implementing, coordinating, and maintaining a full operational centre.
ROC Software Development Plan (SDP)	ROC-GEN-SYS-PLN-00015-LES	- Describes the software development plan of the ROC
ROC Software Validation Plan (SVP)	ROC-GEN-SYS-PLN-00040-LES	Plan to test and validate the ROC concept and engineering infrastructure. Especially it shall provide the list of tests to be performed, the reason, the procedure and the expected results and the reports to be written.
Proposition Technique et Financière du ROC (PTF)	ROC-GEN-OTH-BDG-00010-LES	ROC technical and financial proposal to be addressed to the CNES (in French)
ROC Software Products Assurance Plan (SPAP)	ROC-GEN-QAP-PLN-00033-LES	ROC Quality Assurance / Product Assurance Plan
ROC Operations Management Plan (OMP)	ROC-GEN-MGT-PLN-00041-LES	Lists and details the tools, procedures and responsibilities concerning the instrument operations during the phases of the

		mission
ROC Engineering Guidelines (REG)	ROC-GEN-SYS-NTT-00008-LES	Lists all of the common conventions/rules/recommendations to be applied concerning the ROC engineering activities at LESIA.
ROC Engineering Guidelines for external users (REGU)	ROC-GEN-SYS-NTT-00019-LES	Extension of the REG for the teams external to the LESIA and involved in the RPW Ground Segment engineering activities

Table 11. ROC project management documentation.

5.3.4 RSS main documentation tree

5.3.4.1 ROADS main documentation tree

Figure 9 shows the current main documentation tree of the ROADS. It provides the main deliverable documents relative to the instrument operations and data processing activities, supported by the ROC during the mission. This set of documents shall ensure that the concept and the technical approaches fully satisfy the functional requirements defined at both RPW and Solar Orbiter levels.

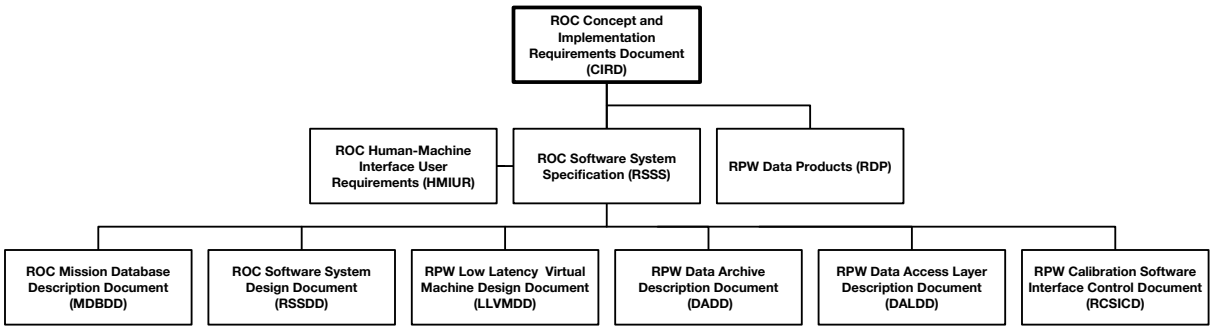

Figure 9. ROC Operations And Data System main documentation tree.

Table below gives the reference and a short description of the ROADS main documentation. The documents in italic are not showed on the figure above.

Document	Reference	Description
ROC Concept and Implementation Requirements Document (CIRD)	ROC-GEN-SYS-PLN-00002-LES	- Presents the concept of the ROC. - Lists the science and operational activities as well as the engineering capabilities implementation requirements, in agreement with requirements defined at RPW and Solar Orbiter system levels. - Lists the responsibilities of the key personnel
RPW Data Products (RDP)	ROC-GEN-DAT-NTT-00006-LES	List and description of all of the RPW data products to be generated by the ROC during the Solar Orbiter mission.
ROC Software System Specification (RSSS)	ROC-GEN-SYS-SPC-00026-LES	It is the Software System Specification (SSS) of the ROC. It covers mainly the specification requirements concerning the ROADS.
ROC Human-Machine Interfaces User Requirements	ROC-OPS-SFT-SWU-00039-LES	Lists the user requirements in terms of human-machine interfaces (HMI) for the ROC
ROC Software System	ROC-PRO-PIP-SPC-00036-LES	RSSDD gathers the Software Design

Design Document (RSSDD)		Documents (SDD) for the RSS
RPW Calibration Software Interface Control Document	ROC-PRO-SFT-ICD-00037-LES	Interface Control Document for the RPW Calibration Software implementation into the RODP.
ROC Software System User Manual (RSSUM)	*ROC-GEN-SYS-SUM-XXXXX-LES*	*Software user manual of the RSS*
ROC Software System Reference Manual (RSSRUM)	*ROC-GEN-SYS-SUM-XXXXX-LES*	*Technical reference manual of the RSS*
RPW Low Latency Virtual Machine Design Document (LLVMDD)	ROC-OPS-LLD-SPC-00018-LES	Software Design Document of the RPW Low Latency Virtual Machine (LLVM)
RPW Low Latency Virtual Machine User Manual (RLLP SUM)	*ROC-OPS-LLD-SUM-00032-LES*	*Software User Manuel of the LLVM*
Dataset Description Document for RPW Low Latency CDF files (DDD RPW LL)	*ROC-OPS-LLD-NTT-00028-LES*	*Description of the RPW Low Latency Dataset to be produced by the RLLP*
ROC Mission Database Description Document (MDBDD)	ROC-OPS-SYS-SPC-00038-LES	Description of the ROC Mission Database (MDB) architecture and content
RPW Data Access Layer Description Document (DALD)	TBD	Description of the ROC DAL facilities concerning RPW data.
RPW Data Archive Description Document (DAD)	TBD	Description of the ROC DArc facilities concerning RPW data.

Table 12. ROC Operations And Data System main documentation tree.

5.3.4.2 ROC GSE main documentation tree

Figure 10 shows the main documentation tree of the ROC GSE.

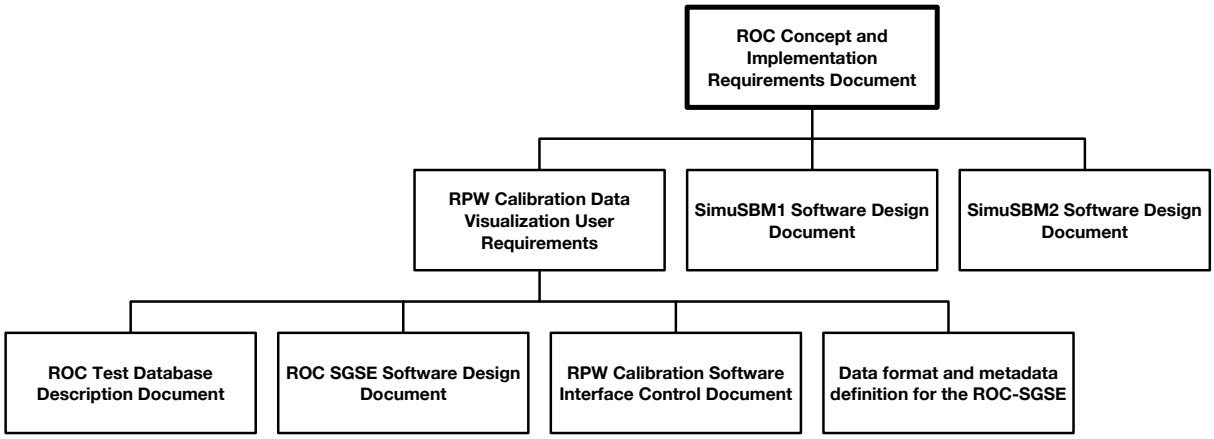

Figure 10. ROC GSE main documentation tree.

Table below gives the reference and a short description of the ROC GSE main documentation. The documents in italic are not showed on the figure above.

Document	Reference	Description
ROC Concept and Implementation	ROC-GEN-SYS-PLN-00002-LES	- Presents the concept of the ROC. - Lists the science and operational

Requirements Document (CIRD)		activities as well as the engineering capabilities implementation requirements, in agreement with requirements defined at RPW and Solar Orbiter system levels. - Lists the responsibilities of the key personnel
RPW Calibration Data Visualization User Requirements	ROC-TST-GSE-SWU-00003-LES	List the user requirements in terms of RPW ground calibration data visualization functionalities.
Data format and metadata for the ROC-SGSE	ROC-TST-GSE-NTT-00017-LES	Data format and metadata definition for the ROC-SGSE
ROC SGSE Software Design Document (ROC SGSE SDD)	ROC-TST-GSE-SPC-00004-LES	Software Design Document of the ROC-SGSE.
ROC-SGSE Test Database Description	ROC-TST-GSE-NTT-00021-LES	Description of the ROC-SGSE test database
ROC-SGSE Calibration Software Interface Control Document	ROC-TST-GSE-ICD-00023-LES	Interface control document (ICD) of the RPW Calibration Software to be implemented into the ROC-SGSE
SimuSBM1 Software Design Document	ROC-TST-SBM-NTT-00005-LES	Software Design Document of the SimuSBM1 software, dedicated to simulate SBM1 event detections
SimuSBM2 Software Design Document	ROC-TST-SBM-NTT-00016-LES	Software Design Document of the SimuSBM2 software, dedicated to simulate SBM2 event detections
Test Viewer SGSE specification	*ROC-TST-GSE-SPC-00012-LES*	*Technical specification of the Test Viewer (TV)*
Plugin Oriented Pipeline for Python (POPPy) framework User Manual	*ROC-TST-GSE-SUM-00035-LES*	*Software User Manual of the POPPy framework used to design the ROC-SGSE and RODP pipelines.*
ROC-SGSE Calibration Software Validation Tool User Manual	*ROC-TST-SFT-SUM-00027-LES*	*Software User Manual of the ROC-SGSE versus RCS interface validation tool*

Table 13. ROC GSE main documentations

5.3.5 ROC requirement identification

The ROC requirements shall be clearly identified in the project documentation. The following conventions shall be applied over the entire project documentation.

Except if it is explicitly mentioned, the ROC requirements are valid during the entire life of the project. They can be cited from a document to another using the requirement identifier keyword.

Every requirement definition shall be assigned a unique identifier (ID). This requirement ID shall have the following structure:

REQ-ROC-ZZZ-XXXX

, where “REQ” refers to requirement, “ROC” indicates the name of the project, “ZZZ” is a 3-characters name which permits to identify the origin of the requirement, and “XXXX” is a 4-digits number starting at 0001, and that must be incremented by 1 each time a new requirement is provided for a given requirement origin “ZZZ”.

5.3.6 ROC requirement structure

The structure of a requirement is the following:

Requirement ID	*Requirement Title*	Dependencies
Requirement Body		

The dependencies indicate the IDs of the possible upper level requirements. Only the 3-characters name and the 4-digits number separated by the "-" of the IDs can be displayed or the dependencies (e.g., "REG-0001).

6 COST AND SCHEDULE MANAGEMENT

The details about the cost and schedule inside the ROC project are presented in [RD4].

7 INTEGRATED LOGISTIC SUPPORT

7.1 Hardware and software logistic supports

The Groupe Informatique Générale du LESIA (GIGL), the computer service of the LESIA, will be the main interlocutor concerning both the hardware and software logistic supports. Especially, the GIGL will:

- Host and keep available the ROC servers, data disks and network interfaces (hereafter called ROC device).
- Ensure that the ROC device is rapidly replaced in case of failure.
- Provide assistance to the ROC team in order to maintain, recover or upgrade software environment installed on the ROC device.
- Ensure that the LESIA collaboration tools, services and software, which are used by the ROC, are always operational.

In some specific cases, the ROC team could also directly request support from the Direction Informatique de l'Observatoire (DIO), which is in charge of the computer service management at the Paris Observatory level.

8 RISK MANAGEMENT

8.1 Risk management at the project level

The following table attempts to identify the categories of risk that could potentially become points of potential failures for the ROC project activities.

Category of risk	Cause(s)	Consequence(s)	Severity	Occurrence probability	Proposed solution(s)	Solution(s) to mitigate the risk
Personnel reduction in the project	Transfer, voluntary redundancy, contract end, disease, pregnancy, ...	Under-sized team, loss of expertise, delays in the project, ground segment	High	Low	- Partially assign an available resource at LESIA - Prompt	- Be sure that the LESIA has potentially another person

		personal or/and system deficiency			hiring of non permanent post	available - Be sure that funds can be promptly invested for hiring - Sharing information inside the project - Maximizing the redundancy of competences

Table 14. Categories of risk at project level.

8.2 Risk management at the software level

The identification and the management of the risks related to the ROC software system shall be described in the SDP document.

9 QUALITY/PRODUCT ASSURANCE MANAGEMENT

The ROC project plans to include QA/PA management in order to:

- Assist the ROC team to define the QA/PA requirements.
- Write the ROC QA/PA plan document
- Ensure that the ROC software and interface products to be delivered are compliant with the requirements defined at RPW and Solar Orbiter levels, including RPW calibration software from analyzer/sensor teams.
- Participate to the preparation of the risk management plan of the ROC
- Support ROC team in the preparation of the preliminary design and acceptance reviews
- Support teams involved in the RPW ground segment activities in the delivery of software product for the ROC.

The requirements, tasks and actors concerning the QA/PA are presented in the "ROC Software Product Assurance Plan" (SPAP) [RD8].

10 ENGINEERING MANAGEMENT

The ROC engineering management mainly concerns software system and data of the ROC.

10.1 ROC software development approach

The ROC development approach in terms of software infrastructures, logistics, resources and schedules shall be detailed in the SDP document.

10.2 ROC software validation approach

The ROC validation strategy shall be presented into the "ROC Software Validation Plan" (SVP) document.

The SVP shall at least provide:

- The list of compatibility, integration and validation tests to be performed to ensure the validation of the ROC software system
- For each test, the reason, the procedures, the person in charge, the people involved, and the expected results and reports
- A schedule of the tests

10.3 ROC engineering conventions and rules

In addition to the ROC SPAP, the engineering conventions concerning the ROC project shall be listed into a dedicated REG [RD5]. The REG shall help the ROC team to ensure the quality and homogeneity of the software development and application, providing standard rules and procedures.

Any additional rules and procedures that could concern external users should be reported into an extra “ROC Engineering Guidelines for External Users” (REGU) document [RD6].

11 LIST OF TBC/TBD/TBWS

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

12 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-]Cols
		Science-Cols

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