

# CASSIS SCIENCE IMPLEMENTATION PLAN

**Doc.No: EXM-CA-PLN-UBE-00004**

**Issue: 1**

**Revision: 1**

**Date: 24. Oct. 2014**

<b>Instrument name:</b>	Colour and Stereo Surface Imaging System (CaSSIS)
<b>Origin Name:</b>	Physikalisches Institut, Universität Bern
<b>WBS code:</b>	N/A
<b>Package code:</b>	N/A
<b>Restrictions:</b>	N/A

	<b>Name</b>	<b>Signature</b>	<b>Date</b>
<b>Prepared by</b>	Ruth Ziethé Project Manager		
<b>Reviewed by</b>	Nicolas Thomas Principal Investigator		
<b>Reviewed by</b>	Olivier Witasse TGO Project Scientist		
<b>Reviewed by</b>	Jorge Vago ExoMars Project Scientist		
<b>Approved by</b>	Leo Metcalfe ExoMars Science Operations Development		



## Table of Contents

Document Change Record .....	2
List of documents .....	4
Scope.....	5
1 Development Phase Requirements .....	6
1.1 Definition of instruments operations and interfaces .....	8
1.2 Validation and tests .....	10
1.3 Instruments commissioning, checkouts and reference measurements .....	12
2 Operational Phase Requirements .....	13
2.1 Science Planning and Operations .....	13
2.2 Data processing and archiving .....	16
3 Post-Operational Phase Requirements.....	18
4 Management Requirements.....	19
4.1 Reviews, meetings and reporting .....	19
4.2 Project Control.....	20
4.3 Quality assurance .....	20
4.4 Documentation.....	22
5 Planning and Flow .....	23
5.1 Operations hardware .....	23
5.2 Planning, operation, and archiving software .....	24
5.2.1 Overview .....	24
5.2.2 Science planning process including uplink and verification.....	25
5.2.3 Calibration and archiving approach .....	26
5.2.4 Software development packages required .....	27
5.3 Management.....	28
5.3.1 Key Personnel .....	28
5.3.2 Schedule.....	29
6 Work Packages .....	30
6.1 Definition of instrument operations .....	30
6.2 Validation and tests .....	31
6.3 Commissioning and Check-Out.....	32
6.4 Science planning and operations .....	33
6.5 Data processing.....	35
6.6 Management.....	36
7 Work Package Diagram .....	37

## List of documents

Applicable documents		
AD 01	EXM-PL-IRD-ESA-00003 Issue 3 Rev 0 TGO E-IRD (JCCB - Signed)	Experiment Interface Requirements Document

Reference documents		
RD 01	EXM-CA-LIS-UBE-00001	List of Acronyms Iss 1 Rev 0
RD 02	EXM-CA-PLN-UBE-00024	CASSIS EXPERIMENT OPERATIONS PLAN (EOP)
RD 03		

## Scope

This document lists the requirements that shall be implemented by CaSSIS. Requirements from this document shall be addressed in the instrument's Science Implementation Plan (SIP).

## 1 DEVELOPMENT PHASE REQUIREMENTS

The main tasks of the PI Teams in the Development Phase are

1. to support SOC in the definition of operations and interfaces
2. to define instruments' science operations
3. to actively participate in the strategic science planning within SWT and SOWG.

The implementation requirements to the PI Teams related to these tasks are specified below.

The compliance is indicated as follows

C – fully compliant

I – intention to be fully compliant at the due time

D – compliant (draft); intention to be fully compliant in due time

Reference is made to the Experiment Operations Plan (EOP) which contains planning concerning the operations which will not be repeated here [RD02].

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant	

Requirement ID	Description	Verification						Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)			
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant		Non Compliant		
PI-DP-1	The PIs shall define instruments operations tools. PI team interfaces shall be agreed with MOC and SOC. The tools shall be operational at launch to allow for cruise phase activities, and for possible participation of the SGS in near-Earth Checkout activities.					X											1			

## 1.1 Definition of instruments operations and interfaces

The operations of the instrument are defined in the Experiment Operation Plan which is a referenced document [RD02].

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)	
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant		
PI-DP-2	The PIs shall define instrument operational configurations: science modes, set-up parameters, and the logic to switch from one mode to another.					X											D		See EOP [RD02]
PI-DP-3	The PI shall support SOC in the definition of the SGSoperations concept and operational interfaces.					X											I		
PI-DP-4	The PI shall support the SOC in the task of verification of resource allocations to the instruments as a function of instrument operational modes.					X											I		
PI-DP-5	The PI shall support the Project Scientists in advising the ExoMars Project and the SOC on instrument science performance related issues relevant to the overall SGS tasks.					X											I		
PI-DP-6	The PI shall establish development and deployment plans for instrument operations facilities, equipment and tools					X											D		See below



Requirement ID	Description	Verification						Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)			
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant		Non Compliant		
PI-DP-7	The PI shall support the SOC in the definition and maintenance of interfaces with the SOC for science planning and operations purposes.					X											I			
PI-DP-8	The PI shall support the SOC in the definition and maintenance of interfaces with the SOC for data handling and processing purposes.					X											I			
PI-DP-9	The PI shall support the SOC in definition and maintenance of interfaces with the SOC for archiving purposes.					X											I			
PI-DP-10	The PI shall define pre-launch calibration data relevant to SGS tasks and provide them.					X											I			

## 1.2 Validation and tests

Requirement ID	Description	Verification						Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)	
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant		Non Compliant
PI-DP-11	The PI shall make available the necessary resources to support the satellite interface tests through preparation of related inputs, review of test plans and procedures, and if required, through actual participation in the tests themselves.					X										X		I cannot guarantee at this time that the "necessary" resources are available. We work on a best effort basis.
PI-DP-12	The PI shall provide instrument test procedure inputs for the relevant part of the SVTs, ISTs and MSTs.					X												
PI-DP-13	The PI shall review and approve instrument procedures defined by the MOC for the relevant part of the SVTs, ISTs and MSTs..					X												
PI-DP-14	The PI shall make available the necessary resources for real-time support at test site and/or at the MOC during SVT, IST or MST execution.					X										X		Necessary here is not a verifiable requirement.

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)		
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant			
PI-DP-15	The PI shall support the evaluation of the relevant part of the SVT, IST and MST results.					X											I			
PI-DP-16	The PI shall support instrument anomaly investigation and resolution for the relevant part of the SVTs, ISTs and MSTs.					X											I			
PI-DP-17	The PI shall make available the necessary resources to support the procedure definition, the procedure approval, the text execution, the results analysis and the anomaly investigation/resolution for the Data Disposition System Interface Test (DDSIT).					X											I			
PI-DP-18	The PI shall make available the necessary resources to support the procedure definition, the procedure approval, the results analysis and the anomaly investigation/resolution for the MOC-SGS End-to-End Test as well as test execution.					X											I			
PI-DP-19	The PI shall make available the necessary resources to support the procedure definition and approval, the test executions, the results analysis and the anomaly investigation/resolution for the first instrument switch-on simulation campaign.					X											/			
PI-DP-23	The PI shall support activities related to the peer review of the archive.					X											I			

### 1.3 Instruments commissioning, checkouts and reference measurements

The operations of the instrument are defined in the Experiment Operation Plan which is a referenced document [RD02].

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)	
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant		
PI-DP-21	The PI shall define and plan, as appropriate in collaboration with the Project, the MOC and/or the SOC, the instrument commissioning, calibration, in-flight-checkout, in-flight reference measurements and in-flight scientific Performance Verification.					X											D		See EOP [RD02]
PI-DP-22	The PI shall support, as appropriate, the Project, the MOC and/or the SOC in planning and execution of instrument commissioning, checkout, in-flight reference measurements and in-flight scientific Performance Verification, by providing commanding sequences or recommended observation sets for instrument checkout and validation activities.					X											I		
PI-DP-23	The PI shall give a detailed description of his observation campaigns aimed at providing checkouts, reference measurements or performing instrument calibration (when the observations will be performed, duration and/or repetition rules, their detailed goal, the required S/C attitude and instrument modes).					X											D		See EOP [RD02]

## 2 OPERATIONAL PHASE REQUIREMENTS

### 2.1 Science Planning and Operations

The Science Operations Phase will start after aerobraking, following a short period of scientific Performance Verification, and will last until the end of the funded science operations phase, including the Nominal and Extended missions. The main tasks of the PI Teams in the Operations Phase are

1. high level science planning and updating of the Science Activity Plan;
2. operating of their instruments;
3. monitoring of the instruments' performance;
4. data processing and delivery of data products for archiving.

The PI Teams implementation requirements related to these tasks are specified below.

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)		
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant			
PI-OP-1	The PI shall support the preparation of the ExoMars Mission Planning, including exchange of files with the SOC in line with the requirements set out in the SOC to Experiment Team ICD and the SIRD/SIP.						X										I			We note that there is at present no ICD.

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)	
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant		
PI-OP-2	The PI shall support the SOC and the Project Scientists in the development of the Science Activity Plan.					X													
PI-OP-3	The PI shall support the SOC and the Project Scientists in the development of the LTP, MTP and STP according to the agreed schedule and procedures.					X													
PI-OP-4	The PIs shall support development and maintenance of the Quick-Look Data Analysis system					X													
PI-OP-5	The PI shall provide instrument operations requests to SOC according to the agreed operations schedule.					X													
PI-OP-6	The PI shall monitor the operations and assess performance of their instruments (trend analysis).						X												
PI-OP-7	The PI shall support the SOC in the investigation and resolution of in-flight instrument related anomalies and the optimisation of instrument parameters involving the PS and the MOC. This may include provision of technical consultancy and presence of PI team technical experts at the MOC if required.					X													

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)		
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant			
PI-OP-8	The PI shall maintain the instrument On-board Software (OBSW), updating and testing it throughout the mission, as necessary.					X											I			
PI-OP-9	The PI shall be responsible for the verification of the correct uploading of the instrument software updates, since science telemetry processing will not be performed at the MOC.						X										I			
PI-OP-10	The PI shall provide to the SWT and the PS processed and analysed data for public relations purposes, even during their proprietary period; this material shall not be used by the SWT or the PS for scientific publications.						X										I			

## 2.2 Data processing and archiving

This section contains the requirements on data processing and archiving during the whole ExoMars mission. The data types are defined in the following way (all data products must be compliant with the PDS4 format):

- **Telemetry data:** Telemetry with time ordered packets and sorted by APIDs.
- **Raw data** (“PDS4 raw products”): Uncalibrated data in “data number” (DN) format extracted and decoded from telemetry packets.
- **Calibrated data:** instrument data converted from DNs into physical units, using calibration files and algorithms.
- **High-level data:** calibrated data in a geophysical context related to the science goals of the mission.

The processing and archiving of the CaSSIS instrument is identified in the following diagram.

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant	



Requirement ID	Description	Verification						Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)		
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant		Non Compliant	
PI-OP-11	The PIs shall generate and validate calibrated and high-level data products in the format agreed and documented in an ICD between SOC and the PI teams and deliver them to SOC according to the agreed data delivery schedule, data rights and release policy.						X										I		See below
PI-OP-12	During the proprietary period the PIs shall share data with the SWT members so as to enhance the scientific return from the mission according to the procedures to be agreed and formalised within the SWT.						X										I		Note that it is our intention to restrict any proprietary period to that necessary for data verification only.

### 3 POST-OPERATIONAL PHASE REQUIREMENTS

The Post-Operational phase duration is 2 year. The following requirements on the PI teams apply in this phase.

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)		
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant			
PI-POP-1	The PIs shall support the SOC in the consolidation of raw, calibrated and high-level data products to complete the data archive.					X											I			

## 4 MANAGEMENT REQUIREMENTS

### 4.1 Reviews, meetings and reporting

Requirement ID	Description	Verification						Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)		
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant		Non Compliant	
PI-MAN-1	The Science Operations activities of the PI teams within the SGS shall be subject to ESA review.					X										I			
PI-MAN-2	The status of the instruments science operations systems shall be included in the regular reporting to the PM/ MM and reported at SWT meetings.					X										C			We already do this
PI-MAN-3	The PIs shall participate in Science Working Team meetings related to the definition and planning of observations/operations.						X									C			
PI-MAN-4	The PI teams shall support Science Operations Working Group meetings.						X									C			
PI-MAN-5	The PI teams shall support Data Handling and Archiving Group meetings.						X									I			

## 4.2 Project Control

Requirement ID	Description	Verification						Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)		
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant		Non Compliant	
PI-MAN-6	The PIs shall implement project control systems and procedures focusing on the definition, maintenance and reporting of schedule and configuration information.					X													This will be extremely basic.
PI-MAN-7	The PIs shall establish and maintain the overall schedule of development and implementation of instrument science operations systems compliant with the SGS schedule.					X													This will be extremely basic.

## 4.3 Quality assurance

Requirement ID	Description	Verification						Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	

Requirement ID	Description	Verification						Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)		
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant		Non Compliant	
PI-MAN-8	All software impacting the science operations processes, especially S/W developed collaboratively between the PI team and the SOC, shall follow standards of good practice in development to be agreed with the SOC. These will be guided by relevant ECSS standards to the degree practicable,					X										I			
PI-MAN-9	A software Quality Assurance Plan defining guidelines and standards for managing all phases of the S/W life cycle shall be defined and maintained. (This may be done jointly with the SOC.)					X											X		We expect support from the SOC for this.

#### 4.4 Documentation

Requirement ID	Description	Verification						Category			Level			Compl. Status			Comments  (Document numbers of test reports etc)		
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant		Non Compliant	
PI-MAN-10	Instrument Science Implementation Plans (SIP) shall to be issued in response to the requirements specified in this document. The instrument SIPs shall be approved by the Project Scientist and the Science Operations Development Manager.					X											C		
PI-MAN-11	An ICD shall be written which shall be approved and signed both by the representative of the SOC and the PIs governing the SOC-PI interface					X											I		
PI-MAN-12	The document numbering and file names shall follow the standards defined by the Project for use by SRE SGSs both in the development and operational phases.					X											C		
PI-MAN-13	The PIs shall put in place a document management system in agreement with rigorous standards.					X											C		

## 5 PLANNING AND FLOW

### 5.1 Operations hardware

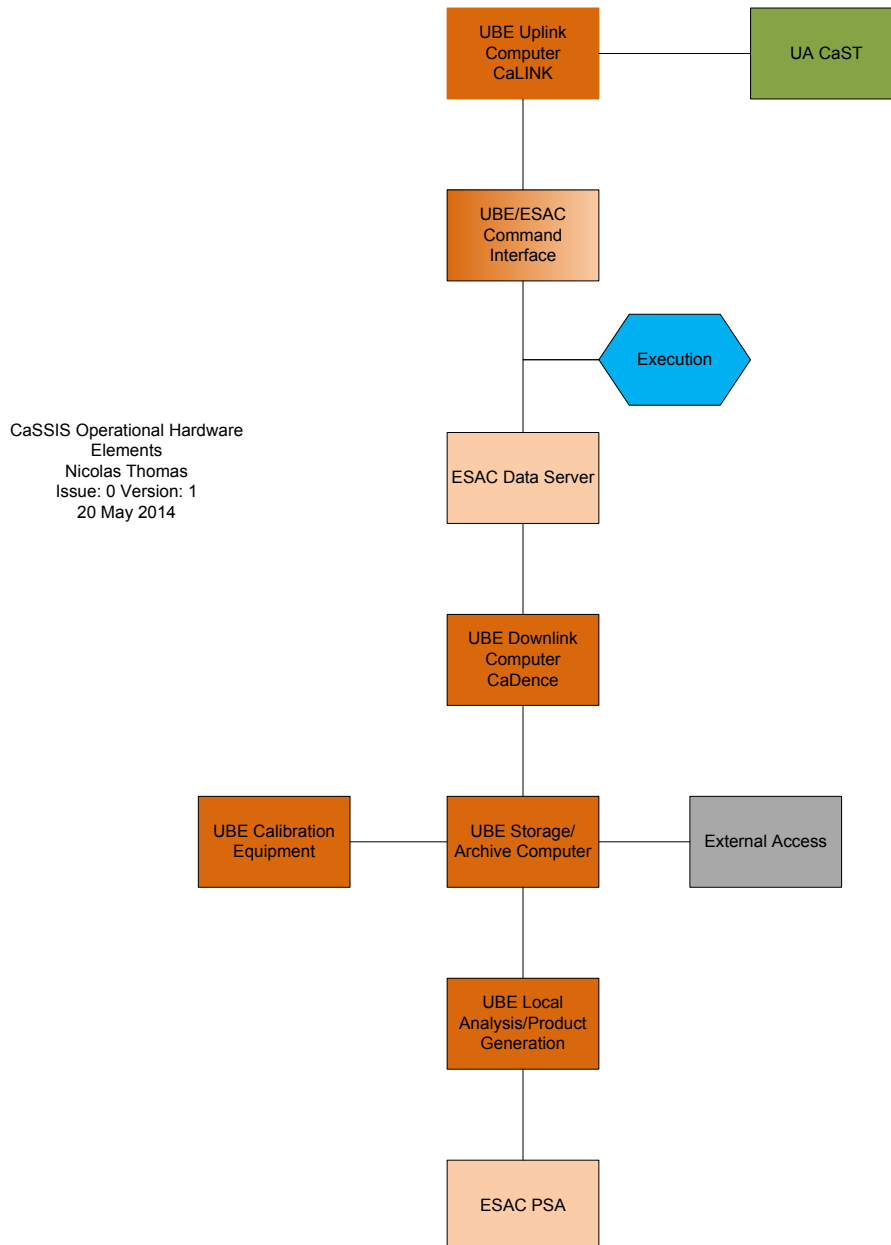


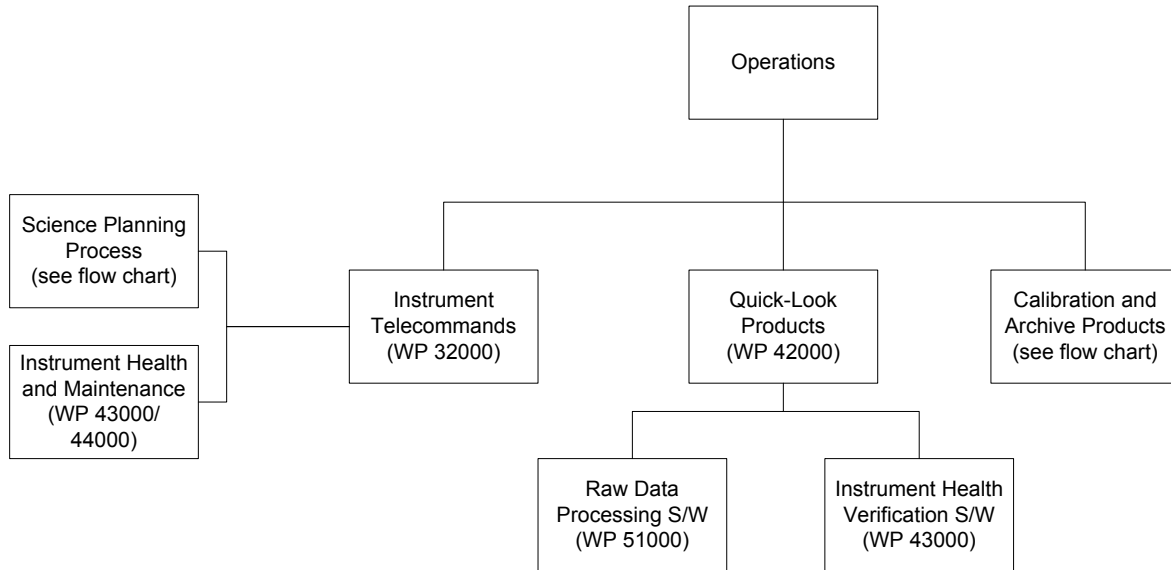
Figure 1 Operations computer hardware and their interfaces This is indicating how we envisage the interface between UBE and ESAC will be set-up, tested and verified. (Package 20000)

The ExoMars DDS will be accessed using a virtual machine with the IP number [130.92.144.131](http://130.92.144.131)

## 5.2 Planning, operation, and archiving software

### 5.2.1 Overview

The relationship between the planning, the operations and the archiving are indicated in the following chart. More detailed flow charts have been generated where indicated.



CaSSIS Operational Software Elements  
 Nicolas Thomas  
 Issue: 0 Version: 2  
 24 October 2014

**Figure 2 Planning, operation, calibration and archiving steps.**



### 5.2.2 Science planning process including uplink and verification

The science planning process is shown in the following flow chart.

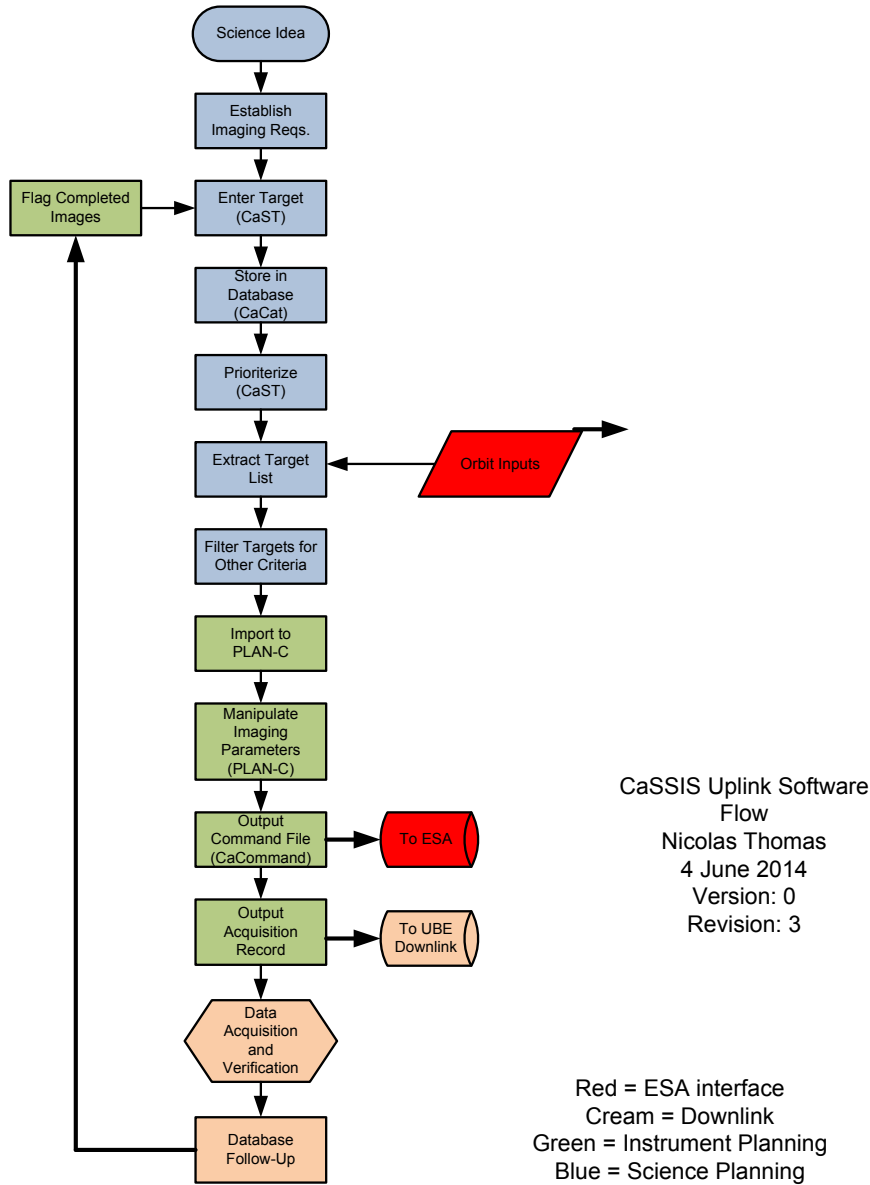


Figure 3 Science planning, uplink flow, and downlink verification

### 5.2.3 Calibration and archiving approach

The calibration and archiving approach is shown in the following flow chart.

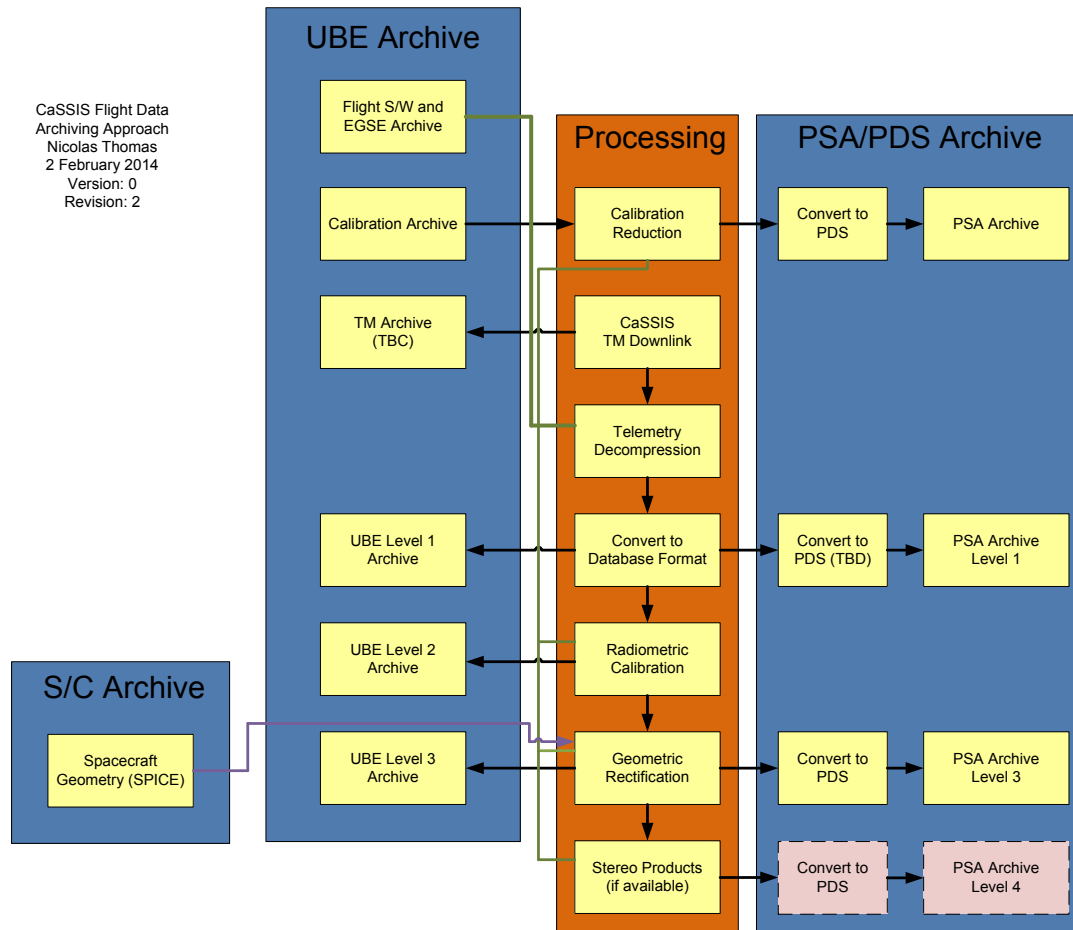
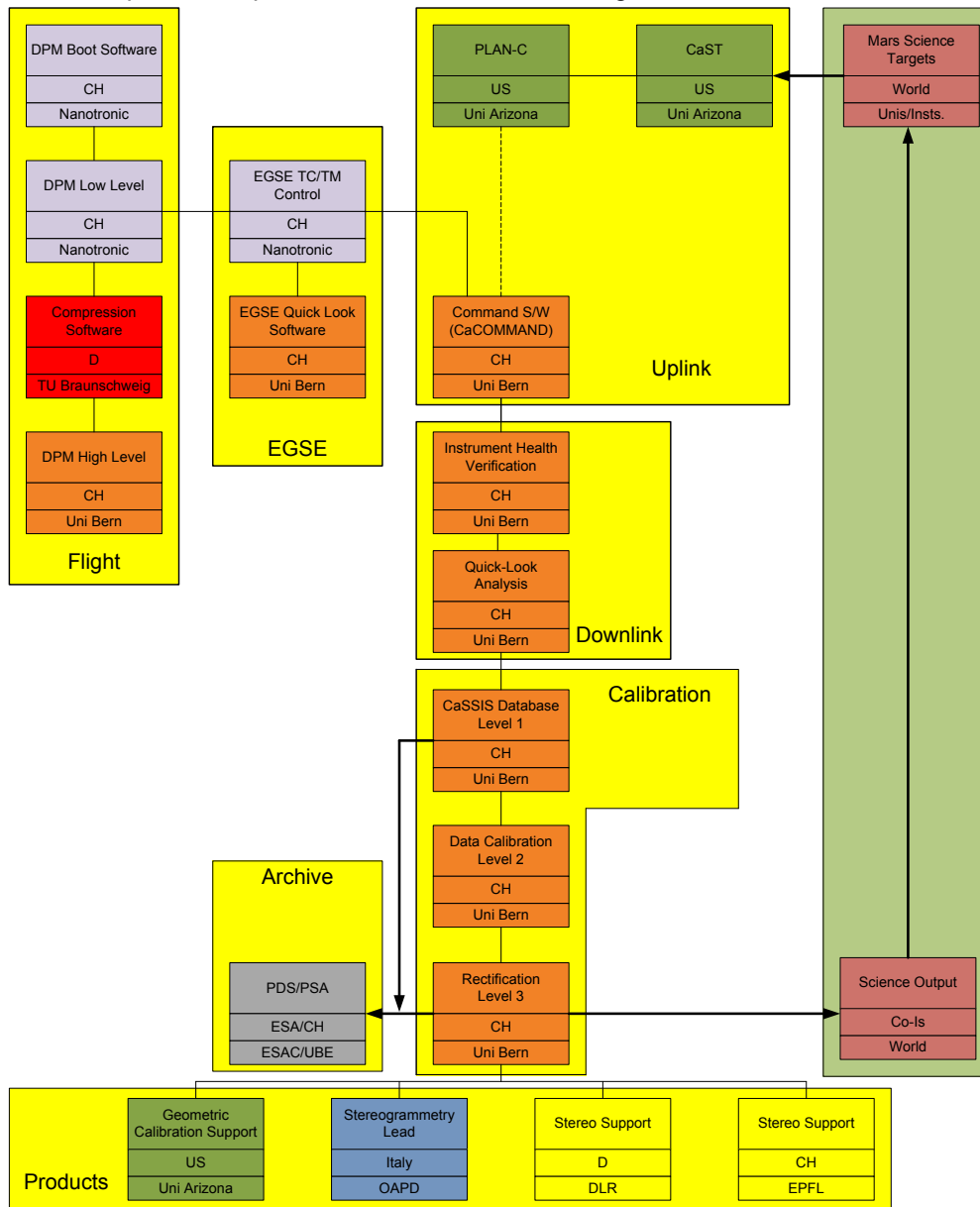


Figure 4 Calibration and Archiving Flow

### 5.2.4 Software development packages required

The software developments required are shown in the following chart.



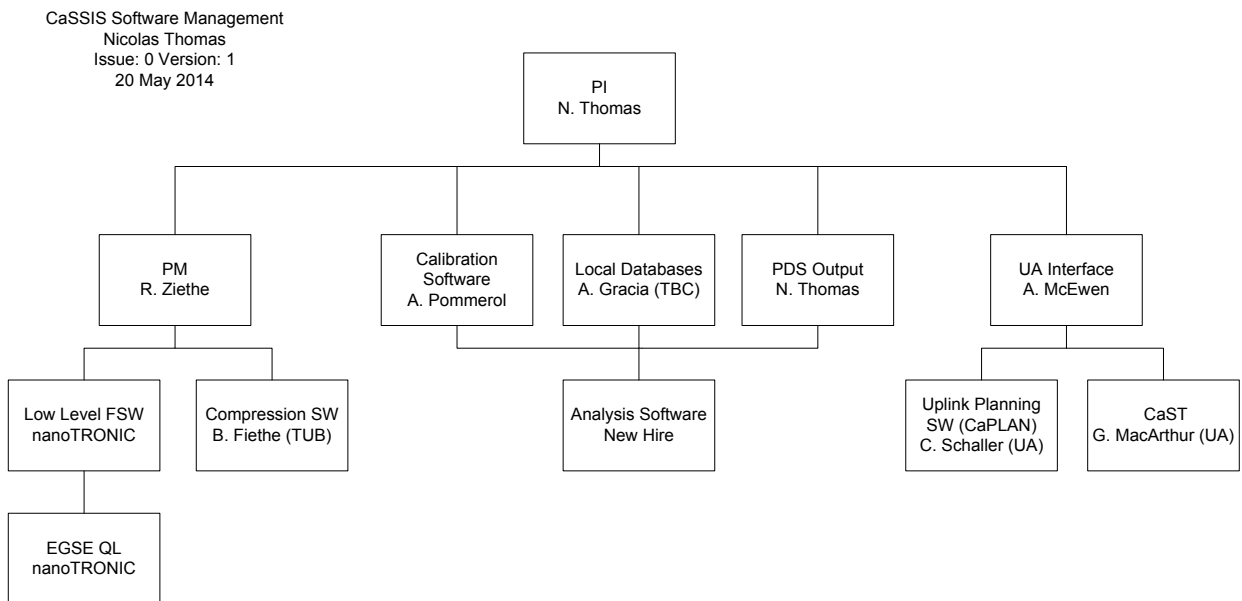
CaSSIS Software Development  
 Nicolas Thomas  
 4 June 2014  
 Version: 0  
 Revision: 6

Figure 5 Software development packages

## 5.3 Management

### 5.3.1 Key Personnel

The principal responsables for the main packages for software are indicated in the following organigram.



**Figure 6 Preliminary management structure for the software development**

### 5.3.2 Schedule

The target schedule is shown in the next diagram.

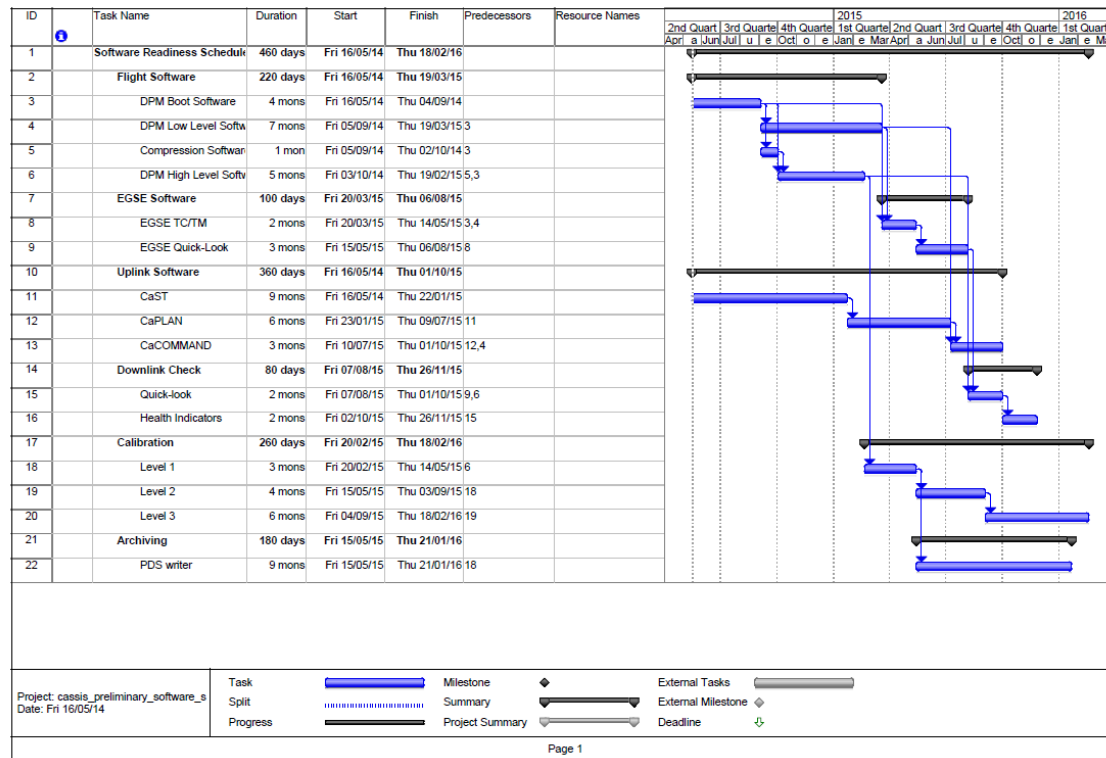


Figure 7 Preliminary software development schedule for operations, calibration and archiving

## 6 WORK PACKAGES

### 6.1 Definition of instrument operations

Work Package Number	10000	Responsible	N. Thomas		
Input		<ul style="list-style-type: none"> <li>• CaSSIS Science Requirements Document (CA-RSD-UBE-10000)</li> <li>• CaSSIS Top Level System Requirements Document (CA-RSD-UBE-00003)</li> </ul>			
Tasks		Sub-task 11000 (N. Thomas) <ul style="list-style-type: none"> <li>• Definition of instrument operational configurations, science modes, and state diagrams (PI-DP-2)</li> <li>• Support of SGS operations concept and operational interfaces (PI-DP3)</li> <li>• Support of Project Scientists in advising ExoMars Project on instrument science performance (PI-DP-5)</li> <li>• Establish plans for instrument operations (PI-DP-6)</li> <li>• Definition and maintenance of interfaces for science planning and operations (PI-DP-7)</li> <li>• Definition and maintenance of interfaces for data handling and processing (PI-DP-8)</li> <li>• Definition and maintenance of interfaces for archiving (PI-DP-9)</li> <li>• Definition and provision of pre-flight calibration data (PI-DP-10)</li> </ul>			

Work Package Number	10000	Responsible	N. Thomas		
		Sub-task 12000 (A. McEwen) Sub-task 12100 (G. MacArthur) <ul style="list-style-type: none"> <li>• Development of a target database</li> </ul> Sub-task 12200 (C. Schaller) <ul style="list-style-type: none"> <li>• Planning tool to identify operational targets</li> </ul>			
Outputs		<ul style="list-style-type: none"> <li>• Planning documents</li> <li>• Pre-flight calibration data</li> <li>• Target database for operations</li> </ul>			

## 6.2 Validation and tests

Work Package Number	20000	Responsible	N. Thomas		
Input		<ul style="list-style-type: none"> <li>• CaSSIS Instrument User Manual</li> <li>• Test procedure templates (from ESAC/ESOC to UBE)</li> </ul>			
Tasks		<p>Sub-task 21000 (K. Ghose)</p> <ul style="list-style-type: none"> <li>• Write instrument test procedures for SVTs, ISTs, and MSTs (PI-DP-12)</li> <li>• Approval of MOC procedures (PI-DP-13)</li> </ul> <p>Sub-task 22000 (R. Ziethe)</p> <ul style="list-style-type: none"> <li>• Make resources available for system level tests and de-bugging (PI-DP-14; PI-DP-17; PI-DP-18; PI-DP-19)</li> </ul> <p>Sub-task 23000 (V. Roloff)</p> <ul style="list-style-type: none"> <li>• Evaluation of results (PI-DP-15)</li> <li>• Anomaly investigation (PI-DP-16)</li> </ul> <p>Sub-task 24000 (L. Guallini)</p> <ul style="list-style-type: none"> <li>• Support of peer-review archiving activities (PI-DP-23)</li> </ul>			
Output		Test results			

### 6.3 Commissioning and Check-Out



Work Package Number	30000	Responsible	N. Thomas		
Input	CaSSIS User Manual CaSSIS Experiment Operation Plan (CA-PLN-UBE-00024)				
Tasks	Sub-task 31000 (N. Thomas) <ul style="list-style-type: none"> <li>• Planning of instrument commissioning, check-out, calibration and science verification (PI-DP-21)</li> </ul> Sub-task 32000 (V. Roloff) <ul style="list-style-type: none"> <li>• Provision of commanding sequences for instrument check-out (PI-DP-22)</li> </ul> Sub-task 33000 (N. Thomas) <ul style="list-style-type: none"> <li>• Detailed descriptions of commissioning, check-out, calibration and science verification observations (PI-DP-23)</li> </ul>				
Output	Plans for observations Commanding sequences				

## 6.4 Science planning and operations

Work Package Number	40000	Responsible	N. Thomas		
Input	CaSSIS Instrument User Manual Planning timelines and appropriate templates				
Tasks	Sub-task 41000 (N. Thomas) <ul style="list-style-type: none"> <li>• Support development of activity plans (PI-OP-2)</li> <li>• Support development of LTP, MTP, and STP (PI-OP-3)</li> <li>• Provision of operational requests (PI-OP-5)</li> <li>• Support for anomaly resolution (PI-OP-7)</li> </ul> Sub-task 42000 (A. Pommerol) <ul style="list-style-type: none"> <li>• Development of a quick-look facility (PI-OP-4)</li> </ul> Sub-task 43000 (V. Roloff) <ul style="list-style-type: none"> <li>• Monitoring of instrument performance (PI-OP-6)</li> </ul> Sub-task 44000 (TBD) <ul style="list-style-type: none"> <li>• Instrument on-board software support (PI-OP-8; PI-OP-9)</li> </ul>				

Work Package Number	40000	Responsible	N. Thomas		
		Sub-task 45000 (N. Thomas) <ul style="list-style-type: none"> <li>Provision of PR material (PI-OP-10)</li> </ul>			
Output		Instrument health plots Software updates as necessary PR material			

## 6.5 Data processing

Work Package Number	50000	Responsible	A. Pommerol		
Input		CaSSIS Instrument User Manual Data			
Tasks		Sub-task 51000 (A. Pommerol) <ul style="list-style-type: none"> <li>Production of calibrated data (PI-OP-11)</li> </ul> Consolidation of data products in data archive (PI-POP-1)			

Work Package Number	50000	Responsible	A. Pommerol		
		Sub-task 52000 (A. Gracia) <ul style="list-style-type: none"> <li>• Production of image database</li> </ul> Sub-task 53000 (N. Thomas) <ul style="list-style-type: none"> <li>• Production of PDS data</li> </ul> Sub-task 54000 (B. Fiethe) <ul style="list-style-type: none"> <li>• Decompression software</li> </ul>			
Output		Calibrated data			

## 6.6 Management

Work Package Number	60000	Responsible	N. Thomas		
Input		ESA Review Requirement			

<b>Work Package Number</b>	<b>60000</b>	<b>Responsible</b>	<b>N. Thomas</b>		
Tasks	Organization and supervision of CaSSIS input to reviews (PI-MAN-2; PI-MAN-3; PI-MAN-4; PI-MAN-5; PI-MAN-6; PI-MAN-7) Quality assurance management and planning (PI-MAN-8; PI-MAN-9)				
Output	Review materials				

## 7 WORK PACKAGE DIAGRAM

CaSSIS SGS Interface WPB  
 Nicolas Thomas  
 Issue: 0 Version: 1  
 24 October 2014

<table border="1"> <tr><td colspan="2">Definition of instrument ops.</td></tr> <tr><td>10000</td><td>N. Thomas</td></tr> </table>	Definition of instrument ops.		10000	N. Thomas	<table border="1"> <tr><td colspan="2">Validations</td></tr> <tr><td>20000</td><td>N. Thomas</td></tr> </table>	Validations		20000	N. Thomas	<table border="1"> <tr><td colspan="2">Check-out Planning</td></tr> <tr><td>30000</td><td>N. Thomas</td></tr> </table>	Check-out Planning		30000	N. Thomas	<table border="1"> <tr><td colspan="2">Science Planning</td></tr> <tr><td>40000</td><td>N. Thomas</td></tr> </table>	Science Planning		40000	N. Thomas	<table border="1"> <tr><td colspan="2">Data Processing</td></tr> <tr><td>50000</td><td>A. Pommerol</td></tr> </table>	Data Processing		50000	A. Pommerol	<table border="1"> <tr><td colspan="2">Management</td></tr> <tr><td>60000</td><td>N. Thomas</td></tr> </table>	Management		60000	N. Thomas	<table border="1"> <tr><td colspan="2">Other</td></tr> <tr><td>70000</td><td>N. Thomas</td></tr> </table>	Other		70000	N. Thomas
Definition of instrument ops.																																		
10000	N. Thomas																																	
Validations																																		
20000	N. Thomas																																	
Check-out Planning																																		
30000	N. Thomas																																	
Science Planning																																		
40000	N. Thomas																																	
Data Processing																																		
50000	A. Pommerol																																	
Management																																		
60000	N. Thomas																																	
Other																																		
70000	N. Thomas																																	
<table border="1"> <tr><td colspan="2">Definition of operations</td></tr> <tr><td>11000</td><td>N. Thomas</td></tr> </table>	Definition of operations		11000	N. Thomas	<table border="1"> <tr><td colspan="2">Procedures</td></tr> <tr><td>21000</td><td>K. Ghose</td></tr> </table>	Procedures		21000	K. Ghose	<table border="1"> <tr><td colspan="2">Planning of check-outs</td></tr> <tr><td>31000</td><td>N. Thomas</td></tr> </table>	Planning of check-outs		31000	N. Thomas	<table border="1"> <tr><td colspan="2">Development of plans</td></tr> <tr><td>41000</td><td>N. Thomas</td></tr> </table>	Development of plans		41000	N. Thomas	<table border="1"> <tr><td colspan="2">Calibrated Data Production</td></tr> <tr><td>51000</td><td>A. Pommerol</td></tr> </table>	Calibrated Data Production		51000	A. Pommerol	<table border="1"> <tr><td colspan="2">Computer Maintenance (UBE)</td></tr> <tr><td>71000</td><td>D. Singh</td></tr> </table>		Computer Maintenance (UBE)		71000	D. Singh				
Definition of operations																																		
11000	N. Thomas																																	
Procedures																																		
21000	K. Ghose																																	
Planning of check-outs																																		
31000	N. Thomas																																	
Development of plans																																		
41000	N. Thomas																																	
Calibrated Data Production																																		
51000	A. Pommerol																																	
Computer Maintenance (UBE)																																		
71000	D. Singh																																	
<table border="1"> <tr><td colspan="2">Target Database Production</td></tr> <tr><td>12000</td><td>A. McEwen</td></tr> </table>	Target Database Production		12000	A. McEwen	<table border="1"> <tr><td colspan="2">Test Resources</td></tr> <tr><td>22000</td><td>R. Zieth</td></tr> </table>	Test Resources		22000	R. Zieth	<table border="1"> <tr><td colspan="2">Sequence Generation</td></tr> <tr><td>32000</td><td>V. Roloff</td></tr> </table>	Sequence Generation		32000	V. Roloff	<table border="1"> <tr><td colspan="2">Quick-Look</td></tr> <tr><td>42000</td><td>A. Pommerol</td></tr> </table>	Quick-Look		42000	A. Pommerol	<table border="1"> <tr><td colspan="2">Image Database</td></tr> <tr><td>52000</td><td>A. Gracia</td></tr> </table>	Image Database		52000	A. Gracia	<table border="1"> <tr><td colspan="2">Networks (UBE)</td></tr> <tr><td>72000</td><td>G. Borrini</td></tr> </table>		Networks (UBE)		72000	G. Borrini				
Target Database Production																																		
12000	A. McEwen																																	
Test Resources																																		
22000	R. Zieth																																	
Sequence Generation																																		
32000	V. Roloff																																	
Quick-Look																																		
42000	A. Pommerol																																	
Image Database																																		
52000	A. Gracia																																	
Networks (UBE)																																		
72000	G. Borrini																																	
	<table border="1"> <tr><td colspan="2">Results and Anomaly</td></tr> <tr><td>23000</td><td>V. Roloff</td></tr> </table>	Results and Anomaly		23000	V. Roloff	<table border="1"> <tr><td colspan="2">Descriptions of observations</td></tr> <tr><td>33000</td><td>N. Thomas</td></tr> </table>	Descriptions of observations		33000	N. Thomas	<table border="1"> <tr><td colspan="2">Instrument Performance</td></tr> <tr><td>43000</td><td>V. Roloff</td></tr> </table>	Instrument Performance		43000	V. Roloff	<table border="1"> <tr><td colspan="2">PDS Generation</td></tr> <tr><td>53000</td><td>N. Thomas</td></tr> </table>	PDS Generation		53000	N. Thomas	<table border="1"> <tr><td colspan="2">Instrument Operator</td></tr> <tr><td>73000</td><td>TBD</td></tr> </table>		Instrument Operator		73000	TBD								
Results and Anomaly																																		
23000	V. Roloff																																	
Descriptions of observations																																		
33000	N. Thomas																																	
Instrument Performance																																		
43000	V. Roloff																																	
PDS Generation																																		
53000	N. Thomas																																	
Instrument Operator																																		
73000	TBD																																	
	<table border="1"> <tr><td colspan="2">Peer-Review Archiving</td></tr> <tr><td>24000</td><td>L. Guallini</td></tr> </table>	Peer-Review Archiving		24000	L. Guallini		<table border="1"> <tr><td colspan="2">On-board software</td></tr> <tr><td>44000</td><td>TBD</td></tr> </table>	On-board software		44000	TBD	<table border="1"> <tr><td colspan="2">Decompression S/W</td></tr> <tr><td>54000</td><td>B. Fiethe</td></tr> </table>	Decompression S/W		54000	B. Fiethe																		
Peer-Review Archiving																																		
24000	L. Guallini																																	
On-board software																																		
44000	TBD																																	
Decompression S/W																																		
54000	B. Fiethe																																	
			<table border="1"> <tr><td colspan="2">PR Material</td></tr> <tr><td>45000</td><td>N. Thomas</td></tr> </table>	PR Material		45000	N. Thomas																											
PR Material																																		
45000	N. Thomas																																	