# SPIRE ICC: ACTOR DESCRIPTIONS

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# 1. INTRODUCTION

## 1.1 Purpose of document

An *actor* is an idealization of an external person, process or thing that interacts with the system; it may be a person, another computer system or some executable process. The actor represents a role played by a user (e.g. Observer, Mission Planner), rather than a specific person; a person may play the role of several different actors.

The aim of this document is to identify the actors specific to the SPIRE ICC and their goals, which form the use-cases of the SPIRE ICC. Many of these actors are functionally equivalent to HCSS actors (normally with the same name); in such cases, their descriptions in this document deal only with their SPIRE ICC-specific interests and responsibilities. It is assumed that aspects common to the HCSS and the SPIRE ICC are covered in the HCSS Actors' Descriptions document [**AD1**].

The goals of an actor are identified by considering their responsibilities and how these can be fulfilled. The goals are decomposed into sub-goals by asking "How does the actor achieve this goal?". Conversely, asking "Why does the actor have this goal?" leads to higher level goals, which may in turn suggest other lower-level goals.

The user-level use-cases correspond to goals which:

- involve interaction with system
- yield a result of benefit to the actor
- are relatively short term

Goals are too low-level to be considered as use-cases if they describe the implementation or the user interface, or they are only of interest to the actor as a means to an end.

## 1.2 Format of descriptions

Each actor description specifies the following information:

**Title**: The actor's name
**Version**: Version number of the actor description
**Status**: Draft or Approved
**HCSS Equivalent**: The HCSS actor which is functionally equivalent to this actor (reference number in [**AD1**])
**Description**: Short description of the actor and their characteristics
**Phase**: The missions phases associated with the actor
**Responsibilities**: The actor's jobs responsibilities including services provided as a secondary actor
**Interests**: Conditions that the actor would like to see achieved
**Goal hierarchy**: The actor's goals with lower-level goals being indented more
**Use-case summary**: A list of the goals which relate to the system and are at the level of use-cases

**Open Issues**: A list of points which are still to be resolved
**Comments**: Any other remarks

## 1.3 Stakeholders

A stakeholder is someone with a vested interest in the behaviour of the SPIRE ICC. Each of the actors identified above is a stakeholder but there are stakeholders who never interact directly with the system. Examples are the Herschel science working team, ESA PR office, ESA director of science and the head of the space science department. In the use-case descriptions document, each use-case has a stakeholder section which allows these non-participating stakeholders and their interests to be identified. Their interests show up in the checks and validations the system performs and the logs and reports that the system creates.

## 1.4 References

### 1.4.1 Applicable Documents

| | | | | |
|---|---|---|---|---|
| **AD1** | Herschel Common Science System: Actor Descriptions | FIRST/FSC/DOC/0157 | 2.0 | 23 May 2002 |

### 1.4.2 Reference Documents

| | | | | |
|---|---|---|---|---|
| **RD 1** | SPIRE Instrument Control Centre: Use-Case Definitions | SPIRE-SAP-DOC-001241 | 2.0 | 21 June 2002 |

## 1.5 List of Acronyms

| | |
|---|---|
| **AD** | Applicable Document |

## Contents

# A1 CALIBRATION SCIENTIST

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A3** – Calibration Scientist

**Description:**

The Calibration Scientist has a strong astronomical background and an in-depth knowledge of the properties and operations of the instrument. They plan the necessary calibration observations to characterize the instrument, determine and verify the calibration parameters of the instrument and specify how these parameters have to be applied in the standard product generation.

When analysing the calibration observation data the calibration scientist will check that the model of the instrument's behaviour is still valid. If not, he will modify calibration parameters and analysis procedures/ algorithms in his local environment to see if the model can be improved. Upon determining improvements to the model he will request the necessary update to be made to the HCSS. As a result of his analysis the calbration scientist may determine that a change in the observation strategy proposed in the calibration plan is needed or that a new type of calibration observation template is required.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Write and maintain the overall calibration plan
- Implement the calibration plan
- Determine the instrument calibration parameters
- Validate the instrument calibration parameters
- Monitor the trends in instrument characteristics
- Propose improvements in standard product generation software
- Propose improvements in on-board reduction & compression
- Propose improvements in observing modes
- Document the instrument performance/calibration to the astronomer

**Interests:**

- Simple, readable code of the standard processing software
- Easy plugging-in of experimental code into standard product generation software in private sandbox
- Easy access to all relevant uplink, observation science data and ancillary data associated with (multiple instances of) functional units
- Same access to in-orbit as to ILT data.
- Availability of calibration reference data from other facilities
- Availability of satellite observing time for calibration

**Goal hierarchy:**

Calibrate SPIRE
- Prepare calibration plan
  - Obtain calibration requirement document from instrument team
  - Interact with instrument team to make sure each requirement is well understood
  - Investigate consequence of possible instrumental artefacts on the calibration strategy
  - Collect results from test phases to consolidate them into calibration measurements
  - Create calibration observations
  - Budget calibration observations
  - Compile all observation into calibration plan
  - Check that calibration observations can be scheduled
  - Validate and verify calibration plan with instrument team
  - Place the calibration plan into configuration control
- Update calibration plan
  - Retrieve current plan
  - Retrieve current report
  - Propose changes to plan, including assessment of effectiveness, impact and risk
  - Approve changes
  - Make changes to plan
- Schedule the observations
  - Check the planned observations can be carried out
  - Implement the planned observations using the CUS
  - Check the total time fits in with time allocated
    - Estimate observation time
  - Pass observation executions plus any timing constraints to CC
- Check observations have been completed successfully
- Retrieve observations and associated data from HCSS database
- Check quality
- Data reduction of relevant observations for this time period
- Update relevant calibration artefacts
  - Retrieve the relevant data
  - Produce update to artefact in ICC sandbox
  - Validate and verify updated artefact

Runs validation test
Produce a report on the update
Place update in ICC test environment
Determine which updates will be made persistent this period
Verify the planned updates for this time period
Approve all updates and enter into CC
Scientifically validates the updated system
Define the tests and test cases for scientific validation
Write the scientific validation reports
Update calibration report
Approve updates
Investigate instrument problem
Update calibration plan to reflect new operation mode of SPIRE

**Use-case summary:**

- Calibrate SPIRE (UC-CAL001)
- Prepare the calibration plan (UC-CAL004)
- Update Calibration Artefact (UC-CAL105)
- Estimate observation time (UC-AOP102)
- Update Calibration Plan (UC-CAL101)
- Schedule Calibration Observation (UC-CAL102)
- Scientifically validate a calibration/IA artefact update (UC-CAL103)
- Generate calibration report (UC-CAL104)
- View observation schedule (UC-CUS101)
- Investigate instrument problem (UC-ENG005)
- ?Convert from engineering units to astrophysical units (UC-DAC108)
- ?Read and prepare data-frames for IA processing (UC-DAS101)

**Open issues:**

**Comments:**

## A2 COMPUTER SYSTEM MANAGER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A4** – Computer System Manager

**Description:**

The computer system manager supports the hardware, operating system and system level software (libraries, third party software, development tools, etc). He manages the computing environment. The computer system manager requires no detailed knowledge of the systems being developed over-and-above the requirements it places on support during development and support during and after deployment.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Maintain functioning of the hardware, operating system and system level software.
- Install new hardware, operating system and system level software to fulfill requirements of the systems under development.
- Upgrade hardware, operating system and system level software.
- Maintain network connectivity both internally and to the outside world
- Perform backups
- Maintain security
- Support the users of the hardware, operating system and system level software.

**Interests:**

- A computing environment that allows development and operations to be performed with minimal downtime/ interruption.

**Goal hierarchy:**

Requests for system access or privilege change
    Grants system access or privileges
    Informs user that change has been made
    Logs access or privilege change
Maintaining computing environment
    Upgrade OS and install patches

Update computing environment
Procure and update new hardware
Make regular backups

**Use-case summary:**

- Request ICC system access privilege (UC-ICC109)
- Maintaining computing environment (UC-ICC009)

**Open issues:**

**Comments:**

## A3 CONFIGURATION CONTROLLER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A6** – Configuration Controller

**Description:**

The configuration controller is responsible for all aspects of configuration and version control associated with the development, deployment and maintenance phases of the ICC system. The configuration controller ensures that:

- The system under development is properly partitioned into configuration controlled and version controlled items. This includes its documentation, test harnesses and the persistent data it produces or ingests from external sources.
- Any submission of a version controlled item is fully traceable to its origin.
- Any version of each configuration controlled item (package, system) can be generated from its constituent items in a reliable and reproducible way.
- The archive of persistent data in the widest sense (data proper, software, documentation) is partitioned into a hierarchy of areas (scratch, test, operational, etc.). This allows concurrent existence of advanced versions of the same item at different levels without interference.
- The appropriately authorised "promotion" of a version controlled item to a higher level in the area hierarchy can be performed.
- The system change request (SCR) mechanism operates smoothly.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Identify the configuration and version controlled items.
- Establish ICC configuration control scheme and procedures.
- Ensure that the configuration control scheme and procedures are being used correctly.
- All relevant items are kept under version/ configuration control.
- Configuration controlled items (packages) can be assembled from version controlled items.
- New system releases (developer, user, formal) can be built and previous builds can be

reconstructed from configuration controlled items (packages).

- Ensure that migration between the area hierarchy (scratch, test, operational, ...) can be performed by authorised stakeholders.
- Maintain the system change request (SCR) database.
- Ensure traceability of software changes to SCRs.

**Interests:**

- Integrated HSC and ICC configuration control environments.
- All relevant software items (data, software, and documents) are under version control irrespective of their origin (HSC, MOC, ICCs).
- The set of data in the widest sense (data proper, software, documentation) can be navigated and "indexed" to support, for example, the analysis of impacts arising from any change.
- The disposition (allocated by the configuration control board) and impact assessment (performed by software maintenance) associated with SCRs.

**Goal hierarchy:**

Generate, validate and verify scripts and observation requests
    Put the new script or observation request in the HCSS
Update the CUS database
    Allow the changes to be reflected in the CUS database
Update the MIB
    Decides the MIB is to be the operations MIB
    Deliver the updated MIB to the HCSS
Investigate external SC/instrument effect on SPIRE instrument
    Issue an SCR on the appropriate system
Handle problem report
    Validate that the problem report is a new one
    Identify who is in charge of system incriminated in problem report
    Perform first analysis to establish priorities and deadlines
    Enter the modified elements in configuration control
    Close the problem report
Plan and deliver a new user release
    Issue timetable for next release based on what is available and what is still needed for release
    Plan and deliver a new developers release
        Issue a timetable for next release taking into account the users' release
        Freezes development activities
        Pre-releases the developers' release
        Releases the new developers' release
        Documents the new developers' release
        Allows development activities to resume
    Document the release
    Deliver the new release to the HSC
Produce a new test environment

Validate that all elements of the test environment system can be delivered
Assemble a report containing all changes to the test environment
Identify the current versions of the system elements as being part of a released test environment
Configure the system so that the selected version of the system elements are now the default ones
Notify ICC users of the change
Generate new OBS
Update OBS
Retrieve OBS image from local SPIRE database
Prepare delivery documentation
Deliver the OBS image, associated documentation and an uplink scheduling request to the HSC
Scientifically validate a calibration/IA artefact update
Deliver list of test cases to HSC
Deliver report to HSC
Place an item into configuration control
Receive item to be placed under configuration control
Obtain item status (new/update) from item author
Check author is allowed to create/update elements of CC system
Check that item is not already reserved by another system developer
Register item in the configuration control system
Notify item author of success

**Use-case summary:**

- Generate, validate and verify scripts and observation requests (UC-AIV102)
- ?Update calibration artefact (UC-CAL105)
- ?Evaluate ICC-external algorithm (UC-CON002)
- Update the CUS database (UC-CUS102)
- Update the MIB (UC-CUS103)
- Investigate external SC/instrument effect on SPIRE instrument (UC-ENG002)
- Handle problem report (UC-ICC002)
- Plan and deliver a new user release (UC-ICC102)
- Plan and deliver a new developer release (UC-ICC005)
- Produce a new test environment (UC-ICC103)
- Generate new OBS (UC-OBS102)
- Update OBS (UC-AIV101)
- Scientifically validate a calibration/IA artefact update (UC-CAL103)
- Place an item into configuration control (UC-ICC105)

**Open issues:**

**Comments:**

## A4 DATABASE SYSTEM MANAGER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A7** – Database System Manager

**Description:**

The database system manager manages the local node of the HCSS (and possibly a local non-distributed database). The DSM has a background in object-orientated database systems and has a detailed knowledge of the core class model / schema implemented in the database.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Ensure the continuing integrity of the database as it grows.
- Perform evolutions on the database.
- Ensure the ability to restore the database in the event of a failure.
- Tune the database for optimal performance.

**Interests:**

- Data reaching the database from whatever source preserves its integrity during transmission.

**Goal hierarchy:**

Requests for database access or privilege change
    Grants database access or privileges
    Informs user that change has been made
    Logs access or privilege change
Maintain computing environment
    Maintain database

**Use-case summary:**

- Request ICC system access privilege (UC-ICC109)
- Maintain computing environment (UC-ICC009)

**Open issues:**

**Comments:**

## A5 DATA PROCESSOR

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent:** -

**Description:**

The task of the data processor is to process the data from the SPIRE instrument.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Process data

**Interests:**

- Well-documented and easy to use reduction software

**Goal hierarchy:**

Process FTS data
- Decides which output data products are wanted
  - Extraction of artefact from HCSS
- Identifies reduction procedure required to obtain the data products
- Applies reduction software to all input data to create data products
  - Flag bad and missing data
  - Store data (to local store)
  - Reconstruct of each scan/interferogram
  - Visualisation of raw data (interactive)
  - Electrical cross-talk removal
  - $0^{th}$ order deglitching
  - Convert position counter to mechanical mirror position
  - Generate array of signal vs. position
  - Convert mechanical position to OPD for each detector
  - Phase correct
  - Re-grid data to obtain a ZPD point
  - Correct responsivity
  - Correct for time-dependent variation in flux

Correct for position-dependent variation in flux
Transform between sky and spacecraft coordinate systems
Deglitch FTS data to a 1st order
Apodise (removal of outlying frequency signals)
Fourier Transform individual scans
Remove instrument signature
Remove pixel-to-pixel sensitivity variation (flat field)
Convert to physical units (flux calibration)
Produce a spectrum per sky pixel
Produce a 3D data cube
Select and display map over spectral range
Assess quality of data products
Examine observation and data reduction history
Detect and identify lines
Reduce photometer data
Decides which output data products are wanted
Identifies reduction procedure required to obtain the data products
Applies reduction software to all input data to create data products
Identify and flag bad data
Filter data on any criteria
Visualize any data product
Remove pixel-to-pixel sensitivity variation (flat field)
Identify and flag data on any criteria
Subtract a background
Transform between sky and spacecraft coordinate systems
Resample and combine data spatially and/or temporally
Convert from engineering units to astrophysical units (flux calibration)
Determine colour correction
Apply colour correction
Convert output data to popular data formats
Assess quality of data products
Examine observation and data reduction history
Detect sources
Subtract off-source data (demodulate data)

**Use-case summary:**

- Process FTS data (UC-FTS101)
- Reduce photometer data (UC-PHT101)
- Identify and flag bad data (UC-DAC101)
- Filter data on any criteria (UC-DAC102)
- Remove effects of instrument cross-talk (UC-DAC103)
- Remove pixel-to-pixel sensitivity variations (flat-field) (UC-DAC104)
- Identify and flag data on any criteria (UC-DAC105)
- Subtract a background (UC-DAC106)
- Transform between sky and spacecraft coordinate systems (UC-DAC107)
- Convert from engineering units to astrophysical units (UC-DAC108)

- Read and prepare data-frames for IA processing (UC-DAS101)
- Import non-IA format data (UC-DAS102)
- Convert output data into popular data formats (UC-DAS103)
- Examine observation and data reduction history (UC-DAS104)
- Display error and information messages (UC-DAS105)
- Access interactive analysis documentation (UC-DAS106)
- Record data reduction history (UC-DAS107)
- Visualise any data product (UC-DAS108)
- Reconstruct of each scan/interferogram (UC-FTS103)
- Convert position counter to mechanical mirror position (UC-FTS104)
- Generate array of signal vs. position (UC-FTS105)
- Convert mechanical position to OPD (optical path difference) for each detector (UC-FTS106)
- Phase correct (UC-FTS107)
- Re-grid data to obtain a ZPD point (UC-FTS108)
- Responsitivity correction (UC-FTS109)
- Correct for time-dependent variation in flux (UC-FTS110)
- Correct for position-dependent variation in flux (UC-FTS111)
- Deglitch FTS data to a 1st order (UC-FTS112)
- Apodise (removal of outlying frequency signals) (UC-FTS113)
- Fourier transform individual scans (UC-FTS114)
- Remove instrument signature (UC-FTS115)
- Produce a spectrum per sky pixel (UC-FTS116)
- Produce a 3D data cube (UC-FTS117)
- Detect and identify lines (UC-FTS118)
- Resample and combine data spatially and/or temporally (UC-PHT108)
- Determine colour correction (UC-PHT110)
- Apply colour correction (UC-PHT111)
- Detect sources (UC-PHT113)
- Subtract off-source data (demodulate data) (UC-PHT121)

**Open issues:**

**Comments:**

## A6 DOCUMENTER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: -**

**Description:**
An ICC member.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**
- Document all aspects of the ICC

**Interests:**
- A well-documented and easy to use documentation control system

**Goal hierarchy:**
Maintain ICC web page
    Deliver items to information handler
Create or update a document
    Requests modification of a document
    Assesses the extent of the modification of the document to decide the scope of the review
    Writes or modifies the document
    Enters the document into the DCCS

**Use-case summary:**
- Maintain ICC web page (UC-ICC110)
- Create or update a document (UC-ICC104)

**Open issues:**

**Comments:**

## A7 EXPERT KNOWLEDGE SYSTEM

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent:** -

**Description:**

A user or system with sufficient scientific, instrument or software knowledge and/or expertise to be capable of making value judgements and handling queries. based on these. This may be an astronomer, the ICC or the SPIRE Consortium.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Assess scientific quality of synthetic data
- Provide instrumental and scientific expertise

**Interests:**

- The science simulator produces data as scientifically valid as possible
- The algorithms used are the most efficient and effective possible

**Goal hierarchy:**

Simulate scientific performance
- Assess the scientific quality of data
- Report on the data quality

Consortium expert knowledge capture
- Return required information to inquirer

Evaluate ICC-external algorithm
- Obtains from algorithm source: algorithm, description and justification
- Checks that similar algorithm has not already been submitted
- Makes sure algorithm is relevant for IA
- Assigns priority level to the algorithm (benefits vs. costs)
- Defines algorithm test plan
- Approves algorithm
- Submits an SCR

Disseminate knowledge

Submits knowledge they believe of use outside ICC to ICC Helpdesk with appropriate justifications and indications of potential interested parties

**Use-case summary:**

- Simulate scientific performance (UC-CAL106)
- Consortium expert knowledge capture (UC-CON101)
- Evaluate ICC-external algorithm (UC-CON002)
- Disseminate knowledge (UC-CON102)

**Open issues:**

**Comments:**

## A8 EXTERNAL USER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: -**

**Description:**

A user requiring access to the HCSS database system or ICC systems.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

**Interests:**

- The user can access the HCSS or ICC systems.

**Goal hierarchy:**

Issue a command to interact with the database
Requests system access or changed privileges

**Use-case summary:**

- Access database from outside the ICC (UC-ICC108)
- Request ICC system access privilege (UC-ICC109)

**Open issues:**

**Comments:**

## A9 HERSCHEL SCIENCE CENTRE

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent:** -

**Description:**

This actor is the single-point interface to the outside world including not only the astronomical community but also the press and the general public. The HSC is responsible for all observatory aspects of the Herschel mission. The HSC will ensure that the scientific productivity and impact of the Herschel mission is maximised within the given constraints.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Herschel
- Ref. Ground Segment Design Description

**Interests:**

- The best data possible from SPIRE

**Goal hierarchy:**

Calibrate SPIRE
    Perform the calibration observations
Update OBS
    Upload new OBS image
Scientifically validate a calibration/IA artefact update
    Accept the test cases as complete for scientific validation

**Use-case summary:**

- Calibrate SPIRE (UC-CAL001)
- ?Support HSC query (UC-HSC002)
- ?Plan and deliver a new user release (UC-ICC102)
- Update OBS (UC-AIV101)
- Scientifically validate a calibration/IA artefact update (UC-CAL103)

**Open issues:**

**Comments:**

# A10 ICC HELPDESK

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A11** - Helpdesk

**Description:**

The helpdesk actor is responsible for providing answers to technical and scientific questions specific to SPIRE. The helpdesk actor provides user support in the following ways:

- By answering to a query from external actors (via the HCSS helpdesk): general public, astronomers, observers, archive users. The helpdesk actor provides this support either by consulting its own database of previous requests and/ or interfacing with various other actors (ICC actors for example) and using their expertise.
- By sending out information to mailing-lists and
- By maintaining information pages relevant to the various phases of the mission.

Additionally the helpdesk actor will generate helpdesk statistics.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Reply to a helpdesk user query in a timely fashion
- Provide statistics about helpdesk queries
- Maintain support tools (e.g. information pages, FAQs, etc.)
- Provide individual users with information
- Broadcast messages to a helpdesk mailing list.

**Interests:**

- Availability of an automated system for helpdesk query submission and listing
- Easy accessibility of the helpdesk replies to previous requests
- Easy accessibility of information sources for providing support to the helpdesk user
- Maintaining consistency of reply to similar queries
- Easy semi-automated generation of statistics
- Availability of a system to support the generation and maintenance of Information

Pages
- User satisfied with response
- Few repeat questions

**Goal hierarchy:**

Consortium expert knowledge capture
- Stores unsolicited information from consortium in ICC database
- Logs transfer of information
- Searches other sources and makes further enquiries to fulfil request

Disseminate knowledge
- Assesses the information for its importance outside ICC
- Determines which parties are likely to be interested in the information
- Send the information to interested parties

Support HSC query
- Register and log query, identifying it as coming from HSC
- Make sure that the query has not been answered yet
- Determine who in the ICC is able to deal with the query
- Log the report and forward it to the HSC
- Close out the helpdesk query

**Use-case summary:**
- Consortium expert knowledge capture (UC-CON101)
- Disseminate knowledge (UC-CON102)
- Support HSC query (UC-HSC002)

**Open issues:**

**Comments:**

# A11 ICC MANAGER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A12** – ICC Manager

**Description:**

The ICC manager manages the day-to-day, and longer-term, operation of the ICC. He/she has significant insight into the properties, calibration and operation of the instrument together with a good knowledge of the Herschel Ground Segment systems and interfaces.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Manage all ICC activities
- Assign tasks to ICC members
- Keeping resource level in line with ICC responsibilities
- Continually review ICC responsibilities
- Maintain performance of instrument to meet its stated mission aims
- Ensure instrument and science performance are adequately monitored
- Formally report on 'instrument status' to PI, consortium and HSC
- Planning for contingency situations (short term)
- Authorize all changes within the ICC
- Delegation of tasks

**Interests:**

- Smooth ICC operation
- Smooth instrument operation
- Fulfilling goals set by PI
- Successful operations at HSC and MOC

**Goal hierarchy:**

Calibrate SPIRE

Approve calibration plan and distribute associated work packages

Investigate external SC/instrument effect on SPIRE instrument
- Contact relevant parties if problem report suggests other systems need to analyse the report before an SCR can be made
- Pass recommendations from outside investigations to MRB

Training
- Agree appropriate action with SSD/ST/SPA

Support HSC query
- Defines work package with other ICC/HSC for large problems

Manage the ICC
- Establish jointly with ESA the detailed list of ICC tasks and deliveries
- Generate the ICC SIP
- Establish and maintain the ICC schedule
- Manage the ICC interfaces with ESA Project Team, the other ICCs, the HSC and the MOC
- Support the ground segment reviews
- Attend the meetings of the F-GSAG
- Establish jointly with SCI-SA the set of documents to be produced by the ICC
- Provide the infrastructure and facilities to support the work of the ICC

Manage ICC Knowledge Base
- Establish a documentation system for the storage and dissemination of ICC documents
- Provide infrastructure and facilities to support documentation system
- Establish a website for the storage and dissemination of information
- Provide infrastructure and facilities to support website
- Determine from time to time any staff training needs
- Determine from time to time any meeting needs

Reach ICC personnel out of normal hours
- Reports problem to the appropriate person(s)

Collaborate with other ICCs or HSC
- Receives a request concerning a possible common work area
- Assess the request internally in the SPIRE ICC
- Contacts other ICC/HSC managers for work-package distribution
- Designate contact point for work-packages and milestones
- Sets up a team inside the ICC to complete the designated work-packages

**Use-case summary:**

- Calibrate SPIRE (UC-CAL001)
- Investigate external SC/instrument effect on SPIRE instrument (UC-ENG002)
- Training (UC-HSC101)
- Support HSC query (UC-HSC002)
- Manage the ICC (UC-ICC001)
- Manage ICC Knowledge Base (UC-KNO001)
- Reach ICC personnel out of normal hours (UC-ICC111)
- Collaborate with other ICCs or HSC (UC-OTH001)

**Open issues:**

**Comments:**

## A12 ICC SCIENTIST

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent:** -

**Description:**

A scientist with astronomy, instrument and software skills. A member of the ICC.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Scientific performance of the instrument
- Scientific usability of the data products

**Interests:**

- User-friendly processing software

**Goal hierarchy:**

Simulate science performance
    Assess the scientific quality of the output data
Plan and deliver a new user release
    Test, validate and verify scientifically the release
Test, validate and verify observing modes
    Define a test plan for testing the new observing mode
    Review test results and assess the release of the new observing mode

**Use-case summary:**

- Simulate science performance (UC-CAL106)
- Plan and deliver a new user release (UC-ICC102)
- Test, validate and verify observing modes (UC-CUS001)

**Open issues:**

**Comments:**

## A13 INFORMATION HANDLER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent:** -

**Description:**

The information handler receives, collates and distributes any information which requires dissemination either within the ICC or externally.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Distribution of information

**Interests:**

- An efficient and easy-to-use system for receiving and retrieving information
- An efficient and easy-to-use system for distribution information

**Goal hierarchy:**

Calibrate SPIRE
    Circulate calibration plan
    Distribute updated calibration report
Update calibration artefact
    Inform regarding artefact update
Simulate science performance
    Inform regarding simulated data quality reports
Consortium expert knowledge capture
    Add consortium response to ICC database
    Log the transaction
Update the CUS database
    Distribute test report in case of test, verification or validation failure
Update the MIB
    Distribute test report in case of test, verification or validation failure
Simulate instrument behaviour
    Distribute non-feasibility report for test script

Handle problem report
    Distribute closed problem report
Plan and deliver a new user release
    Deliver release document
Plan and deliver a new developer release
    Deliver new developers' release report
Produce a new test environment
    Distribute delivery report
    Distribute problem report
Generate new OBS
    Pass relevant information to the OBSMT
    Report OBS change decision
Collaborate with other ICCs or HSC
    Distribute milestone completion report
Update OBS
    Notify instrument users of new OBS image
Scientifically validate a calibration/IA artefact update
    Deliver scientific validation report to ICC
Create or update a document
    Inform regarding document update
Place an item into configuration control
    Notify item author of success
Validate and verify OBS
    Circulate test report
Maintain ICC web page
    Place item(s) in correct place on server

**Use-case summary:**

- Calibrate SPIRE (UC-CAL001)
- Update calibration artefact (UC-CAL105)
- Simulate science performance (UC-CAL106)
- Consortium expert knowledge capture (UC-CON101)
- Update the CUS database (UC-CUS102)
- Update the MIB (UC-CUS103)
- Simulate instrument behaviour (UC-ENG101)
- Handle problem report (UC-ICC002)
- Plan and deliver a new user release (UC-ICC102)
- Plan and deliver a new developer release (UC-ICC005)
- Produce a new test environment (UC-ICC103)
- Generate new OBS (UC-OBS102)
- Collaborate with other ICCs or HSC (UC-OTH001)
- Update OBS (UC-AIV101)
- Scientifically validate a calibration/IA artefact update (UC-CAL103)
- Create or update a document (UC-ICC104)
- Place an item into configuration control (UC-ICC105)
- Validate and verify OBS (UC-OBS101)
- Maintain ICC web page (UC-ICC110)

**Open issues:**

**Comments:**

- It is implicitly assumed that the dissemination of information is to all interested parties

## A14 INFRASTRUCTURE SOFTWARE DEVELOPER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent:** –

**Description:**

The infrastructure software developer has a computer engineering background. They might also have an astronomical data reduction background but this is not essential. The infrastructure software developer designs, codes, tests and implements infrastructure software.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Design, code, test and integrate infrastructure parts of the ICC software:
- Write documentation (User Manuals etc.)

**Interests:**

- Easy access to all data (uplink and downlink) associated with an observation.
- Navigation and queries down to the functional unit resolution element
- Smooth maintenance / development of the software system independent of the physical location (test environment available, etc)
- ICC configuration control integrated with HSC configuration control including version control
- Notifications of new SCRs etc.

**Goal hierarchy:**

Evaluate ICC-external algorithm
    Re-writes the algorithm according to software standards
Training
    Identify training need
    Carry out agreed action
Plan and deliver a new release
    Create or update software artefact(s) within the ICC
        Prepare a sandbox

Checkout the artefact from the CCS into sandbox
Write or modify the unit test
Write or modify the software
Test the software within the sandbox
Write or modify the documentation
Plan and deliver a new developer release
Create or update software artefact(s) within the ICC

**Use-case summary:**

- Evaluate ICC-external algorithm (UC-CON002)
- ?Simulate instrument behaviour (UC-ENG101)
- Training (UC-HSC101)
- Plan and deliver a new user release (UC-ICC102)
- Create or update a software artefact(s) (within the ICC) (UC-ICC101)
- Plan and deliver a new developer release (UC-ICC005)

**Open issues:**

**Comments:**

## A15 INSTRUMENT ENGINEER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A13** – Instrument Engineer

**Description:**

The instrument engineer has a deep knowledge of the instrument hardware and its operations. Also they have significant insight into the calibration of the instrument. The main task is to bring about and maintain the instrument operating in optimal fashion.

**Phase:**

| | | | |
|---|---|---|---|
| Instrument level testing: | Y | | |
| Integrated system testing: | | Y | |
| Ground segment testing: | Y | | |
| LEOP: | | N | |
| Commissioning: | Y | | |
| Calibration/PV: | | Y | |
| Science demonstration: | | Y | |
| Routine operations: | | Y | |
| Post operations: | N | | |

**Responsibilities:**

- Define and maintain instrument operating procedures
- Monitor the health and performance of the instrument.
- Support the HSC helpdesk

**Interests:**

- Priority access to all instrument housekeeping telemetry and instrument science telemetry, especially in contingency cases.
- Ability to stop instrument operation and put it in a safe mode.

**Goal hierarchy:**

Generate, validate and verify scripts and observation requests
- Start and configure Test Control or CUS
- Retrieve a script or observation request from the local database
- Modify the script or observation request
- Inspect the result and produce a verification report

Test, validate and verify observing modes
- Define a test plan for testing the new observing mode
- Generate, validate and verify the observation executions resulting from the test plan
- Review test results and assesses the release of the new observing mode

Update the CUS database

Document the changes to be made
Update the MIB
Document the needed update
Reach ICC personnel out of normal hours
Analyses the problem and takes appropriate action
Generate new OBS
Update the OBS
Update OBS
Test the new OBS image on the instrument
Analyses problem reports
Schedule calibration observation
CUS update needed
View observation schedule
Start access software
Search the list of schedules on a list of user-specified criteria
Display the resulting schedule(s)
Simulate instrument behaviour
Validate the technical quality of the output data

**Use-case summary:**

- Generate, validate and verify scripts and observation requests (UC-AIV102)
- Test, validate and verify observing modes (UC-CUS001)
- Update the CUS database (UC-CUS102)
- Update the MIB (UC-CUS103)
- ?Store analysis data (UC-ENG003)
- Reach ICC personnel out of normal hours (UC-ICC111)
- Generate new OBS (UC-OBS102)
- Update OBS (UC-AIV101)
- Schedule calibration observation (UC-CAL102)
- View observation schedule (UC-CUS101)
- Simulate instrument behaviour (UC-ENG101)

**Open issues:**

**Comments:**

# A16 INSTRUMENT TESTER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A14** – Instrument Tester

**Description:**

The task of the instrument tester is to perform the formal tests of new or revised instrument operating procedures, mainly during ILT and IST. The instrument tester should be familiar with the operations of the instrument and the test equipment using the EGSE. The results of the tests are fed back to the instrument engineer.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | N | |

**Responsibilities:**

- Assist the instrument engineer in preparing test procedures.
- Perform tests
- Manually command the instrument during ILT.
- Write test reports

**Interests:**

- Consistent and persistent storage of observation telemetry data during all mission phases.
- Consistent set of observation processing software applicable to engineering observations during all mission phases.
- Consistent sets of functional units for engineering observations during all mission phases.
- If necessary access to live telemetry during IST and in-orbit mission phases.
- Test equipment should be handled by the same tools as the instrument during ILT.

**Goal hierarchy:**

Perform instrument test
- Consult with experts to design the test objectives
- Write the test code
- Execute the test on the instrument model with the test facility
- Retrieve the test result from the instrument database

- Analyze the test data
- Validate the results of the analysis
- Document the test results
- Store the test procedure, analysis and report

Generate, validate and verify scripts and observation requests
- Validate the script or the observation request using validation s/w
- Run the script or the observation request on instrument or simulator

Access data storage
- Start a test or replay of a test

Calibrate SPIRE
- Perform the calibration observations

Update the CUS database
- Test, verify and validate the new/updated operational mode

Update the MIB
- Test, validate and verify the new MIB in a test environment
  - Test the updated MIB on the instrument simulator
  - Produce a test report
  - Test the updated MIB with SCOS-2000
  - Produce a test report
  - Test the updated MIB in an HCSS sandbox

Store analysis data
- Select data to be made persistent
- Request from the storage system the information needed to store the data
- Make the data persistent in the storage system

Generate new OBS
- Take new OBS image, test it and produce a report

Validate and verify OBS
- Get new OBS image from the OBSMT
- Run a set of tests on the instrument simulator to ensure that OBS behaves as expected and does not compromise instrument/SC safety
- Run a set of tests on the instrument to ensure that OBS behaves as expected and does not compromise instrument/SC safety
- Produce a test report

Simulate science performance
- Retrieve information describing the sky observed by the instrument
- Retrieve information describing how the observation is performed
- Prepare input for simulator
- Execute observation on the simulator

Test, validate and verify observing modes
- Translate the observing mode definition into a CUS script
- Store the script in the sandbox CUS database
- Define a test plan for testing the new observing mode
- Review test results and assess the release of the new observing mode

Simulate instrument behaviour
- Receive the description of the test to be performed on the simulator
- Write the test script
- Execute the script on the simulator
- Write a validation report on test execution

**Use-case summary:**

- Perform instrument test (UC-ENG004)
- Generate, validate and verify scripts and observation requests (UC-AIV102)
- Access data storage (UC-AIV103)
- Calibrate SPIRE (UC-CAL001)
- Update the CUS database (UC-CUS102)
- Update the MIB (UC-CUS103)
- Store analysis data (UC-ENG003)
- Generate new OBS (UC-OBS102)
- Validate and verify OBS (UC-OBS101)
- Simulate science performance (UC-CAL106)
- Test, validate and verify observing modes (UC-CUS001)
- Simulate instrument behaviour (UC-ENG101)

**Open issues:**

**Comments:**

## A17 MATERIALS REVIEW BOARD

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: -**

**Description:**

A group of people combining expertise in different instrument aspects, e.g. subsystems, that meets to decide what to do in the event of an instrument problem. A MRB can also arbitrate on changes to SW system that might affect the instrument behaviour.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | N | |

**Responsibilities:**

- Instrument safety

**Interests:**

- Solutions to instrument problems which have a minimal impact on the health and operability of the instrument.

**Goal hierarchy:**

Generate, validate and verify scripts and observation requests
    Decide if the new script or observation request should be put in the HCSS database
Investigate instrument problem
    Accept proposed solution
Investigate external SC/instrument effect on SPIRE instrument
    Determines if any updates are needed to the instrument logic or data processing
Handle problem report
    Recommends modifications to be made
Generate new OBS
    Approve the OBS change

**Use-case summary:**

- Generate, validate and verify scripts and observation requests (UC-AIV102)

- Investigate external SC/instrument effect on SPIRE instrument (UC-ENG002)
- Investigate instrument problem (UC-ENG005)
- Handle problem report (UC-ICC002)
- Generate new OBS (UC-OBS102)

**Open issues:**

**Comments:**

## A18 ON-BOARD SOFTWARE MAINTENANCE TEAM

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A25** – SW Maintenance Team

**Description:**

The on-board software maintenance team is responsible for the maintenance of the on-board software.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | N | |

**Responsibilities:**

- To maintain the OBS in operation

**Interests:**

- The OBS is maintainable

**Goal hierarchy:**

Generate new OBS
    Generate a new OBS image

**Use-case summary:**

- Generate new OBS (UC-OBS102)

**Open issues:**

**Comments:**

## A19 OPERATIONS ENGINEER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: -**

**Description:**

A person who knows precisely how to use the ICC system in order to do things, how to define database elements…

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | N | |

**Responsibilities:**

**Interests:**

**Goal hierarchy:**

- Test, validate and verify observing modes
  - Define a test plan for testing the new observing mode
- Update the CUS database
  - Implement the changes in a test version of the CUS database
  - Update the operational database (?UC-ICC101)
- Update the MIB
  - Implement the updates in a test MIB
    - Retrieve the MIB editor from the HCSS database
    - Use the MIB editor to update the MIB access table
    - Verify the updated MIB
    - Export the updated MIB from the MIB editor into ASCII files

**Use-case summary:**

- Test, validate and verify observing modes (UC-CUS001)
- Update the CUS database (UC-CUS102)
- Update the MIB (UC-CUS103)

**Open issues:**

**Comments:**

## A20 PROBLEM ANALYST

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A18** – Problem Analyst

**Description:**

The problem analyst analyses the system change requests (SCRs) submitted to the ICC. The problem analyst is the person with an overview of the system(s) that would be involved in potential changes. This actor is a vehicle allowing the "Supply SCR analysis" use case to be associated with a single actor and not duplicated through many actors. It covers actions which are performed by the software maintenance team, the instrument engineer and calibration scientist (TBC).

Problems may arise due to the instrument misbehaving, the spacecraft misbehaving, the ground station, other instruments, computer hardware, etc.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- To analyse an SCR such that sufficient information is provided to allow the CCB to make a decision and the implementers of the change to know the required updates.

**Interests:**

- The status of the SCR and in which system version the change will be implemented.

**Goal hierarchy:**

Investigate external SC/instrument effect on SPIRE instrument
- Determine what supplementary information is needed for investigation and gather it
- Analyse the problem, produce a report and pass it to the MRB

Investigate instrument problem
- Try to reproduce the problem with the simulators
- Check for possible influence of other Herschel instruments
- Identify work-around or solution to the problem
- Test work-around or solution to the problem on the simulators

Propose changes to the SPIRE operations to implement work-around or solutions

Support HSC query

Analyse the query and produce a report answering it

Handle problem report

Perform first analysis to establish priorities and deadlines

Analyse the problem and identify modification to make

Add problem analysis and recommended solution to problem report

Modify the elements of the system

Interface for joint ICC/HSC areas of commonality

Assess the request internally in the SPIRE ICC

Report to ICC Manager on completion of milestones

**Use-case summary:**

- Investigate external SC/instrument effect on SPIRE instrument (UC-ENG002)
- Investigate instrument problem (UC-ENG005)
- Support HSC query (UC-HSC002)
- Handle problem report (UC-ICC002)
- Collaborate with other ICCs or HSC (UC-OTH001)

**Open issues:**

**Comments:**

## A21 PROBLEM REPORTER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A19** – Problem Reporter

**Description:**

The Problem Reporter submits software change requests to the ICC. This actor is a vehicle allowing the "submit an SCR" use case to be associated with a single actor and not duplicated through many actors. There are 2 categories of SCR:

- ICC users within the ICC can submit SCRs relating to an identified ICC version.
- The ICC developers can submit SCRs relating to general issues affecting the development.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- To submit a valid SCR which provides sufficient information to allow a subsequent evaluation/analysis to be performed.

**Interests:**

- The status of the SCR and in which ICC version the change will be implemented.

**Goal hierarchy:**

Investigate external SC/instrument effect on SPIRE instrument
    Report the problem to the problem analyst
Reach ICC personnel out of normal hours
    Report problem to ICC manager or delegated deputy

**Use-case summary:**

- Investigate external SC/instrument effect on SPIRE instrument (UC-ENG002)
- Reach ICC personnel out of normal hours (UC-ICC111)

**Open issues:**

**Comments:**

## A22 SCIENTIFIC PRODUCT ANALYST

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A24** – Scientific Product Analyst

**Description:**

The Scientific Product Analyst (SPA) has responsibility for the success of the quality control processing (QCP), on-demand processing (ODP) and interactive analysis (IA) performed by the ICC.

QCP is performed automatically on all observation related telemetry received from the MOC. The SPA monitors this automatic process and the output it produces. He supplies information to be included in the observation quality control reports when necessary. Additionally the SPA can invoke QCP to (re)process selected observations. It is the SPA who is responsible for the final value associated with the observation quality flag.

The archive user/ astronomer can request on-demand processing of observation data (UCF-491). The SPA is responsible for monitoring and maintaining the on-demand processing environment.

Similarly the archive user/ astronomer can perform interactive analysis using the ICC directly (UCF-493). The SPA is responsible for monitoring and maintaining the IA environment.

**Phase:**

| | | | |
|---|---|---|---|
| Instrument level testing: | N | | |
| Integrated system testing: | | N | |
| Ground segment testing: | Y | | |
| LEOP: | | Y | |
| Commissioning: | Y | | |
| Calibration/PV: | | Y | |
| Science demonstration: | | Y | |
| Routine operations: | | Y | |
| Post operations: | Y | | |

**Responsibilities:**

- Ensure quality control flags are computed for executed observations that have not previously been run through the Quality Control Pipeline (QCP).
- Import ICC-produced quality results for an observation if available.
- Investigate and disposition observations for which QCP has indicated problems.
- Sanity check QCP results by visual inspection of QCP-generated products.
- Maintain a list of executed observations for which QCP has incorrectly indicated failure.

- Re-run updated QCP software on observations that incorrectly have been declared failed due to errors in QCP software.
- Spot check updated QCP software on observations previously declared successful to ensure these updates have not introduced new problems.
- Monitor status of on-demand reprocessing (executing jobs).
- Control on-demand reprocessing queue.
- Monitor and maintain the ICC interactive analysis environment

**Interests:**

- Robust (against various possible defects in input data that could be corrected) algorithms are implemented for automatic generation of quality control information.
- QCP generates reproducible results.
- In most cases (> 95%), QCP generates "correct" results once it has been validated for a particular AOT.
- The fraction of observations for which QCP generates erroneous results decreases as the mission progresses.
- ICC-generated quality assessment results (or changes thereto) are taken into account.
- All observations are run through QCP.
- Default task parameter settings exist and a standard path through IA has been established for each instrument operational mode that allow scripted execution of a chain of IA modules to produce "scientifically valid" output products under most circumstances.
- IA modules have been designed to allow chained execution by a batch-like process that does not require user decisions to be made interactively or mandatory manual user input during execution or at completion of any individual module.

**Goal hierarchy:**

Training
    Identify training need
    Carry out agreed action

**Use-case summary:**

- ?Evaluate ICC-external algorithm (UC-CON002)
- Training (UC-HSC101)

**Open issues:**

**Comments:**

## A23 SCIENTIFIC SOFTWARE DEVELOPER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A22** – Scientific Software Developer

**Description:**

The scientific software developer has a computer engineering and astronomical data reduction background. Furthermore this person has an understanding of the instrument characteristics and its operation modes. The scientific software developer designs, codes, tests and implements software for scientific data analysis and reduction. A key issue is the use of sandboxes (private environment) by this actor in order to develop and modify his software.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Design, code, test and integrate scientific parts of the ICC software:
- Write documentation (User Manuals etc.)

**Interests:**

- Easy access to all data (uplink and downlink) associated with an observation.
- Navigation and queries down to the functional unit resolution element
- Smooth maintenance / development of the software system independent of the physical location (test environment available, etc)
- ICC configuration control integrated with HSC configuration control including version control
- Notifications of new SCRs etc.

**Goal hierarchy:**

Evaluate ICC-external algorithm
    Re-writes the algorithm according to software standards
Training
    Identify training need
    Carry out agreed action
Plan and deliver a new release

Create or update software artefact(s) within the ICC
Prepare a sandbox
Checkout the artefact from the CCS into sandbox
Write or modify the unit test
Write or modify the software
Test the software within the sandbox
Write or modify the documentation
Plan and deliver a new developer release
Create or update software artefact(s) within the ICC

**Use-case summary:**

- ?Simulate science performance (UC-CAL106)
- Evaluate ICC-external algorithm (UC-CON002)
- ?Simulate instrument behaviour (UC-ENG101)
- Training (UC-HSC101)
- Plan and deliver a new user release (UC-ICC102)
- Create or update a software artefact(s) (within the ICC) (UC-ICC101)
- Plan and deliver a new developer release (UC-ICC005)

**Open issues:**

**Comments:**

## A24 SOFTWARE TESTER

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent: A23** - Software Tester

**Description:**

The software tester actor addresses the testing actions to be performed within the ICC. After the package level testing an additional level of testing is foreseen whereby the scientific software is tested by an indentified group of experts.
Note 1: The actual software developer activities are, in general, outside the scope of the actor descriptions. Where the software developer uses the system he is described using actors such as a software tester or as software maintenance.
Note 2: The test coordinator activities are fully described by the software tester actor and are not detailed elsewhere.

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

- Review test specifications and harnesses produced by other software testers
- Design, expand and maintain test specifications and harnesses
- Design and maintain the database of tests
- Produce test plans
- Perform tests
- Produce test reports

**Interests:**

- The testing objectives, specified by other stakeholders, are clear.
- The test environment allows the test's objectives to be achieved.

**Goal hierarchy:**

Evaluate ICC-external algorithm
    Evaluate the algorithm quantitatively and provide report
Training
    Identify training need
    Carry out agreed action

Create or update a software artefact(s) (within the ICC)
Prepare the test environment
Test and validate the software within the test environment
Enter the artefact into the CCS
Plan and deliver a new developer release
Validate and verify the developers' release
Validate and verify OBS
Run a set of software checks to ensure that the image integrity is maintained and that only expected parts of the image have been updated

**Use-case summary:**

- Evaluate ICC-external algorithm (UC-CON002)
- Training (UC-HSC101)
- Create or update a software artefact(s) (within the ICC) (UC-ICC101)
- Plan and deliver a new developer release (UC-ICC005)
- Validate and verify OBS (UC-OBS101)

**Open issues:**

**Comments:**

## APPENDIX: SOFTWARE SYSTEMS

- **Interactive Analysis**

**Version:** **0.1**
**Status:** **draft**

**Description:**

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

**Interests:**

**Goal hierarchy:**

**Use-case summary:**

- Identify and flag bad data (UC-DAC101)
- Filter data on any criteria (UC-DAC102)
- Remove effects of instrument cross-talk (UC-DAC103)
- Remove pixel-to-pixel sensitivity variations (flat-field) (UC-DAC104)
- Identify and flag data on any criteria (UC-DAC105)
- Subtract a background (UC-DAC106)
- Transform between sky and spacecraft coordinate systems (UC-DAC107)
- Convert from engineering units to astrophysical units (UC-DAC108)
- Read and prepare data-frames for IA processing (UC-DAS101)
- Import non-IA format data (UC-DAS102)
- Convert output data into popular data formats (UC-DAS103)
- Examine observation and data reduction history (UC-DAS104)
- Display error and information messages (UC-DAS105)
- Access interactive analysis documentation (UC-DAS106)
- Record data reduction history (UC-DAS107)
- Visualise any data product (UC-DAS108)
- Reconstruct of each scan/interferogram (UC-FTS103)
- Convert position counter to mechanical mirror position (UC-FTS104)
- Generate array of signal vs. position (UC-FTS105)

- Convert mechanical position to OPD (optical path difference) for each detector (UC-FTS106)
- Phase correct (UC-FTS107)
- Re-grid data to obtain a ZPD point (UC-FTS108)
- Responsitivity correction (UC-FTS109)
- Correct for time-dependent variation in flux (UC-FTS110)
- Correct for position-dependent variation in flux (UC-FTS111)
- Deglitch FTS data to a 1st order (UC-FTS112)
- Apodise (removal of outlying frequency signals) (UC-FTS113)
- Fourier transform individual scans (UC-FTS114)
- Remove instrument signature (UC-FTS115)
- Produce a spectrum per sky pixel (UC-FTS116)
- Produce a 3D data cube (UC-FTS117)
- Detect and identify lines (UC-FTS118)
- Resample and combine data spatially and/or temporally (UC-PHT108)
- Determine colour correction (UC-PHT110)
- Apply colour correction (UC-PHT111)
- Detect sources (UC-PHT113)
- Subtract off-source data (demodulate data) (UC-PHT121)

**Open issues:**

**Comments:**

- **Quick Look Analysis**

  **Version:** **0.1**
  **Status:** **draft**

  **Description:**

  **Phase:**

  | | | |
  |---|---|---|
  | Instrument level testing: | Y | |
  | Integrated system testing: | | Y |
  | Ground segment testing: | Y | |
  | LEOP: | | Y |
  | Commissioning: | Y | |
  | Calibration/PV: | | Y |
  | Science demonstration: | | Y |
  | Routine operations: | | Y |
  | Post operations: | N | |

  **Responsibilities:**

  **Interests:**

  **Goal hierarchy:**

  **Use-case summary:**
  - Access data storage (UC-AIV103)

  **Open issues:**

  **Comments:**

## Database

**Version:** **0.1**
**Status:** **draft**

**HCSS Equivalent:**

**Description:**

**Phase:**

| | | |
|---|---|---|
| Instrument level testing: | Y | |
| Integrated system testing: | | Y |
| Ground segment testing: | Y | |
| LEOP: | | Y |
| Commissioning: | Y | |
| Calibration/PV: | | Y |
| Science demonstration: | | Y |
| Routine operations: | | Y |
| Post operations: | Y | |

**Responsibilities:**

**Interests:**

**Goal hierarchy:**

**Use-case summary:**

- Access database from outside the ICC (UC-ICC108)

**Open issues:**

**Comments:**