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C H A N G E L O G

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SRR RID SR-CCB-43		3.5-70 (new) 3.7-200 (new)
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SRR RID SR-CCB-47		3.7-130 (TBC added)
SRR RID SR-CCB-50		3.7-125 (new)
Resolutions of TBCs, TBDs and TBWs in the IRD following HCSS SRR recommendation R07-1. The details of discussion leading to the resolution of TBCs, TBDs and TBWs are recorded in the HGSSE#12 and HGSSE#13 MoM.		3.1-75 (new) 3.1-110 (TBC removed) 3.1-130 (TBC removed) 3.1-145 (modified + TBD removed) 3.1-160 (TBC removed) 3.1-190 (TBC removed) 3.1-220 (modified + TBC removed) 3.1-240/250 (deleted) 3.1-260 (modified) 3.1-265 (new) 3.1-295 (added) 3.1-320 (modified + TBC removed) 3.1-360 (TBC removed) 3.1-390 (modified +TBC removed) 3.1-410 (TBC removed) 3.1-435/436 (new) 3.1-455 (new)

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HGSSE#14		3.3-35 (new)
HGSSE#15		4.9.1 deleted

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1 INTRODUCTION

1.1 Objective

The objective of this document is to define the interface requirements between the different elements of the Herschel Ground Segment (GS).

The Herschel GS mandate is defined in the Herschel SMP [AD-1] and elaborated in the Herschel GS scenario [AD-2].

The interface requirements in this document are applicable to the design, development and operation of the different systems or centres supporting the Herschel GS. It is complementary to the user requirements documents on these systems, see [RD-5] [RD-15], [RD-16] & [RD-17].

1.2 Scope

This document defines the functional, control flow and performance requirements applicable to the interfaces between the different elements of the Herschel GS.

The Herschel GS elements are the HGS operational centres and the HGS systems.

The different centres of the Herschel GS considered in this document are the following, see [AD-2] section 4:
- The Herschel Mission Operations Centre (MOC)
- The Herschel Science Centre (HSC)
- The Herschel Instruments Control Centres (ICCs):
  - The SPIRE Instrument Control Centre
  - The PACS Instrument Control Centre
  - The HIFI Instrument Control Centre.

In the rest of the document, no distinction is made between the different ICCs. It is assumed that the interface requirements will not differ from one ICC to another.
In line with [AD-2]section 4.3.2, this document makes the distinction between the ICCs set-up at their home institute, referred to as ICC@ICC, and the ICCs set-up at MOC, referred to as ICC@MOC. ICC refers to both ICC@ICC and ICC@MOC.

Information flows requirements related to IPAC shall be included at a later stage (TBC).

The different systems of the Herschel GS considered in this document are the following, see [AD-3]
- The Herschel Common Science System (HCSS) which with the RTA and the OBSM systems supports the HSC and ICC operations as well as the instrument teams in ILT and IST
- The RTA system which supports the RT analysis of the instrument HK data
- The OBSM system which supports the instrument on board SW maintenance

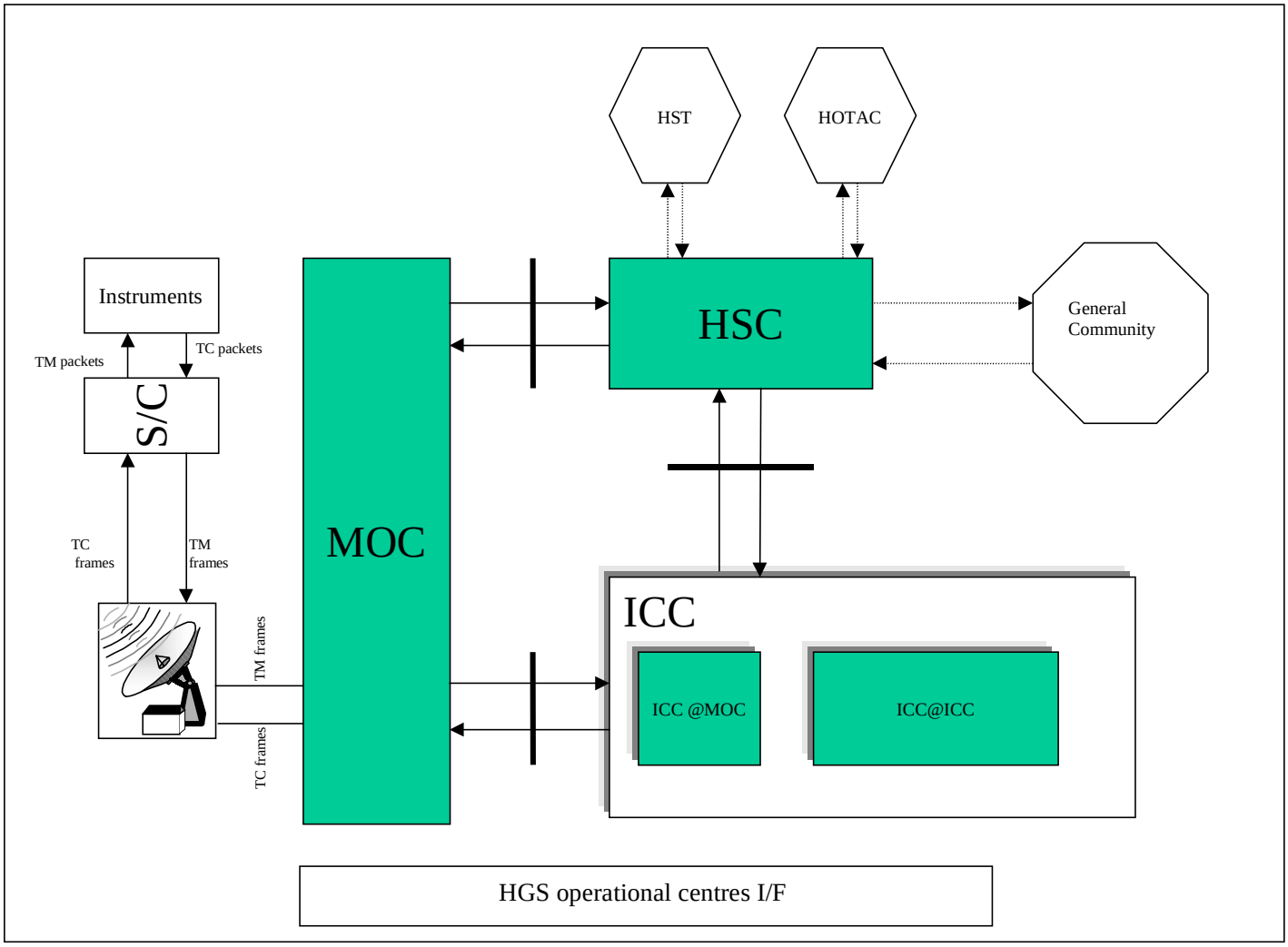
- The EGSE-ILT which supports the test executions in ILT
- The CCS which supports the test executions in IST
- The MCS which supports the MOC operations

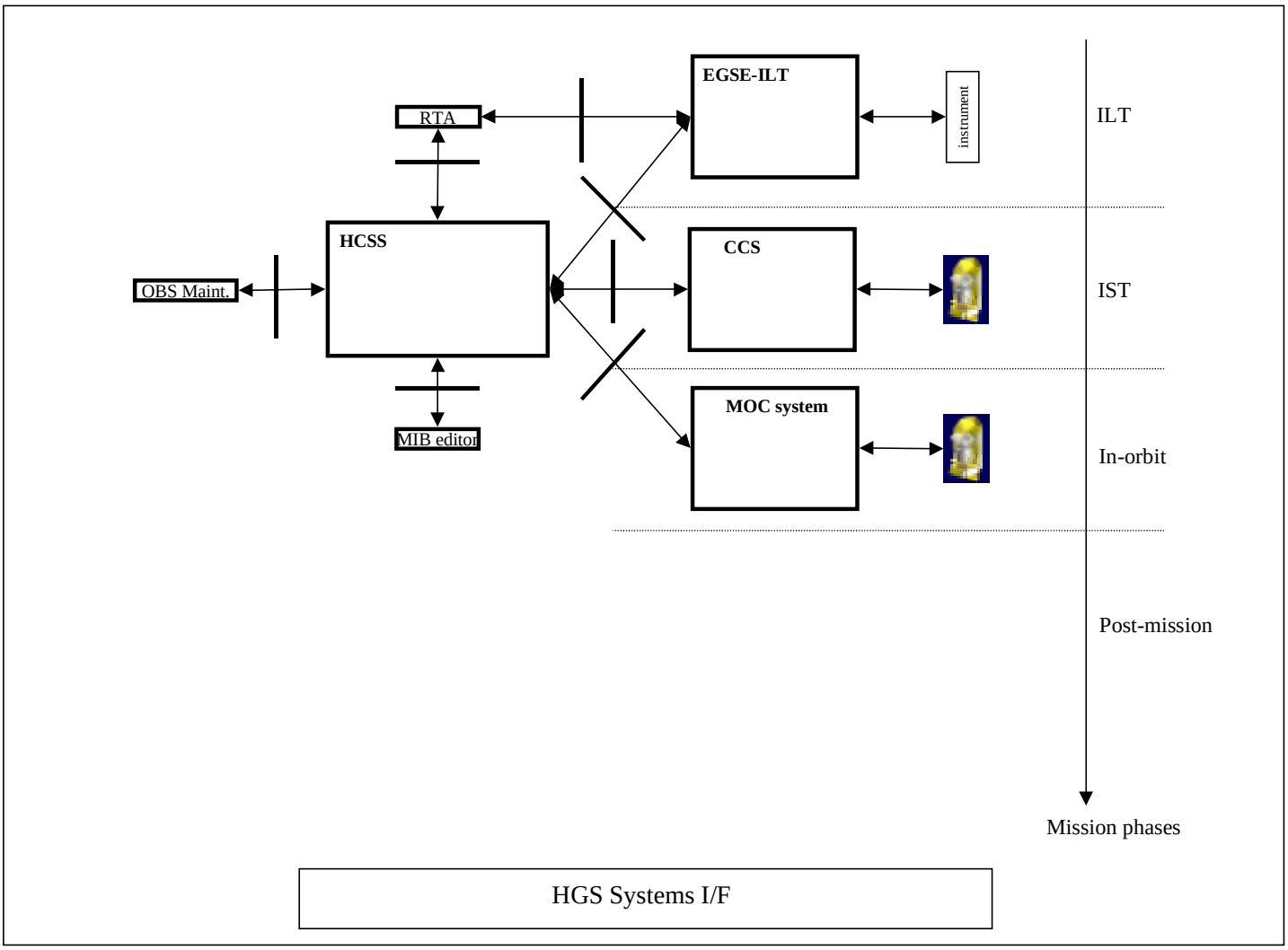
Note: Although the CCS is addressed, see sections 4.8 & 4.9, this document does not put any formal requirements on the CCS. This document is indeed not applicable to the Herschel/Planck industrial contractor in charge of supplying the CCS.

The different test and operational phases covered in this document are the following:
- Instrument Level Test (ILT)
- Integrated System Test (IST)
- Ground system tests (SVT/EE)
- In-orbit phase including:
  - Launch and early operations phase (LEOP)
  - Commissioning phase (CP)
  - Performance Verification phase (PV)
  - Routine phase (Routine)
- Post-operational phase (Post-Ops) including:
  - Run-down phase
  - Mission consolidation phase
  - Active archive phase
  - Archive consolidation phase

The Ground System Tests are not further addressed in this document, it is not expected to yield any new requirements with respect to the in-orbit phase.
During LEOP, the Herschel science ground segment will be in “listening” mode only.
The document does not cover any requirements related to the reliability (error rate), availability, maintenance and security of the interfaces between the different elements of the Herschel GS. These requirements can be added at a later stage if needed.

The two following figures illustrate the interfaces covered by this IRD. These interfaces are marked with ▌


HST
HOTAC
Instruments
TM packets
TC packets
S/C
HSC
General
Community
MOC
TC
frames
TM
frames
TM frames
TC frames
ICC
ICC @MOC
ICC@ICC
HGS operational centres I/F



In in-orbit phase, the HCSS will support the HSC and ICCs operation.

1.3 Structure of the document

The core of this document is sections 3 & 4. The section 3 defines the interface requirements between the Herschel GS centres and systems for the in-orbit and post operation phases and the section 4 defines the interface requirements between the Herschel GS systems during ILT and IST.
In in-orbit phase, as mentioned above, the MCS will support the MOC operation and the HCSS will support the HSC and ICCs operation. The interfaces between the HCSS and the MCS are then the same as the ones between the MOC and the HSC or ICCs and are therefore not specifically addressed.

The section 3 & 4 are structured at the highest level along the main interfaces between centres or systems. Each main interface section is then divided up into as many subsections (information subsection) as there are types of information exchanged as part of this interface. Each information subsection is further divided up into the following sub-subsections, grouping the requirements related to:

- the definition of the information exchanged
- the control over the exchange of information (when applicable)
- the performance associated with the exchange (when applicable)

When relevant, the reference document being the source of a requirement is indicated. In addition, non-obvious requirements are commented. Both source information and comments are written in *italic*.

The section 2 of this document gives an overview of the information flow between the different Herschel GS centres and systems based on the Herschel operation scenario document [AD-2] and the Herschel GS Design Description document [AD-3]

1.4 Definitions, acronyms & abbreviations

1.4.1.1 Acronyms and abbreviations

The list of acronyms for the Herschel GS can be found in [RD-8]

1.4.1.2 Definitions

The definition of terms for the Herschel GS can be found in [RD-8]

1.5 References

1.5.1 APPLICABLE DOCUMENTS

[AD-1] Herschel Science management plan (SMP), ESA/SPC(97)22
[AD-2] Herschel Operation Scenario Document, FIRST/FSC/DOC/0114
[AD-3] Herschel Ground Segment Design Document, FIRST/FSC/DOC/0146

1.5.2 REFERENCE DOCUMENTS

[RD-1] *deleted*
[RD-2] Herschel Science Implementation Requirements Document (SIRD), SCI-PT-03646
[RD-3] Mission Implementation Requirements Document (MIRD), SC-PT-8818
[RD-4] Herschel Operations Interface Requirements Document (OIRD), SCI-PT-RS-07360
[RD-5] HCSS URD, FIRST/FSC/DOC/0115
[RD-6] deleted
[RD-7] Herschel-PLANCK Packet Structure ICD, PP-IS-F-07527
[RD-8] Glossary document, FIRST/FSC/DOC/0120
[RD-9] HCSS SPMP, FIRST/FSC/DOC/0116, issue 2
[RD-10] *deleted*

[RD-11] Instrument Interface Document-Part A, SCI-PT-IIDA/ , issue 1.0
[RD-12] HIFI Instrument Interface Document-Part B, SCI-PT-IIDB/HIFI-02125, issue 1.0

[RD-13] PACS Instrument Interface Document-Part B, SCI-PT-IIDB/PACS-02126, issue 1.0
[RD-14] SPIRE Instrument Interface Document-Part B, SCI-PT-IIDB/SPIRE-02124, issue 1.0
[RD-15] EGSE-ILT URD, FIRST-SPI-DOC-000127, draft 1
[RD-16] RTA and MIB editor URD, HICC-2000/01, draft 2
[RD-17] OBS Maintenance URD, TBW

1.5.3 MINUTES OF MEETINGS

[HGSSE#1] Herschel Ground Segment System Engineering Group meeting #1, FIRST/FSC/MOM/0097
[HGSSE#2] Herschel Ground Segment System Engineering Group meeting #2, FIRST/FSC/MOM/0101
[HGSSE#3] Herschel Ground Segment System Engineering Group meeting #3, FIRST/FSC/MOM/0104
[HGSSE#4] Herschel Ground Segment System Engineering Group meeting #4, FIRST/FSC/MOM/0107
[HGSSE#5] Herschel Ground Segment System Engineering Group meeting #5, FIRST/FSC/MOM/0129
[HGSSE#6] Herschel Ground Segment System Engineering Group meeting #6, FIRST/FSC/MOM/0132
[HGSSE#7] Herschel Ground Segment System Engineering Group meeting #7, FIRST/FSC/MOM/0142
[HGSSE#8] Herschel Ground Segment System Engineering Group meeting #8, FIRST/FSC/MOM/0150
[HGSSE#9] Herschel Ground Segment System Engineering Group meeting #9, PACS-KL-MM-010
[HGSSE#10] Herschel Ground Segment System Engineering Group meeting #10, FIRST/FSC/MOM/0165
[HGSSE#11] Herschel Ground Segment System Engineering Group meeting #11, FIRST/FSC/MOM/0171
[HGSSE#12] Herschel Ground Segment System Engineering Group meeting #12, FIRST/FSC/MOM/0179
[HGSSE#13] Herschel Ground Segment System Engineering Group meeting #13, FIRST/FSC/MOM/0190
[HGSSE#14] Herschel Ground Segment System Engineering Group meeting #14, FIRST/FSC/MOM/0206
[HGSSE#15] Herschel Ground Segment System Engineering Group meeting #13, Herschel/FSC/MOM/0213

[FGSSW#2] Herschel Ground Segment Workshop#2, Vilspa 13-15 October 1999

2 GENERAL DESCRIPTION

2.1 Assumptions

This document takes into consideration a number of high-level design assumptions in line with [AD-2].

1. During routine phase, the Herschel GS will only provide guaranteed high data rate communication links (e.g. >= 256 kbps) between the MOC and the HSC and between the HSC and the ICC@ICC.
   [Source: [AD-2] section 4]

2. RT commanding to the S/C can only be performed from the MOC
   [Source: [AD-2] section 4]

3. The MOC-HSC I/F is a non-RT interface.
   [Source: [AD-2] section 4]

2.2 Information flow general description

This section gives an overview of the different information flows. The information flows between the different centres of the Herschel GS are driven by the operational mandate of these centres as defined in [AD-2], section 4.3.

2.2.1 INFORMATION FLOW RELATED TO MOC

The MOC is responsible for all aspects of S/C operation as well as the safety of the instruments. This includes the following responsibilities vis-à-vis the HSC and ICCs:

- Generating the commands to be uplinked to the satellite from the commanding requests originating from the HSC and ICCs and reporting to the HSC and ICCs on the satellite commanding. *[Source: [AD-2]section 4.3.3]*.
- Making the satellite TM data available to the HSC and ICCs (including ICC@MOC) *[Source: [AD-2]section 4.3.3 &5.7.8 & 5.7.9]*.
- Making the instrument and S/C databases reference available to the HSC and ICCs *[Source: [AD-2]section 4.3.3]*
- Making available SW and data to support instrument and S/C commanding requests by HSC and ICCs, e.g.:
  - S/C predicted orbit data *[Source: [AD-2]section 5.7.9]*.
  - S/C attitude constraints *[Source: [AD-2]section 5.3.1.1 & 5.3.1.3]*.
  - S/C slew time and path *[Source: [AD-2]section 5.3.1.3]*.
  - Observations scheduling constraints (planning skeleton) *[Source: [AD-2]section 5.3.1.1]*.
- Making available SW and ancillary data to support science and calibration data processing by the HSC and ICCs, e.g.:
  - S/C reconstituted orbit data *[Source: [AD-2]section 5.7.9]*.
  - S/C attitude history *[Source: [AD-2]section 5.7.9]*.
- Making available instrument safety information to support instrument operation by ICCs., e.g.:

- Flagging satellite mal-functions or operational problems to the HSC and ICCs for them to take appropriate actions *[Source: [AD-2]section 4.3.3 & 5.5]*.

The MOC will make available TM data and ancillary data to the rest of the GS; it will not distribute them. *[Source: [AD-2]section 5.7.8]*.

2.2.2 INFORMATION FLOW RELATED TO THE HSC

The HSC is the single-point interface to the outside world for all Herschel observatory matters *[Source:[AD-2]section 4.3.1]*. As such, it acts as a single point of contact in particular for:
- the provision of information on the observatory
- observation proposal handling
- observation scheduling (referred in [AD-2] as scientific mission planning)
- observation products and observation quality control data generation
- provision of observatory related SW to the observatory users.

The HSC also acts, except for the ICC@MOC set-up, as the interface between the ICCs and the MOC. *[Source:[AD-2]section 4. 1]*. However, this does not exclude some direct information flow between the ICC@ICC and MOC.

These overall HSC responsibilities lead to the following responsibilities in terms of interface vis-à-vis the ICCs and MOC:
- Receiving engineering and calibration observations and associated scheduling constraints from ICCs for inclusion in the scientific mission planning *[source [AD-2]5.2.1]*.
- Delivering to MOC the observations schedule commanding requests for each scheduling period resulting from the scientific mission planning process *[Source [AD-2]5.3.3]*.
- Retrieving from MOC TM and ancillary data for permanent storage and for making this data available to the ICC@ICC *[Source [AD-2]5.7.10]*.
- Making engineering and calibration observational data available to the ICCs together with any observational data needed by ICCs for calibration purposes.
- Receiving from the ICCs and transmitting to the MOC (after PS approval) the instrument on-board SW memory updates *[Source [AD-2]5.11.1]*.
- Receiving instrument and S/C information and SW from respectively ICCs and MOC which is of interest to the Herschel observatory users and making such information available to these users *[Source [AD-2]4.3.1]*.

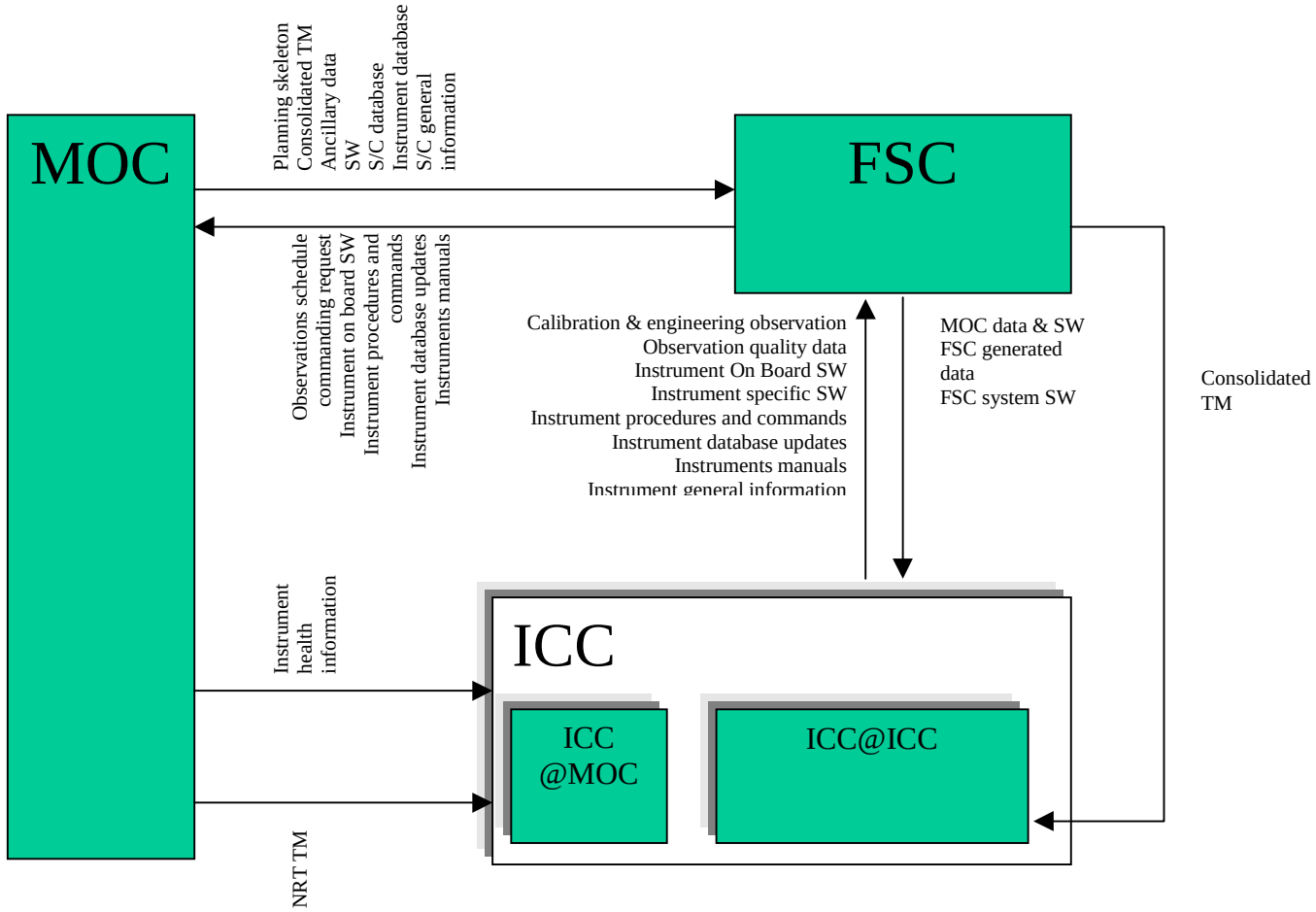
2.2.3 INFORMATION FLOWS RELATED TO ICC

The ICCs are responsible for the successful operation of their instruments and for making possible the processing of TM into resulting data. This leads to the following responsibilities vis-à-vis the HSC and the MOC:
- Delivering instrument user manuals to HSC and MOC *[Source [AD-2]4.3.2]*
- Delivering instrument IA SW and documentation to HSC to be made available to astronomers
- Delivering instruments procedures and commands to MOC for commanding and monitoring of their instruments *[Source [AD-2]4.3.2]*

- Delivering the instruments on-board SW update to MOC (via HSC) for uplink *[Source [AD-2]4.3.2 & 5.11.1]*
- Delivering the instrument modes scientific validation status information to the HSC, *see [HGSSE#4]*.
- Delivering instruments engineering observations to the HSC *[Source [AD-2]5.2]*
- Delivering instruments calibration observations to the HSC *[Source [AD-2]5.2]*
- Delivering to the HSC available science observation quality data. *[Source [AD-2]4.3.2]*. Not all the ICCs commit to perform systematic quality control of observations.
- Delivering to the MOC (via HSC) instrument data base updates
- Delivering instrument specific SW and data updates to support proposal handling and scientific mission planning at the HSC; this includes:
  - Instrument observation time estimator SW and data (including calibration data) *[Source [AD-2]4.3.2]*
  - Commanding requests generation SW *[Source [AD-2]4.3.2]*
- Delivering instrument specific SW and data (including calibration data) updates to support data processing and evaluation at the HSC *[Source [AD-2]4.3.2]*
- Delivering instrument simulator SW *[Source [AD-2]4.3.2]*

2.2.4 INFORMATION FLOW BETWEEN CENTERS SUMMARY

The following diagram summarises the discussion on the information flow between the different Herschel GS centres:



2.2.5 INFORMATION FLOW IN ILT AND IST

This section introduces the information flow between the FGS systems in ILT and IST. In ILT and IST, respectively the EGSE-ILT and the CCS will simulate to a large extent the functions carried out by the MCS in routine phase and consequently the interfaces between the EGSE-ILT and the CCS can be seen to a large extent as a subset of the interfaces between the MOC and the HSC or ICCs during operation, see also the concept of smooth transition in [AD-3].

In essence, in ILT and IST, the HCSS will generate command sequences which will be passed over to the EGSE-ILT or CCS for execution on board the instrument or by the test environment. The HCSS will then retrieve the resulting TM for analysis and storage. As in in-orbit phase, the command sequences will originate from observations.

3 INTERFACE REQUIREMENTS FOR IN-ORBIT AND POST-MISSION PHASES

3.1 *MOC to HSC interfaces*

3.1.1 CONSOLIDATED TM

3.1.1.1 Information flow requirements

FGS-IR-3.1-10 The MOC shall make available all S/C and instrument TM data to the HSC.

[Source: [AD-2]5.7.10]
Important: In operations, TM packets lost during space-ground transmission will not be recovered.

FGS-IR-3.1-20 The MOC shall make available TM data to the HSC as consolidated TM data.

[Source: [AD-2]5.7.10]

FGS-IR-3.1-30 The MOC shall make available TM data (S/C and instruments) to the HSC in a format from which the source TM packets generated on board can be extracted.

[Source: [AD-2]5.8]
The MOC is not processing the scientific TM packets, see [RD-4]. Therefore the science TM data and by extension all instrument HK TM data will be delivered as produced on board in the format of ESA standard packets. However, the MOC may add additional header and trailer information to the source packets.

FGS-IR-3.1-40 *deleted*

FGS-IR-3.1-50 *deleted*

FGS-IR-3.1-60 *deleted*

FGS-IR-3.1-70 *deleted*

Note that this section does not cover the requirements the HSC may have with respect to the content of a TM packet, as this is not relevant to the HSC interface with MOC. These requirements are expected to be covered in the OIRD, see [RD-4]. This shall be the case, in particular, for the following requirements:

1. *It shall be possible for the HSC to detect missing consolidated TM data.*
   The intention is that the source sequence counter of a TM packet header can be used to detect missing data. This implies that the different types of instrument TM data can be distinguished by APID (at least science and HK) to avoid having to search different streams of TM for all the sequence counter values.

2. *It shall be possible for the HSC to associate TM data with observations and observations measurements. The intention here is that instrument TM packets will be tagged with an observation and measurement id. S/C TM will be related to observations by time.*

3.1.1.2 Control flow requirements

FGS-IR-3.1-75 The HSC shall request the MOC to make available consolidated TM data for a given operational period.

FGS-IR-3.1-80 The MOC shall make available to the HSC the consolidated TM data separately according to the following categories:

- Event TM data per APID
- TC verification data per APID
- HK TM data per APID
- science TM data per APID
- S/C TM data

[Source: [AD-2]5.7.10]
This should allow the early retrieval of consolidated event, verification and HK TM data that represents a small proportion of the overall TM data, see [AD-2]5.7.8.

FGS-IR-3.1-90 The MOC shall indicate the availability of consolidated TM data on a time period basis.

FGS-IR-3.1-100 The HSC shall pull consolidated TM data from the MOC.

[Source: [AD-2]5.7.8]

3.1.1.3 Performance requirements

FGS-IR-3.1-110 The MOC shall make available to the HSC any sequence of any category of consolidated TM data from dump TM not later than 10 minutes after the last “bit” of this sequence has been received by the MOC.

To be related to performance requirement FGS-IR-3.5-20
This requirement is not applicable to consolidation of live TM. Live TM received by MOC is only consolidated after all TM generated on board prior to the DTCP has been consolidated, see HGSSE#4. This may take several hours; e.g. it is expected that MOC will need 16 hours to retrieve the dump TM corresponding to an OD.
This requirement covers only the consolidation process by MOC, not the transfer of TM from the MOC to the HSC.

3.1.2 S/C PREDICTED ORBIT DATA

3.1.2.1 Information flow requirements

FGS-IR-3.1-120 The MOC shall make available the S/C orbit predicted data to the HSC.

[Source: [AD-2] 5.7.9]
The HSC will use this data in scientific mission planning to assess the relative velocity of the S/C vis-à-vis a celestial source. Indeed, the relative velocity may impact the selection of the frequency band of an instrument needed in the observation of this celestial source. The data is expected to be provided in the same format as for reconstituted orbit data, see 3.1.9

3.1.2.2 Control flow requirements

FGS-IR-3.1-130 The MOC shall notify the HSC of the availability of S/C predicted orbit data updates for a given operational period.

It is agreed [HGSSE#12] that MOC would notify the HSC of the availability of non-regular data.

FGS-IR-3.1-140 The HSC shall pull S/C predicted orbit data updates from the MOC.

3.1.2.3 Performance requirements

FGS-IR-3-1-145 The velocity of the S/C shall be predicted to an accuracy of not worse that 1 m/s

Source: [HGSSE#13]

3.1.3 S/C ATTITUDE CONSTRAINT ALGORITHM & DATA

3.1.3.1 Information flow requirements

FGS-IR-3.1-150 The MOC shall make available to the HSC the S/C attitude constraints algorithm (with test data) and data updates.

[Source: [AD-2] 5.3.1.1 & 5.3.1.3]
The HSC will use the algorithm & data to check that a scheduled observation does not violate the S/C attitude constraints. The S/C attitude constraints can be due to astronomical constraints (e.g. solar aspect angle) or to S/C engineering constraints (e.g. pointing of high gain antenna to earth during space-ground communication).
From past experience (e.g. XMM), delivery of algorithm and test data are preferable to delivery of SW.

3.1.3.2 *Control flow requirements*

FGS-IR-3.1-160 The MOC shall notify the HSC of the availability of S/C attitude constraint algorithm & data updates for a given operational period.

It is agreed [HGSSE#12] that MOC would notify the HSC of the availability of non-regular data.

FGS-IR-3.1-170 The HSC shall pull S/C attitude algorithm & data updates from the MOC.

3.1.3.3 Performance requirements

N/A

3.1.4 S/C SLEW TIME AND PATH PREDICTOR ALGORITHM & DATA

3.1.4.1 Information flow requirements

FGS-IR-3.1-180 The MOC shall make available to the HSC the S/C slew time and path predictor algorithm and data updates.

[Source: [AD-2] 5.3.1.4]
The HSC will use the algorithm & data in scientific mission planning to predict slew durations and to check that the slew path is compatible with the S/C attitude constraints.

3.1.4.2 *Control flow requirements*

FGS-IR-3.1-190 The MOC shall notify the HSC of the availability of S/C slew time and path predictor algorithm & data updates.

It is agreed [HGSSE#12] that MOC would notify the HSC of the availability of non-regular data only

FGS-IR-3.1-200 The HSC shall pull S/C slew time and path predictor algorithm & data updates from the MOC.

3.1.4.3 Performance requirements

N/A

3.1.5 PLANNING SKELETON DATA

3.1.5.1 Information flow requirements

FGS-IR-3.1-210 The MOC shall make available to the HSC the planning skeleton information for any given scheduling period.

[Source: [AD-2]5.3.1.1]
The HSC will use this information for scientific mission planning to identify the time windows where observations can be scheduled as well as the DTCP periods.

3.1.5.2 Control flow requirements

FGS-IR-3.1-220 The HSC shall poll the MOC to know of the availability of a new planning skeleton for a given scheduling period.

FGS-IR-3.1-230 The HSC shall pull planning skeleton information from the MOC.

3.1.5.3 Performance requirements

FGS-IR-3.1-240 *deleted*

FGS-IR-3.1-250 *deleted*

The timing for the availability of the planning skeletons from MOC shall be part of the detailed operational plan covering the end-to-end scheduling activities.

3.1.6 SCHEDULE STATUS INFORMATION

3.1.6.1 Information flow requirements

FGS-IR-3.1-260 The MOC shall let the HSC know of its acceptance/rejection of a schedule

3.1.6.2 Control flow requirements

FGS-IR-3.1-265 The HSC shall poll the MOC to know of the acceptance/rejection of a schedule

Note however that in case of rejection, section 3.1.19 applies.

3.1.6.3 Performance requirements

N/A
Note however that in case of rejection, section 3.1.19 applies.

3.1.7 MISSION TIMELINE SUMMARY

3.1.7.1 Information flow requirements

FGS-IR-3.1-270 The MOC shall make available to the HSC the mission timeline summary corresponding to any given operational period.

See [HGSSE#1]. The mission timeline summary will include the list of all TCs uplinked to the satellite for autonomous execution during this operational period. The HSC will use this information to verify the translation by MOC of an observations schedule into the corresponding timeline. ICCs may use this information to follow on-board operation during the commissioning and in general to help in diagnosing instrument mal-functions.

3.1.7.2 Control flow requirements

FGS-IR-3.1-280 The HSC shall poll the MOC to know of the availability of a new mission timeline summary.

FGS-IR-3.1-290 The HSC shall pull the new mission timeline summary from MOC.

3.1.7.3 Performance requirements

FGS-IR-3.1-295 The MOC shall make available the mission timeline summary before the uplink of the corresponding mission timeline to the S/C.

This requirement is justified for commissioning phase and when diagnosing instrument mal-functions, see comments in 3.1.7.1.

3.1.8 TC HISTORY

3.1.8.1 Information flow requirements

FGS-IR-3.1-300 The MOC shall make available to the HSC the TC history information for any given operational period.

See [HGSSE#1]. The TC history information will include the uplink and execution status of all the TCs uplinked for execution during the operational period. The TC history is made available to the ICCs in addition to the TC verification reports that are part of the instrument HK TM.
The HSC will use this information to flag observations that were not commanded as scheduled. It will make it available to the ICCs. An ICC will use the TC history for instrument command verification purpose.

FGS-IR-3.1-310 The TC history data shall include the necessary information for the HSC to be able to associate (when relevant) the TC to the instrument or S/C commanding requests in the corresponding observations schedule.

[Source [AD-3]3.1.8.4.1]

3.1.8.2 Control flow requirements

FGS-IR-3.1-320 The HSC shall request the MOC to make available TC history data for a given operational period.

FGS-IR-3.1-330 The HSC shall pull TC history data from the MOC.

3.1.8.3 Performance requirements

FGS-IR-3.1-340 The MOC shall make available to the HSC the TC history for a given operational period at the same time as the consolidated HK TM for this period.

See [HGSSE#4]. See 3.1.1.3 for performance requirements on consolidated HK TM.

3.1.9 S/C ORBIT DATA (RECONSTITUTED)

3.1.9.1 Information flow requirements

FGS-IR-3.1-350 The MOC shall make available the S/C reconstituted orbit data to the HSC.

[Source: [AD-2]5.7.9]

The HSC and ICCs may use this information for scientific data processing.

3.1.9.2 Control flow requirements

FGS-IR-3.1-360 The MOC shall notify the HSC of the availability of new S/C reconstituted orbit data for a given operational period.

It is agreed [HGSSE#12] that MOC would notify the HSC of the availability of non-regular data.

FGS-IR-3.1-370 The HSC shall pull S/C reconstituted orbit data from the MOC.

3.1.9.3 Performance requirements

N/A

3.1.10 S/C ATTITUDE HISTORY

3.1.10.1 *Information flow requirements*

FGS-IR-3.1-380 The MOC shall make available the S/C attitude data corresponding to a given operational period.

[Source: [AD-2]5.7.9]
The HSC and the ICCs will use this data for scientific data reduction and for calibration on top of the raw attitude data included in the S/C HK TM. The S/C attitude history will allow to reconstitute the pointing of the S/C at any given time of the operational period (including slew and SSO tracking periods).
The HSC and the ICCs will have to reconstruct instrument pointing from the S/C attitude data and instrument misalignment against the S/C pointing reference (e.g. STR).

3.1.10.2 Control flow requirements

FGS-IR-3.1-390 The HSC shall poll the MOC to know of the availability of new attitude history data for a given operational period .

FGS-IR-3.1-400 The HSC shall pull attitude history data from the MOC.

3.1.10.3 Performance requirements

FGS-IR-3.1-410 The MOC shall make available the attitude history data for an OD not later than 8 hours after the actual reception by the MOC of the related TM packets.

See [FGSSW#2] and [HGSSE#13]

3.1.11 TIME CORRELATION

See [HGSSE#15]

3.1.11.1 Information flow requirements

FGS-IR-3.1-420 The MOC shall make available to the HSC the time correlation data.

The HSC and ICCs will use the time correlation data for the purpose of scientific data processing and for calibration. This data will allow to unambiguously correlate the S/C on board time with the UTC time.

FGS-IR-3.1-430 The time correlation data shall allow to correlate the S/C time and UTC time with a precision of better than 20 ms at any time of the S/C mission.

3.1.11.2 Control flow requirements

FGS-IR-3.1-435 The HSC shall poll the MOC to know of the availability of new time correlation data for a given operational period .

FGS-IR-3.1-436 The HSC shall pull time correlation data from the MOC.

3.1.11.3 Performance requirements

FGS-IR-3.1-440 The MOC shall make available to the HSC the time correlation data for a given operational period at the same time as the S/C consolidated HK TM for this period.

See [HGSSE#4]. See 3.1.1.3 for performance requirements on consolidated HK TM.

3.1.12 DERIVED PARAMETERS

3.1.12.1 Information flow requirements

FGS-IR-3.1-450 The MOC shall make available to the HSC the instruments derived parameters for a given operational period.

The HSC may be using derived parameters values for the purpose of scientific data processing. It will also make it available to the ICCs. An ICC will use the values of the instruments derived parameters for monitoring their instruments.
Derived parameters are only derived from HK TM parameters

3.1.12.2 Control flow requirements

FGS-IR-3.1-455 The HSC shall pull consolidated TM data from the MOC.

The derived parameters data will be delivered with the flow of consolidated TM as separate packets, see [HGSSE#1]

3.1.12.3 Performance requirements

FGS-IR-3.1-460 The MOC shall make available to the HSC the derived parameters data for a given operational period and instrument at the same time as the instrument consolidated HK TM for this period.

See [HGSSE#1]. See 3.1.1.3 for performance requirements on consolidated HK TM.

3.1.13 OUT OF LIMITS INFORMATION

3.1.13.1 Information flow requirements

FGS-IR-3.1-470 The MOC shall make available the instruments parameters OOL information for a given operational period.

The HSC may be using this data for the purpose of observation quality control. It will make it available to the ICCs. An ICC will use OOL information for monitoring their instruments. The MOC will make available the list of instrument parameters out of limits (soft & hard) for a given operational period.
OOL data are only relevant for HK TM parameters including derived parameters.

3.1.13.2 Control flow requirements

FGS-IR-3.1-475 The HSC shall pull OOL data from the MOC.

The OOL *data will be delivered with the flow of consolidated TM as separate packets, see [HGSSE#1]*

3.1.13.3 Performance requirements

FGS-IR-3.1-480 The MOC shall make available to the HSC the instrument parameters OOL for a given operational period at the same time as the instrument consolidated HK TM for this period.

See [HGSSE#4]. See 3.1.1.3 for performance requirements on consolidated HK TM.

3.1.14 INSTRUMENT MEMORY IMAGE

3.1.14.1 Information flow requirements

FGS-IR-3.1-490 The MOC shall make available to the HSC the instrument memory image corresponding to an instrument memory dump requested by an ICC.

The HSC is not using this information. It will make it available to the ICCs. The instrument memory image comes in addition to the memory dump TM data included within the HK TM.

3.1.14.2 Control flow requirements

FGS-IR-3.1-495 The MOC shall notify the HSC of the availability of dumped instrument memory images.

[Source: [HGSSE#12]]

FGS-IR-3.1-496 The HSC shall pull dumped instrument memory images from the MOC.

3.1.14.3 Performance requirements

FGS-IR-3.1-498 The MOC shall make the image of an instrument memory at the latest one hour after the last TM data of the memory dump has been received by MOC.

This requirement is only justified for memory dump request following an instrument alert.[Source: [HGSSE#12]]

3.1.15 S/C AND INSTRUMENTS DATABASES

3.1.15.1 Information flow requirements

FGS-IR-3.1-500 The MOC shall make available to the HSC the S/C and instruments reference databases.

[Source: [AD-2] 4.3.3]
The MOC is responsible for maintaining the S/C and instruments reference databases for the Herschel GS, see [HGSSE#1].
The HSC will make the S/C and instrument reference databases available to the ICCs. Updates to the instruments reference databases originate from the ICCs and are forwarded by the HSC to the MOC.
The HSC and ICCs will use the S/C and instrument databases to decode the TM. It is not clear at this stage whether or not the HSC will use the S/C database.

Instrument database is to include at least the definition of instrument TC, TM (HK and science header only), parameter monitoring and calibration/de-calibration as well as instrument command sequences.

3.1.15.2 Control flow requirements

FGS-IR-3.1-505 The MOC shall notify the HSC of the availability of new instruments reference databases.

FGS-IR-3.1-506 The HSC shall pull new instruments reference databases from the MOC.

3.1.15.3 Performance requirements

N/A
The delivery of instrument databases shall be subject to a detailed operational scenario in line with the scheduling cycle [HGSSE#12]

3.1.16 INSTRUMENT APERTURES POINTING MISALIGNMENT

3.1.16.1 Information flow requirements

FGS-IR-3.1-510 The MOC shall make available to the HSC the instruments (virtual) aperture misalignment reference data w.r.t. the S/C attitude reference.

See [HGSSE#4]. The MOC is responsible for maintaining the instruments apertures pointing misalignment reference data for the Herschel GS. The MOC is not performing the measurement. The measurement values are provided by the ICC via the HSC, see 3.4.6 & 3.7.10.

The HSC will make these reference data available to the ICCs.
Updates to these reference data originate from the ICCs and are forwarded by the HSC to the MOC.
The HSC and ICCs will use this data to reconstitute the instrument (aperture) pointing from the S/C pointing information delivered by MOC.

3.1.16.2 Control flow requirements

FGS-IR-3.1-515 The MOC shall notify the HSC of the availability of new instruments aperture pointing misalignment data.

[Source:[HGSSE#12]]

FGS-IR-3.1-516 The HSC shall pull new instruments aperture pointing misalignment data from the MOC.

3.1.16.3 Performance requirements

N/A
to be subject to a detailed operational scenario [HGSSE#12]

3.1.17 SSO DATABASE

3.1.17.1 Information flow requirements

FGS-IR-3.1-520 The MOC shall make available to the HSC the SSO reference database.

[Source: [AD-2] 4.3.3]
The MOC is responsible for maintaining the SSO reference database for the Herschel GS.
The HSC will make the SSO reference database available to the ICCs.
Updates to the SSO reference database originate from the HSC.
The HSC and ICCs will use the SSO database to compute the celestial co-ordinates of SSOs.

3.1.17.2 Control flow requirements

FGS-IR-3.1-525 The MOC shall notify the HSC of the availability of a new SSO reference database.

[Source:[HGSSE#12]]

FGS-IR-3.1-526 The HSC shall pull a new SSO reference database from the MOC.

3.1.17.3 Performance requirements

N/A
to be subject to a detailed operational scenario [HGSSE#12]

3.1.18 S/C GENERAL INFORMATION

3.1.18.1 Information flow requirements

FGS-IR-3.1-530 The MOC shall make available to the HSC the S/C information of interest to the Herschel observers.

[Source: [AD-2]4.3.1]
E.g. S/C pointing accuracy
The HSC will post this information for Herschel observers to consult.

3.1.18.2 Control flow requirements

FGS-IR-3.1-535 The MOC shall notify the HSC of the availability of new S/C general information.

[Source: [HGSSE#12]]

FGS-IR-3.1-536 The HSC shall pull new S/C general information from the MOC.

3.1.18.3 Performance requirements

N/A

3.1.19 INSTRUMENTS MAL-FUNCTIONS OR OPERATION PROBLEMS INFORMATION

3.1.19.1 Information flow requirements

FGS-IR-3.1-540 The MOC shall make available to the HSC the mal-functions or operation problems information related to the instruments.

[Source: [AD-2]4.3.3 & 5.5]

3.1.19.2 Control flow requirements

FGS-IR-3.1-545 The MOC shall notify the HSC of instruments mal-function or operation problems.

[Source:[HGSSE#12]]

3.1.19.3 Performance requirements

FGS-IR-3.1-548 The MOC shall notify the HSC of any instrument mal-function or operation problem within one hour of the detection of the problem

3.2 MOC to ICC interfaces

3.2.1 INSTRUMENTS MAL-FUNCTIONS OR OPERATION PROBLEMS INFORMATION

3.2.1.1 Information flow requirements

FGS-IR-3.2-10 The MOC shall make available to the ICCs the mal-functions or operation problems information related to their instruments.

[Source: [AD-2]4.3.3 & 5.5]

3.2.1.2 Control flow requirements

FGS-IR-3.2-15 The MOC shall notify the ICCs of any mal-functions or operation problems related to their instruments.

3.2.1.3 Performance requirements

FGS-IR-3.2.18 The MOC shall notify the ICCs of any mal-functions or operation problems related to their instruments within one hour of the detection of the mal-function or problem.

3.2.2 TELEMETRY IN COMMISSIONING AND FOR EMERGENCIES

During commissioning phase and for emergencies, ICC members in ICC@ICC will carry out activities in close cooperation with ICC@MOC. ICC@ICC therefore needs TM data to be available at nearly the same time as ICC@MOC, in fact within 20 minutes after reception by MOC, see [HGSSE#2]. For this purpose, as described in the FGSDD [AD-3]section 3.6.2, ICC@ICC will receive TM directly from ICC@MOC. The ICC@MOC ICC@ICC link is considered internal to ICC and is not subject to any interface requirements in this document. It is expected that the NRT TM flow from MOC to ICC@ICC will be routed via the ICC@MOC and that the flow between ICC@MOC and ICC@ICC will be under ICC responsibility.

3.2.2.1 Information flow requirements

FGS-IR-3.2-20 *deleted*

FGS-IR-3.2-30 *deleted*

3.2.2.2 Control flow requirements

N/A

3.2.2.3 Performance requirements

FGS-IR-3.2-40 *deleted*

3.3 MOC to ICC@MOC interfaces

3.3.1 TELEMETRY IN COMMISSIONING AND FOR EMERGENCIES

3.3.1.1 Information flow requirements

FGS-IR-3.3-10 The MOC shall make available to an ICC@MOC its instrument TM in NRT during the commissioning phase and for instrument emergencies.

[Source: [AD-2]4.3.3]

FGS-IR-3.3-20 The MOC shall make available the TM data to the ICC@MOC in a format from which the source TM packets generated on board can be extracted.

3.3.1.2 Control flow requirements

FGS-IR-3.3-30 The MOC shall push the NRT TM data to the ICC@MOC.

FGS-IR-3.3-35 It shall be possible for the ICC@MOC to fetch TM data from the MOC DDS.

[Source: [HGSSE#14]]. This requirement is to cover the cases where MOC fails for technical reasons to deliver TM data to ICC@MOC in NRT. In these cases , ICC@MOC should have the possibility to retrieve these TM from the DDS.

3.3.1.3 Performance requirements

FGS-IR-3.3-40 During the commissioning phase and for instrument emergencies, the MOC shall make available to an ICC@MOC its instrument TM not later than one minute after the TM packet has been received by MOC.

[Source: [AD-3]3.6].

FGS-IR-3.3-50 The MOC ICC@MOC I/F shall support a data rate equivalent to the maximum instrument on-board data rate (400 kbps).

3.4 HSC to MOC interfaces

3.4.1 OBSERVATIONS SCHEDULE

3.4.1.1 Information flow requirements

FGS-IR-3.4-10 The HSC shall make available to the MOC the observations schedule corresponding to any given scheduling period.

[Source: [AD-2]5.3.3]
The observations schedule exported to the MOC will include the sequence of UTC time tagged S/C commanding requests (e.g. pointing) and instrument commanding requests for this schedule.
Instrument commanding is expected to be in the form of TC mnemonics, see [AD-3]3.1.2.1.
The MOC will use the observations schedule to generate the mission timeline to be uplinked to the satellite for the given scheduling period.

FGS-IR-3.4-20 *deleted*

FGS-IR-3.4-30 An observations schedule made available to the MOC by the HSC shall be compatible with the S/C operational and design constraints.

[Source: [AD-2]5.3.13]
E.g. the observations schedule shall be compatible with:
- *the observation windows as defined in the planning skeleton*
- *the S/C attitude constraints (e.g. the ones linked to DTCP)*
- *the commanding rate between the S/C DHSS and the instruments*

- *the amount of data which can be uplinked by MOC during a DTCP*
- *the amount of instrument TM which can be stored on board between two consecutive DTCPs.*

3.4.1.2 Control flow requirements

FGS-IR-3.4-40 *deleted*

FGS-IR-3.4-50 The HSC shall push observations schedules to the MOC.

3.4.1.3 Performance requirements

FGS-IR-3.4-60 *deleted*

FGS-IR-3.4-70 *deleted*

The timing for the availability of the schedule from HSC shall be part of the detailed operational plan covering the end-to-end scheduling activities.

3.4.2 INSTRUMENT ON BOARD SW AND ON BOARD CONTROL PROCEDURES UPDATES

3.4.2.1 Information flow requirements

FGS-IR-3.4-80 The HSC shall make available to the MOC instrument On Board SW and On Board Control Procedures (OBCP) updates

[Source: [AD-2]5.11.1]
The HSC will receive the On Board SW and OBCP updates from the ICCs for approval before the HSC passes it over to MOC for uplink.
For On Board SW, it is expected that the entire memory image be delivered to MOC for each on board SW update. It will then be up to MOC On Board Software Management to define the part of the image to be uplinked, see [AD-3]3.1.8.7.
For OBCP, the entire procedure will be delivered.

3.4.2.2 Control flow requirements

FGS-IR-3.4-90 *deleted*

FGS-IR-3.4-100 The HSC shall push On board SW and OBCP updates to the MOC.

3.4.2.3 Performance requirements

N/A

3.4.3 SSO DATABASE UPDATES

3.4.3.1 Information flow requirements

FGS-IR-3.4-110 The HSC shall make available to the MOC SSO database updates.

[Source: [AD-2]4.3.3]
The requests for new SSOs (leading to SSO database updates) will come from observers or ICCs via the HSC.
The MOC is responsible for maintaining the SSO reference database reference for the Herschel GS.
Note that the HSC shall provide the first version of the SSO database to the MOC.

3.4.3.2 Control flow requirements

FGS-IR-3.4-115 The HSC shall push SSO databases updates to the MOC.

3.4.3.3 Performance requirements

N/A

3.4.4 INSTRUMENTS DATABASE UPDATES

3.4.4.1 Information flow requirements

FGS-IR-3.4-120 The HSC shall make available to the MOC the ICC instruments database updates.

[Source: [AD-2]4.3.3]
Instruments database updates originate from the ICCs and are forwarded by the HSC to the MOC.
The MOC is responsible for maintaining the instruments reference databases for the Herschel GS.

3.4.4.2 Control flow requirements

FGS-IR-3.4-125 The HSC shall push instrument databases updates to the MOC.

3.4.4.3 Performance requirements

N/A

3.4.5 INSTRUMENTS USER MANUALS

3.4.5.1 Information flow requirements

FGS-IR-3.4-130 The HSC shall make available to the MOC the instrument user manuals (including the instrument procedures) necessary for MOC to operate the instruments

[Source: [AD-2]4.3.2]
Instruments procedures originate from the ICCs and are forwarded by the HSC to the MOC.
MOC will use the instrument procedures in manual commanding of the instruments.

Control flow requirements

FGS-IR-3.4-135 The HSC shall push instrument user manuals to the MOC

3.4.5.2 Performance requirements

N/A

3.4.6 INSTRUMENT APERTURES POINTING MISALIGNEMENT UPDATES

3.4.6.1 Information flow requirements

FGS-IR-3.4-140 The HSC shall make available to the MOC the updates of the instrument (virtual) apertures misalignment data w.r.t. the S/C attitude reference.

[Source: [AD-3] 3.1.8.7]
Misalignment data originate from the ICCs and are forwarded by the HSC to the MOC.
The MOC is responsible for maintaining the misalignment data reference for the overall Herschel GS.

3.4.6.2 Control flow requirements

FGS-IR-3.4-145 The HSC shall push instrument apertures pointing misalignment updates to the MOC.

3.4.6.3 Performance requirements

N/A

3.5 HSC to ICC interfaces

The ICCs and HSC are expected to have a common data repository, see [AD-2]4.2.2. In this context, requirements on pushing/pulling the data between the HSC and the ICCs are N/A as HSC and ICCs will store/retrieve data from the HCSS..
HSC data to be accessed by ICCs include the data generated at the HSC (e.g. proposal, observation, schedule data) and data imported from MOC (TM and ancillary data). This section differentiates between these data as they are expected to be associated with different control flow and performance requirements. The HSC shall notify the ICCs for the availability of non regular HSC data.

3.5.1 CONSOLIDATED TM DATA

3.5.1.1 Information flow requirements

FGS-IR-3.5-10 The HSC shall make available to the ICC@ICC all the S/C and instrument consolidated TM received from the MOC.

[Source: [AD-2]5.7.10]
The ICC@MOC gets the TM directly from the MOC, see 3.3.1 above.

3.5.1.2 Control flow requirements

FGS-IR-3.5-15 The HSC shall notify the ICC@ICC of the availability of new consolidated TM data

3.5.1.3 Performance requirements

FGS-IR-3.5-20 An ICC@ICC shall be able to access consolidated TM with the following performance:

Delay includes consolidation by MOC, physical transfer from MOC to HSC, ingestion into the HSC system and transfer from HSC to ICC.	HK TM	Science TM
Commissioning + PV	20 minutes after MOC has received the last bit belonging to the consolidation period	2 hours after MOC has received the last bit belonging to the consolidation period

Routine	20 minutes after MOC has received the last bit belonging to the consolidation period	32 hours after MOC has received the last bit belonging to the consolidation period

In routine phase, an overall delay of 48 hours between the reception of science TM at the Ground Station and the availability of this data at ICCs is acceptable. This leads to a 32 hours acceptable delay from MOC to ICCs (the S/C to MOC transfer of science TM data is expected to take 16 hours (200 kbps link). Consequently, in routine phase, science TM data can be consolidated and retrieved by HSC on an OD basis (i.e. once every 24 hours).

In PV phase, the operation cycle (including: analysis of science TM data from previous cycle, generation of new calibration uplink data, scheduling of next cycle) will have to be performed within a few days. A 32 hours delay to get the science data is therefore not acceptable.

In commissioning phase, ICC@ICC will receive non-consolidated TM in NRT from ICC@MOC to cover NRT activities. Consolidated TM will be made available by the HSC in the same manner as during PV phase See [AD-3]3.6.

This requirement is meant to be applicable also in the case of a missed pass. The requirement is on the elapsed time between a last TM bit of a given period being received by MOC and this TM bit being received by an ICC, it does not consider the elapsed time between on board generation of the TM and its reception by MOC, where the missed pass will have an effect.

3.5.2 MOC DATA

This section specifies ICC requirements for retrieval from HSC of SW & data originating from MOC, see 3.1 above (with the exception of TM that has been addressed above).

3.5.2.1 Information flow requirements

FGS-IR-3.5-30 The HSC shall make available to the ICCs the S/C orbit predictor data updates received from the MOC.

FGS-IR-3.5-40 The HSC shall make available to the ICC@ICC the mission timeline summary data received from the MOC .

FGS-IR-3.5-50 The HSC shall make available to the ICC@ICC the TC history data received from the MOC.

FGS-IR-3.5-60 The HSC shall make available to the ICC@ICC the reconstituted S/C orbit data received from the MOC.

FGS-IR-3.5-70 The HSC shall make available to the ICC@ICC the S/C attitude history data received from the MOC.

FGS-IR-3.5-80 The HSC shall make available to the ICC@ICC the time correlation data received from the MOC.

FGS-IR-3.5-90 The HSC shall make available to the ICC@ICC the instrument derived parameters of their respective instrument received from the MOC.

FGS-IR-3.5-100 The HSC shall make available to the ICC@ICC the OOL information of their respective instrument received from the MOC.

FGS-IR-3.5-110 The HSC shall make available to the ICC@ICC the S/C & instruments reference databases received from the MOC.

FGS-IR-3.5-120 The HSC shall make available to the ICC@ICC the SSO reference database received from the MOC.

FGS-IR-3.5-130 The HSC shall make available to the ICC@ICC the instrument memory images of their respective instruments received from the MOC.

3.5.2.2 Control flow requirements

FGS-IR-3.5-135 The HSC shall notify an ICC of the availability of new MOC data when relevant to the ICC

3.5.2.3 Performance requirements

N/A

3.5.3 HSC GENERATED DATA

3.5.3.1 Information flow requirements

FGS-IR-3.5-140 The HSC shall make available to the ICCs the data generated by the HSC.

[Source: [AD-2]4.2.2]

HSC generated data include proposal data, observation data (except TM) and schedule data.
Note that ICCs may not have the access right to all HSC generated data.

3.5.3.2 Control flow requirements

FGS-IR-3.5-145 The HSC shall notify an ICC of the availability of new HSC generated data when relevant to the ICC.

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3.5.3.3 Performance requirements

N/A

3.5.4 HSC SYSTEM SW

3.5.4.1 Information flow requirements

FGS-IR-3.5-150 The HSC shall make available to the ICCs the necessary proposal submission SW updates to be able to define their calibration AOT observations.

The ICCs will use the HSC system to generate calibration AOT observations. The HSC system SW will not support the generation of non-AOT observations.

FGS-IR-3.5-160 The HSC shall make available to the ICCs all the necessary scientific mission planning SW updates to be able to check the schedulability of their engineering and calibration observations.

[Source: [AD-2]5.2.1]

3.5.4.2 Control flow requirements

FGS-IR-3.5-165 The HSC shall notify an ICC of the availability of new HSC system SW when relevant to the ICC.

3.5.4.3 Performance requirements

N/A

3.5.5 HELPDESK QUERIES

3.5.5.1 Information flow requirements

FGS-IR-3.5-170 It shall be possible for the HSC to transfer helpdesk queries to the relevant ICCs

Note: This is for queries from the community that the HSC cannot answer directly. This includes queries on instrument-related software.

3.5.5.2 Control flow requirements

N/A

3.5.5.3 Performance requirements

N/A

3.6 *ICC to MOC interfaces*

There will be no direct information flow between the ICC@ICC and MOC. Information which is logically flowing from ICC@ICC to MOC (e.g. instrument database updates, instrument procedures and commanding sequences) will physically flow through the HSC.

Information flow from ICC@MOC to MOC will be mostly of informal nature and cannot be captured in forms of requirements into this document.

3.7 ICC to HSC interfaces

The ICCs and HSC are expected to have a common data repository, see [AD-2]4.2.2. In this context, requirements on pushing/pulling the data between the HSC and the ICCs are N/A as HSC and ICCs will store/retrieve data from the HCSS..
The ICCs shall notify the HSC for the availability of non regular ICC data.

3.7.1 INSTRUMENT ON BOARD SW AND ON BOARD CONTROL PROCEDURES UPDATES

3.7.1.1 Information flow requirements

FGS-IR-3.7-10 The ICCs shall make available to the HSC instrument On Board SW and On Board Control Procedures (OBCP) updates and associated information.

[Source: [AD-2]4.3.2 & 5.11.1]

The HSC will receive an On board SW and OBCP update from an ICC for approval by the PS before passing it over to MOC for uplink.
The associated information shall help the PS to assess the impact of the update on the scientific operation of the instrument and resulting observation scientific data, see [HGSSE#4].

3.7.1.2 Control flow requirements

FGS-IR-3.7-20 The ICCs shall notify the HSC of the availability of an instrument on board SW and OBCP update to be validated.

FGS-IR-3.7-30 *deleted*

3.7.1.3 Performance requirements

N/A

3.7.2 INSTRUMENT HEALTH REPORT

3.7.2.1 Information flow requirements

FGS-IR-3.7-40 The ICCs shall make available to the HSC their information on the health of their instruments.

See [HGSSE#1]. After processing of their instrument TM using RTA, QLA or IA, or following a report from the MOC on a potential instrument anomaly, any findings relevant to observation scheduling (e.g. abnormal functioning of a particular instrument mode) should be sent by the ICCs to the HSC.
The HSC will use this information to guide the scientific mission planning (e.g. to prevent all observations using a non-functioning instrument observing mode from being scheduled).

FGS-IR-3.7-45 The ICCs shall make available to the HSC their instrument trend analysis reports.

3.7.2.2 Control flow requirements

FGS-IR-3.7-47 The ICCs shall notify the HSC of the availability of new information on the health of their instruments.

3.7.2.3 Performance requirements

FGS-IR-3.7-48 The ICC shall make available to the HSC any information regarding an anomaly on their instruments within one working hour after the detection of the anomaly according to agreed procedures

Concerning the above requirement, it should be noted that severe instrument anomalies would already have been dealt within the on-board by the instrument itself or the DCMS (resulting in the instrument being switched-off) or the MOC (leading to the execution of n instrument procedure). Instrument anomalies that can only be detected by ICCs would most likely result from trend analysis exercises, which requires data to be accumulated over a possibly very substantial time period.

3.7.3 ENGINEERING AND CALIBRATION OBSERVATIONS & SCHEDULING CONSTRAINTS

3.7.3.1 Information flow requirements

FGS-IR-3.7-50 The ICCs shall make available to the HSC their instrument engineering and calibration observations to be scheduled.

[Source: [AD-2]5.2.1]
The HSC will schedule the instrument engineering and calibration observations as part of the scientific mission planning process on the basis of the associated scheduling constraint information.

FGS-IR-3.7-60 The ICCs shall make available to the HSC the scheduling constraints information associated with engineering and calibration observations.

[Source: [AD-2]5.2.1]

3.7.3.2 Control flow requirements

FGS-IR-3.7-65 The ICCs shall notify the HSC of the availability of new instrument engineering and calibration observations to be scheduled .

3.7.3.3 Performance requirements

N/A

3.7.4 INSTRUMENT MODE VALIDATION STATUS

3.7.4.1 Information flow requirements

FGS-IR-3.7-70 The ICCs shall make available to the HSC their instrument modes validation status.

The HSC will use this information to release science observations for scheduling. Only observations using instrument modes that have been scientifically validated can normally be released for scheduling.

3.7.4.2 Control flow requirements

FGS-IR-3.7-75 The ICCs shall notify the HSC of a new validation status of their instrument modes.

3.7.4.3 Performance requirements

N/A

3.7.5 OBSERVATION ANALYSIS REPORT

3.7.5.1 Information flow requirements

FGS-IR-3.7-80 The ICCs shall make available to the HSC their information on quality of executed observation.

[Source: [AD-2]4.3.2]
This shall allow feedback from ICCs to HSC (and beyond to observers) concerning observation quality information. Note that not all ICCs commit to performing systematic quality control of observations.

3.7.5.2 Control flow requirements

FGS-IR-3.7-85 The ICCs shall notify the HSC of the availability of new information on observation quality

3.7.5.3 Performance requirements

N/A

No performance requirement can be added here as the ICCs will generate observation quality report on a best effort basis with no commitment.

3.7.6 INSTRUMENT SPECIFIC SW & DATA

3.7.6.1 Information flow requirements

FGS-IR-3.7-90 The ICCs shall make available to the HSC their instrument simulator SW & data updates.

[Source: [AD-2]4.3.2]
The HSC will use the instrument simulator SW to check instrument commanding requests resulting from observations schedules or to validate instrument on board SW updates See [AD-2]5.11.1.

FGS-IR-3.7-100 The ICCs shall make available to the HSC their instrument time estimator SW & data updates.

[Source: [AD-2]4.3.2]
The HSC will use the instrument time estimator SW as part of the HSC proposal submission process and scientific mission planning.

FGS-IR-3.7-110 The ICCs shall make available to the HSC their instrument commanding SW & data updates.

[Source: [AD-2]4.3.2]
The instrument commanding SW and data include calibration uplink data and updates to observing modes.
The HSC will use the instrument commanding SW and data as part of the HSC scientific mission planning

FGS-IR-3.7-120 The ICCs shall make available to the HSC their instrument observation data processing SW & data updates.

[Source: [AD-2]4.3.2]
The instrument observation data processing SW & data updates includes the calibration downlink data.
The HSC will use the instrument data processing SW and data updates as part of the HSC data processing and evaluation process (including quality control processing and observation product generation).
The HSC will also make available this SW to observers.

FGS-IR-3.7-125 The ICCs shall make available to the HSC the information substantiating the scientific validation of their observation data processing SW for any given AOT.

3.7.6.2 Control flow requirements

FGS-IR-3.7-127 The ICCs shall notify the HSC of the availability of new instrument specific SW or data when relevant to the HSC

3.7.6.3 Performance

N/A

3.7.7 INSTRUMENT OBSERVER MANUALS & GENERAL INFORMATION

3.7.7.1 Information flow requirements

FGS-IR-3.7-130 The ICCs shall make available to the HSC their instrument observer manual updates (TBC).

[Source: [AD-2]4.3.2]
The instrument observer manual may not be subject to an interface as their elaboration could be a collaborative effort between the PST and the ICCs.

FGS-IR-3.7-140 The ICCs shall make available to the HSC the instruments scientific data analysis recipes manuals.

The HSC will post this information for Herschel observers to consult.

FGS-IR-3.7-150 The ICCs shall make available to the HSC general instruments information of relevance to the Herschel observers.

[Source: [AD-2] 4.3.2]
The HSC will post this information for Herschel observers to consult.

3.7.7.2 Control flow requirements

FGS-IR-3.7-155 An ICC shall notify the HSC of the availability of a new update to its instrument observer manuals or any other information of relevance to the Herschel observers.

3.7.7.3 Performance requirements

N/A

3.7.8 INSTRUMENTS DATABASE UPDATES

3.7.8.1 Information flow requirements

FGS-IR-3.7-160 The ICCs shall make available to the HSC their instruments database updates.

[Source: [AD-2]4.3.3]
The HSC will not make direct use of the instruments database updates. The HSC will forward them to the MOC.

3.7.8.2 Control flow requirements

FGS-IR-3.7-165 An ICC shall notify the HSC of the availability of a database update for its instrument.

3.7.8.3 Performance requirements

N/A

3.7.9 INSTRUMENTS USER MANUALS

3.7.9.1 Information flow requirements

FGS-IR-3.7-170 The ICCs shall make available to the HSC the instrument user manuals (including instrument procedures) necessary for the operation of their instruments by MOC.

The HSC will not make use of the instrument procedures. The HSC will forward them to MOC.

3.7.9.2 Control flow requirements

FGS-IR-3.7-175 An ICC shall notify the HSC of the availability of a new update of its instrument user manual.

3.7.9.3 Performance requirements

N/A

3.7.10 INSTRUMENT APERTURES POINTING MISALIGNEMENT UPDATES

3.7.10.1 Information flow requirements

FGS-IR-3.7-180 The ICCs shall make available to the HSC the updates of their instrument (virtual) aperture misalignment data w.r.t. the S/C attitude reference.

The HSC will not directly use this data. The HSC will forward it to the MOC.

3.7.10.2 Control flow requirements

FGS-IR-3.7-185 An ICC shall notify the HSC of the availability of an update of its instrument aperture pointing misalignment data.

3.7.10.3 Performance requirements

N/A

3.7.11 INSTRUMENT MANUALS

3.7.11.1 Information flow requirements

FGS-IR-3.7-190 *deleted*

see instrument user manuals, section 3.7.9

3.7.11.2 Control flow requirements

N/A

3.7.11.3 Performance requirements

N/A

3.7.12 HELPDESK QUERIES

3.7.12.1 Information flow requirements

FGS-IR-3.7-200 The ICCs shall make available to the HSC (helpdesk) replies to specific instrument related queries

Note: This is for queries from the community that the HSC cannot answer directly. This includes queries on instrument-related software.
It is anticipated that this is only a punctual, low-level activity. Interaction is with the HSC not directly with the originator of the query

3.7.12.2 Control flow requirements

N/A

3.7.12.3 Performance requirements

N/A

3.8 HCSS to RTA interfaces

3.8.1 TELEMETRY DURING OPERATIONS

3.8.1.1 Information flow requirements

FGS-IR-3.8-10 The HCSS shall make instrument HK telemetry available to RTA.

HK TM includes TC verification packets and event packets.

FGS-IR-3.8-20 The HCSS shall make the telemetry available to the RTA system as source packets as provided by MOC.

3.8.1.2 Control flow requirements

FGS-IR-3.8-25 The RTA shall trigger the TM data reception from the HCSS

FGS-IR-3.8-26 The HCSS shall allow to select TM according to the following criteria:

- Generation time
- APIDs
- Test procedure execution
- Observation execution

3.8.1.3 Performance requirements

FGS-IR-3.8-30 The instrument telemetry shall arrive at the RTA system at a rate up to 10 times the on board data rate.

With the current on board data rate for HK, this would amount to about 40 kbps.

3.9 RTA to HCSS interfaces

3.9.1.1 Information flow requirements

FGS-IR-3.9-10 The RTA shall make available to the HCSS its logs for any given testing period
[Source: [AD-3]3.2.8].
E.g. OOL data

3.9.1.2 Control flow requirements

FGS-IR-3.9-20 The HCSS shall pull the RTA logs data from the RTA

3.9.1.3 Performance requirements

N/A

3.10 HCSS to OBS Maintenance interfaces

3.10.1 INSTRUMENT ON BOARD MEMORY IMAGE

3.10.1.1 Information flow requirements

FGS-IR-3.10-10 It shall be possible to retrieve instrument On Board Memory Image from the HCSS into the OBSM.
[Source: [AD-3]3.2.9].

3.10.1.2 Control flow requirements

FGS-IR-3.10-20 The retrieval of an instrument On Board Memory Image from the HCSS shall be triggered from the OBSM

3.10.1.3 Performance requirements

N/A

3.11 OBS Maintenance to HCSS interfaces

3.11.1.1 Information flow requirements

FGS-IR-3.11-10 It shall be possible to store On Board Memory Image into the HCSS from the OBSM.
[Source: [AD-3]3.2.9].

3.11.1.2 Control flow requirements

FGS-IR-3.11-20 The storage of an On Board Memory Image to the HCSS shall be triggered from the OBSM

3.11.1.3 Performance requirements

N/A

4 INTERFACE REQUIREMENTS FOR ILT AND IST

4.1 HCSS to EGSE-ILT interfaces (ILT only)

4.1.1 TESTS PROCEDURE INPUTS

4.1.1.1 Information flow requirements

FGS-IR-4.1-05 The HCSS shall make available to the EGSE-ILT available (test) observing modes and associated parameters definitions.

[Source: [AD-3]3.2.7.1].
Observing modes are used by the EGSE-ILT (Test Control) in the definition of test procedures

FGS-IR-4.1-10 It shall be possible to import command mnemonic sequences from the HCSS to the EGSE-ILT by specifying observing modes and associated parameters values.

[Source: [AD-3]3.2.7.1].
The observation command mnemonic sequence exported to the EGSE-ILT will include the sequence of relative time tagged instrument and test equipment commanding requests for this observation.
Commanding is expected to be in the form of TC mnemonics, see [AD-3]3.2.2].

FGS-IR-4.1-20 An observation command mnemonic sequence made available to the EGSE-ILT by the HCSS shall be compatible with the test operational and design constraints.

E.g. the observations schedule shall be compatible with:
- *the commanding rate between the CDMS I/F and the instruments*

4.1.1.2 Control flow requirements

FGS-IR-4.1-25 The EGSE-ILT shall pull observing modes from the HCSS

FGS-IR-4.1-30 The EGSE-ILT shall trigger the reception of the observation command mnemonic sequences from the HCSS

4.1.1.3 Performance requirements

FGS-IR-4.1-40 The elapsed time between the request by the EGSE-ILT to the HCSS of the generation of an observation command mnemonic sequence and the reception of this sequence by the EGSE-ILT shall not exceed 5 seconds.

During ILT the Test Control component will (automatically) request observation command mnemonic sequences to be generated on the fly by directly calling HCSS functions out of an available (pre-defined) test observation mode and parameters. The elapsed time will largely depend on the complexity of the observation.

FGS-IR-4.1-50 *deleted*

4.1.2 INSTRUMENT DATABASE UPDATES

Instrument databases include the definition of the instrument TC and TM as well as the TC and TM related to the TEIs.

4.1.2.1 Information flow requirements

FGS-IR-4.1-60 The HCSS shall make instruments databases updates available to the EGSE-ILT.

[Source: [AD-3]3.2.10].

FGS-IR-4.1-70 Instruments databases updates shall be made available in the form appropriate for the RTA system (SCOS 2000 based)

[Source: [AD-3]3.1.6].

4.1.2.2 Control flow requirements

FGS-IR-4.1-80 The EGSE-ILT shall pull instruments databases updates from the HCSS

4.1.2.3 Performance requirements

N/A

4.1.3 INSTRUMENT MEMORY IMAGE

4.1.3.1 Information flow requirements

FGS-IR-4.1-90 The HCSS shall make instrument memory images updates available to the EGSE-ILT.

[Source: [AD-3]3.2.7.2].

FGS-IR-4.1-100 Instrument memory images updates shall be made available in the form appropriate for the EGSE-ILT On Board Software Management (SCOS 2000 based)

[Source: [AD-3] 3.2.7.2].

4.1.3.2 Control flow requirements

FGS-IR-4.1-110 The EGSE-ILT shall pull instruments memory images updates from the HCSS

4.1.3.3 Performance requirements

N/A

4.2 EGSE-ILT to HCSS interfaces (ILT only)

4.2.1 TELEMETRY

4.2.1.1 Information flow requirements

FGS-IR-4.2-10 The EGSE-ILT shall make available to the HCSS all instrument and test equipment telemetry data generated during tests.

[Source: [AD-3]3.2.7.3].

FGS-IR-4.2-20 The EGSE-ILT shall make available the TM data to the HCSS in a format from which the TEI and instrument source TM packets can be extracted.

Similar to FSG-IR-3.1-30. TM format is expected to be the same in ILT/IST as in operation.

FGS-IR-4.2-21 The test equipment TM data shall include the necessary information for the HCSS to be able to associate, when relevant, each TM data to the context of an observation and observation measurement

[Source: [AD-3]3.2.7.3].
This requirement also applies to instrument TM, however this is out of the scope of this document. See also comment in 3.1.1.1.

4.2.1.2 Control flow requirements

FGS-IR-4.2-25 The HCSS shall trigger the TM data reception from the EGSE-ILT

FGS-IR-4.2-30 The TM data shall be received from the EGSE-ILT as one single TM data stream

It would be desirable to have the same protocol for the TM data stream in ILT as in operation between MOC and ICC@MOC.

4.2.1.3 Performance requirements

FGS-IR-4.2-40 The instrument TM shall be available in the HCSS not later than 5 seconds after the EGSE-ILT has received/generated it.

This performance requirement is derived from the need for QLA to analyse instrument TM on line.

FGS-IR-4.2-50 The EGSE-ILT HCSS TM I/F shall support a data rate equivalent to the addition of the maximum instrument on-board data rate (400 kbps) and the maximum TEIs data rate (400 kbps).

4.2.2 TESTS PROCEDURES

4.2.2.1 Information flow requirements

FGS-IR-4.2-60 It shall be possible to store (retrieve) test procedures definitions from (into) the EGSE-ILT into (from) the HCSS

[Source: [AD-3]3.2.7.1].

FGS-IR-4.2-70 It shall be possible to store test procedures execution logs from the EGSE-ILT into the HCSS

[Source: [AD-3]3.2.7.1].

FGS-IR-4.2-80 It shall be possible to store (retrieve) autonomy procedures definitions from (into) the EGSE-ILT into (from) the HCSS

[Source: [AD-3]3.2.7.1].

4.2.2.2 Control flow requirements

FGS-IR-4.2-90 The storage (retrieval) of test procedures definition and execution logs into (from) the HCSS shall be triggered from the EGSE-ILT

4.2.2.3 Performance requirements

N/A

4.3 HCSS to RTA interfaces (ILT & IST)

4.3.1 TELEMETRY

4.3.1.1 Information flow requirements

FGS-IR-4.3-10 The HCSS shall make instrument HK telemetry available to RTA.

[Source: [AD-3]3.2.8].
HK TM includes TC verification packets and event packets

FGS-IR-4.3-20 The HCSS shall make the telemetry available to the RTA system as source packets as provided by the EGSE-ILT or the CCS.

Similar to FSG-IR-3.1-30. TM format is expected to be the same in ILT/IST as in operation.

4.3.1.2 Control flow requirements

FGS-IR-4.3-25 The RTA shall trigger the TM data reception from the HCSS

FGS-IR-4.3-26 The HCSS shall allow to select TM according to the following criteria:

- Test or instrument configuration
- Generation time
- APIDs
- Test procedure execution
- Observation execution

Wrt the test or instrument configuration: The possibility exists, especially in the test phases, that independent HCSS nodes will be ingesting telemetry data simultaneously. An example is IST tests on the QM running in parallel with ILT test on the FM.
If the resulting TM packet objects originate from the same instrument (albeit different models) they can bear the same APIDs, time tags, etc, making it difficult or impossible to use these criteria to identify them uniquely.

4.3.1.3 Performance requirements

FGS-IR-4.3-30 *deleted*

In ILT and IST, RTA will interface with the HCSS for the TM retrieval only for off-line assessment of TM (play back mode).

FGS-IR-4.3-35 The HCSS RTA TM I/F shall support a data rate equivalent to 10 times the maximum instrument HK on-board data rate (4 kbps).

4.3.2 INSTRUMENT DATABASE UPDATES

4.3.2.1 Information flow requirements

FGS-IR-4.3-40 The HCSS shall make instrument database updates available to RTA.

[Source: [AD-3]3.2.10].

FGS-IR-4.3-50 Instrument data base updates shall be made available in the form appropriate for the RTA system (SCOS 2000 based)

4.3.2.2 Control flow requirements

FGS-IR-4.3-60 The RTA shall pull the instrument database update from the HCSS

4.3.2.3 Performance requirements

N/A

4.4 RTA to HCSS interfaces

4.4.1 TC HISTORY (ILT ONLY)

4.4.1.1 Information flow requirements

FGS-IR-4.4-10 The RTA shall make available to the HCSS the TC history data for any given testing period

[Source: [AD-3]3.2.7.4].

FGS-IR-4.4-20 The TC history data shall include the necessary information for the HCSS to be able to associate (when relevant) the TC to the instrument or TE command mnemonics exported by the HCSS.

Similar to FGS-IR-3.1-310. The TC history is expected to have the same format in ILT/IST as in operation.

4.4.1.2 Control flow requirements

FGS-IR-4.4-30 The HCSS shall pull the TC history data from the RTA

4.4.1.3 Performance requirements

N/A

4.4.2 RTA LOGS (ILT & IST)

4.4.2.1 Information flow requirements

FGS-IR-4.4-40 The RTA shall make available to the HCSS its logs for any given testing period

[Source: [AD-3] 3.2.8].
E.g. OOL data

4.4.2.2 Control flow requirements

FGS-IR-4.4-50 The HCSS shall pull the RTA logs data from the RTA

4.4.2.3 Performance requirements

N/A

4.5 OBS Maintenance to HCSS (ILT & IST)

4.5.1 ON BOARD MEMORY IMAGE

4.5.1.1 Information flow requirements

FGS-IR-4.5-10 It shall be possible to store (retrieve) On Board Memory Image from (into) the OBSM (from) into the HCSS.

[Source: [AD-3]3.2.9].

4.5.1.2 Control flow requirements

FGS-IR-4.5-20 The storage (retrieval) of an On Board Memory Image to (from) the HCSS shall be triggered from the OBSM

4.5.1.3 Performance requirements

N/A

4.6 HCSS to OBS Maintenance (ILT & IST)

See previous section

4.7 RTA to EGSE-ILT interfaces (ILT only)

4.7.1 RTA EVENT AND PARAMETERS

4.7.1.1 Information flow requirements

FGS-IR-4.7-10 RTA shall send TM parameter values and events (TBC) to the EGSE-ILT (test control) when HK data processing results call for procedures to be carried out by the EGSE-ILT.

[Source: [AD-3]3.2.4].
RTA events and TM parameters values sent over to the EGSE-ILT will allow the triggering of autonomy procedures.
Examples of such events are:

- *HK parameter out of limit -> send packet to initiate shut down of instrument*
- *HK parameter out of limits -> send packet to initiate 'abort measurement'*

- *HK parameter(s) at certain level ->send packet to indicate that test is finished. This could subsequently result in Test Control generating and activating a new 'schedule'.*

4.7.1.2 Control flow requirements

FGS-IR-4.7-20 The EGSE-ILT shall trigger the reception of the RTA events and TM parameters values.

FGS-IR-4.7-30 *deleted*

4.7.1.3 Performance requirements

FGS-IR-4.7-40 RTA events shall arrive at the EGSE-ILT within 0.5 second after their generation.

The figure of 0.5 second is to be put in relation with the end-to-end latency for the triggering/execution of an autonomy procedure that is expected to be of the order of 3 to 4 seconds.

4.8 HCSS to CCS interfaces (IST only)

All information and data flow from instrument group to CCS shall follow requirements as given in the IID-A and IID-Bs (see [RD-11], [RD-12], [RD-13] & [RD-14]). In line with the concept of smooth transition, see [AD-3], it is expected that requirements between the HCSS and the EGSE-ILT as identified in section 4.1 above, i.e. requirements regarding test procedures inputs, instrument database and instrument memory image, apply as well to the interface between the HCSS and the CCS.
As explained in 1.2, this document however does not formally identify requirements between the HCSS and the CCS..

4.9 CCS to HCSS interfaces (IST only)

In line with the concept of smooth transition, see [AD-3], it is expected that requirements between the EGSE-ILT and the HCSS as identified in section 4.2.1 and between the RTA and the HCSS as identified in section 4.4.1 above, i.e. requirements regarding TM and TC history, apply as well to the interface between the CCS and the HCSS.
As explained in 1.2, this document however does not formally identify requirements between the CCS and the HCSS.

4.9.1 TELEMETRY

4.9.1.1 Information flow requirements

FGS-IR-4.9-10 *deleted*

FGS-IR-4.9-20 *deleted*

FGS-IR-4.9-21 *deleted*

4.9.1.2 Control flow requirements

FGS-IR-4.9-30 *deleted*

4.9.1.3 Performance requirements

FGS-IR-4.9-40 *deleted*

4.10 MIB editor to HCSS (ILT & IST)

4.10.1 INSTRUMENT DATABASE

4.10.1.1 Information flow requirements

FGS-IR-4.10-10 It shall be possible to store (retrieve) an instrument database from (into) the MIB editor (from) into the HCSS.

[Source: [AD-3]3.2.10].

FGS-IR-4.10-15 The instrument database shall be in a format compatible with the format expected by SCOS-2000

[Source: [AD-3] 3.2.6].

4.10.1.2 Control flow requirements

FGS-IR-4.10-20 The storage (retrieval) of an instrument database to (from) the HCSS shall be triggered from the MIB editor

4.10.1.3 Performance requirements

N/A

4.11 HCSS to MIB editor (IST & ILT)

See previous section

4.12 EGSE-ILT to RTA I/F (ILT only)

This interface corresponds to either internal SCOS-2000 I/F (SCOS-2000 commanding and SCOS-2000 monitoring) or to I/F between the EGSE-ILT Interface Unit and SCOS-2000, see HSCDD [AD-3]section 3,2. Both interfaces have already been implemented and are expected to be used as is. No specific requirements have been identified for their use in the context of the Herschel ILT.