HCSS
User Requirements
Document

Document Approval

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Document Status Sheet

1. Document Title: HCSS User Requirements Document			
2. Issue	**3. Revision**	**4. Date**	**5. Reason for change**
Draft 0	0	17/09/1999	Initial draft by Stephane Veillat
Draft 0	1	27/09/1999	Comments from G. Pilbratt
Draft 0	2	04/11/1999	Review by ISO IDC at meeting in ESTEC on 05/10/99
Draft 0	3	15/02/2000	Update to make it in line with 'Scenario' document draft 0.9 Transfer of the document from Word to FrameMaker
Draft 0	4	17/03/2000	Update after 'internal' SCI-SA review and 'Scenario' document draft 0.95
1	0	26/05/2000	Update after review with all FIRST GS groups and Vilspa New document custodian A. Heras
1	1	02/11/2000	Addition of user requirements on access and retrieval of Telemetry, Help-desk system, CUS and IA/QLA.
2	0	31/08/2001	Implementation of the recommendations and RIDs of the FCSS SRR/v0.1 PDR Review Board Addition of new user requirements.
2	1	07/07/2005	Major review for next development phase. Proposal of modification and addition of new user requirements
2	1.5	15/09/2005	Intermediate issue during major review before final agreement of the proposed changes
2	2	25/11/2005	Issue with all modifications incorporated ready for signature
2	3	21/12/2007	Input from Data Access RRF and other requested changes incorporated.

2. Issue	3. Revision	4. Date	5. Reason for change
2	4	25/01/2008	Comments from HSC members incorporated. Note that change bars are given with respect to the last version approved by the HCSS MG, v2.2.

Document Change Record

1.Document Title: HCSS User Requirements Document	
2. Document Reference Number: FIRST/FSC/DOC/0115	
3. Document Issue/Revision Number: 2.2	
4. Section	**5. Reason For Change (with respect to issue 2.0)**
1.2	“Observation data reduction and analysis” added to HCSS users functions list
1.3.2	SREM acronym added. ASCII, HIFI, QLA definitions corrected
1.4	Lists of Applicable and Reference Documents updated
2	In “Astronomers”, in last line, “and software” added In “PS Team”, 4th bullet added In “HSC Operations”, second paragraph deleted In “ICC teams”, first line, “with much larger freedom in data access” added
3.1.1	HCSS-UR-3.1-0020, comment added
3.1.2.1	HCSS-UR-3.1-0040, proposal definition added in comment and syntax corrected HCSS-UR-3.1-0070, 6th bullet added in comment
3.1.2.4	“adding new data” deleted from second introduction paragraph
3.1.2.5	HCSS-UR-3.1-0290, comment modified
3.1.2.9	HCSS-UR-3.1-0350, requirement deleted
3.1.2.10	HCSS-UR-3.1-0380, requirement rephrased
3.1.3.1	HCSS-UR-3.1-0470, references to “Instrument Scheduling Schemes” document added HCSS-UR-3.1-0480, “for a privileged user” deleted HCSS-UR-3.1-0505, new requirement HCSS-UR-3.1-0530, examples of statistics added as comment
3.1.3.3	HCSS-UR-3.1-0570, “TBC in MOC operations plan” deleted from comment

3.1.3.5	New long-term mission planning concept HCSS-UR-3.1-0620, modified and comment added HCSS-UR-3.1-0630, modified HCSS-UR-3.1-0631, new requirement HCSS-UR-3.1-0641, new requirement HCSS-UR-3.1-0642, new requirement HCSS-UR-3.1-0650, modified
3.1.4.1	HCSS-UR-3.1-0660, in comment, “(containing instrument data and satellite pointing information)” added HCSS-UR-3.1-0670, reference to SPRs modified HCSS-UR-3.1-0700, specification improved HCSS-UR-3.1-0701, comment added HCSS-UR-3.1-0710, comment modified to indicate that products will be permanently stored
3.1.4.2	Introduction modified to indicate that products will be permanently stored. HCSS-UR-3.1-0730, requirement rephrased HCSS-UR-3.1-0750, comment modified HCSS-UR-3.1-0760, “volume of data” added in comment HCSS-UR-3.1-0761, “HCSS operator” replaced by “HSC helpdesk”
3.1.4.3	HCSS-UR-3.1-0770, comment extended to indicate that not all quality control data will be automatically generated HCSS-UR-3.1-0810, requirement rephrased HCSS-UR-3.1-0830, “automatic and human inspection” replaced by “associated” HCSS-UR-3.1-0835, new requirement
3.1.5.1	HCSS-UR-3.1-0885, new requirement HCSS-UR-3.1-0910, “and combinations thereof - are required” added HCSS-UR-3.1-0921, “general” replaced by “arbitrary” HCSS-UR-3.1-0930, comment modified HCSS-UR-3.1-0950, “and combinations thereof - are required” added HCSS-UR-3.1-0955, new requirement HCSS-UR-3.1-0960, requirement rephrased HCSS-UR-3.1-0970, requirement modified HCSS-UR-3.1-0975, new requirement
3.1.5.2	HCSS-UR-3.1-0990, “TBC by ICCs” removed from comment
3.1.5.5	HCSS-UR-3.1-1081, new requirement HCSS-UR-3.1-1082, new requirement

3.1.5.6	HSC replaced by HCSS HCSS-UR-3.1-1090, comment modified HCSS-UR-3.1-1095, new requirement HCSS-UR-3.1-1101, “HCSS operator” replaced by “HSC helpdesk”
3.1.6	HCSS-UR-3.1-1115, last sentence added to comment HCSS-UR-3.1-1160, “storage, and access” added HCSS-UR-3.1-1161, new requirement HCSS-UR-3.1-1165, new requirement HCSS-UR-3.1-1166, new requirement
3.1.7	HCSS-UR-3.1-1200, requirement deleted HCSS-UR-3.1-1205, new requirement HCSS-UR-3.1-1221, requirement rephrased HCSS-UR-3.1-1222, comment extended HCSS-UR-3.1-1223, requirement modified
3.1.8	HCSS-UR-3.1-1253, document types moved from the requirement text to the comment. OASIS OpenDocument formats added. HCSS-UR-3.1-1262, requirement rephrased
3.1.11	HCSS-UR-3.1-1310, forth bullet deleted HCSS-UR-3.1-1340, comment rephrased HCSS-UR-3.1-1362, requirement deleted
3.1.12	HCSS-UR-3.1-1370, “Solaris” replaced by “Linux”. Comment with list of platforms added. HCSS-UR-3.1-1380, pointing IA modules added and “expert” IA replaced by “calibration” IA. “Observation quality control, quick look analysis” deleted HCSS-UR-3.1-1395, new requirement HCSS-UR-3.1-1400, “It is desirable” deleted HCSS-UR-3.1-1410, “architecture and documentation” added HCSS-UR-3.1-1421, requirement rephrased HCSS-UR-3.1-1460, requirement rephrased HCSS-UR-3.1-1480, “in the user’s computer” added for clarification HCSS-UR-3.1-1500, Definition of break point added in comment
	HCSS-UR-3.1-1520, “in his/her local environment” added HCSS-UR-3.1-1530, “history” replaced by “log” HCSS-UR-3.1-1545, new requirement HCSS-UR-3.1-1555, new requirement HCSS-UR-3.1-1556, new requirement
3.1.13	HCSS-UR-3.1-1590, availability of data for the calibration scientists added in comment
3.1.14	HCSS-UR-3.1-1640, applicability of the ILT requirement extended to all phases

3.2.1	HCSS-UR-3.2-0010, comment extended
3.2.2	HCSS-UR-3.2-0100, 30 replaced by 50 HCSS-UR-3.2-0111, comment added HCSS-UR-3.2-0112, “simultaneous” deleted, “in any 10 minute period” added to requirement
3.2.3	HCSS-UR-3.2-0131, new requirement
3.2.4	HCSS-UR-3.2-0135, “10 minutes” replaced by “1 hour”. Comment added. HCSS-UR-3.2-0140, “one thousand” changed to “ten thousand”. In comment “8” replaced by “7”. HCSS-UR-3.2-0150, requirement deleted HCSS-UR-3.2-0160, in comment, “10 Tbytes” replaced by “60 Tbytes” and reference to Planck deleted since it is no longer applicable HCSS-UR-3.2-0162, requirement modified HCSS-UR-3.2-0163, new requirement on ingestion HCSS-UR-3.2-0164, new requirement HCSS-UR-3.2-0165, new requirement
3.2.5	HCSS-UR-3.2-0209, new requirement HCSS-UR-3.2-0240, requirement modified HCSS-UR-3.2-0250, TBD replaced by 2 months HCSS-UR-3.2-0260, TBD replaced by 2 hours HCSS-UR-3.2-0290, new requirement
Appendix B	“SREM data” added to in “Auxiliary data” “Astronomical calibration sources data” added to “Calibration” Note 3 extended to specify ICC data access to proprietary data
Appendix C	Updated
Appendix D	Updated

3. Document Issue/Revision Number: 2.3	
4. Section	**5. Reason For Change**
1.3.2	SCOM added in list of acronyms
1.4.1	AD-8 updated
1.4.2	References updated
3.1.4.2	HCSS-UR-3.1-0764, new requirement, following discussions with DP group
3.1.5.1	HCSS-UR-3.1-0890, reference to list of Herschel data added HCSS-UR-3.1-0900, clarification added (following Data Access URD) HCSS-UR-3.1-0910, HCSS replaced by HCSS/Herschel Science Archive (following Data Access URD) HCSS-UR-3.1-0931, requirement added (following Data Access URD) HCSS-UR-3.1-0955, clarification added (following Data Access URD) HCSS-UR-3.1-0970, rephrased (following Data Access URD) HCSS-UR-3.1-0975, HCSS replaced by HCSS/Herschel Science Archive (following Data Access URD) HCSS-UR-3.1-0981, new requirement (following Data Access URD)
3.1.5.6	HCSS-UR-3.1-1090, HCSS replaced by HCSS/Herschel Science Archive (following Data Access URD) HCSS-UR-3.1-1100, HCSS replaced by HCSS/Herschel Science Archive (following Data Access URD)
3.1.5.8	New subsection for Trend Analysis high level requirements added HCSS-UR-3.1-1113, new requirement (following Data Access URD) HCSS-UR-3.1-1114, new requirement (following Data Access URD)
3.1.12	HCSS-UR-3.1-1556, rephrased (following Data Access URD) HCSS-UR-3.1-1557, new requirement (following Data Access URD) HCSS-UR-3.1-1558, new requirement (following Data Access URD)
3.1.15	New subsection on manual commanding on request from HGSSE HCSS-UR-3.1-1670, new requirement HCSS-UR-3.1-1680, new requirement
3.2.2	HCSS-UR-3.2-0112, HCSS replaced by HCSS/Herschel Science Archive, and number of users reduced from 250 to 120 (following Data Access URD)
3.2.4	HCSS-UR-3.2-0161, clarification extended (following Data Access URD) HCSS-UR-3.2-0180, requirement modified, following discussions with DP group
Appendix B	“Detailed Observation Parameters” availability extended to astronomers Row “Instrument Derived Parameters data” deleted
Appendix C	Updated with the newly added requirements
Appendix D	Updated with the newly added requirements

3. Document Issue/Revision Number: 2.4	
4. Section	**5. Reason For Change**
3.1.4.2 3.1.5.6 3.1.9 Appendix C Appendix D	HCSS-UR-3.1-0730, example modified HCSS-UR-3.1-0763, requirement deleted HCSS-UR-3.1-1090, requirement rephrased to reflect current agreements HCSS-UR-3.1-1095, requirement rephrased to reflect current agreements HCSS-UR-3.1-1100, rephrased, “user” specified as “astronomer” HCSS-UR-3.1-1110, requirement and clarification modified HCSS-UR-3.1-1251, clarification changed to reflect current situation Requirement HCSS-UR-3.1-0763 deleted from table Requirement HCSS-UR-3.1-0763 deleted from table

Table of contents

1 Introduction

1.1 Purpose

This document captures the top-level user requirements, functional and non functional, of the Herschel Common Science System (HCSS). The HCSS is defined as the sum of all H/W and S/W components that are common to the science and instrument operations.

This document represents the formal user requirements input to the development of the HCSS, which is driven by and responds to the science implementation requirements defined in the SIRD [AD-2]. Formally, the present document is issued by the Herschel Project Scientist (the 'customer'), on behalf of all future users of the HCSS, to the HCSS Management Group (HCSSMG, the 'supplier'), represented by its chairperson, who will manage the development of the HCSS by the Common System Development Team (CSDT), see [AD-4].

1.2 Scope

The Herschel Ground Segment is a joint venture, involving the Herschel Science Centre (HSC), three Instrument Control Centres (ICCs), the Mission Operations Centre (MOC) and the associated NASA Herschel Science Center (NHSC). The overall operations concept as well as the division of responsibilities between the ground segment elements, is given in [AD-3] section 4. For a description of the design of the ground segment and of the operational context of the HCSS during the different mission phases see [RD-4].

This document captures all HSC, ICC, and MOC requirements on the HCSS, covering all the user functions of the HCSS. It does not identify the requirements on the HCSS to support the interfaces with the MOC and the ICCs, see [AD-3] section 4.2. These requirements are identified in the Herschel Ground Segment Interfaces Requirements Document (IRD), see [RD-1].

The user functions identified in this document cover the complete operational life cycle of the HSC. It includes the following phases (described in [AD-3]):

- Development, testing, and simulations
- Call for Key Project observation time proposals
- Call for Guaranteed Time observation time proposals
- Call for Open Time observation time proposals
- Commissioning phase
- Performance Verification phase
- Science demonstration phase
- Routine phase
- Run-down phase
- Mission consolidation phase

- Active archive phase
- Archive consolidation phase

The historical archive phase is outside the scope of the Herschel mission. This archive is the state of the archive at the end of the archive consolidation phase, i.e. at the end of the funded mission.

The requirements specified in this document must be fulfilled by the final operational system, which shall be ready for the End-to-end tests and Ground Segment simulations previous to launch. However, the concept of smooth transition between mission phases implies a continuous building up of the system such that the need for the requirements implementation is a function of the mission phase (see Appendix D).

A few requirements specific to the ILT system are compiled in the corresponding subsection. However, constraint and security requirements only applicable to ILT and ISTs have been left out of the scope of this document, and will be discussed in the context of the CSDT.

The HCSS users functions fall broadly into the following areas:

- Information provision
- Proposal generation and handling
- Observation scheduling
- Observation product generation & quality control
- Observation data reduction and analysis
- Storage, access and retrieval of data, products and S/W
- Support to calibration and cross-calibration

1.3 Definition of Terms and Acronyms

1.3.1 Definition of Terms

See [RD-2].

1.3.2 Acronyms

AD	Applicable Document
AO	Announcement of Opportunity
AOT	Astronomical Observation Template
API	Application Programming Interface
ASCII	American Standard Code for Information Interchange
CSDT	Common System Development Team
CUS	Common Uplink System
DTCP	Daily Telecommunications Period

ESA	European Space Agency
ESOC	European Space Operations Centre
FAQ	Frequently Asked Questions
FIRST	Far Infrared and Submillimetre Telescope (former name of the Herschel Space Observatory)
FITS	Flexible Image Transport System
GUI	Graphical User Interface
H/W	Hardware
HCSS	Herschel Common Science System
HCSSMG	HCSS Management Group
HIFI	Heterodyne Instrument for the Far Infrared
HK	House Keeping (data)
HOTAC	Herschel Observation Time Allocation Committee
HSC	Herschel Science Centre
HSCDT	HSC Development Team
HTML	Hypertext Mark-up Language
I/O	Input/Output
IA	Interactive Analysis (software)
ICC	Instrument Control Centre
ID	Identification
ILT	Instrument Level Test
IRAS	Infrared Astronomical Satellite
IRD	Interface Requirements Document
IRSKY	Infrared Sky (A Software Programme)
ISO	Infrared Space Observatory
IST	Integrated System Tests
LAN	Local Area Network
LO	Local Oscillator
MIME	Multipurpose Internet Mail Extensions
MOC	Mission Operations Centre
MS	Microsoft
NED	NASA/IPAC Extragalactic Database
NHSC	NASA Herschel Science Centre
NRT	Near-Real Time
OBCP	On Board Control Procedure
OBSW	On-Board Software
OD	Operational Day
OOL	Out-of-limits
OS	Operating System
PACS	Photodetector Array Camera and Spectrometer
PCS	Permanent Command Sequence
PDF	Portable Document Format
PI	Principal Investigator
PR	Public Relations
PS	Project Scientist

PST	Project Scientist Team
QCP	Quality Control Pipeline
QLA	Quick Look Analysis (software)
QSO	Quasi-Stellar Object
RA	Right Ascension
RD	Reference Document
RID	Review Item Discrepancy
RTA	Real-time Assessment (software)
S/C	Spacecraft
S/N	Signal-to-noise (ratio)
S/W	Software
SCOS	Spacecraft Operating System
SCOM	SCience Operations Manager
SCR	Software Change Request
SIMBAD	Set of Identifications, Measurements, and Bibliography for Astronomical Data
SIP	Science Implementation Plan
SIRD	Science Implementation Requirements Document
SIRTF	Space Infrared Telescope Facility
SOFIA	(NASA/DLR) Stratospheric Observatory for Infrared Astronomy
SPACON	Spacecraft Controller
SPIRE	Spectral and Photometric Imaging Receiver
SPR	Software Problem Report
SREM	Standard Radiation Environment Monitor
SSO	Solar System Object
TBC	To be Confirmed
TBD	To be Determined
TC	Telecommand
TM	Telemetry
ToO	Target of Opportunity
URD	User Requirements Document
UTC	Universal Time Coordinated
WWW	World Wide Web

1.4 References

1.4.1 Applicable Documents

AD-1 FIRST Science Management Plan

AD-2 Herschel Science Implementation Requirements Document (SIRD), Issue 1.2, 28 April 2003, PT-03646

AD-3 Herschel Space Observatory Operations Scenario Document, Issue 1.2, 17 March 2003, Herschel/HSC/DOC/0114

AD-4 Herschel Science Centre Science Implementation Plan (SIP), draft 0.9,

31 May 2002, Herschel/HSC/DOC/0249

AD-5 HIFI Science Implementation Plan, issue 1.1, ICC/1998-001

AD-6 PACS Science Implementation Plan, issue 1.1, 14 June 2002, PACS-ME-PL-014

AD-7 SPIRE Science Implementation Plan, issue 1.2, 30 October 2002, SPIRE-RAL-PRJ-000018

AD-8 Herschel Instrument Scheduling Schemes, issue 1.2, 19 December 2007, Herschel/HSC/DOC/0334

1.4.2 Reference Documents

RD-1 Herschel Ground Segment Interface Requirements Document, issue 2.6, 4 October 2004, FIRST/FSC/DOC/0117 (IRD)

RD-2 HCSS Glossary of Terms, issue 1.1, 15 March 2001, FIRST/FSC/DOC/0120

RD-3 HSC List of Acronyms

RD-4 Herschel Ground Segment Design Description, issue 1.5, 3 April 2006, FIRST/FSC/DOC/0146

RD-5 End user requirements for HIFI interactive analysis, draft 0.5, 20 December 2004, ICC/2001-004

RD-6 PACS IA Software User Requirements Document, issue 0.6, 25 April 2003, PACS-ME-RD-002

RD-7 SPIRE ICC: Use-Case Defiinitions, issue 2.2, 12 January 2005, SPIRE-SAP-DOC-001241

RD-8 HCSS Preparatory Calibration Database Requirements, issue 1.0, 19 April 2007, Herschel/HSC/DOC/0350

1.5 Document Overview

1.5.1 Structure

The core of the document is section 3 which identifies the HCSS user requirements. This section is split into functional requirements, section 3.1, and non-functional requirements, section 3.2.

Section 3.1 is structured around the main HCSS functionalities. Each main functionality section (level 3 section) is split into sections corresponding to HCSS specific functions as identified from [AD-2] and [AD-3].

Appendix A of the document indicates which group(s) of the HCSS users will be using which functions. Appendix B lists the Herschel data, specifying the HCSS user group that will have access rights on each particular data set. In Appendix C the traceability matrix of this document requirements to the SIRD requirements is given. Appendix D provides the mission phases when each requirement is applicable.

1.5.2 Requirement Identification

Requirements are uniquely numbered with their section number to which is appended a sequence number unique within the section. Text in *italics* as part of requirements is explanatory, and not part of the formal requirement.

2 User characteristics

The following HCSS user groups have been identified:
[Source: [AD-3] section 7]

The general public

The general public may use the system to get Herschel general information. This will include information on the mission, its objectives and achievements in a clear and concise way as well as on educational aspects (e.g., material for schools and planetariums, explanations to understand Herschel science in a more general astronomy context). General public are non registered users.

Astronomers

Astronomers will use the HCSS to get information on the mission, including progress reports, status, news, statistics, descriptions of the facility, observing opportunities, PR events and stories, scientific results, publications lists, relevant conferences, etc. Astronomers may use the above information to decide if Herschel is a suitable facility to carry out their science. Astronomers will also use the system to get scientific data resulting from Herschel observations which are in the public domain as well as tools to analyse these data. Astronomers must register to the HCSS in order to be allowed to retrieve Herschel data and software from the archive.

Proposers

Proposers are astronomers who have decided to apply for Herschel observation time. They will use the HCSS to prepare and submit their scientific proposals using information (instrument and spacecraft operating modes, lists of blocked observations, etc.) and tools (observing time calculators including what-if facilities, entry and editing tools, etc.). Proposers are registered users.

Herschel Observation Time Allocation Committee (HOTAC)

The members of HOTAC will use the HCSS to read and grade the proposals online.

Observers

Observers are proposers whose scientific proposals (or a subset of them) have been accepted by the HOTAC. Observers will use the HCSS to update their observations as new information becomes available (revised sensitivities, updated observing modes, results from the initial Herschel observations of their programme, etc.), to see the scheduling status of their observations and to retrieve their scientific data as soon as available in the system. The Observers group consist of two subgroups: “owners” and “associated users”. A proposal has a single “owner”. This owner may allow access to proprietary data of this proposal to the “associated users” on per observation basis (e.g. a proposal PI may want to

give rights to “associated users” to work on the proposal itself or on data produced as a result of the execution of an observation).

The “owner” of a proposal is responsible for the coordination of proposal updates carried out by the “associated users”. The PST will deal exclusively with the “owner” of the proposal for any proposal related matters (e.g. total proposal time vs. HOTAC allocated time).

PS Team

The HSC will use the HCSS to maintain scientific proposals. The PS Team shall make sure that accepted scientific proposals are up-to-date with the latest instruments knowledge before being released for scheduling.

The PS Team will support the feasibility assessment of accepted proposals (e.g through instrument simulators, visibility tool, astronomical tools, access to other observatories data) and check on and resolve duplication of proposals and observations. In addition, the PS Team will use the HCSS to:

- make statistical analysis of the submitted proposals
- release observations for scheduling and to recommend ToO for scheduling
- approve and follow-up the observations schedule
- generate long term plans of possible observation scenarios, based on the database of approved and as yet unscheduled observations and scheduling constraints and preferences
- plan and analyze observations, together with the ICCs, for calibration purposes
- provide instrument expert support to quality control of the observations, by analysing problematic cases
- investigate influence of AOT/OBSW changes on proposals (duration etc.)
- investigate influence of changes in product generation software
- ensure that all HCSS data are properly archived and retrievable by authorized users
- perform archive based statistical analyses in support of e.g. HOTAC, mission planning, PR, and general ESA activities

HSC Operations

HSC Operations will use the HCSS to produce scientific observation schedules and export them to the MOC. To do this HSC Operations will use a number of tools like visibility checker, observing and slew time calculators various constraint checkers etc., to be able to select schedulable observations from the database.

After retrieval of TM and auxiliary data for a particular OD, HSC Operations will use the HCSS to store these data for retrieval by the system users. HSC Operations will also at this stage process the data related to the execution of each observation to generate automati-

cally the corresponding quality data, and to flag those observations that need further analysis by instrument experts or are related to software problems.

ICC teams

ICC teams will use the HCSS in a similar way to observers, although with much larger freedom in data access, for engineering, calibration and performance verification purposes. They will use it to submit (engineering or calibration) observations and retrieve the resulting observation raw data plus any other Herschel data required to improve calibration and instrument knowledge. ICC teams will also use the system to feed back the calibration and instrument information, so that during operations the remaining observation programme is executed in an optimal way. Improved calibration and instrument knowledge has to feed back to data products and documentation for the external astronomical community (astronomers) as well.

The ICCs will also upgrade/adapt the uplink software (CUS, AOTs) and data reduction software (IA and thus standard product generation) to reflect improved understanding of the instrument behaviour.

HSC help-desk

Help-desk will use the HCSS to help and administrate HSC users (astronomers). Help-desk will help answering users queries (e.g. tracking users queries, establishing FAQ, maintaining users mail addresses). Help-desk will control the astronomers usage of the system (e.g. by registering the HSC users, defining their access rights). In addition, help-desk will interact with the HCSS to generate statistics on HSC usage and help-desk activities.

Software Development and Maintenance teams (in HSC and ICCs)

The S/W Development and Maintenance teams will use the HCSS to develop, test, deliver and maintain software packages and to deliver, archive and maintain documentation. They will also use the system to generate and monitor SPRs, and link them to software modules and observational data. Therefore they will need access to S/W modules, to the data model, the Herschel data, and to HCSS functionalities like e.g. configuration control.

Mission Operations Centre (MOC)

The Mission Operations Centre will use the HCSS for storage and retrieval of Herschel data. The MOC will provide the HSC with the input required to prepare scientific observations schedules, and will make available all TM and ancillary data to be stored by the HCSS. The MOC will import from the HCSS the observation schedules, and instrument specific data as instrument memory loads and dumps, instrument databases and instrument command sequences.

Note: The user groups should be understood not as physical entities but as roles. As a consequence, an individual user of the HCSS can belong to several user groups (i.e. have several roles). For instance an individual can belong to several groups (e.g PST and the observers).

3 Requirements

3.1 Capability requirements

3.1.1 Public information provision

HCSS-UR-3.1-0010 The HCSS shall provide wide ranging on-line general and specific information on the objectives, capabilities, status, and achievements of the Herschel mission.
Information provided will be comprehensive and cover, among others, the instrument observer's manuals. Information about the mission, its objectives and the means to achieve them are provided by on-line documents.

HCSS-UR-3.1-0020 The HCSS shall provide on-line information about the availability of information and services for registered users, and how to register.
There are no pre-conditions for users to be allowed to register.

HCSS-UR-3.1-0030 The HCSS shall provide on-line information to users on the instruments calibration, health status and on the software available to reduce the Observations (IA, on-demand processing).

3.1.2 Proposal generation and handling

3.1.2.1 Generation of a new Proposal

HCSS-UR-3.1-0040 The HCSS shall support the generation and/or editing of a new AOT-based observing Proposal.
A Proposal is a request for Herschel observing time containing a scientific rationale for the request and a list of Observations.
It is proposed that the Proposal generation & handling interface is only a graphical interface, but supporting the import of suitably formatted source list files.

HCSS-UR-3.1-0050 The HCSS shall support the generation and/or editing of AOT-based Observations within a Proposal.
The definition of new observing modes and AOTs is covered by HCSS-UR-3.1-1310.

HCSS-UR-3.1-0060 The HCSS shall provide on-line information to the proposer to aid in the writing of Proposals.
Examples of on-line information are the observer's manuals, on-line help or tutorials on Proposal submission, lists of blocked targets, examples of filled-in AOTs.

HCSS-UR-3.1-0070 The HCSS shall provide on-line access to internal and external scientific tools and databases through the HCSS standard interface.
Required databases and tools are:
- *Sky visualisation tools (e.g. IRSKY) with on-line access to other mission databases (e.g IRAS, ISO, SIRTF, SOFIA, 2Mass)*
- *SIMBAD*
- *Sky visibility tools showing which areas of sky are visible for Herschel at given times*
- *Co-ordinates and proper motion of selected SSOs*
- *Astrophysical databases providing information on sky background*
- *Visualisation of instrument footprints on the sky*

The HCSS shall provide hyperlinks to external databases. Their GUIs will be used by default, so that no additional development is necessary. HCSS GUIs are required for the internal databases (e.g. sky visibility tools, SSOs).

HCSS-UR-3.1-0080 The HCSS shall provide on-line access to Observation time estimators for all AOTs.

HCSS-UR-3.1-0081 The time estimator shall calculate the S/N, sensitivity or antenna noise temperature (depending on the instrument) of an Observation for a time and a key set of AOT parameters specified by the user.
Note that the meaning of time and its constraint values will be different for different observing modes.
As a "nice to have" option, the time estimator should show graphically the dependence of the S/N as a function of Observation time for a certain instrument configuration.

HCSS-UR-3.1-0082 The time estimator shall calculate the total Observation time for a S/N, sensitivity or antenna noise temperature (depending on the instrument) and a key set of AOT parameters entered by the user.
This requirement is not considered essential but "nice to have".

HCSS-UR-3.1-0083 The time estimator output shall specify the amount of time spent in each Observation building block, and the total Observation time.
Therefore the observer can assess which part of the Observation can be optimised.

HCSS-UR-3.1-0084 The time estimator shall indicate any "step" behaviour in the time calculation.
E.g. in case S/N is an input parameter, with S/N=10 the time is 10000 s, but with S/N=9.9 the time is 6000 s, because it could be achieved with one scan less.

HCSS-UR-3.1-0085 The time estimator shall be 10% accurate with respect to the most precise available calculation of the Observation time.

HCSS-UR-3.1-0086 The inter-Observation overheads of the Observation duration (e.g. slews) shall be the same across all instruments and modes as applicable.
The overheads will be agreed by ICCs and PST. They must be conservative in order to avoid difficulties in adjusting Proposal stage-2 calculated time to HOTAC awarded time, which is based on time estimator output.

HCSS-UR-3.1-0090 - Deleted-

HCSS-UR-3.1-0100 The HCSS shall provide on-line access to information from earlier Proposal cycles.
E.g. target lists, PI names, AOTs from already accepted Proposals.The exact content of this information will be defined and consolidated by the PST, following agreed guidelines on Proposal proprietary data.

HCSS-UR-3.1-0110 - Deleted-

HCSS-UR-3.1-0120 It shall be possible to retain a newly generated or edited Proposal.

HCSS-UR-3.1-0130 It shall be possible to delete a whole Proposal.

HCSS-UR-3.1-0140 It shall be possible to delete Observations within a Proposal.

HCSS-UR-3.1-0150 It shall be possible to copy (parts of) a Proposal to another Proposal.

HCSS-UR-3.1-0160 It shall be possible to copy (parts of) an Observation to another Observation.

The Proposal generation support is expected to be independent from the Proposal category: open time, guaranteed time or key-project time.

3.1.2.2 Submission of a new Proposal

The action of submitting a Proposal to the HCSS leads to the Proposal being considered for selection by HOTAC.

HCSS-UR-3.1-0170 The HCSS shall support the submission of a new Proposal.

HCSS-UR-3.1-0180 The HCSS shall support the submission of a Proposal with SSO Observations.
The submission of SSO Observations is specific to the extent that there is no source fixed co-ordinates and that this may imply some specific validity checks with respect to the observing mode.

HCSS-UR-3.1-0190 The HCSS shall support the submission of a Proposal with fixed time Observations.

HCSS-UR-3.1-0191 The HCSS shall support the submission of a Proposal with concatenated Observations

HCSS-UR-3.1-0200 The HCSS shall check a new Proposal before accepting its submission. *Simple checks such as "minimum information is present in a correct format" are performed on an edited Proposal before it can be submitted. Minimum information will include at least:*

- *Science category*
- *Science justification*
- *Target list and associated instrument mode category*
- *Total Observation time applied for, and (max) individual Observation times*
- *Status of Proposals accepted on previous cycles, and recent publications of relevance*

For generic ToOs Proposals, the checks to be performed will be reduced to science category, science justification and status of accepted Proposals and recent publications of relevance.

HCSS-UR-3.1-0210 The HCSS shall store any submitted Proposal (including all its Observations), and assign the corresponding access rights following the agreed security policy.

3.1.2.3 Update of a submitted Proposal

After submission of a Proposal, update of the Proposal may be needed before presenting the Proposal for review by HOTAC.

Update should be understood in the sense of modifying existing data or adding new data, e.g. because of announced instrumental parameter changes.

HCSS-UR-3.1-0220 The HCSS shall support the update of a previously submitted Proposal (including its Observations).

3.1.2.4 Update of an accepted Proposal

After his/her Proposal has been accepted, the observer will refine his/her accepted Proposal within specified guidelines, keeping within his/her awarded observing time (stage-2 Proposal submission). He/she will use the latest measured performance of spacecraft and instruments determined during the calibration and performance verification period or, should performance values change with time, the routine phase; pre-launch, predicted performance values, based on laboratory measurements, will have to be used.

Update should be understood in the sense of modifying existing data.

HCSS-UR-3.1-0230 The HCSS shall support the update of a previously accepted Proposal (including its Observations).

HCSS-UR-3.1-0240 It shall be possible to apply a given Proposal or Observation update to a pre-selected set of Proposals or Observations.

This is intended to be used by the proposer or by PST to e.g. tweak or change Observations to reflect improved understanding of the instrument.

HCSS-UR-3.1-0250 During the submission or re-submission of a stage 2 Proposal, the HCSS shall check that all parameters required to Schedule the contained Observations have been filled in and are within the allowed range.

3.1.2.5 Control of Proposal updates

HCSS-UR-3.1-0260 The HCSS shall provide the capability to restrict the update which can be performed on a Proposal accepted by HOTAC.
E.g. after approval of a Proposal by the HOTAC some Proposal attributes shouldn't be modified any more by the observer, and the total Observation time should be kept compatible with the time awarded by HOTAC.

HCSS-UR-3.1-0261 Proposal update restrictions shall be configurable by the PST.
The HCSS shall check automatically the following Proposal modifications, being the default allowed/not allowed conditions as specified:

- *change of instrument: not allowed*
- *change of observing mode: not allowed*
- *deleting a target: allowed (may be necessary to keep within HOTAC time if time cut from requested)*
- *adding a target: not allowed*
- *replacing a target: not allowed*
- *changing filter (PACS "blue"): not allowed*
- *reducing wavelength coverage in spectroscopy: allowed*
- *increasing wavelength coverage in spectroscopy: allowed up to 5% of the originally proposed range*
- *decreasing sky coverage (e.g. by making a smaller raster): allowed*
- *increasing sky coverage: allowed up to 5% of the originally proposed sky coverage*
- *changing central coordinates: allowed up to 50% of the aperture size*

This list should be considered as preliminary since requirements may change depending on the final set of AOTs offered to the community. The numerical values specified in the restrictions shall be configurable.

HCSS-UR-3.1-0262 The HCSS shall check that the total Observation time in every Proposal is equal to or less than the Observation time assigned by HOTAC, taking into account the time allocation per priority.
HOTAC will assign time for each priority class (1, 2 or 3), that is, there will be three HOTAC awarded times per Proposal.

HCSS-UR-3.1-0263 The HCSS shall prevent the automatic acceptance of a Proposal with HOTAC constraints specified by text.
Submission of such a Proposal shall trigger a notification to the PST, so that the update is manually checked.

HCSS-UR-3.1-0270 It shall be possible to prevent any update to (i.e. to freeze) a Proposal or a set of submitted Proposals.
During HOTAC review, Proposals should not be modifiable. In addition, it is planned that after acceptance of a Proposal by HOTAC, it can be updated only during a given period of time

HCSS-UR-3.1-0280 It shall be possible to un-freeze a Proposal or a set of Proposals previously frozen.
This is to allow updating of a Proposal, either on request by the proposer, or on request by the HSC.

HCSS-UR-3.1-0290 It shall be possible to retain the complete update history of an accepted Proposal (including its Observations).
This excludes the scientific justification.

HCSS-UR-3.1-0300 The HCSS shall forbid the update of already executed Observations.
The purpose of this requirement is to avoid that modifications in the database of already executed Observations seriously bias any statistics on Herschel Observation time.

3.1.2.6 Statistics & Reports generation

HCSS-UR-3.1-0310 The HCSS shall support the generation of statistical reports from the Proposals taking into account their status (submitted, accepted, etc....).

HCSS-UR-3.1-0311 The HCSS shall allow the generation of statistics on the Proposal and Observation database.
A standard set of statistics to be generated by the HCSS are:
- *For Proposals: Statistics on time asked/accepted per country, number of Proposals per country.*
- *For Observations: Time per instrument/AOT, Number of Observations per instrument/AOT. Splitting possibilities: by accepted, observed, by Schedule status, by country of PI.*

3.1.2.7 Observation technical feasibility evaluation

HCSS-UR-3.1-0320 The HCSS shall support the evaluation of the technical feasibility of an Observation.
Examples of technical evaluation are:
- *Source visibility assessment*

- *Sensitivity and observing time computation (it is assumed that the time estimators will be used for this purpose; see section 3.1.2.1)*

3.1.2.8 Proposal & Observation duplication check

HCSS-UR-3.1-0330 The HCSS shall support the detection of possible duplication of submitted Observations.

3.1.2.9 Proposal & Observation acceptance & grading

HCSS-UR-3.1-0340 It shall be possible to accept/reject a submitted Proposal.
When a Proposal is rejected, all the Observations it contains are rejected.

HCSS-UR-3.1-0350 - Deleted -

HCSS-UR-3.1-0360 It shall be possible to accept a Proposal subject to certain proposed modifications.
The HOTAC and/or PST may suggest changes to a Proposal such that it can then be accepted (e.g. revised amount of Observation time).

HCSS-UR-3.1-0370 It shall be possible to assign grades to Observations.

HCSS-UR-3.1-0371 The HCSS shall support Proposal evaluation by HOTAC, by providing tools to generate evaluation reports per Proposal and to aid HOTAC meeting discussions and production of outcome.

3.1.2.10 Observation release

An accepted Observation has to be released before it will be made available for scheduling.

HCSS-UR-3.1-0380 It shall be possible to flag an individual or a pre-selected set of Observations to be released or blocked for scheduling, following observer's input.

HCSS-UR-3.1-0381 The HCSS shall allow the PST to block, release or force-release an individual or a pre-selected set of Observations.
Then an Observation is released if:
- *the PST has force-released it*
- *the PST and the observer have both released it.*

In all other cases the Observation is blocked.

3.1.3 Observation scheduling

Generation of the Observation Schedule will be performed for a given scheduling period.

It is assumed in this section that the scheduling of a period cannot impact the Schedule of any earlier period. E.g. the scheduling of HIFI in period N+1 should not lead to modify HIFI commanding in period N-1 due to, for instance commanding the HIFI LO.

3.1.3.1 Draft Schedule generation

HCSS-UR-3.1-0390 The HCSS shall support the generation of draft Observation Schedules covering a given scheduling period.

HCSS-UR-3.1-0400 It shall be possible to pre-select Observations for draft scheduling from the set of released Observations based on specific criteria.
Examples of pre-selection criteria are:
- *Pointing direction*
- *Instrument modes*
- *Grade*

HCSS-UR-3.1-0410 It shall be possible to automatically generate one or several draft Schedule(s) from a set of pre-selected Observations.

HCSS-UR-3.1-0420 The automatic generation of a draft Schedule shall be optimised according to figures of merit, subject to a set of configurable criteria.

HCSS-UR-3.1-0430 It shall be possible to generate a draft Schedule interactively.

HCSS-UR-3.1-0440 It shall be possible to edit a generated draft Schedule, i.e. to:
- Insert an Observation in a given time range
- Move an Observation
- Delete an Observation

HCSS-UR-3.1-0450 It shall be possible to set scheduling preferences
Examples of scheduling preferences are:
- *Observation grades*
- *Observation types*
- *Observation categories*
- *Observation pointing direction*
- *Failed Observation*

HCSS-UR-3.1-0460 The automatic generation of a draft Schedule shall automatically take into account the scheduling preferences.

HCSS-UR-3.1-0470 The generation or editing of a draft Schedule shall automatically take into account the scheduling constraints.
Examples of scheduling constraints are [source: [AD-3] section 5.3.1.3, and [AD-8]]
- *sources visibility*

- *the Observation window*
- *S/C pointing constraints within an Observation window.*
- *the instruments constraints within the Observation window [Source: [AD-8]]*
- *the slew time between Observations and/or measurements*
- *the Observation duration as computed with the selected calibration data*
- *specific constraints linked to an Observation*
- *fixed time Observation*
- *concatenated Observation*
- *constraints linked to maximum amount of instrument HK and science data which can be stored on board and downlinked during DTCP.*
- *constraints linked to the compatibility on an Observation instrument mode with the instrument mode of the predecessor and successor Observation [Source: [AD-3] section 3.3.5 and [AD-8]]*
- *constraints linked to engineering and calibration data.*

HCSS-UR-3.1-0480 It shall be possible to indicate that a given set of Observations must be Scheduled during a specific period.

HCSS-UR-3.1-0490 It shall be possible to schedule SSO Observations, that may include additional offset pointing wrt the position of the SSO itself.
Scheduling SSO Observations is specific to the extent that there is no source fixed co-ordinates and that the scheduling of a SSO Observation is twofold. It includes the scheduling of the SSO Observation itself and possibly of the associated offset Observation (background Observation). The latter Observation may be scheduled a few days after the execution of the SSO Observation itself.

HCSS-UR-3.1-0500 It shall be possible to schedule fixed time and concatenated Observations.

HCSS-UR-3.1-0505 It shall be possible to schedule Observations in which the instrument settings depend on spacecraft conditions at the time when the Observation will be executed.
Spacecraft conditions may be e.g. the spacecraft radial velocity.

HCSS-UR-3.1-0510 It shall be possible to schedule Observations without target specification (e.g., engineering Observations using internal calibrators alone).

HCSS-UR-3.1-0520 The HCSS shall offer on-line scheduling aid functions depicting Observations scheduling constraints, including sky visibility.

HCSS-UR-3.1-0530 It shall be possible to compute and display statistics on a given generated Schedule.

Examples of statistics are: Percentage in the OD of slew times with idle instrument, distribution of Observation grades, fraction of fixed time Observations, identification of calibration and engineering Observations and their duration.

HCSS-UR-3.1-0540 It shall be possible to retain a generated draft Schedule.

3.1.3.2 Schedule approval

HCSS-UR-3.1-0550 The HCSS shall support the approval of a draft Observation Schedule.
To approve a Schedule will move the Schedule state from draft to approved, see [1.3.1])
The Schedule for a given scheduling period is approved by the PS or his representative. It is important that the Schedule is presented to him in a readable form and together with the different figures of merits.

HCSS-UR-3.1-0560 It shall be possible to de-approve a previously approved Observation Schedule for a given Observation window.
To de-approve a Schedule moves the Schedule state from approved back to draft.

3.1.3.3 Committable Schedule generation

HCSS-UR-3.1-0570 The HCSS shall support the automatic generation of a committable Schedule from an approved Schedule.
Note that the Schedule will be uplinked on an OD basis.
Note that committable Schedules include the instantiation of the instrument commands sequences to execute the Observation.

HCSS-UR-3.1-0580 The committable Schedule shall include any parallel and/or serendipity modes Observations if applicable.

HCSS-UR-3.1-0590 The committable Schedule shall take into account the instrument constraints linked to the serendipity and parallel modes. These constraints shall not lead to the modification of the approved Schedule.

HCSS-UR-3.1-0600 It shall be possible to retain a committable Schedule.

3.1.3.4 Exported Schedule feed-back handling

HCSS-UR-3.1-0610 The HCSS shall be able to automatically update the state of Observations belonging to an exported Schedule after cancellation, rejection, abortion or full execution of this Schedule.
Note that this update will only determine whether an Observation has been executed or not. For an executed Observation, it will not say if the Observation was successful or failed.

This automatic update shall not lead to the automatic rescheduling of a non executed calibration Observation. The HCSS shall alert the appropriate ICC so they can determine in a timely manner if their planned calibration activities need to be adjusted [Source: [AD-3] section 5.2.1].

3.1.3.5 Long-term planning

HCSS-UR-3.1-0620 The HCSS shall support the user in the generation of long-term plans. The generation of these plans must not interfere with the "normal"' mission planning.
The long term plan is not a long term schedule, but a high level long term allocation of key observations prepared by the mission planning scientist. The HCSS provides the tools for the generation of the long term plan and for the definition of the mission planning strategy.

HCSS-UR-3.1-0630 The generation of a long-term plan shall take into account the scheduling constraints, as specified in [AD-8], and the Observation status (i.e. already executed Observations are not considered).

HCSS-UR-3.1-0631 Certain scheduling constraints parameters shall be editable by the user.
Examples of editable scheduling constraints are:
- *Instrument to be operated*
- *Solar Aspect Angle (for improved pointing performance)*

HCSS-UR-3.1-0640 The HCSS shall be able to automatically generate statistics from a long term plan.

HCSS-UR-3.1-0641 The HCSS shall generate statistics from the Observations database taking into account the satellite and instrument scheduling constraints.
Important indicators are the number of schedulable Observations per OD, and the percentage of Observations that are visible with a given instrument schedule scheme.

HCSS-UR-3.1-0642 The HCSS shall provide a sky distribution display of Observations selected by the user according to certain criteria (e.g. time period, instrument).

HCSS-UR-3.1-0650 It shall be possible to retain a generated long-term plan and the constraints used to generate it.

Note that the HCSS will not support the generation of Schedules from the long-term plan.

3.1.4 Product generation and quality control

3.1.4.1 Generation of Observation products

HCSS-UR-3.1-0660 The HCSS shall support the systematic and automatic generation of products for executed science Observations from the Observation raw data. This implies that the system shall be able to configure the default set of scientific tools and calibration files appropriate to the Observations being processed.
It is intended that HSC will process all Observations for quality control purposes, by using IA modules with default parameters. As a result the corresponding standard products (containing instrument data and satellite housekeeping and pointing information) will be generated per Observation, including a quick-look product that shall allow the astronomer to browse the contents of the Observation. Note that not all calibration and engineering Observations will allow the production of a standard product.

HCSS-UR-3.1-0670 The HCSS shall automatically generate a persistent link between executed Observations products and associated uplink, auxiliary and quality data. If applicable, also SPRs should be associated.

HCSS-UR-3.1-0680 It shall be possible to automatically generate Observation products in batch mode for a set of pre-selected science Observations.

HCSS-UR-3.1-0690 The HCSS shall support the selection of the version of the scientific tools and calibration files to be used for the generation of science Observation products.
The default (best) set of these options will be set by the HSC in agreement with the ICCs.

HCSS-UR-3.1-0700 Observation products shall be qualified with a description of the standard processing release number, main processing tasks, calibration files and their versions used to generate them.

HCSS-UR-3.1-0701 It shall be possible to reproduce Observation standard data products generated with a certain version of the standard processing at any time.
S/W and databases may have to be reinstalled if old versions are required. The HCSS will provide information on how to access them.

HCSS-UR-3.1-0710 It shall be possible to retain automatically generated scientific Observation products.
Data Products will be saved permanently and replaced by new product versions when bulk reprocessing with a new pipeline version is performed.

3.1.4.2 On-demand generation of products

The aim of On-demand generation of products is to generate products with the latest data processing software version.

HCSS-UR-3.1-0720 The HCSS shall support the on-demand generation of scientific Observation products.
Observation products generated on-demand by an astronomer will be retained by the HCSS for a limited period of time during which it can be downloaded by the user, see 3.1.5.4.

HCSS-UR-3.1-0730 It shall be possible to customize the on-demand processing. This can be achieved by the user selecting on pre-defined options displayed on the user interface.
An example could be a choice to select a non-standard pipeline optimised for this kind of observation.

HCSS-UR-3.1-0740 The HCSS shall provide a context sensitive on-line help on the possibilities to customize the on-demand processing, and what the currently recommended set is for a particular kind of Observation.

HCSS-UR-3.1-0750 It shall be possible to retain on-demand generated scientific Observation products.
It is not yet decided for how long to save the on-demand products, e.g. they could be saved until the processing S/W has been updated, like a 'cache' memory.

HCSS-UR-3.1-0760 The HCSS shall prevent the execution of on-demand product generation requests exceeding predefined limits and inform the user.
The limits are related to e.g. total time required for the processing or volume of data, and will be set according to the type of user (e.g. ICCs must have less restrictions).

HCSS-UR-3.1-0761 It shall be possible to contact the HSC helpdesk by e-mail, to request on-demand generation of products of an amount of data that exceeds the predefined limits.

HCSS-UR-3.1-0762 In case of a processing software error during on-demand processing, the HCSS shall notify the user that made the request.

HCSS-UR-3.1-0763 - Deleted -

HCSS-UR-3.1-0764 It shall be possible to disable on-demand processing on request by the SCOM or PS.

3.1.4.3 Quality control of products

HCSS-UR-3.1-0770 The HCSS shall support the systematic and automatic generation of quality control data for each executed Observation, which will include extracted information from the MOC operations reports, and pre-defined information generated by the standard processing.
Automatic means that no user interaction is needed except for triggering the process. Other quality control data will be produced by human inspection and ingested manually in the system.
The quality control data shall indicate to the observer whether his/her Observation raw data are processable or not with the current version of the data processing S/W.
Examples of quality information automatically generated by the HCSS are:

- *the quality flag (Good, unknown/questionable, invalid Observational setup, missing TM, real-time problem, poor pointing, real-time problem instrument malfunction, processing problem - raw data OK, processing problem - raw and basic data OK, processing problem - no science data available, never executed).*
- *the version of the processing software used*
- *the default settings of the processing software used*

HCSS-UR-3.1-0780 It shall be possible to automatically generate quality control data in batch mode for a set of pre-selected Observations.

HCSS-UR-3.1-0790 In case of a processing software error (both for systematic and on-demand processing), the HCSS shall notify the operator.

HCSS-UR-3.1-0791 The HCSS shall allow the linking of problem reports (e.g. SPRs on data processing, Instrument anomaly reports) to the affected set of Observations. The corresponding problem report numbers and titles shall be included in the quality control data of these Observations.

HCSS-UR-3.1-0800 The HCSS shall retain the quality control generated data.

HCSS-UR-3.1-0810 The user shall be allowed to enter information in the Quality Control Report of a given Observation.
The HCSS will not automatically mark those Observations which have failed data processing as failed Observations. An Observation will be marked failed only after investigation by an instrument specialist (from HSC or ICCs). For instance, the failure may be traced back to a data processing S/W error. The HCSS shall be able to record the result of this analysis.

HCSS-UR-3.1-0820 The HCSS shall support the update of the quality control data for each Observation.

HCSS-UR-3.1-0830 All associated quality control data shall be available for display together with the Observation.

HCSS-UR-3.1-0835 It shall be possible to produce statistics on quality control reports.
Examples are:
- *Number of quality control reports produced in a certain period*
- *Number of quality control reports pending closure*
- *Fraction of Observations that need re-scheduling*
- *Fraction of Observations for which the standard product generation failed*
- *Fraction of Observations with a certain type of problem*

3.1.5 Storage, access to and retrieval of Herschel data, products & S/W

3.1.5.1 General

HCSS-UR-3.1-0840 The HCSS shall support the storage, access to and retrieval of all Herschel data, including products and documentation, according to user rights and preferences (see [Appendix B:]).
This also includes final scientific products reduced by astronomers external to HSC (like maps obtained in Key programs).

HCSS-UR-3.1-0850 The HCSS shall support the storage, access to and retrieval of all Herschel S/W (except MOC S/W), according to user privileges and preferences (see [Appendix B:]).
This requirement refers to the storage, access and retrieval of software artifacts in the archive (e.g. code, documentation, related SCRs, test data, binaries), not to the access to the software sub-systems functionality.

HCSS-UR-3.1-0860 The HCSS shall provide a configuration control system (version control, history, etc.).

HCSS-UR-3.1-0870 The HCSS shall support the management of multiple versions of Herschel data and objects.
Management should include the possibility to delete data that meet certain criteria.

HCSS-UR-3.1-0880 The HCSS shall make the relations between the various items visible to the user and allow the user to follow the relations between items to directly access (information on) all related items.

HCSS-UR-3.1-0885 The HCSS shall allow expert users to navigate around persistent data following the links between them.
Experts users are ICC and PST members.

HCSS-UR-3.1-0890 It shall be possible to access Herschel data by queries.
(It is assumed that regarding queries two main group of users can be defined: the external users (astronomer, proposer, observer, HOTAC) and the expert users (HSC, S/W maintenance, help-desk and ICCs). External users will perform "general" queries and expert users both "general" and "expert" queries. The access and proprietary rights will determine which HSC data will be accessible for retrieval (see [Appendix B:] for the list of Herschel data).

HCSS-UR-3.1-0900 Queries against a criteria or a combination of criteria shall give as a result the list of Herschel data items that match the query.
Here "data items" addresses both Herschel data entities (e.g., Products), or the values of a queried parameter for Trend Analysis. Trend Analysis is a task for the ICCs, not for the astronomer.

HCSS-UR-3.1-0910 The HCSS/Herschel Science Archive shall support "general" queries (as opposed to "expert" queries) on Herschel data through an appropriate GUI (entering ASCII lists shall be allowed).
The following supported "general" queries - and combinations thereof - are required:

- *Search on position (a user specified radius around a central position or in a box). Accepted coordinate systems will be RA and Dec (J2000, B1950), galactic coordinates and ecliptic coordinates.*
- *Search on target name. Name resolution should be done by giving the option to use SIMBAD, NED or none.*
- *Search on target type (e.g. QSO, HII region, galactic/extragalactic).*
- *Search on Observation id (which will include the mission phase ID, e.g. ILT, key programs...).*
- *Search on Proposal administration data (i.e. Proposal id, proposer name, key-words, abstract strings).*
- *Search on wavelength ranges.*
- *Search on Observation type (e.g. spectrum, photometry, image).*
- *Search on Observation characteristics (instrument, observing mode, exposure time, and others TBD by PST/ICCs when AOTs are defined).*
- *Search on time (UTC or OD number), or interval of time.*
- *Search on Observation status (e.g. released, executed, failed)*
- *Search on Observation quality flag.*
- *Search on specific data contents (e.g. value of dark current, flux densities).*

HCSS-UR-3.1-0920 It shall be possible to access external data and tools in order to resolve queries (e.g., SIMBAD, NED).

HCSS-UR-3.1-0921 It shall be possible to write arbitrary queries on Herschel data.

HCSS-UR-3.1-0930 Expert users shall be able to write queries against all persistent objects and their public attributes.
Access to and retrieval of data resulting from a query is subject to access rights and privileges.

HCSS-UR-3.1-0931 It shall be possible to write queries, and combinations of queries, on the metadata of products.

HCSS-UR-3.1-0940 Expert users shall be able to define functions for queries on linked data, via a GUI. All user defined functions will be kept in a library for general access.

HCSS-UR-3.1-0950 Certain expert queries should be supported by the HCSS through an appropriate GUI.
The following supported expert queries - and combinations thereof - are required:

- *Search on documents parameters (e.g., title, author, area)*
- *Search on document content*
- *Search on SPR or Software Change request data (e.g., number, title, originator, system)*
- *Search on type of pointing data (e.g., raster, line scanning)*
- *Search on Observation execution event (e.g. out of limits, command verification error)*
- *Search on version number used to generate Observations (uplink) or to produce products (downlink)*
- *Search on sub-measurements of an Observation*
- *Search on types of sub-measurements of Observations*
- *Search on building blocks*

HCSS-UR-3.1-0955 Expert users shall be able to perform arbitrary searches on data contents.
Searches can be done in one step, or in several steps requiring a script.

HCSS-UR-3.1-0960 It shall be possible to retrieve any data associated with the result of a query, according to the user's access rights.

HCSS-UR-3.1-0970 The user shall be able to select the items to retrieve from the list of query results.

HCSS-UR-3.1-0975 The HCSS/Herschel Science Archive shall provide the user with an indication of the volume of data requested for retrieval.

HCSS-UR-3.1-0980 The HCSS shall support bulk data delivery

HCSS-UR-3.1-0981 It shall be possible to run non-interactive queries through batch scripts able to generate and to prepare a (subset of) the corresponding data for download.

3.1.5.2 RTA and IA/QLA access and retrieval of TM and DataFrame Objects

HCSS-UR-3.1-0990 The HCSS shall support the retrieval of TM data and DataFrame Objects by the ICCs to be analyzed by the systems RTA and IA/QLA.
RTA and QLA will need to interface with the HCSS. Interface requirements are covered in the IRD [RD-1].

HCSS-UR-3.1-0991 The HCSS shall support the retrieval of all types of TM source packets and DataFrame Objects.

HCSS-UR-3.1-0992 It shall be possible to select the type of TM source packet or DataFrame Object to be retrieved.
Selection of packets will reduce the performance overhead of dealing with unnecessary packets such as, i.e. event packets, which are not normally handled by IA/QLA.

HCSS-UR-3.1-0993 It shall be possible to request TM packets and DataFrame Objects over (i) a given absolute time range, (ii) a given time range relative to the current time, (iii) a given Observation, and (iv) a given (set of) type(s) of building block(s).

HCSS-UR-3.1-0994 It shall be possible to make a request on the most recent TM packet and DataFrame Object.

3.1.5.3 Access and retrieval of Proposal information

HCSS-UR-3.1-1000 The HCSS shall support the access and retrieval of Proposal information from proprietary Proposals according to user rights and privileges.

3.1.5.4 Access and retrieval of Observation raw data, quality control data and products

See section 3.1.4 for quality control data and product generation.

HCSS-UR-3.1-1010 The HCSS shall provide on-line information on how to access and reduce the Herschel accessible scientific data.

HCSS-UR-3.1-1020 The HCSS shall support the access to and retrieval of all products associated with an executed Observation (e.g., raw data, scientific products).
Observation products are not necessarily retained in the HCSS. Therefore the user may have to explicitly request the product generation (on-demand processing) beforehand.

HCSS-UR-3.1-1030 The HCSS shall support access to and retrieval of auxiliary data, quality control data and uplink data for an executed Observation.

HCSS-UR-3.1-1040 - Deleted -

HCSS-UR-3.1-1050 Upon reception of a request for proprietary data, the HCSS shall indicate the date when that proprietary data will become public.

HCSS-UR-3.1-1060 Access to and retrieval of serendipity and parallel mode scientific raw data shall be possible, according to access rights and privileges.

3.1.5.5 Access and retrieval of scientific tools

HCSS-UR-3.1-1070 The HCSS shall allow on-line access by astronomers to S/W tools according to access rights, in particular tools for data reduction purposes (IA).

HCSS-UR-3.1-1080 The HCSS shall allow the downloading of S/W tools according to access rights.
Examples of S/W tools are:
- *tools for Observation Proposal submission purpose (e.g starmap like tool)*
- *scientific tools for data reduction purpose (IA).*

HCSS-UR-3.1-1081 When an astronomer runs HCSS downloaded S/W tools on his/her computer, the HCSS shall detect whether an old version is installed, and shall recommend and provide the corresponding upgrade.

HCSS-UR-3.1-1082 The user shall have the option to prevent automatic upgrades of HCSS downloaded S/W tools.

3.1.5.6 HCSS data retrieval and modification monitoring

HCSS-UR-3.1-1090 It shall be possible to trace back any retrieval of data from the HCSS at the Herschel Science Centre.
The requirement does not apply to direct retrievals from the HCSS database made by expert users (HSC and ICCs).
In order to trace back, retrieval requests shall be logged indicating who, what and when. The users will be informed of this policy.
Note that a distinction between access (read, view) and retrieval (download) is made.

HCSS-UR-3.1-1095 It shall be possible to trace back which users, and when, have accessed an operational HCSS database where proprietary Herschel Observation data are stored.

HCSS-UR-3.1-1100 The HCSS shall have the capability to limit the amount of data that astronomers are allowed to retrieve.

The limits are related to e.g. total size of requested data, time of duration of retrieval.

HCSS-UR-3.1-1101 The user shall be offered the possibility to contact the HSC helpdesk by e-mail, to request a retrieval of an amount of data that exceeds the pre-defined limits.

HCSS-UR-3.1-1110 It shall be possible to trace back modifications to HCSS data.
Tracing back of modifications will be specified on a sub-system basis and will be implemented through versioning.

3.1.5.7 Telecommands and pointing

HCSS-UR-3.1-1111 The HCSS shall be able to associate the Telecommands in the TC history data to the instrument commanding requests in the corresponding Observations Schedule.

HCSS-UR-3.1-1112 The HCSS shall support the accurate association of pointing requests in the Observations Schedule, of Observations and of Observations building blocks with the actual satellite pointing data provided by the MOC.

3.1.5.8 Trend Analysis

HCSS-UR-3.1-1113 The HCSS shall support the access of Herschel data to carry out Trend Analysis on time intervals covering up to the duration of the mission.

HCSS-UR-3.1-1114 It shall be possible to request data (both raw and converted) outside an observation.
If a time period is selected, all data should be available even if they are not associated with an observation.

3.1.6 Calibration and cross-calibration

HCSS-UR-3.1-1115 The HCSS shall support the generation and/or editing of AOT and non-AOT based calibration Proposals.
Calibration Proposals will obviously not follow the acceptance cycle, and will be entered and submitted as stage-2 Proposals. They will not be subjected to the proposal update controls specified in section 3.1.2.5.

HCSS-UR-3.1-1120 The HCSS shall support the generation and submission of AOT based calibration Observations.

HCSS-UR-3.1-1130 The HCSS shall provide the capability to generate non-AOT based calibration Observations (i.e., engineering and non-AOT based calibration Observations).

Non-AOT Observations will also be template based but, unlike the AOT Observations, these templates are ICC/HSC internal and not available to the general astronomer. For the creation of these templates see HCSS-UR-3.1-1310.

HCSS-UR-3.1-1140 - Deleted-

HCSS-UR-3.1-1150 The HCSS shall be able to associate scheduling constraints definition with engineering and calibration Observations.
The HCSS is expected to automatically take these scheduling constraints into account when generating a draft Schedule (see 3.1.3.1).

HCSS-UR-3.1-1151 The HCSS shall alert the submitting ICC whenever calibration Observations requested for execution in a specific OD are excluded from the committed Schedule for that OD.

The HCSS will then treat calibration Observations as any other Observation (sections 3.1.3 & 3.1.5 also apply to calibration Observations)

HCSS-UR-3.1-1160 The HCSS shall support the submission, storage and access of calibration data for instrument commanding and product generation.
Calibration data can be both uplink and downlink calibration data.

HCSS-UR-3.1-1161 The HCSS shall support browsing, query and retrieval of calibration data that satisfy the criteria specified in the query.

HCSS-UR-3.1-1165 The HCSS shall support the storage, access to, browsing, query and retrieval of preparatory astronomical calibration sources data.
These data consist of, for example, source coordinates, photometry, spectral energy distributions, models, and related articles (see [RD-8]). Note that, in the case of Solar System Objects, the data are time dependent.

HCSS-UR-3.1-1166 The HCSS shall provide S/W tools to allow cross-calibration among the Herschel instruments and with other far-infrared and submillimetre instruments. These S/W tools shall allow the convolution of Observations taking into account instrument sensitivities, spectral resolution, angular resolution, band widths and units, as applicable.
The list of non Herschel instruments to be incorporated in the tools is to be defined.

3.1.7 S/W development and maintenance

HCSS-UR-3.1-1170 The HCSS shall support distributed S/W development.
Under distributed S/W development is understood that S/W developers who are located at different geographical locations can develop software in a consistent way and transparent from physical location. Support to S/

W development in the context of this requirement covers the support for S/W distribution, testing (installation and testing in a restricted environment) and installation in the operational environment.

HCSS-UR-3.1-1180 It shall be possible to interface additional clients to the HCSS through a standard API.

HCSS-UR-3.1-1190 It shall be possible to submit S/W tools by the ICCs for download by the HCSS users.

HCSS-UR-3.1-1200 - Deleted -

HCSS-UR-3.1-1205 It shall be possible to make statistics on downloaded HCSS S/W.

HCSS-UR-3.1-1210 It shall be possible to trace back any modification to any HCSS S/W.
In order to trace back, all modifications shall be logged indicating the who, what and when.

HCSS-UR-3.1-1220 The HCSS shall provide the capability to handle problems e.g. SPRs, SCRs, RIDs, which will include:

- submission
- tracking of progress
- control (accepting, rejecting, closing)
- access control
- report
- maintenance

Note that only authorized users in the HSC and ICCs shall be allowed to enter problem reports, not each observer or scientist using the archive. The problem reports to be handled by the system shall not be restricted to software, but shall also be related to anomalies and non-conformances found in H/W, operational procedures, or at the system engineering level. A more detailed list of problem reports to be handled by the HCSS will be defined by CSDT, ICCs and HSC.

HCSS-UR-3.1-1221 The HCSS shall provide access to the design documents and diagrams used for its construction, and the source code used to build it.

HCSS-UR-3.1-1222 The HCSS shall provide the capability to generate test data, to set up test environments, to execute tests on HCSS software, and to produce the corresponding test plans and reports.
It must be ensured that the testing environment does not affect the operational system. Separate operational and development environments shall exist at the HSC.
Not all test data can be generated by the HCSS (e.g. TM).

HCSS-UR-3.1-1223 The HCSS shall provide the capability of defining a development/test area with selected HCSS modules (aka "sandbox") that can be modified and run without affecting the operational HCSS. Optionally this area shall be shared among several users independently of the geographical location.

3.1.8 HCSS users registration

HCSS-UR-3.1-1230 The HCSS shall provide the facilities to manage the registration of its users.
The management of user registration covers the creation of accounts, editing their properties, removing or blocking access to an account and the production of reports.

HCSS-UR-3.1-1240 It shall be possible for a user to update part of his/her registration data.

3.1.9 Help-desk system

HCSS-UR-3.1-1250 The HCSS shall support the management of the astronomers' queries and corresponding answers through the Help-desk system.

HCSS-UR-3.1-1251 The Help-desk system shall acknowledge all incoming mails with a reference number.
Help-desk will be based on a Web page interface.

HCSS-UR-3.1-1252 The Help-desk system shall keep log files of all incoming and outgoing mails.

HCSS-UR-3.1-1253 The Help-desk system shall be capable of coping with MIME types with an easy access to software handling various styles.
Supported types will be: MS Word, Postscript, PDF, HTML, MS Excel, OASIS OpenDocument (Text, Spreadsheet, Presentation).

HCSS-UR-3.1-1254 The Help-desk system shall support keeping track of a question with associated reference number independently of the E-mails involved.
For example, if there are two questions in an E-mail, each one should be traced independently, since the first one may be answered and the second one still pending.

HCSS-UR-3.1-1255 The Help-desk system shall acknowledge each answer with a reference to the corresponding question.

HCSS-UR-3.1-1256 The Help-desk system shall automatically warn the operator of pending questions approaching the deadline set in the policy section. This warning time threshold (i.e. time between warning and deadline) should be configurable as well as the deadline length.

HCSS-UR-3.1-1257 The Help-desk system shall provide updated status information on pending questions.
The status information should contain e.g. who has pending questions, since when and the due date.

HCSS-UR-3.1-1258 The Help-desk system shall allow easy querying and browsing of questions and answers.
The queries will be, e.g., on a combination of topic, string search, similarity of question, date of answer and answerer.

HCSS-UR-3.1-1259 The Help-desk system shall support the generation and maintenance of FAQs.

HCSS-UR-3.1-1260 It shall be possible to automatically generate and maintain mailing lists of the HCSS user groups.
HSC help-desk will need to contact users by phone, email or fax.

HCSS-UR-3.1-1261 It shall be possible to configure the automatic distribution of information to large mailing lists.
It may be necessary to send the information with elapsed time between recipients or at a certain time, when it is less likely that there are network congestion problems.

HCSS-UR-3.1-1262 The Help-desk system shall be provided with a graphical user interface and on-line help for the Help-desk operator.
Not only a Help-desk operator, but also other users (PST astronomers, ICC members) will need to access the system with relatively low frequency.

HCSS-UR-3.1-1270 The Help-desk system shall provide the option to generate a standard set of statistics and have the possibility to query more complex statistics.
"Standard statistics" are number of mails received (per topic) and sent (mass mailings separated) and summary of pending questions. More complex statistics are to be calculated from fields stored in the database, e.g.: time received by helpdesk, time forwarded to answerer, time returned from answerer, time sent from helpdesk, answerer, topic.

3.1.10 HCSS state changes notification

HCSS-UR-3.1-1280 The HCSS shall provide a messaging service informing users of (classes of) changes to the system and to the database contents. The messaging service shall be configurable to allow users to select, according to user privileges, on what "subjects" he/she wants to get up to date information.
This requirement covers notifications to all HCSS users. For example, to the proposer/observer on changes on Observation status (e.g. successful submission, state changes such as from scheduled to observed, or data ready for download) or to S/W developers when a new module has been inserted or updated.

3.1.11 Common Uplink System

HCSS-UR-3.1-1290 The HCSS shall support the generation of a relative time tagged command mnemonic sequence corresponding to an observing mode with defined parameters.
Note that all Observations will be based on observing modes defined through templates.

HCSS-UR-3.1-1300 The HCSS shall support the computation of the duration of an Observation and of its building blocks corresponding to an observing mode with defined parameters.
This forms the basis for an Observing Time Calculator.

HCSS-UR-3.1-1310 The HCSS shall support the definition and editing of a new observing mode through the use of scripts.
The scripts shall provide the following capabilities:

- *start and end statements to explicitly bracket a measurement entity*
- *spacecraft related pointing commands (incl. all scientific pointing modes offered by Herschel)*
- *single instrument commands (incl. dummy commands) with their respective parameters represented by "verb elements" of the scripting language*
- *default parameter settings shall be identified by a special character*
- *flags to disable certain parameter and limit checks in the subsequent translation process needed for special engineering procedures*
- *branches*
- *loops*
- *use of variables and constants*
- *integer and floating point calculations*
- *string operations*

- *comments*
- *statements to write to displays*
- *I/O statements to allow the input/output of information (configuration data, logs etc.)*
- *call and/or inclusion of sub-routines, scripts or other routines with and without parameters to allow easy access to already written batch code*
- *call of more complex commanding structures (e.g. a combination of OBCPs and single instrument commands).*

HCSS-UR-3.1-1320 The HCSS shall support the validation of a script corresponding to a new or modified observing mode.
The validation involves to check the script for correctness of syntax and to check whether the provided parameters for the individual commands have valid values and are within allowed limits.

HCSS-UR-3.1-1330 It shall be possible to disable the validation for certain blocks or individual statements in the script.

HCSS-UR-3.1-1340 The HCSS shall provide an error message log and a detailed report during the generation of a relative time tagged command mnemonic sequence from an observing mode script.
The default error logging should be that errors within a block report back the block name in which the error occurs and the line number. The report should contain information about e.g. the total duration of the Observation/measurement and detailed duration of each individual building block.

HCSS-UR-3.1-1350 It shall be possible to retain a newly defined observing mode.

HCSS-UR-3.1-1360 It shall be possible to convert astronomical Observations (in the form of filled-out AOTs) into observing mode scripts.

HCSS-UR-3.1-1361 The HCSS shall support the definition and editing of a new Observation building block through the use of scripts. The Observation building block can subsequently be used in the definition of Observation modes or in the definition of other building blocks.

HCSS-UR-3.1-1362 - Deleted -.

3.1.12 Interactive Analysis

HCSS-UR-3.1-1370 IA shall work on the platform selected for the HCSS development (Linux) as well as on other Unix OS commonly used by the astronomical community. As a goal, IA should be platform independent.

That is, as a minimum, support to the following platforms will be provided:

- *Windows*
- *Solaris*
- *Linux*
- *Mac OS*

HCSS-UR-3.1-1380 IA shall contain two types of modules: (1) Observation data reduction modules and modules to generate pointing information, common for general and expert users (observer IA); and (2) modules for instrument and pointing calibration and for trend analysis, only for expert users (calibration IA).
Detailed instrument specific requirements can be found in [RD-5], [RD-6] and [RD-7].

HCSS-UR-3.1-1390 The observer IA shall consist of: (i) modules to interactively process Herschel data from raw data to final products (e.g. images, spectra); (ii) modules for data visualization; (iii) modules for data input/output.
Final products shall contain data that are ready for publication, e.g. calibrated images, calibrated coadded maps for large rasters, and calibrated spectra/spectral datacubes, processed to a level where positions, fluxes and wavelengths can be directly measured using common astronomical data analysis packages.
The availability in IA of powerful graphics and immediate visualization tools must be stressed.
Detailed instrument specific requirements can be found in [RD-5], [RD-6] and [RD-7].

HCSS-UR-3.1-1395 The user shall be able to run the standard product generation modules in the IA environment.
That is, the user shall be able to do the same processing steps with the same inputs (calibration objects, default user parameters) under IA as standard product generation would have done.

HCSS-UR-3.1-1400 The observer IA shall contain modules for data analysis (e.g. line and continuum fitting) and modules to import and handle fully processed data/catalogues from other sources, and to link them to the Herschel data.
It will be necessary e.g. to overplot images with source catalogues from other wavelengths.

HCSS-UR-3.1-1410 The observer IA user interface, architecture and documentation shall be similar for the three Herschel instruments.
This implies that e.g. GUIs appearance, module naming conventions, help system, for the three instruments follow agreed guidelines.

HCSS-UR-3.1-1420 The basic IA user interface shall consist of a command line and GUIs as appropriate. To work from GUIs should not be the only option.
Experience shows that interactive analysis restricted to GUIs limits the processing possibilities.
It is desirable that the command line language will be the same for all instruments.

HCSS-UR-3.1-1421 It shall be possible to invoke a GUI driven process from the command-line and to go back to the command-line mode. The output data from the GUI process shall be made available to the user for further processing from the command-line.

HCSS-UR-3.1-1430 The IA environment shall be flexible enough to provide the capabilities of a scripting language, with the possibility to run scripts containing calls to IA modules.
Scripts shall include the following capabilities:
- *Operations of constants, variables and structures*
- *String operations*
- *Loops*
- *Conditionals*
- *I/O routines from/to files or display*
- *Comments*

HCSS-UR-3.1-1440 It shall be possible to start IA data reduction processes in a batch mode.

HCSS-UR-3.1-1450 It shall be possible for the user to call his/her own data reduction programs written in the same language as IA, while in the IA environment.
"In the IA environment" means that the user has started IA and is using the IA user interface, either locally or remotely.

HCSS-UR-3.1-1460 Information shall be provided to the user on how to call his/her own local data reduction programs written in other software languages (to be specified) while in the IA environment.

HCSS-UR-3.1-1470 It shall be possible to use external astronomical and mathematical software libraries (to be specified) while in the IA environment.
Preferably the software libraries should be written in the same language as IA.

HCSS-UR-3.1-1480 The IA environment shall support local data and session storage in the user's computer.

HCSS-UR-3.1-1490 IA shall provide the capability to write and read data in formats (e.g. FITS, to be specified) that can be exported/imported to/from other data processing packages.

HCSS-UR-3.1-1500 IA data processing shall have well defined “break points” at which valid/meaningful intermediate products can be produced in format(s) accessible to the user.
A break point is understood to be the point between two tasks, not an ad-hoc interruption of the data processing run. As a consequence someone who has modules, or prefers to write modules, in another package can perform a certain step in this package and then go back and continue in the Herschel provided software.

HCSS-UR-3.1-1510 The source of the IA modules shall be made available to the general user, so that he/she has all the information on the algorithms applied.

HCSS-UR-3.1-1520 The user shall have the capability to modify IA modules and run the modified code in his/her local environment.

HCSS-UR-3.1-1530 The product generation log (modules run, input data, calibration files) shall be attached to each data product generated in the IA environment.
The product generation log can be specified for example in the header or in extensions to the exported format (e.g. FITS), so that it is not lost when the data is exported out of IA.

HCSS-UR-3.1-1540 IA shall provide enough information to identify the software and calibration files used in the data reduction to be referred to when publishing results.
IA modules and files will be continuously updated. For the implementation of this requirement it is necessary that e.g. IA releases are defined. This may be achieved through the definition of two IA levels: a lower working level, where modules are updated continuously, and an upper level, where modules are upgraded to in association with each new release.

HCSS-UR-3.1-1545 IA shall provide the capability to run an IA generated history file using the latest versions of the IA modules and calibration data.
The requirement refers only to functionality. The user might have to edit the history script in case of module and calibration file upgrades.

HCSS-UR-3.1-1550 IA shall be provided with a comprehensive help system which shall be context sensitive. The IA help system shall contain a manual, recipes on how to use the system and provide links to Herschel documents.

HCSS-UR-3.1-1555 It shall be possible to run (part of) IA without a network connection.
It is accepted that not all IA functionality will be available in stand-alone mode. For example, there will be science analysis tools that need internet access to programs or databases.
It is assumed that a network connection is required to obtain the data prior to analysis.

HCSS-UR-3.1-1556 It shall be possible to query, select and retrieve data via commands in the IA session.
The query utilities shall be the same as those specified in section 3.1.5.1.

HCSS-UR-3.1-1557 The command syntax to query, select and retrieve data within the IA environment, shall be simple and intuitive to use.

HCSS-UR-3.1-1558 Within an IA session, it shall be possible to browse, query and retrieve data from the IA local store.

3.1.13 Security

HCSS-UR-3.1-1560 The HCSS shall ensure the confidentiality of HCSS user registration data.
User registration data shall be password protected. Other type of accesses to HCSS user registration data by external parties (e.g. e-mail address lists) will be established by the PST.

HCSS-UR-3.1-1570 The HCSS shall ensure the confidentiality of Proposal data, according to the policy defined by the PS.
Proprietary Proposals which have not been accepted by HOTAC are only accessible to the Proposal owner and the PST.
For accepted proprietary Proposals, part of the data (i.e. necessary data to help new Proposal submitters avoid duplication) will be made publicly accessible, see also HCSS-UR-3.1-0100.

HCSS-UR-3.1-1580 The HCSS shall ensure the confidentiality all related HOTAC data, according to user access rights as defined by the PST.

HCSS-UR-3.1-1590 The HCSS shall make sure proprietary Observation raw data and products are only accessible to and retrievable by the owner of that data (or associated users, see section 2, “Observers”) during the corresponding proprietary time period.
The calibration scientists will have access to all data of their instrument, and to proprietary data from other instruments on request to the Project Scientist.

HCSS-UR-3.1-1600 It shall be possible to assign the proprietary time period to Observation raw data and products according to the policy guidelines established by the PS.

HCSS-UR-3.1-1610 The HCSS shall be protected against corruption by users.
Users shall never be allowed to perform actions that can corrupt, disturb or put out of service the HCSS.

3.1.14 User requirements specific for ILTs

HCSS-UR-3.1-1620 The HCSS shall provide the environment to process, analyse and store ILT generated data, and to generate and store the corresponding test analysis reports.
During ILTs, the HCSS will interface with the EGSE. See [RD-4] for a description of the ILT setup.

HCSS-UR-3.1-1630 The HCSS shall support queries on Test Procedures parameters.
Queriable parameters are e.g. instrument modes to be validated, Test procedure identification, Test conductor.

HCSS-UR-3.1-1640 The HCSS shall provide a mechanism for logging e.g. test progress, operator comments in electronic test logs.
This capability shall be permanently available in the system, not only for ILTs.

HCSS-UR-3.1-1650 The HCSS shall generate automatic persistent links among test procedure, uplink data, test procedure Observation data, test logs and test analysis report.

HCSS-UR-3.1-1660 The HCSS shall be able to link the Telecommands in the TC history data to the corresponding instrument or test equipment command mnemonics exported by the HCSS in association with a test procedure.

3.1.15 HCSS support to manual commanding

HCSS-UR-3.1-1670 The HCSS shall support the generation of observation command sequences which can be imported into the MOC control system and used to generate operational flight procedures.

HCSS-UR-3.1-1680 The HCSS shall support the generation of parameter values which can be assigned to telecommand parameters which are about to be manually commanded.

3.2 Constraint requirements

3.2.1 User interface

HCSS-UR-3.2-0010 The HCSS shall have a user interface that is compatible with generally used graphical user interfaces in astronomy.

Currently a WWW based user interface is the most logical option. This requirement applies to the main portals of the HCSS sub-systems, not to every module in particular.

3.2.2 HCSS access constraints

HCSS-UR-3.2-0020 It shall be possible to have local access to the HCSS functions, data and products (LAN connection).

HCSS-UR-3.2-0030 It shall be possible to have remote access to the HCSS functions, data and products (Internet connection and dedicated lines).

HCSS-UR-3.2-0031 Each type of user will have a single point of access to the HCSS.
The HCSS should look as a single entity to the user, regardless of the system and database being distributed or replicated.

HCSS-UR-3.2-0040 Only authorised users shall have access to the HCSS functions, data and products.

HCSS-UR-3.2-0050 Authorisation to access an HCSS function, data or product, and the type of access (e.g. read/create/modify/delete), shall be defined according to the user group and user name with precedence of user name.

HCSS-UR-3.2-0060 Each individual user shall belong to at least one user group.

HCSS-UR-3.2-0061 It shall be possible to configure a remote site as read-only with respect to the HCSS database.

HCSS-UR-3.2-0070 The HCSS shall at least be able to support the access to functions as defined in [Appendix A:] of this document.
In particular the following accesses shall be outlined:
1. Access by the ICC of the draft Schedule generation function. Indeed it shall be possible for an ICC to draft complete or partial Schedules with previously generated and submitted calibration or engineering Observations. In case of a draft of a partial Schedule, one should understand that a Schedule is initiated with calibration or engineering Observations by an ICC and completed with science Observations by the HSC.
2. Access by an observer to Observation end-product generation. This corresponds to the concept of on-demand reprocessing.

HCSS-UR-3.2-0080 The HCSS shall have a response time which is consistent with interactive use.
Nominally the response time should be less than a second. This response time is the time interval between entering a command or pushing a button and getting the action started by the system. It does not include network delays in case of remote access.

HCSS-UR-3.2-0090 The HCSS shall support a minimum of 30 (TBC by the HSC and ICCs operations plans) remote accesses in parallel for expert users (HSC and ICCs).

HCSS-UR-3.2-0100 The HCSS shall support a minimum of 50 (TBC by the HSC and ICCs operations plans) local accesses in parallel for expert users (HSC and ICCs).

HCSS-UR-3.2-0110 The HCSS shall guarantee one access by each operational center (HSC, ICCs and MOC) for operational tasks, at any time the HSC is available, irrespective of the number of current accesses.

HCSS-UR-3.2-0111 The HCSS shall allow "batch-type" transaction facilities (e.g. updates), that enables applications to communicate with the HCSS without human intervention.
A batch transaction is a transaction that is not initiated from an interactive session.

HCSS-UR-3.2-0112 The HCSS/Herschel Science Archive shall support 120 accesses for general users (non HSC or ICCs) in any 10 minute period.
The maximum number of accesses to the ISO Data Archive in any 10 minute period has been 10. The maximum number of allowed simultaneous accesses is 120, but there is no record that it has ever happened.

HCSS-UR-3.2-0113 The HCSS shall allow several (authorised) users to read a data item in parallel.

3.2.3 HCSS operational constraints

HCSS-UR-3.2-0120 The HCSS shall support decentralized operations using network facilities.
The HCSS is to be designed to support Herschel scientific operations on multiple sites (an HSC site and multiple ICC sites, with very likely more than one site per ICC). The operation of the HCSS shall not depend in principle on the physical site where they are performed.

HCSS-UR-3.2-0130 The HCSS shall support a smooth transition between mission phases.
This requirement covers the need for the HCSS to support the retrieval and processing of data ingested in a previous phase of the mission (e.g. retrieval and processing of ILT data during the routine phase), and the re-usability of tools in different phases of the mission.
For a more detailed description of the concept of "smooth transition" see [AD-3].

HCSS-UR-3.2-0131 Simultaneous operation of HCSS subsystems shall be supported, taking into account the performance requirements defined in section 3.2.4.

The following main processes may run simultaneously:

- *Submission of proposals by observers and submission of HOTAC reports*
- *Processing of proposals in the database (e.g. statistics generation)*
- *Mission Planning generation of schedules*
- *Long Term mission planning*
- *Helpdesk activities*
- *Ingestion of telemetry and other ESOC files*
- *Standard Product Generation*
- *Quality Control Processing*
- *On-Demand Processing by the astronomer*
- *Interactive Analysis*
- *Querying of the database*
- *Provision of data for retrieval*
- *Bulk reprocessing of Observations with a new Standard Product Generation version*
- *Propagation of data to other sites*
- *S/W maintenance activities, including testing and HCSS builds*

3.2.4 HCSS performance constraints

HCSS-UR-3.2-0134 The performance of the system during “Proposal editing” shall be comparable to the average performance when filling in a Web form.

HCSS-UR-3.2-0135 The processing of all Proposals shall be done in less than 1 hour.
Processing here includes global updates in the database like new time estimations and checks against HOTAC time allocation.

HCSS-UR-3.2-0136 The HCSS shall be able to handle a total of 4000 Proposals, containing in average 50 Observations.
There should be no limitation to the number of Observations in a Proposal.

HCSS-UR-3.2-0137 The HCSS system shall be designed to cope with 2000 Proposal submissions a day and 1000 Proposal submissions per hour assuming the last hour changes are minor.
In ISO 1000 Proposals were submitted, with 90% on the last day and 50% on the last hour before the deadline.

HCSS-UR-3.2-0138 The HCSS shall be able to provide feedback in not more than 10 minutes to a user having submitted a Proposal on line. This first level of feedback is limited to acknowledging Proposal receipt.

HCSS-UR-3.2-0139 The HCSS time estimators shall provide the requested output in less than 10 seconds.
The goal is 1 second. This requirement applies both to stage-1 and stage-2 Proposals.

HCSS-UR-3.2-0140 The HCSS shall be able to generate a Schedule for a 24 hours (nominal) OD from ten thousand potential Observations in less than one hour.
It is foreseen to be able to generate 7 OD Schedules per working day.

HCSS-UR-3.2-0150 - Deleted -

HCSS-UR-3.2-0160 The HCSS shall support the storage of around a million Observations with their associated data and products.
This implies that the HCSS shall be able to store 60 Tbytes.
The ISO post mission archive is storing around 100 000 Observations including calibration and engineering Observations

HCSS-UR-3.2-0161 All data archived, as well as the latest versions of S/W and calibration files shall be ready to be delivered to authorised users within 5 minutes of a request.
This requirement assumes a standard data request for a few Gbytes, and data to which no processing must be applied. That is, it excludes the time required for e.g. On Demand Processing.

HCSS-UR-3.2-0162 It shall be possible to insert a new data object (in transactions < 1Mbyte) into the HCSS and have it accessible locally, after ingestion, for use within 10 seconds.

HCSS-UR-3.2-0163 It shall be possible to ingest in the HCSS, at a local node, a new object with a size of less than 100 Mbytes in 2 minutes.

HCSS-UR-3.2-0164 It shall be possible to insert a new s/w object into the HCSS and have it accessible after the next build.
If the user develops a task locally, the HCSS environment will provide means (e.g. sandbox, reloading) so that he/she and his/her collaborators do not have to wait for the next build to use/test it.

HCSS-UR-3.2-0165 The HCSS shall generate a build of the system in 5 hours.

HCSS-UR-3.2-0170 - Deleted -

HCSS-UR-3.2-0180 In average, the HCSS shall process the TM associated with 12 Operational Days of 24 hours (nominal) each, and produce the corresponding end-products (scientific, auxiliary data and quality data) in 24 hours.
The goal should be to process 24 hours of TM data in 15 minutes.

HCSS-UR-3.2-0190 The HCSS shall be able to retrieve TM data at a rate 8 times higher than the on-board TM data geneneration.
This requirement is to be understood in the context of TM replay.

HCSS-UR-3.2-0200 The HCSS shall not generate at a local node more than a minute delay between the ingestion and the retrieval of TM data.
This requirement is to be understood in the context of monitoring NRT TM data by the ICC, at either the ICC@MOC or the ICC@ICC. Considering IRD performance requirements, it means that ICCs at ICC@MOC will be able to retrieve TM from the HCSS within two minutes of reception of the TM at MOC.

3.2.5 Reliability, maintainability and availability constraints

HCSS-UR-3.2-0209 The HCSS shall be robust against gaps in telemetry.
Clearly this also includes the creation of data frames.

HCSS-UR-3.2-0210 The HCSS shall guarantee the consistency of the HCSS data.
This implies consistency between HCSS archived data and MOC data (TM and ancillary), among products in the archive in relation with the software versions and procedures used to generate them, and between the uplink and downlink data.

HCSS-UR-3.2-0211 The HCSS shall be available 24 hour a day (nominally).

HCSS-UR-3.2-0220 In case of accidental temporary loss of HCSS data, it shall be possible to restore these data or part of these data.

HCSS-UR-3.2-0221 The HCSS shall allow data deleted accidentally to be recovered up to a configurable period (not less than 5 days) after deletion.

HCSS-UR-3.2-0230 It shall not be possible to lose more than 24 hours of HCSS data (temporary loss).

HCSS-UR-3.2-0240 In case of a crash, it shall be possible to restore the HCSS database in less than 1 hour.

HCSS-UR-3.2-0250 The HCSS Mean Time To Failure shall be more than 2 months.

HCSS-UR-3.2-0260 The HCSS Mean Time To Repair shall be less than 2 hours.

HCSS-UR-3.2-0261 The maximum contiguous downtime for the HCSS shall be 24 hours.

HCSS-UR-3.2-0270 The HCSS shall be maintainable for a period of 20 years.

HCSS-UR-3.2-0280 Costs for the HCSS IA associated commercial software must be low.
To adopt commercial software or to develop the corresponding functionality in-house will be decided after a proper assessment of costs and advantages/disadvantages for the implementation of the system.

HCSS-UR-3.2-0290 It shall be possible to generate, submit and update Proposals, and to query and retrieve Herschel data without the need to pay for or manage commercial system licenses.

Appendix A: HCSS users versus HCSS functionalities usage matrix

HCSS main functionalities	HCSS sub-functionalities	General Public	astronomers	proposers	observers	HOTAC	PS Team	HSC Operations	ICC Teams	Help-desk	S/W devel. & mainten.	MOC
Information provision		y	y	y	y	y	y	y	y	y	y	y
Proposal generation & handling												
	generation of a new Proposal			y			y		y			
	submission of a new Proposal			y			y		y			
	update of a submitted Proposal			y			y		y			
	update of an accepted Proposal Observations				y		y		y	y		
	control of update Proposal						y			y		
	Statistics and report generation					y	y			y		
	Observation technical feasibility evaluation						y		y			
	Observation scientific evaluation					y	y					
	Proposal & Observation duplication check						y		y			
	Proposal & Observation acceptance & grading					y	y					
	Observation release						y					

Table 1: HCSS users versus HCSS functionalities matrix

HCSS main functionalities	HCSS sub-functionalities	General Public	astronomers	proposers	observers	HOTAC	PS Team	HSC Operations	ICC Teams	Help-desk	S/W devel. & mainten.	MOC
Observation schedul-ing												
	Draft Schedule gener-ation							y	y			
	Schedule approval						y					
	Committable Sched-ule generation							y				
	Schedule feed-back handling							y				
	Long term planning						y	y	y			
Product generation & quality control												
	Generation of Obser-vation products							y	y		y	
	On-demand genera-tion of products		y		y		y	y	y		y	
	Quality control of products						y	y	y			
Storage, access and retrieval of Herschel data, products & S/W												
	General[1]	y	y	y	y	y	y	y	y	y	y	y
	RTA and IA/QLA access and retrieval of TM								y			

Table 1: HCSS users versus HCSS functionalities matrix

HCSS main functionalities	HCSS sub-functionalities	General Public	astronomers	proposers	observers	HOTAC	PS Team	HSC Operations	ICC Teams	Help-desk	S/W devel. & mainten.	MOC
	Access and retrieval of Proposal information[1]		y	y	y	y	y	y	y	y		
	Access and retrieval of Observation raw data, quality control data and products[1]		y		y		y	y	y	y	y	
	Access and retrieval of scientific tools[1]		y		y		y		y			
	HCSS data retrieval and modification monitoring						y	y	y	y	y	
Calibration and cross-calibration support							y		y			
S/W development and maintenance							y		y		y	
HCSS users registration									y	y	y	
Support to help-desk							y		y	y		
HCSS state change notification			y	y	y	y	y	y	y	y	y	y
Common Uplink[2] System				y	y		y	y	y		y	
Interactive Analysis			y		y		y	y	y		y	

Table 1: HCSS users versus HCSS functionalities matrix

[1] According to data access and proprietary rights.

[2] Proposers and observers shall have access to the Observing Time Calculator part of the CUS

Appendix B: HCSS archive contents and HCSS user access

The following table provides an overview of the Herschel data that the HCSS shall archive and make available for retrieval according to user access rights and proprietary data periods. The columns indicate the required availability of the data sets for each HCSS user.

Herschel data	Herschel data sub-sets	General Public	astronomers	proposers	observers	HOTAC	PS Team	HSC Operations	ICC Teams	Help-desk	S/W devel. & mainten.	MOC
Mission documentation												
	Public documents	y	y	y	y	y	y	y	y	y	y	y
	Internal documents					y	y	y	y	y	y	y
Proposal data												
	Proposer's data[1]			y		y	y	y	y	y		
	Proposal text[1]			y		y	y	y	y	y		
	Target list[2]		y	y	y	y	y	y	y	y		
	Observing modes[2]		y	y	y	y	y	y	y	y		
	Detailed Observation parameters[2]		y	y	y	y	y	y	y	y		
	Proposal status[1]			y	y	y	y	y	y	y		
Help-desk database												
	Public data (i.e. FAQs)	y	y	y	y	y	y	y	y	y		
	Internal data						y		y			
HOTAC data												
	HOTAC reports					y	y					

Table 2: HCSS archive contents and HCSS user access

Herschel data	Herschel data sub-sets	General Public	astronomers	proposers	observers	HOTAC	PS Team	HSC Operations	ICC Teams	Help-desk	S/W devel. & mainten.	MOC
	Support to HOTAC (technical feasibility, duplication, etc.)					y	y					
Planning data												
	Planning skeleton							y	y			y
	Draft/approved/com-mittable/exported/ rejected Schedules						y	y	y			y
	Executed/aborted/ Schedules commands		y		y		y	y	y			y
	Commanding Time-line Summary		y		y		y	y	y			y
	Observation status (Scheduled/executed/ failed)		y		y		y	y	y	y		y
	Long-term plans						y	y	y			
	ICC draft calibration Schedules						y	y	y			
	SSO ephemerides database						y	y	y		y	y
Guide star catalogue			y		y		y	y	y			y
MOC operations data												
	SPACON operations report						y	y	y			y
	TC history[3]						y	y	y			y

Table 2: HCSS archive contents and HCSS user access

Herschel data	Herschel data sub-sets	General Public	astronomers	proposers	observers	HOTAC	PS Team	HSC Operations	ICC Teams	Help-desk	S/W devel. & mainten.	MOC
	OOL Information						y	y	y			y
Time Correlation			y		y		y	y	y		y	y
Satellite telemetry[3]			y		y		y	y	y		y	y
Auxiliary data												
	Orbit data		y		y		y	y	y		y	y
	Attitude pointing data		y		y		y	y	y		y	y
	SREM data		y		y		y	y	y			
Observation standard products[3]			y		y		y	y	y		y	
Instrument Health reports			y		y		y	y	y			y
Observations Quality control reports[3,4]			y		y		y	y	y		y	
Observations Analysis Report (ICC)							y	y	y		y	
Observation measurement derived parameters (TBC)									y			
Space Weather reports			y		y		y	y	y			
Papers published with Herschel data			y		y		y		y			
Test procedures, reports and input/output data												

Table 2: HCSS archive contents and HCSS user access

Herschel data	Herschel data sub-sets	General Public	astronomers	proposers	observers	HOTAC	PS Team	HSC Operations	ICC Teams	Help-desk	S/W devel. & mainten.	MOC
	ILTs, ISTs						y	y	y		y	
	End-to-End Tests, Simulations						y	y	y		y	y
S/W development/ maintenance												
	S/W Problem Reports				y		y	y	y		y	y
	S/W Change Reports				y		y	y	y		y	y
	S/W Installation notes		y	y	y		y	y	y		y	y
	S/W Release notes		y	y	y		y	y	y		y	y
	S/W modules[5]		y	y	y		y		y		y	
Calibration												
	Uplink/downlink calibration data		y		y		y	y	y		y	
	Calibration/engineering Observations definitions		y		y		y	y	y			
	Calibration/engineering scheduling constraints						y	y	y			
	Calibration/engineering Observations		y		y		y	y	y			
	Astronomical calibration sources data						y		y			
Instrument databases								y	y			y

Table 2: HCSS archive contents and HCSS user access

Herschel data	Herschel data sub-sets	General Public	astronomers	proposers	observers	HOTAC	PS Team	HSC Operations	ICC Teams	Help-desk	S/W devel. & mainten.	MOC
Instrument On board S/W and memory images								y	y			y
Instrument Command Sequences								y	y			y

Table 2: HCSS archive contents and HCSS user access

[1] Only the owner of the Proposal (proposer or ICC) can access the corresponding data

[2] Only available for accepted Proposals

[3] Available to astronomers after the proprietary period has expired. Each ICC will have granted access to all data of their instrument, and to other instruments data on request to the Project Scientist.

[4] The Observation Quality control report is the result of compiling, selecting and displaying in readable form all quality related data (from HSC, MOC and ICCs)

[5] Only S/W development/maintenance shall be allowed to modify/insert modules. Certain S/W modules (e.g. IA) shall be accessible to be downloaded by other users.

Appendix C: HCSS URD/ SIRD requirements matrix

HCSS URD requirement	SIRD requirements
HCSS-UR-3.1-0010	FSCF-005, FSCO-015
HCSS-UR-3.1-0020	FSCF-005, FSCO-015
HCSS-UR-3.1-0030	ICCO-090, FSCF-005, FSCO-015
HCSS-UR-3.1-0040	FSCF-020, FSCF-045, FSCF-155, FSCO-010
HCSS-UR-3.1-0050	FSCF-020, FSCF-045, FSCF-155, FSCO-010
HCSS-UR-3.1-0060	FSCF-020, FSCF-155, FSCO-010, FSCO-015
HCSS-UR-3.1-0070	FSCF-020, FSCF-075, FSCF-155, FSCO-010, FSCO-015
HCSS-UR-3.1-0080	ICCF-105, FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0081	ICCF-105, FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0082	ICCF-105, FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0083	ICCF-105, FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0084	ICCF-105, FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0085	ICCF-105, FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0086	ICCF-105, FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0100	FSCF-020, FSCF-155, FSCO-010, FSCO-015
HCSS-UR-3.1-0120	FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0130	FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0140	FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0150	FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0160	FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0170	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010
HCSS-UR-3.1-0180	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010
HCSS-UR-3.1-0190	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0191	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010, FSCO-065

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.1-0200	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010
HCSS-UR-3.1-0210	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010
HCSS-UR-3.1-0220	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010
HCSS-UR-3.1-0230	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0240	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0250	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010
HCSS-UR-3.1-0260	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0261	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0262	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0263	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0270	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0280	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0290	FSCF-020, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0300	FSCF-020, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0310	FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0311	FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0320	FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0330	FSCF-020, FSCF-155, FSCO-010
HCSS-UR-3.1-0340	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010
HCSS-UR-3.1-0360	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010
HCSS-UR-3.1-0370	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010
HCSS-UR-3.1-0371	FSCF-020, FSCF-045, FSCF-155, FSCO-010

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.1-0380	FSCF-020, FSCF-045, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0381	FSCF-020, FSCF-155, FSCF-165, FSCO-010, FSCO-065
HCSS-UR-3.1-0390	FSCF-160, FSCO-060
HCSS-UR-3.1-0400	FSCF-160, FSCO-060
HCSS-UR-3.1-0410	FSCF-160, FSCO-060
HCSS-UR-3.1-0420	FSCF-160, FSCO-060
HCSS-UR-3.1-0430	FSCF-160, FSCO-060
HCSS-UR-3.1-0440	FSCF-160, FSCO-060
HCSS-UR-3.1-0450	FSCF-160, FSCO-060
HCSS-UR-3.1-0460	FSCF-160, FSCO-060
HCSS-UR-3.1-0470	FSCF-160, FSCO-060
HCSS-UR-3.1-0480	FSCF-160, FSCO-060
HCSS-UR-3.1-0490	FSCF-160, FSCO-060
HCSS-UR-3.1-0500	FSCF-160, FSCO-060
HCSS-UR-3.1-0505	FSCF-160, FSCO-060
HCSS-UR-3.1-0510	FSCF-160, FSCO-060
HCSS-UR-3.1-0520	FSCF-160, FSCO-060
HCSS-UR-3.1-0530	FSCF-160, FSCO-060
HCSS-UR-3.1-0540	FSCF-160, FSCO-060
HCSS-UR-3.1-0550	FSCF-160, FSCO-060
HCSS-UR-3.1-0560	FSCF-160, FSCO-060
HCSS-UR-3.1-0570	FSCF-160, FSCO-060
HCSS-UR-3.1-0580	FSCF-160, FSCO-060
HCSS-UR-3.1-0590	FSCF-160, FSCO-060
HCSS-UR-3.1-0600	FSCF-160, FSCO-060
HCSS-UR-3.1-0610	FSCF-160, FSCF-165, FSCO-060, FSCO-065

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.1-0620	FSCF-010, FSCO-060
HCSS-UR-3.1-0630	FSCF-010, FSCO-060
HCSS-UR-3.1-0631	FSCF-010, FSCO-060
HCSS-UR-3.1-0640	FSCF-010, FSCO-060
HCSS-UR-3.1-0641	FSCF-010, FSCO-060
HCSS-UR-3.1-0642	FSCF-010, FSCO-060
HCSS-UR-3.1-0650	FSCF-010, FSCO-060
HCSS-UR-3.1-0660	ICCF-130, ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-210, FSCO-067, FSCA-003, FSCA-004
HCSS-UR-3.1-0670	ICCF-130, ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-210, FSCO-067, FSCA-003, FSCA-004
HCSS-UR-3.1-0680	ICCF-130, ICCF-210, ICCF-215, FSCF-020, FSCF-105, FSCF-210, FSCO-067, FSCA-003, FSCA-004
HCSS-UR-3.1-0690	ICCF-130, ICCF-210, ICCF-215, FSCF-020, FSCF-105, FSCF-210, FSCO-067, FSCA-003, FSCA-004
HCSS-UR-3.1-0700	ICCF-130, ICCF-210, ICCF-215, FSCF-020, FSCF-105, FSCF-210, FSCO-067, FSCA-003, FSCA-004
HCSS-UR-3.1-0701	ICCF-130, ICCF-210, ICCF-215, FSCF-020, FSCF-105, FSCF-210, FSCO-067, FSCA-003, FSCA-004
HCSS-UR-3.1-0710	ICCF-130, ICCF-210, ICCF-215, FSCF-020, FSCF-105, FSCF-210, FSCO-067, FSCA-003, FSCA-004
HCSS-UR-3.1-0720	FSCF-020, FSCF-045, FSCF-105, FSCF-105, FSCF-220, FSCO-068, FSCA-003, FSCA-004
HCSS-UR-3.1-0730	FSCF-020, FSCF-045, FSCF-105, FSCF-105, FSCF-220, FSCO-068, FSCA-003, FSCA-004
HCSS-UR-3.1-0740	FSCF-020, FSCF-045, FSCF-105, FSCF-105, FSCF-220, FSCO-068, FSCA-003, FSCA-004
HCSS-UR-3.1-0750	FSCF-020, FSCF-045, FSCF-105, FSCF-105, FSCF-220, FSCO-068, FSCA-003, FSCA-004
HCSS-UR-3.1-0760	FSCF-020, FSCF-045, FSCF-105, FSCF-105, FSCF-220, FSCO-068, FSCA-003, FSCA-004

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.1-0761	FSCF-020, FSCF-045, FSCF-105, FSCF-220, FSCO-068, FSCA-003, FSCA-004
HCSS-UR-3.1-0762	FSCF-020, FSCF-045, FSCF-105, FSCF-220, FSCO-068, FSCA-003, FSCA-004
HCSS-UR-3.1-0764	FSCF-020, FSCF-045, FSCF-105, FSCF-220, FSCO-068, FSCA-003, FSCA-004
HCSS-UR-3.1-0770	FSCF-020, FSCF-045, FSCF-105, FSCF-230, FSCO-069, FSCA-003, FSCA-004
HCSS-UR-3.1-0780	ICCO-070, FSCF-020, FSCF-105, FSCF-230, FSCO-069, FSCA-003, FSCA-004
HCSS-UR-3.1-0790	FSCF-020, FSCF-105, FSCF-230, FSCO-069, FSCA-003, FSCA-004
HCSS-UR-3.1-0791	FSCF-020, FSCF-105, FSCF-230, FSCO-069, FSCA-003, FSCA-004
HCSS-UR-3.1-0800	ICCO-070, FSCF-020, FSCF-105, FSCF-230, FSCO-010, FSCO-069, FSCA-003, FSCA-004
HCSS-UR-3.1-0810	FSCF-020, FSCF-105, FSCF-230, FSCO-010, FSCO-069, FSCA-003, FSCA-004
HCSS-UR-3.1-0820	FSCF-020, FSCF-105, FSCF-230, FSCO-010, FSCO-069, FSCA-003, FSCA-004
HCSS-UR-3.1-0830	FSCF-020, FSCF-105, FSCF-230, FSCO-010, FSCO-069, FSCA-003, FSCA-004
HCSS-UR-3.1-0835	FSCF-020, FSCF-105, FSCF-230, FSCO-010, FSCO-069, FSCA-003, FSCA-004
HCSS-UR-3.1-0840	ICCF-120, ICCF-125, ICCF-210, FSCF-020, FSCF-045, FSCF-105, FSCF-110, FSCF-150, FSCO-015, FSCO-055, FSCA-002, FSCA-003, FSCA-003, FSCA-004
HCSS-UR-3.1-0850	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCF-170, FSCO-050, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-0860	ICCF-185, FSCF-105, FSCF-150, FSCO-075, FSCA-001, FSCA-003, FSCA-004, PAQA-031
HCSS-UR-3.1-0870	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-105, FSCF-150, FSCA-001, FSCA-003, FSCA-004

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.1-0880	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-110, FSCF-150, FSCA-003, FSCA-004
HCSS-UR-3.1-0885	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-110, FSCF-150, FSCA-003, FSCA-004
HCSS-UR-3.1-0890	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, ICCO-050, FSCA-003, FSCA-004
HCSS-UR-3.1-0900	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, ICCO-050, FSCA-003, FSCA-004
HCSS-UR-3.1-0910	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCO-070, ICCO-050, FSCA-003, FSCA-004
HCSS-UR-3.1-0920	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, ICCO-050, FSCA-003, FSCA-004
HCSS-UR-3.1-0921	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, ICCO-050, FSCA-003, FSCA-004
HCSS-UR-3.1-0930	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-105, FSCF-150, ICCO-050, FSCA-003, FSCA-004
HCSS-UR-3.1-0931	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-105, FSCF-150, ICCO-050, FSCA-003, FSCA-004
HCSS-UR-3.1-0940	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-105, FSCF-150, ICCO-050, FSCA-003, FSCA-004
HCSS-UR-3.1-0950	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-105, FSCF-150, ICCO-050, FSCA-003, FSCA-004
HCSS-UR-3.1-0955	ICCF-120, ICCF-125, ICCF-210, ICCF-215, FSCF-105, FSCF-150, ICCO-050, FSCA-003, FSCA-004
HCSS-UR-3.1-0960	ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, ICCO-050, FSCA-003, FSCA-004
HCSS-UR-3.1-0970	ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCA-003, FSCA-004
HCSS-UR-3.1-0975	ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCA-003, FSCA-004
HCSS-UR-3.1-0980	ICCF-210, ICCF-215, FSCF-105, FSCF-150, FSCA-003, FSCA-004

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.1-0981	ICCF-210, ICCF-215, FSCF-105, FSCF-150, FSCA-003, FSCA-004
HCSS-UR-3.1-0990	ICCF-130, ICCO-035, ICCO-040, ICCO-045, FSCF-150
HCSS-UR-3.1-0991	ICCF-130, ICCO-035, ICCO-040, ICCO-045, FSCF-150
HCSS-UR-3.1-0992	ICCF-130, ICCO-035, ICCO-040, ICCO-045, FSCF-150
HCSS-UR-3.1-0993	ICCF-130, ICCO-035, ICCO-040, ICCO-045, FSCF-150
HCSS-UR-3.1-0994	ICCF-130, ICCO-035, ICCO-040, ICCO-045, FSCF-150
HCSS-UR-3.1-1000	FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCO-015, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1010	ICCO-090, FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCO-015, FSCA-003, FSCA-004
HCSS-UR-3.1-1020	ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCA-003, FSCA-004
HCSS-UR-3.1-1030	ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCA-003, FSCA-004
HCSS-UR-3.1-1050	FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCO-025, FSCA-003, FSCA-004
HCSS-UR-3.1-1060	ICCF-215, ICCO-060, FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCA-003, FSCA-004
HCSS-UR-3.1-1070	ICCF-130, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCF-155, FSCA-003, FSCA-004
HCSS-UR-3.1-1080	ICCF-130, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCF-155, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1081	ICCF-130, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCF-155, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1082	ICCF-130, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCF-155, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1090	ICCF-215, FSCF-020, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1095	ICCF-215, FSCF-020, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.1-1100	FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1101	FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1110	FSCF-020, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1111	FSCF-150, FSCA-003, FSCA-004
HCSS-UR-3.1-1112	ICCF-125, ICCO-040, ICCO-042, ICCO-050, FSCF-020, FSCF-150, FSCF-210, FSCO-012, FSCA-003, FSCA-004
HCSS-UR-3.1-1113	ICCF-130, ICCF-176, ICCF-180, ICCF-215, ICCO-040
HCSS-UR-3.1-1114	ICCF-130, ICCF-176, ICCF-180, ICCF-215, ICCO-040
HCSS-UR-3.1-1115	ICCO-030, ICCO-050
HCSS-UR-3.1-1120	ICCO-030, ICCO-050
HCSS-UR-3.1-1130	ICCO-030, ICCO-050
HCSS-UR-3.1-1150	ICCO-030, ICCO-050, FSCF-160
HCSS-UR-3.1-1151	ICCO-030, ICCO-050, FSCF-160
HCSS-UR-3.1-1160	FSCF-150, ICCO-030, ICCO-050
HCSS-UR-3.1-1161	FSCF-150, ICCO-030, ICCO-050
HCSS-UR-3.1-1165	ICCF-135, ICCF-145, ICCF-147, ICCF-148, ICCO-030, ICCO-050, ICCA-025, FSCF-060, FSCF-065, FSCF-075, FSCF-080, FSCF-085, FSCF-087, FSCF-105, FSCF-150
HCSS-UR-3.1-1166	ICCF-130, ICCO-050, ICCO-072, ICCA-045, FSCF-080, FSCF-105, FSCA-004
HCSS-UR-3.1-1170	ICCF-176, ICCF-177, ICCO-080, ICCA-030, FSCF-170
HCSS-UR-3.1-1180	ICCF-176, ICCF-177, ICCO-080, ICCA-030, FSCF-170
HCSS-UR-3.1-1190	ICCF-176, ICCF-177, ICCO-080, ICCA-030, FSCF-170
HCSS-UR-3.1-1210	FSCF-170, FSCO-050
HCSS-UR-3.1-1220	ICCF-176, ICCF-177, ICCO-080, ICCA-030, FSCO-050, FSCO-075

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.1-1221	ICCF-190, ICCO-080, FSCF-105, FSCF-170, FSCF-185, FSCO-050
HCSS-UR-3.1-1222	ICCF-176, ICCF-177, ICCF-190, ICCF-195, ICCO-065, ICCO-080, ICCA-030, ICCA-035, FSCF-170, FSCO-050
HCSS-UR-3.1-1223	ICCF-176, ICCF-177, ICCO-065, ICCO-080, ICCA-030, FSCF-170, FSCO-050
HCSS-UR-3.1-1230	FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1240	FSCF-020, FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1250	FSCF-020, FSCF-045, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1251	FSCF-020, FSCF-045, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1252	FSCF-020, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1253	FSCF-020, FSCF-045, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1254	FSCF-020, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1255	FSCF-020, FSCF-045, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1256	FSCF-020, FSCF-105, FSCO-015, FSCO-015, FSCA-004
HCSS-UR-3.1-1257	FSCF-020, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1258	FSCF-020, FSCF-045, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1259	FSCF-020, FSCF-045, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1260	FSCF-020, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1261	FSCF-020, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1262	FSCF-020, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1270	FSCF-020, FSCF-105, FSCO-015, FSCA-004
HCSS-UR-3.1-1280	FSCF-020, FSCF-045, FSCF-105, FSCO-070, FSCA-003, FSCA-004
HCSS-UR-3.1-1290	ICCF-050, ICCF-060, ICCF-070, ICCO-075
HCSS-UR-3.1-1300	ICCF-050, ICCF-060, ICCF-070, ICCO-075
HCSS-UR-3.1-1310	ICCF-050, ICCF-060, ICCF-070, ICCO-075

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.1-1320	ICCF-050, ICCF-060, ICCF-070, ICCO-075
HCSS-UR-3.1-1330	ICCF-050, ICCF-060, ICCF-070, ICCO-075
HCSS-UR-3.1-1340	ICCF-050, ICCF-060, ICCF-070, ICCO-075
HCSS-UR-3.1-1350	ICCF-050, ICCF-060, ICCF-070, ICCO-075
HCSS-UR-3.1-1360	ICCF-050, ICCF-060, ICCF-070, ICCO-075
HCSS-UR-3.1-1361	ICCF-050, ICCF-060, ICCF-070, ICCO-075
HCSS-UR-3.1-1370	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1380	ICCF-130, ICCO-050, ICCO-070, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1390	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1395	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1400	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1410	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1420	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1421	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1430	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1440	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1450	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1460	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1470	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.1-1480	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1490	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1500	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1510	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1520	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1530	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1540	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1545	ICCF-130, ICCO-050, ICCO-075, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1550	ICCF-130, ICCO-050, ICCO-075, ICCO-090, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1555	ICCF-130, ICCO-050, ICCO-075, ICCO-090, ICCA-025, FSCF-020, FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.1-1556	ICCF-120, ICCF-125, ICCF-130, ICCF-210, ICCF-215, FSCF-020, FSCF-045, FSCF-105, FSCF-150, ICCO-050, ICCO-075, ICCO-090, FSCO-070, ICCA-025, FSCA-003, FSCA-004
HCSS-UR-3.1-1557	ICCF-130, ICCF-210, ICCF-215, FSCF-105, FSCF-150, ICCO-050, ICCO-075, ICCO-090, ICCA-025, FSCA-003, FSCA-004
HCSS-UR-3.1-1558	ICCF-130, ICCF-215, FSCF-105, FSCF-150, ICCO-050, ICCA-25, FSCA-004
HCSS-UR-3.1-1560	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1570	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1580	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.1-1590	FSCF-045, FSCF-105, FSCF-150, FSCO-025, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1600	FSCF-045, FSCF-105, FSCF-150, FSCO-025, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1610	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.1-1620	FSCF-150
HCSS-UR-3.1-1630	FSCF-150
HCSS-UR-3.1-1640	FSCF-150
HCSS-UR-3.1-1650	FSCF-150
HCSS-UR-3.1-1660	FSCF-150
HCSS-UR-3.1-1670	ICCF-065, ICCF-075, ICCF-090, ICCF-095, ICCF-100, ICCF-115, ICCF-170, ICCO-035, ICCO-040, FSCF-175
HCSS-UR-3.1-1680	ICCF-065, ICCF-075, ICCF-090, ICCF-095, ICCF-100, ICCF-115, ICCF-170, ICCO-035, ICCO-040, FSCF-175
HCSS-UR-3.2-0010	FSCF-045, FSCF-105, FSCA-003, FSCA-004
HCSS-UR-3.2-0020	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.2-0030	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.2-0031	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.2-0040	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.2-0050	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.2-0060	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.2-0061	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003
HCSS-UR-3.2-0070	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.2-0080	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003
HCSS-UR-3.2-0090	FSCF-150, FSCO-055, FSCA-003, PERF-053
HCSS-UR-3.2-0100	FSCF-150, FSCO-055, FSCA-003, PERF-053
HCSS-UR-3.2-0110	FSCF-150, FSCO-055, FSCA-003
HCSS-UR-3.2-0111	FSCF-150, FSCO-055, FSCA-003
HCSS-UR-3.2-0112	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004, PERF-053
HCSS-UR-3.2-0113	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004, PERF-054
HCSS-UR-3.2-0120	FSCF-150, FSCO-055, FSCA-003
HCSS-UR-3.2-0130	FSCF-105, FSCF-150, FSCA-003
HCSS-UR-3.2-0131	FSCF-140, FSCF-150, FSCO-010, FSCO-015, FSCO-055, FSCO-060, FSCO-065, FSCO-067, FSCO-069, FSCO-075, FSCA-003
HCSS-UR-3.2-0134	FSCF-045, FSCF-155, FSCO-010
HCSS-UR-3.2-0135	FSCF-045, FSCF-155, FSCO-010, PERF-031
HCSS-UR-3.2-0136	FSCF-105, FSCF-155, FSCO-010, PERF-031
HCSS-UR-3.2-0137	FSCF-045, FSCF-155, FSCO-010, PERF-016
HCSS-UR-3.2-0138	FSCF-045, FSCF-155, FSCO-010, PERF-017
HCSS-UR-3.2-0139	ICCF-105, FSCF-155, FSCO-010
HCSS-UR-3.2-0140	FSCO-060, PERF-021
HCSS-UR-3.2-0160	FSCF-105, FSCF-110, FSCF-150, FSCO-055, FSCA-003, FSCA-004, PERF-059a
HCSS-UR-3.2-0161	FSCF-150, FSCO-055, FSCA-003, FSCA-004, PERF-056
HCSS-UR-3.2-0162	FSCF-150, FSCO-055
HCSS-UR-3.2-0163	FSCF-150, FSCO-075
HCSS-UR-3.2-0164	FSCF-150, FSCO-075, PERF-060b
HCSS-UR-3.2-0165	FSCF-150, FSCO-075, PERF-060b
HCSS-UR-3.2-0180	FSCO-055, FSCA-003, FSCA-004, PERF-070

HCSS URD requirement	SIRD requirements (Continued)
HCSS-UR-3.2-0190	FSCO-055
HCSS-UR-3.2-0200	FSCF-150, FSCO-055
HCSS-UR-3.2-0209	FSCF-150, FSCF-210, FSCF-220, FSCF-230, FSCO-055, FSCO-067, FSCO-068, FSCO-069
HCSS-UR-3.2-0210	FSCF-105, FSCF-110, FSCF-150, FSCO-055, FSCA-001, FSCA-002, FSCA-003
HCSS-UR-3.2-0211	FSCF-045, FSCF-105, FSCF-150, FSCO-055, FSCA-003, FSCA-004, PERF-010, PERF-050
HCSS-UR-3.2-0220	FSCF-105, FSCF-110, FSCF-150, FSCO-055, FSCO-075, FSCA-001
HCSS-UR-3.2-0221	FSCF-105, FSCF-110, FSCF-150, FSCO-055, FSCO-075, FSCA-001, PERF-055
HCSS-UR-3.2-0230	FSCF-105, FSCF-110, FSCF-150, FSCO-055, FSCO-075, FSCA-001, FSCA-003
HCSS-UR-3.2-0240	FSCF-110, FSCF-150, FSCO-055, FSCO-075, FSCA-001, FSCA-003
HCSS-UR-3.2-0250	FSCF-150, FSCO-055
HCSS-UR-3.2-0260	FSCF-150, FSCO-055
HCSS-UR-3.2-0261	FSCF-150, FSCO-055, FSCA-003, PERF-011, PERF-023, PERF-030, PERF-051
HCSS-UR-3.2-0270	FSCF-105, FSCF-110, FSCF-150, FSCO-055, FSCA-003, FSCA-004
HCSS-UR-3.2-0280	FSCF-020, FSCF-045, FSCF-105, FSCA-004
HCSS-UR-3.2-0290	FSCF-020, FSCF-045, FSCF-105, FSCA-004

Appendix D: HCSS requirements applicability to Herschel mission phases

For clarity, the mission phases listed in section 1.2 have been re-grouped as follows:

- Development, testing, and simulations:
  - Development and maintenance (note that this phase overlaps with all the others)
  - ILT
  - IST
  - Ground Segment simulations
- Call for Key Project Observation time proposals:
  - AOs
- Call for Guaranteed Time Observation time proposals:
  - AOs
- Call for Open Time Observation time proposals:
  - AOs
- Commissioning phase:
  - Commissioning
- Performance Verification phase:
  - Performance Verification
- Science demonstration phase:
  - Routine
- Routine phase:
  - Routine
- Run-down phase:
  - Archive
- Mission consolidation phase:
  - Archive
- Active archive phase:
  - Archive
- Archive consolidation phase
  - Archive

HCSS URD requirement	Development and maintenance	ILT	IST	GS Sim.	AOs	Commissioning	PV	Routine	Archive
HCSS-UR-3.1-0010					y	y	y	y	y
HCSS-UR-3.1-0020					y	y	y	y	y
HCSS-UR-3.1-0030					y	y	y	y	y
HCSS-UR-3.1-0040				y	y	y	y	y	
HCSS-UR-3.1-0050				y	y	y	y	y	
HCSS-UR-3.1-0060				y	y	y	y	y	
HCSS-UR-3.1-0070				y	y	y	y	y	y
HCSS-UR-3.1-0080					y	y	y	y	
HCSS-UR-3.1-0081					y	y	y	y	
HCSS-UR-3.1-0082					y	y	y	y	
HCSS-UR-3.1-0083					y	y	y	y	
HCSS-UR-3.1-0084					y	y	y	y	
HCSS-UR-3.1-0085					y	y	y	y	
HCSS-UR-3.1-0086					y	y	y	y	
HCSS-UR-3.1-0100					y			y	
HCSS-UR-3.1-0120				y	y	y	y	y	
HCSS-UR-3.1-0130				y	y	y	y	y	
HCSS-UR-3.1-0140				y	y	y	y	y	
HCSS-UR-3.1-0150				y	y	y	y	y	
HCSS-UR-3.1-0160				y	y	y	y	y	
HCSS-UR-3.1-0170				y	y	y	y	y	
HCSS-UR-3.1-0180				y	y	y	y	y	
HCSS-UR-3.1-0190				y	y	y	y	y	

HCSS URD requirement	Development and maintenance	ILT	IST	GS Sim.	AOs	Commissioning	PV	Routine	Archive
HCSS-UR-3.1-0191				y	y	y	y	y	
HCSS-UR-3.1-0200				y	y	y	y	y	
HCSS-UR-3.1-0210				y	y	y	y	y	
HCSS-UR-3.1-0220				y	y	y	y	y	
HCSS-UR-3.1-0230				y	y	y	y	y	
HCSS-UR-3.1-0240				y	y	y	y	y	
HCSS-UR-3.1-0250				y	y	y	y	y	
HCSS-UR-3.1-0260					y			y	
HCSS-UR-3.1-0261					y			y	
HCSS-UR-3.1-0262					y			y	
HCSS-UR-3.1-0263					y			y	
HCSS-UR-3.1-0270					y			y	
HCSS-UR-3.1-0280					y			y	
HCSS-UR-3.1-0290				y	y	y	y	y	
HCSS-UR-3.1-0300				y	y	y	y	y	
HCSS-UR-3.1-0310					y			y	y
HCSS-UR-3.1-0311					y			y	y
HCSS-UR-3.1-0320					y	y	y	y	
HCSS-UR-3.1-0330					y			y	
HCSS-UR-3.1-0340					y			y	
HCSS-UR-3.1-0360					y			y	
HCSS-UR-3.1-0370					y			y	
HCSS-UR-3.1-0371					y			y	
HCSS-UR-3.1-0380				y	y	y	y	y	

HCSS URD requirement	Development and maintenance	ILT	IST	GS Sim.	AOs	Commissioning	PV	Routine	Archive
HCSS-UR-3.1-0381				y	y	y	y	y	
HCSS-UR-3.1-0390				y		y	y	y	
HCSS-UR-3.1-0400				y		y	y	y	
HCSS-UR-3.1-0410				y		y	y	y	
HCSS-UR-3.1-0420				y		y	y	y	
HCSS-UR-3.1-0430				y		y	y	y	
HCSS-UR-3.1-0440				y		y	y	y	
HCSS-UR-3.1-0450				y		y	y	y	
HCSS-UR-3.1-0460				y		y	y	y	
HCSS-UR-3.1-0470				y		y	y	y	
HCSS-UR-3.1-0480				y		y	y	y	
HCSS-UR-3.1-0490				y		y	y	y	
HCSS-UR-3.1-0500				y		y	y	y	
HCSS-UR-3.1-0505				y		y	y	y	
HCSS-UR-3.1-0510				y		y	y	y	
HCSS-UR-3.1-0520				y		y	y	y	
HCSS-UR-3.1-0530				y		y	y	y	
HCSS-UR-3.1-0540				y		y	y	y	
HCSS-UR-3.1-0550				y		y	y	y	
HCSS-UR-3.1-0560				y		y	y	y	
HCSS-UR-3.1-0570				y		y	y	y	
HCSS-UR-3.1-0580				y		y	y	y	
HCSS-UR-3.1-0590				y		y	y	y	
HCSS-UR-3.1-0600				y		y	y	y	

HCSS URD requirement	Development and maintenance	ILT	IST	GS Sim.	AOs	Commissioning	PV	Routine	Archive
HCSS-UR-3.1-0610				y		y	y	y	
HCSS-UR-3.1-0620				y	y	y	y	y	
HCSS-UR-3.1-0630				y	y	y	y	y	
HCSS-UR-3.1-0631				y	y	y	y	y	
HCSS-UR-3.1-0640				y	y	y	y	y	
HCSS-UR-3.1-0641				y	y	y	y	y	
HCSS-UR-3.1-0642				y	y	y	y	y	
HCSS-UR-3.1-0650				y	y	y	y	y	
HCSS-UR-3.1-0660				y			y	y	y
HCSS-UR-3.1-0670				y			y	y	y
HCSS-UR-3.1-0680				y			y	y	y
HCSS-UR-3.1-0690				y			y	y	y
HCSS-UR-3.1-0700				y			y	y	y
HCSS-UR-3.1-0701				y			y	y	y
HCSS-UR-3.1-0710				y			y	y	y
HCSS-UR-3.1-0720				y				y	y
HCSS-UR-3.1-0730				y				y	y
HCSS-UR-3.1-0740				y				y	y
HCSS-UR-3.1-0750				y				y	y
HCSS-UR-3.1-0760				y				y	y
HCSS-UR-3.1-0761				y				y	y
HCSS-UR-3.1-0762				y				y	y
HCSS-UR-3.1-0764				y				y	y
HCSS-UR-3.1-0770				y			y	y	y

HCSS URD requirement	Development and maintenance	ILT	IST	GS Sim.	AOs	Commissioning	PV	Routine	Archive
HCSS-UR-3.1-0780				y			y	y	y
HCSS-UR-3.1-0790				y			y	y	y
HCSS-UR-3.1-0791				y			y	y	y
HCSS-UR-3.1-0800				y			y	y	y
HCSS-UR-3.1-0810				y			y	y	y
HCSS-UR-3.1-0820				y			y	y	y
HCSS-UR-3.1-0830				y			y	y	y
HCSS-UR-3.1-0835				y			y	y	y
HCSS-UR-3.1-0840	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-0850	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-0860	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-0870	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-0880	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-0890	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-0900	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-0910				y	y	y	y	y	y
HCSS-UR-3.1-0920				y	y	y	y	y	y
HCSS-UR-3.1-0921	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-0930	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-0931	y	y	y	y		y	y	y	y
HCSS-UR-3.1-0940			y	y	y	y	y	y	y
HCSS-UR-3.1-0950		y	y	y	y	y	y	y	y
HCSS-UR-3.1-0955		y	y	y	y	y	y	y	y
HCSS-UR-3.1-0960	y	y	y	y	y	y	y	y	y

HCSS URD requirement	Development and maintenance	ILT	IST	GS Sim.	AOs	Commissioning	PV	Routine	Archive
HCSS-UR-3.1-0970	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-0975	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-0980						y	y	y	y
HCSS-UR-3.1-0981		y	y	y		y	y	y	y
HCSS-UR-3.1-0990		y	y	y		y	y	y	
HCSS-UR-3.1-0991		y	y	y		y	y	y	
HCSS-UR-3.1-0992		y	y	y		y	y	y	
HCSS-UR-3.1-0993		y	y	y		y	y	y	
HCSS-UR-3.1-0994		y	y	y		y	y	y	
HCSS-UR-3.1-1000					y		y	y	y
HCSS-UR-3.1-1010								y	y
HCSS-UR-3.1-1020						y	y	y	y
HCSS-UR-3.1-1030						y	y	y	y
HCSS-UR-3.1-1050								y	y
HCSS-UR-3.1-1060								y	y
HCSS-UR-3.1-1070		y	y		y	y	y	y	y
HCSS-UR-3.1-1080		y	y		y	y	y	y	y
HCSS-UR-3.1-1081		y	y		y	y	y	y	y
HCSS-UR-3.1-1082		y	y		y	y	y	y	y
HCSS-UR-3.1-1090	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-1095							y	y	
HCSS-UR-3.1-1100								y	y
HCSS-UR-3.1-1101								y	y
HCSS-UR-3.1-1110	y	y	y	y	y	y	y	y	y

HCSS URD requirement	Development and maintenance	ILT	IST	GS Sim.	AOs	Commissioning	PV	Routine	Archive
HCSS-UR-3.1-1111		y	y	y		y	y	y	y
HCSS-UR-3.1-1112				y		y	y	y	y
HCSS-UR-3.1-1113				y		y	y	y	y
HCSS-UR-3.1-1114				y		y	y	y	y
HCSS-UR-3.1-1115				y		y	y	y	
HCSS-UR-3.1-1120				y		y	y	y	
HCSS-UR-3.1-1130				y		y	y	y	
HCSS-UR-3.1-1150				y		y	y	y	
HCSS-UR-3.1-1151				y		y	y	y	
HCSS-UR-3.1-1160		y	y	y		y	y	y	
HCSS-UR-3.1-1161		y	y	y		y	y	y	y
HCSS-UR-3.1-1165		y	y	y		y	y	y	y
HCSS-UR-3.1-1166		y	y	y		y	y	y	y
HCSS-UR-3.1-1170	y								
HCSS-UR-3.1-1180	y								
HCSS-UR-3.1-1190	y								
HCSS-UR-3.1-1210	y								
HCSS-UR-3.1-1220	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-1221	y								
HCSS-UR-3.1-1222	y								
HCSS-UR-3.1-1223	y								
HCSS-UR-3.1-1230	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-1240	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-1250					y			y	y

HCSS URD requirement	Development and maintenance	ILT	IST	GS Sim.	AOs	Commissioning	PV	Routine	Archive
HCSS-UR-3.1-1251					y			y	y
HCSS-UR-3.1-1252					y			y	y
HCSS-UR-3.1-1253					y			y	y
HCSS-UR-3.1-1254					y			y	y
HCSS-UR-3.1-1255					y			y	y
HCSS-UR-3.1-1256					y			y	y
HCSS-UR-3.1-1257					y			y	y
HCSS-UR-3.1-1258					y			y	y
HCSS-UR-3.1-1259					y			y	y
HCSS-UR-3.1-1260					y			y	y
HCSS-UR-3.1-1261					y			y	y
HCSS-UR-3.1-1262					y			y	y
HCSS-UR-3.1-1270					y			y	y
HCSS-UR-3.1-1280	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-1290		y	y	y		y	y	y	
HCSS-UR-3.1-1300		y	y	y		y	y	y	
HCSS-UR-3.1-1310		y	y	y		y	y	y	
HCSS-UR-3.1-1320		y	y	y		y	y	y	
HCSS-UR-3.1-1330		y	y	y		y	y	y	
HCSS-UR-3.1-1340		y	y	y		y	y	y	
HCSS-UR-3.1-1350		y	y	y		y	y	y	
HCSS-UR-3.1-1360		y	y	y		y	y	y	
HCSS-UR-3.1-1361		y	y	y		y	y	y	
HCSS-UR-3.1-1370		y	y			y	y	y	y

HCSS URD requirement	Development and maintenance	ILT	IST	GS Sim.	AOs	Commissioning	PV	Routine	Archive
HCSS-UR-3.1-1380		y	y			y	y	y	y
HCSS-UR-3.1-1390		y	y			y	y	y	y
HCSS-UR-3.1-1395						y	y	y	y
HCSS-UR-3.1-1400							y	y	y
HCSS-UR-3.1-1410								y	y
HCSS-UR-3.1-1420		y	y			y	y	y	y
HCSS-UR-3.1-1421		y	y			y	y	y	y
HCSS-UR-3.1-1430		y	y			y	y	y	y
HCSS-UR-3.1-1440		y	y			y	y	y	y
HCSS-UR-3.1-1450		y	y			y	y	y	y
HCSS-UR-3.1-1460		y	y			y	y	y	y
HCSS-UR-3.1-1470		y	y			y	y	y	y
HCSS-UR-3.1-1480		y	y			y	y	y	y
HCSS-UR-3.1-1490		y	y			y	y	y	y
HCSS-UR-3.1-1500		y	y			y	y	y	y
HCSS-UR-3.1-1510		y	y			y	y	y	y
HCSS-UR-3.1-1520		y	y			y	y	y	y
HCSS-UR-3.1-1530		y	y			y	y	y	y
HCSS-UR-3.1-1540						y	y	y	y
HCSS-UR-3.1-1545		y	y			y	y	y	y
HCSS-UR-3.1-1550		y	y			y	y	y	y
HCSS-UR-3.1-1555		y	y			y	y	y	y
HCSS-UR-3.1-1556		y	y			y	y	y	y
HCSS-UR-3.1-1557		y	y			y	y	y	y

HCSS URD requirement	Development and maintenance	ILT	IST	GS Sim.	AOs	Commissioning	PV	Routine	Archive
HCSS-UR-3.1-1558		y	y			y	y	y	y
HCSS-UR-3.1-1560	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-1570					y	y	y	y	y
HCSS-UR-3.1-1580					y			y	y
HCSS-UR-3.1-1590						y	y	y	y
HCSS-UR-3.1-1600						y	y	y	y
HCSS-UR-3.1-1610	y	y	y	y	y	y	y	y	y
HCSS-UR-3.1-1620		y	y						
HCSS-UR-3.1-1630		y	y						
HCSS-UR-3.1-1640		y	y	y	y	y	y	y	y
HCSS-UR-3.1-1650		y	y						
HCSS-UR-3.1-1660		y	y	y		y	y	y	y
HCSS-UR-3.1-1670				y		y	y	y	y
HCSS-UR-3.1-1680				y		y	y	y	y
HCSS-UR-3.2-0010				y	y	y	y	y	y
HCSS-UR-3.2-0020	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0030	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0031	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0040	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0050	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0060	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0061	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0070	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0080	y	y	y	y	y	y	y	y	y

HCSS URD requirement	Development and maintenance	ILT	IST	GS Sim.	AOs	Commissioning	PV	Routine	Archive
HCSS-UR-3.2-0090	y			y	y	y	y	y	y
HCSS-UR-3.2-0100	y			y	y	y	y	y	y
HCSS-UR-3.2-0110	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0111	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0112					y			y	y
HCSS-UR-3.2-0113	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0120		y	y	y		y	y	y	y
HCSS-UR-3.2-0130	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0131				y	y	y	y	y	y
HCSS-UR-3.2-0134				y	y	y	y	y	
HCSS-UR-3.2-0135					y	y	y	y	
HCSS-UR-3.2-0136					y	y	y	y	y
HCSS-UR-3.2-0137					y			y	
HCSS-UR-3.2-0138					y	y	y	y	
HCSS-UR-3.2-0139				y	y	y	y	y	
HCSS-UR-3.2-0140				y		y	y	y	
HCSS-UR-3.2-0160						y	y	y	y
HCSS-UR-3.2-0161	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0162	y								
HCSS-UR-3.2-0163		y	y	y	y	y	y	y	y
HCSS-UR-3.2-0164		y	y	y	y	y	y	y	y
HCSS-UR-3.2-0165		y	y	y	y	y	y	y	y
HCSS-UR-3.2-0180				y		y	y	y	y
HCSS-UR-3.2-0190		y	y	y		y	y	y	

HCSS URD requirement	Development and maintenance	ILT	IST	GS Sim.	AOs	Commissioning	PV	Routine	Archive
HCSS-UR-3.2-0200		y	y	y		y			
HCSS-UR-3.2-0209				y		y	y	y	y
HCSS-UR-3.2-0210	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0211		y	y	y	y	y	y	y	y
HCSS-UR-3.2-0220	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0221	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0230		y	y	y	y	y	y	y	y
HCSS-UR-3.2-0240		y	y	y	y	y	y	y	y
HCSS-UR-3.2-0250		y	y	y	y	y	y	y	y
HCSS-UR-3.2-0260		y	y	y	y	y	y	y	y
HCSS-UR-3.2-0261	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0270	y	y	y	y	y	y	y	y	y
HCSS-UR-3.2-0280		y	y			y	y	y	y
HCSS-UR-3.2-0290		y	y	y	y	y	y	y	y