

# **SPIRE ICC EXTERNAL INTERFACES**

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## 1. INTRODUCTION

### 1.1 Purpose of document

This document identifies the external interfaces between the SPIRE ICC and other systems (e.g. the HCSS), the constraints these interfaces place on both systems and whether these constraints are met. Currently only interfaces between the SPIRE ICC and the HCSS have been examined but it is envisaged that other systems will be covered in later versions of this document,

The SPIRE ICC-HCSS interface list has been compiled by searching for explicit mentions to either the ICC or the HCSS in [AD1] and [AD2] respectively, and by checking whether any actions are put on the ICC by actors in [AD3] who are also members of the ICC.

### 1.2 Actors

The ICC manager is a proper user of the HCSS during ILT.

The HSC development team (HSCDT) actor belongs to both the HSC and the ICC – this is composed of the Computer System Manager, the Configuration Control Board, the Configuration Controller, the Database System Manager, the Software Tester and the Software Maintenance Team.

### 1.3 References

#### 1.3.1 Applicable Documents

<b>AD1</b>	Herschel Common Science System: Use Case Definitions	FIRST/FSC/DOC/0158	2.0	23 May 2002
<b>AD2</b>	SPIRE Instrument Control Centre: Use-Case Definitions	SPIRE-SAP-DOC-001241	2.0	21 June 2002
<b>AD3</b>	Herschel Common Science System: Actor Descriptions	FIRST/FSC/DOC0157	2.0	23 May 2002

#### 1.3.2 Reference Documents

<b>RD1</b>	HCSS User Requirements Document	FIRST/FSC/DOC/0115	2.0	3 May 2001
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### 1.4 List of Acronyms

<b>AD</b>	Applicable Document
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## 2. CONSTRAINTS IMPOSED ON SPIRE ICC

### 2.1 HCSS

Use-case references beginning UCF refer to [AD1] and those with UC refer to [AD2].

#### 2.1.1 UCF-003: Request system change

**Description:**

It is assumed that only system users with the Herschel ground segment can submit SCRs. The scope of the use-case is therefore the HSC/ICCs.

**Met by:**

SPIRE ICC uses UCF-421: Submit an SCR.

#### 2.1.2 UCF-004: Perform end-to-end test

**Description:**

Identified test scenarios are:

- Perform validation of ICC/MOC interactions during DTCP reception and processing of live telemetry.
- Perform validation of HCSS ingestion of other ICC input

**Met by:**

#### 2.1.3 UCF-007: Analyse Herschel observation data

**Description:**

Run IA remotely at HSC: The HCSS provides the capability to remotely login to the HCSS to reduce data interactively using IA. It may be that the ICCs only make available to the general astronomer a set of IA modules, excluding the ones used for calibration.

**Met by:**

#### 2.1.4 UCF-008: AOT release

**Description:**

Trigger: the ICCs release an AOT.

**Met by:**

UC-AIV102.

### **2.1.5 UCF-009: AOT blocked**

**Description:**

Trigger: the ICCs notify the HSC that an AOT has a problem.

**Met by:**

### **2.1.6 UCF-031: Generate new system release**

**Description:**

The ICCs will wish to generate system releases according to their own schedule.  
The specific ICC requirements on generating a new system release.

**Met by:**

### **2.1.7 UCF-121: Provide user support**

**Description:**

Actor

Interests as a stakeholder: The HCSS allows the ICC to efficiently support the helpdesk actor; obtaining feedback about the performance of the ICC-instruments and the quality of the generated data products

Main success scenario: Provide helpdesk support

What is the exact level of support provided by the ICCs?

**Met by:**

UC-HSC002

### **2.1.8 UCF-123: Investigate a helpdesk query**

**Description:**

Extensions: Forward query to ICC for investigation

**Met by:**

UC-HSC002

### **2.1.9 UCF-126: Maintain helpdesk system**

**Description:**

Interests as a stakeholder: Want to communicate instrument anomalies and status to the observers

**Met by:**

UC-CON102

**2.1.10 UCF-127: Distribute information to HSC mailing list****Description:**

Trigger: ICC announcement about their instrument

Interests as a stakeholder: Want to communicate instrument anomalies and status to the observers

**Met by:**

UC-CON102

**2.1.11 UCF-151: Perform end-to-end test scenario****Description:**

Extensions:

- Perform validation of ICC/MOC interactions during DTCP reception and processing of live telemetry
- Perform validation of HCSS ingestion of other ICC input

The following “Perform validation of uplink components” test scenarios are currently envisaged:

- Engineering and calibration observation generation (ICC as primary actor)

The following “Perform validation of live telemetry reception and processing” test scenarios are currently envisaged:

- Processing of live telemetry (ICC as primary actor)
- Routing of live telemetry to [ICC@ICC](#) ([ICC@MOC](#) as primary actor)
- Live TM ingestion into isolated FINDAS (ICC as primary actor?)

The following “Perform validation of ICC/MOC interactions during DTCP reception and processing of live telemetry” test scenarios are currently envisaged:

- Validation of instrument hard and soft levels implemented in MOC
- Validation of contingency rescue command sequences
- Validation of [ICC@MOC](#) with MOC communication protocols
- Validation of updating operational database at ICCs

The following “Perform validation of dump telemetry reception and processing” test scenarios are currently envisaged:

- Processing of ICC requests for dump telemetry (ICC as primary actor)
- ICC-provided calibration data feedback ingestion into the FDB (ICC as primary actor)

The following “Perform validation of HCSS ingestion of other ICC input” test scenarios are currently envisaged:

- Ingestion of ICC-provided software into the HSC System (ICC as primary actor)
- Ingestion of ICC-provided data quality info into the FDB (ICC as primary actor)

The following “Perform validation of Quality Control Pipeline” test scenarios are currently envisaged:

- Validation of functional correctness of IA modules (ICC as primary actor)

The following “Validation of network throughput” test scenarios are currently envisaged:

- MOC to [ICC@MOC](#)
- [ICC@MOC](#) to [ICC@ICC](#) (TBC)

- HSC to SPIRE

The “Validation of on-line (live) function performance” throughput test scenarios will address throughput at the MOC, the [ICC@MOC](#) and at the [ICC@ICC](#).

**Met by:**

### **2.1.12 UCF-182: Create draft schedule for a planning period**

**Description:**

The ICCs may use the Mission Planning system to prepare draft schedules. The MP may need to combine contributions from more than one source. Should there be an automatic mechanism or is it sufficient for the ICCs to submit the schedule summary from which the MP can enter the information?

**Met by:**

### **2.1.13 UCF-373: Supply SCR implementation**

**Description:**

Notification of users: in this context, notification is expected to be limited to personnel of FCS or ICC interested in using the updated/created software artefacts for test or development purpose.

**Met by:**

UC-CON102

### **2.1.14 UCF-381: Deploy a new version of the HCSS**

**Description:**

Extensions: HCSSOT exports ICC data to MOC

If the new version implies changes in the telecommanding of the instruments or the spacecraft, i.e. updates in the instrument database, instrument on-board SW, instrument procedures and commanding sequences, instrument apertures pointing misalignment, these ICC data will need to be exported to MOC prior to the actual deployment of the new HCSS version. Also, prior to the deployment, MOC will need to send back the operational version of the updated ICC. Indeed it is MOC who is keeping the reference for these ICC data.

Deployment is multi-sites, as the HCSS will be installed at both HSCC and ICC sites.

The deployment of a new release may involve the export of ICC data to MOC.

**Met by:**

UC-CUS102, UC-CUS103, UC-AIV101, UC-OBS101, UC-OBS102

### **2.1.15 UCF-481: Search Herschel archive**

**Description:**

This use-case is for external HCSS actors. The internal HCSS actors (within the HSC and ICCs) will use the systems associated with them to search the archive. For example, other (ICC) systems will use supplied APIs to interface with their own systems (see UCF-757: Define test procedure template?).

**Met by:**

UC-ICC107, UC-ICC108

### **2.1.16 UCF-489: Retrieve archive artefact**

**Description:**

This use case also addresses retrieval of bulk data. For example, the ICCs may need to retrieve huge amounts of data at once (all calibration observations, all observations of a certain type,...)

**Met by:**

UC-ICC107

### **2.1.17 UCF-511: Consolidated telemetry import**

**Description:**

Main success scenario: HCSS makes ingested consolidated telemetry available to relevant HSC and ICC users.

In PV phase, the ICCs may need to retrieve consolidated TM with a minimum delay.

**Met by:**

### **2.1.18 UCF-512: Automatic MOC data import**

**Description:**

Main success scenario: HCSS makes ingested MOC data available to relevant HSC and ICC users.

**Met by:**

### **2.1.19 UCF-515: One-off import of MOC data**

**Description:**

Main success scenario: HCSS makes MOC data available to the relevant HSC and ICC users.

**Met by:**

### **2.1.20 UCF-516: Interface ICC with MOC**

**Description:**

Trigger: A one-off SW & data delivery (e.g. instrument on board SW update) from ICC to MOC  
The frequency of occurrence is low except during PV phase where it can be expected daily delivery from ICC to MOC for, e.g. instrument database updates or SW on-board instrument updates.

The ICC data are exported to MOC as files.

This use case covers the following ICC data:

- instrument on-board SW updates
- instrument database update
- instrument procedures and command sequences updates
- instrument apertures pointing misalignment updates

**Met by:**

UC-CUS102, UC-CUS103, UC-AIV101, UC-OBS101, UC-OBS102

### **2.1.21 UCF-601: Perform RTA**

**Description:**

Interests as a stakeholder: Wants to use RTA as one of many means to analyse instrument behaviour

If RTA is to be used for analysis of near real-time (unconsolidated) telemetry outside of the context of MOC, the link between MOC and ICC is not provided by HCSS

Is there a need for an “automatic” running of RTA (e.g. in a quality control process at the ICCs?)

**Met by:**

### **2.1.22 UCF-605: Handle helpdesk request for support**

**Description:**

Trigger: Helpdesk has a user query which requires ICC support

Main success scenario:

1. HD: Request ICC help regarding a helpdesk query
2. HCSS: Forward query to identified ICC contact (ICCM)
3. ICCM: Identify responsible person within ICC to investigate query
4. ICC: Investigate problem and compose answer
5. ICC: Send reply to HD

Extensions:

4a ICC: Investigation requires long term analysis notify HD

5a ICC: Investigations suggest changes to the system raise SCR [UCF-421]



**Met by:**

UC-CON002

**2.1.23 UCF-700: Perform ILT test campaign****Description:**

Main success scenario:

- Perform test campaign readiness review (procedural)
- Perform formal post test campaign review (procedural)

**Met by:****2.1.24 UCF-704: Revalidate building blocks/observing modes in ILT****Description:**

Extensions: Create new MIB (ICC functionality)

An example leading to this: if a command definition is no longer present in a new MIB but has instead been replaced by an equivalent command definition of a different name then the validation will fail. However, this was intended, as the building blocks and observing modes were known to need updating. If the MIB is found to be erroneous then ICC functionality must be used to correct it.

**Met by:**

UC-CUS103

**2.1.25 UCF-724: Modify and test a data frame generator****Description:**

Interests as a stakeholder: the ICC manager wants the data frame generator problem to be fixed.

**Met by:****2.1.26 UCF-747: Perform QLA****Description:**

Interests as a stakeholder: the ICC wants to use QLA as one of many means to analyse instrument behaviour

**Met by:**

UC-QLA101

### **2.1.27 UCF-748: Run QLA in near-real time mode**

**Description:**

Interests as a stakeholder: the ICC wants to use QLA as one of many means to analyse instrument behaviour

**Met by:**

UC-QLA101

### **2.1.28 UCF-756: Ingest MIB into HCSS**

**Description:**

The ICCs will update the telecommand mnemonic (command) definitions and/or the telemetry packet definitions in the MIB using ICC functionality.

Interests as a stakeholder: the required MIB is available within the HCSS in a timely manner.

It is probably required that during analysis of data, the 'user' has the option of applying a different MIB to the data. The actual implementation of such an option is the responsibility of the ICC-supplied IA modules.

**Met by:**

UC-CUS103

### **2.1.29 UCC-758: Ingest near real-time telemetry during ILT**

**Description:**

SPIRE test equipment interface (TEI) generated telemetry will be labelled with observation and building block identifiers.

**Met by:**

### **2.1.30 UCF-760: Ingest unconsolidated telemetry during routine phase**

**Description:**

Trigger: [ICC@MOC](mailto:ICC@MOC) is operated

**Met by:**

### **3. CONSTRAINTS IMPOSED BY SPIRE ICC**

Use-case references beginning with UC refer to [AD2].

#### **3.1 HCSS**

Use-case references beginning with UCF refer to [AD1].

##### **3.1.1 Mission planning**

**Description:**

The ICCs will plan observations during Cal/PV phase and will continue to plan calibration observations at regular intervals throughout the mission. Should they use the mission planning system directly or simply provide inputs to the MP? Another possibility is that the ICCs provide inputs to the MP, who generates a schedule, which is then approved by the ICCs.

**Met by:**

##### **3.1.2 UC-AIV002: Access data storage**

**Description:**

Software to ingest and replay telemetry is part of the HCSS.

**Met by:**

UCF-511, UCF-758, UCF-760

##### **3.1.3 UC-CON002: Evaluate ICC-external algorithm**

**Description:**

Integration of an evaluated ICC-external algorithm into IA is not part of this use-case. It is described in the HSC SCR use-cases (UCF-361, UCF-371 and UCF-421).

There is a flaw in the HCSS use-cases regarding SCR: they assume the software (the coded algorithm) already exists. If we include the coding of the software in the SCR normal processing then re-writing the algorithm according to software standards disappears. The “Analyse SCR” use-case in the HCSS should include coding. It is unclear what exactly is covered by the handling of SCR in the HCSS and what is the scope of an SCR.

**Met by:**

##### **3.1.4 UC-CUS003: Update the MIB**

**Description:**

There will actually be several copies of the MIB for each phase of the mission. The configuration control will be handled by the HCSS but the actual scheme to do this is TBD.

Use-case UCF-756 deals with the ingestion of the MIB into the HCSS.

**Met by:**

UCF-756

**3.1.5 UC-FTS001: Process FTS data****Description:**

How the data is retrieved from the database is open at the moment – this use case starts when the data have been retrieved.

Employs UCF-489: Retrieve archive artefact

**Met by:****3.1.6 UC-ICC002: Handle problem report****Description:**

The ICC will use the HCSS problem report system so this use case only contain sections which are relevant/specific to the ICC.

There clearly is a potential for conflict in the extent of responsibilities between the ICC and the HSC over the systems being developed by the ICC.

It is currently foreseen that there will be one problem report system for all three ICCs and the HSC, inside which there will be a SPIRE ICC area.

**Met by:**

UCF-123, UCF-124

**3.1.7 UC-ICC003: Plan and deliver a new user release****Description:**

Note that the HCSS does not have a use-case to describe what they do upon reception of a release.

UCF-005 “Analyze and plan a release” is the closest use-case to that we can find.

The planning of a release may have to be negotiated with HSC.

**Met by:****3.1.8 UC-PHT001: Reduce photometer data****Description:**

How the data is retrieved from the database is open at the moment – this use case starts when the data have been retrieved.

Employs UCF-489: Retrieve archive artefact

**Met by:**

### **3.1.9 UC-AOP101: Plan an observation**

**Description:**

This is in fact an HCSS use case: UCF-484 Perform proposal planning.

**Met by:**

UCF-484

### **3.1.10 UC-AOP102: Estimate observation time**

**Description:**

This is in fact an HCSS use case, but it does not exist yet.

**Met by:**

### **3.1.11 UC-CAL103: Scientifically validate a calibration/IA artefact update**

**Description:**

Scientific validation of a calibration update is a purely HSC concept. When a calibration update is made, it is the HSC that will require us to scientifically validate the new system. To be even clearer, this use case covers those aspects of the scientific validation imposed on the ICC by the HSC for making IA systems available.

Scientific validation has not yet been considered by the HSC, but it is more than likely that the HSC will impose it on the ICC.

**Met by:**

UCF-395

### **3.1.12 UC-DAS103: Conversion of output data into popular data formats**

**Description:**

There exists an HCSS use case/technical note on the scope of popular data formats being considered for support within IA. This use case will probably be redundant if the IA is to be developed commonly by the three instruments.

**Met by:**

### 3.1.13 UC-ICC107: Retrieve artefact from the database

**Description:**

This is in fact an HCSS use case: UCF-489 Retrieve archive artefact.

**Met by:**

UCF-489