ICC Work Packages Summary

GHS1	ICC Development Phase Activities

GHS11	ICC Continuous Tasks
GHS11X1000	**ICC Development Phase Management**
11X1100	Overall Management Activities
11X1200	DAPSAS UK Management Activities
11X1300	DAPSAS Fr Management Activities
GHS11X2000	ICC System Engineering
GHS11X3000	Product/Quality Assurance
GHS11X4000	Support to Herschel Ground Segment Development
GHS11X5000	ICC Operations during development
GHS11X6000	Information Dissemination and Communications

GHS12	Generation of Instrument Information
GHS12X1000	Provision of Instrument Users Manual
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GHS12X3000	**Definition of Instrument Observations**
12X3100	Provision of CUS Database
12X3200	Definition and Test of AOTs
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GHS13	Development Activities
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GHS13X2000	**ICC Design**
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13X2300	ICC Operations Scenario
13X2400	System Design
GHS13X3000	**Provision of Software Infrastructure**
13X3100	Problem Report/SCR System
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13X3300	Configuration Control System
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13X3500	Sandbox Environment
GHS13X4000	Interactive Analysis Framework
GHS13X5000	**Quick Look Analysis**
13X5100	QLA for AVM
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GHS13X6000	**Data Processing Modules**
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13X6120	*Filter Data on any criteria*
13X6130	*Visualize any Data Product*
13X6140	*Identify and Flag Data on any criteria*
13X6150	*Import and Export Data*
13X6160	*Transform Spacecraft Coordinates to Sky position*
13X6170	*Remove Instrument Crosstalk*
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13X6190	*Resample and combine data spatially and/or temporally*
13X61A0	*Data Reduction History (recording and examining)*
13X6200	Photometry Modules
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13X6220	*Detect Sources*
13X6300	Spectrometry Modules
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13X6320	*Convert Position counter to Mechanical Mirror Position*
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13X6340	*Phase Correction*
13X6350	*Regrid*
13X6360	*Responsivity Correction*
13X6370	*Correct for Time-dependant Flux*
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13X6390	*Apodise and Transform Interferogram*
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GHS13X7000	Calibration Analysis Modules
GHS13X8000	Trend Analysis Modules
GHS13X9000	Diagnostic tools
GHS13XA000	Support Tools
13XA100	Science Simulator
13XA200	Engineering Simulator
GHS13XB000	Quality Control Software
GHS13XC000	Key Programmes
GHS13XD000	Instrument Simulator
GHS13XE000	Software Development Meetings

GHS14	**Training**
GHS14X1000	Training in use of HCSS Systems CUS, MPS, Scheduling
GHS14X2000	Training in use of External Systems e.g. MIB editor SCOS2000
GHS14X3000	Other Training – programming languages, operating system, databases etc

GHS2	Support to Instrument Team Activities

GHS21	ILT Support
GHS21X1000	Provision of ILT System(s) – includes integration of ILT systems
GHS21X2000	Produce validation software to validate scripts and observation requests
GHS21X3000	Produce Command Validator
GHS21X4000	Populate Calibration Database (ILT data)
GHS21X5000	Support to ILT Tests

GHS22	IST Support
GHS22X1000	Provision of IST System(s)
GHS22X2000	Populate Calibration Database (IST data)
GHS22X3000	Support to IST Tests

GHS23	Calibration Support
GHS23X1000	Define Calibration Requirements (contribution)
GHS23X2000	Define Calibration Plan (contribution)
GHS23X3000	Define and Create Calibration Database (uplink and downlink)
GHS23X4000	Populate Calibration Database

GHS24	Science Verification
GHS24X1000	Science Verification Plan
GHS24X2000	Pre-Launch Science Verification

GHS3	ICC Operations Preparation

GHS31	Facilities
GHS31X1000	ICC Operations Centre
GHS31X2000	DAPSAS (UK) Centre
GHS31X3000	DAPSAS (Fr) Centre
GHS31X4000	On Board Software Maintenance Facility
GHS31X5000	ICC Test and Maintenance Facilities

GHS32	Operations Planning
GHS32X1000	Provision of Operations Plans
32X1100	ICC OPS procedures
32X1200	IFOP
32X1300	Data Analysis Procedures
GHS32X2000	ICC/HSC Operational Interactions
GHS32X3000	ICC/MOC Operational Interactions
GHS32X4000	Operations Team Setup and Training
GHS32X5000	Training of External Staff

GHS33	Integration and Test
GHS33X1000	ICC Integration
GHS33X2000	Ground Segment Integration
GHS33X3000	Ground Segment Testing

GHS34	Commissioning Phase
GHS34X1000	Provision of Commissioning Phase System (ICC@MOC)
GHS34X2000	Commissioning Phase Support

GHS4	ICC Operations Phase

GFS41	ICC Operations Continuous Tasks
GHS41X1000	Operations Management
GHS41X2000	Project Office
GHS41X3000	Product/Quality Assurance
GHS41X4000	Support to Consortium
GHS41X5000	Recurrent Costs

GHS42	Routine Operations Activities
GHS42X1000	Monitor Instrument Health
GHS42X2000	Calibration Processing
GHS42X3000	Performance Monitoring
GHS42X4000	Trend Analysis
GHS42X5000	Quality Control
GHS42X6000	HelpDesk
GHS42X7000	Information dissemination
GHS42X8000	Generate Calibration Observations
GHS42X9000	Scheduling Observations

GHS43	Non-Routine Activities
GHS43X1000	Performance verification
GHS43X2000	Key Programmes
GHS43X3000	Problem Handling
GHS43X4000	Calibration Evolution
GHS43X5000	Use of Test Facilities

GHS44	Software Evolution
GHS44X1000	IA Framework Evolution
GHS44X2000	**Data Processing Modules evolution**
44X2100	Implement New/Updated Modules
44X2200	Science Verification
GHS44X3000	Calibration Analysis Modules Evolution
GHS44X4000	Trend Analysis Modules Evolution

GHS45	Software Maintenance
GHS45X1000	SPIRE Contribution to HCSS S/W Maintenance
GHS45X2000	Interactive Analysis Framework and Modules Maintenance
GHS45X3000	Software Infrastructure Maintenance
GHS45X4000	Other ICC Software Maintenance

GHS46	Facilities Maintenance
GHS46X1000	**Infrastructure Maintenance**
46X1100	ICC Control Centre Maintenance
46X1200	DAPSAS (UK) Maintenance
46X1300	DAPSAS (Fr) Maintenance
GHS46X2000	Computer System Maintenance

WP Title: ICC Continuous Tasks	**WP Number**	GHS11
	Version:	1.0
WP Manager:	**Date:**	10 Jan. 2002

Description: This is a summary workpackage covering all ICC management, co-ordination and administration activities, which continue throughout the ICC Development Phase. These include; ICC development activities; interfaces with teams outside the ICC; and operation of ICC facilities as they are brought on-line.

Notes:

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: ICC Development Phase Management	**WP Number**	GHS11X1000
	Version:	1.0
WP Manager: ICC Development Manager	**Date:**	10 Jan. 2002

Description: This summary workpackage covers activities related to management of the design and development of the SPIRE ICC.

Start Date:	**End Date:**	**Type:** Continuous

Inputs: None

Activities:

1100: Overall Management Activities

1200: DAPSAS UK Management Activities

1300: DAPSAS Fr Management Activities

Outputs:

1. SPIRE SIP
2. Monthly Progress Reports to SPIRE Project

Assumptions:

1. The facilities of the SPIRE Project Office are available for use by the ICC.
2. Livelink will be used for all documentation and administration of this system is outside the scope of this workpackage (and the ICC, during the Development Phase)

Notes:

All ICC recurrent costs (Telephone, Teleconference, Video Conference, consumables) are accumulated under this Workpackage

Resources:

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
ICC Scientist							
ICC Development Manager							
DAPSAS UK Manager							
DAPSAS Fr Manager							
ICC Software Manager							
Total Staff							
Travel							
Equipment							
Recurrent							
Total							

WP Title: Overall Management Activities		**WP Number**	GHS11X1100
		Version:	1.1
WP Manager: ICC Development Manager		**Date:**	18 Mar. 2002
Description: This workpackage covers those activities related to overall management of the design and development of the SPIRE ICC and management of those activities specific to the Operations Centre			
Start Date:	**End Date:**	**Type:** Continuous	

Inputs:

1. Monthly Reports form DAPSAS Centres
2. Contributions to SIP

Activities:

1110: Attendance at and reporting to ICC Steering Group Meetings (ICC Development Manager, ICC Scientist)

1120: Participation in ICC Definition Team Meetings (ICC Development Manager, ICC Scientist, ICC Software Manager)

1130: ICC Development Planning, including SIP Provision (ICC Development Manager)

1140: Monthly progress reporting to SPIRE Project on ICC development activities (ICC Development Manager, ICC Software Manager)

1150: Organisation and support to SPIRE ICC Reviews (ICC Development Manager, ICC Scientist, ICC Software Manager)

1160: ICC Project Control and Schedule Management (ICC Development Manager)

Outputs:

1. SPIRE SIP
2. Monthly Progress Reports to SPIRE Project

Assumptions:

1. The facilities of the SPIRE Project Office are available for use by the ICC.
2. Livelink will be used for all documentation and administration of this system is outside the scope of this workpackage (and the ICC, during the Development Phase)

Notes:

Resources:

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
ICC Scientist	15	15	15	15	15	15	5
ICC Development Manager	15	35	35	35	35	35	35
ICC Software Manager	10	10	10	10	10	10	10
Total Staff	**40**	**60**	**60**	**60**	**60**	**60**	**50**
Travel (£K)	1.0	1.6	1.6	1.6	1.6	1.6	1.6
Equipment			2.0			2.0	
Total	**1.0**	**1.6**	**3.6**	**1.6**	**1.6**	**3.6**	**1.6**

WP Title: DAPSAS (UK) Management Activities	**WP Number**	GHS11X1200
	Version:	1.0
WP Manager: DAPSAS UK Manager	**Date:**	10 Jan. 2002

Description: This workpackage covers activities related to management of the design and development of the UK DAPSAS Centre.

Start Date:	**End Date:**	**Type:** Continuous

Inputs: None

Activities:

1210: Participation in ICC Definition Team Meetings

1220: ICC Development Planning, including provision of inputs for SIP

1230: Monthly progress reporting to ICC Development Manager on DAPSAS UK development activities Development Manager, ICC Software Manager)

1240: Support to SPIRE ICC Reviews

1250: Project Control and Schedule Management

Outputs:

1. Monthly Progress Reports to ICC Development Manager
2. Contributions to SPIRE SIP

Assumptions:

1. The facilities of the SPIRE Project Office are available for use by the ICC.
2. Livelink will be used for all documentation and administration of this system is outside the scope of this workpackage (and the ICC, during the Development Phase)

Notes:

Resources:

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
DAPSAS UK Manager							
Total Staff							
Travel							
Equipment							
Total							

WP Title: DAPSAS (Fr) Management Activities		**WP Number**	GHS11X1300
		Version:	1.0
WP Manager: DAPSAS Fr Manager		**Date:**	10 Jan. 2002
Description: This workpackage covers activities related to management of the design and development of the French DAPSAS Centre.			
Start Date:	**End Date:**	**Type:** Continuous	

Inputs: None

Activities:

1310: Participation in ICC Definition Team Meetings

1320: ICC Development Planning, including provision of inputs for SIP

1330: Monthly progress reporting to ICC Development Manager on DAPSAS UK development activities Development Manager, ICC Software Manager)

1340: Support to SPIRE ICC Reviews

1350: Project Control and Schedule Management

Outputs:

3. Monthly Progress Reports to ICC Development Manager
4. Contributions to SPIRE SIP

Assumptions:

3. The facilities of the SPIRE Project Office are available for use by the ICC.
4. Livelink will be used for all documentation and administration of this system is outside the scope of this workpackage (and the ICC, during the Development Phase)

Notes:

Resources:

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
DAPSAS Fr Manager							
Total Staff							
Travel							
Equipment							
Total							

WP Title: ICC System Engineering	**WP Number**	GHS11X2000
	Version:	1.0
WP Manager: ICC Systems Engineer	**Date:**	10 Jan. 2002

Description: This workpackage covers all system engineering activities associated with the ICC

Start Date:	**End Date:**	**Type:** Continuous

Inputs:

1. SPIRE Operating modes Document
2. SPIRE Operations Scenario Document

Activities:

2100: Definition of Instrument Operations - breakdown to instrument command level

2200: Definition of Instrument Data Interface with the spacecraft

2300: Definition of SPIRE Operating Procedures

2400: Definition of SPIRE Autonomy/Safety Concept

2500: Definition of ICC Internal Interfaces

2600: Definition of SPIRE ICC Operating Procedures

2700: Definition of ICC Testing

2800: Participation in Project/Consortium Meetings

Outputs:

1. Operating The SPIRE Instrument Document
2. SPIRE Data Interface Control Document
3. SPIRE Operations Document
4. SPIRE Autonomy/Safety Document
5. SPIRE ICC Interfaces Document
6. SPIRE ICC Operating Procedures Document
7. SPIRE ICC Test Plan
8. SPIRE ICC End-to-End Test Plan

Assumptions:

Notes:

System Engineering activities related to the interface to the FSC are contained in other workpackages

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Systems Engineer	15	15	15	10	10	10	10
Total Staff (% fte)	**15**	**5**	**15**	**10**	**10**	**10**	**10**
Travel	0.15	0.25	0.25	0.25	0.25	0.25	0.25
Equipment		2.0			2.0		
Total (£K)	**0.15**	**2.25**	**0.25**	**0.25**	**2.25**	**0.25**	**0.25**

WP Title: Product / Quality Assurance		**WP Number**	GHS11X3000
		Version:	1.0
WP Manager: ICC PA Manager		**Date:**	10 Jan 2001
Description: This workpackage covers all PA/QA activities associated with the ICC in the Development Phase			
Start Date:	**End Date:**	**Type:** Continuous	

Inputs:

Activities:

3100: Provision of ICC Hardware and Software PA/QA Plans

3200: Operation of the Configuration Control System (SPR/NCR) for ICC Software development

3300: Operation of the Configuration Control System (NCR) for ICC systems development

3400: Configuration Control of On Board Software after delivery from IFSI

3500: Acceptance of Delivered systems for ICC

3600: Liaison with ESA PA Section

Outputs:

1. ICC PA Plan
2. ICC Software PA Plan

Assumptions:

Notes:

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC PA Manager		5	10	5	5	5	5
ICC Config. Control Manager			10	15	15	15	15
Total Staff (% fte)		**5**	**20**	**20**	**20**	**20**	**20**
Travel							
Equipment							
Total (£K)							

WP Title: Support to Herschel Ground Segment Development		**WP Number**	GHS11X4000
		Version:	1.0
WP Manager: ICC Development Manager		**Date:**	10 Jan. 2002
Description: This workpackage covers all management activities concerned with development and design of the Herschel Ground Segment, including both interactions with ESA and the other Herschel instrument groups.			
Start Date:	**End Date:**	**Type:** Continuous	

Inputs:

Activities:

4100: HGSAG Activities (ICC Development Manager)

4200: HCSSMG Activities (ICC Development Manager. ICC Software Manager)

4300: HGS System Engineering (ICC Systems Engineer)

4400: Liaison with FSC Development Manager (ICC Development Manager)

4500: Liaison with ICC Development Managers (ICC Development Manager)

4600: Monthly progress reporting for SPIRE HCSS development activities (ICC Software Manager)

4700: Support to Ground Segment Reviews (ICC Development Manager, ICC Software Manager)

Outputs:

Monthly Development Progress Reports

Assumptions:

Notes:

Work related to software development and design is included in the relevant workpackages elsewhere

Resources:

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
ICC Development Manager	15	15	15	15	15	15	15
ICC Systems Engineer	15	15	15	10	10	10	10
ICC Software Manager		5	5	5	5	5	5
Total Staff (% fte)	**30**	**35**	**35**	**30**	**30**	**30**	**30**
Travel	2.0	3.2	3.2	2.4	2.4	2.4	2.4
Equipment							
Total (£K)	**2.0**	**3.2**	**3.2**	**2.4**	**2.4**	**2.4**	**2.4**

WP Title: ICC Operations during Development	**WP Number**	GHS11X5000
	Version:	1.0
WP Manager: ICC Development Manager	**Date:**	10 Jan. 2002

Description: This workpackage covers all activities concerned with operating the ICC during the Development Phase. As ICC systems are developed, purchased, or supplied, they will be operated as part of the ICC.

Start Date:	**End Date:**	**Type:** Continuous

Inputs:

Activities:

5100: Computer Systems procurement, installation and maintenance, including software licences (ICC Systems Manager)

5200: Defining and Operating procedures for control of access to HSC/ICC systems (ICC Development Manager)

5300: Operation of ICC Help Desk (ICCDT)

5400: Configuration Control Board Meetings

Outputs:

Assumptions:

The SPIRE Project Office will handle all day-to-day organisation and administrative duties

Notes:

For convenience, all recurrent costs (Telephone, Teleconference, Video Conference, consumables) are accumulated under this Workpackage

This includes: Software Licensing, Hardware maintenance costs, Publicity materials

Resources:

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
ICC Development Manager			5	5	5	5	5
ICC Systems Manager	10	10	10	20	30	50	50
ICCDT			5	15	25	25	25
Total Staff (% fte)	**30**	**35**	**35**	**30**	**30**	**30**	**30**
Travel							
Equipment							
Recurrent	0.25	0.5	1.5	1.5	2.0	2.0	2.0
Total (£K)	**0.25**	**0.5**	**1.5**	**1.5**	**2.0**	**2.0**	**2.0**

WP Title: Information dissemination and communications	**WP Number**	GHS11X6000
	Version:	1.0
WP Manager: ICC Development Manager	**Date:**	10 Jan. 2002

Description: This workpackage covers all activities concerned with the dissemination of information to the consortium, astronomers and the general public.

Start Date:	**End Date:**	**Type:** Continuous

Inputs:

Activities:

6100: ICC Web page design and Maintenance (ICCDT)

6200: Provision of Publicity material (ICCDT)

6300: Participation in Press conferences (ICC Development Manager etc)

6400: Support to PPARC publicity events (ICCDT)

6500: Maintenance of mail/email distribution lists (ICCDT)

6600: Participation in Consortium meetings (ICCDT)

Outputs:

1. Press Releases
2. Publicity Material

Assumptions:

Notes:

Resources:

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
ICC Development Manager			5	5	5	5	10
ICCDT			5	5	5	10	20
Total Staff (% fte)			**10**	**10**	**10**	**15**	**30**
Travel	1.2	0.5	1.5	1.5	1.5	1.5	1.5
Equipment							
Total (£K)							

WP Title: Generation of Instrument Information		**WP Number**	GHS12
		Version:	1.0
WP Manager:		**Date:**	01 April 2001
Description: This is a summary work package covering all activities associated with the generation of information on the instrument that is used elsewhere in the ICC or has to be delivered to ESA.			
Start Date:	**End Date:**	**Type:** Continuous	
Inputs:			
Activities: ➢ Provision of the Instrument User Manual and Database ➢ Definition of Instrument Observations and provision of an Observers Manual ➢ Definition of instrument Operating Procedures			
Outputs:			
Assumptions:			
Notes:			

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**
ICC Development Manager						
ICC Operations Scientist						

WP Title: Provision of Instrument Users Manual	WP Number	GHS12X1000
	Version:	1.0
WP Manager:	**Date:**	04 Jan 2002

Description: This work package covers activities concerned with the provision of the SPIRE instrument users manual, including all processes of collecting information from the instrument team. The instrument users manual is a document delivered to ESA, which describes all aspects of instrument design and behaviour.

Start Date: Jan 2002	**End Date:** Start of IST	**Type:**

Inputs:

- Selected SPIRE documentation

Activities:

- Keep up to date with instrument team activities by attending instrument team meetings, Instrument Design Reviews, Readiness Reviews and HGSAG Meetings
- Check instrument and HGS documentation for any constraints placed on the IUM
- Define what SPIRE documents should be included in the IUM (e.g. SPIRE Operating Modes, Instrument Design Description, OBS documentation, IA/QLA documentation etc.).
- Obtain necessary documents for inclusion.
- Liaison with the sub-system Development Teams to keep up to date with sub-system designs and documentation.
- Liaison with the HSC to ensure timely deliveries and that the information content is what the HSC require.
- Compile/update IUM

Outputs:

- New/updated IUM

Assumptions:

- None

Notes:

- The exact format and content of the IUM is not yet clear. The IUM is likely to consist of a selected sub-set of SPIRE documents, which is yet TBD. It is also not yet clear whether any new documentation e.g. a introduction etc will need to be added.
- We may also need to liase with the HGS Systems Engineering Group as there may be decisions taken within this group on common aspects of the IUM.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total		**5**	**15**	**20**	**25**	**30**	**5**

WP Title: Provision of Instrument Database (MIB)	**WP Number**	GHS12X2000
	Version:	1.0
WP Manager:	**Date:**	03 Jan 2002

Description: This work package covers all activities concerned with the provision of the SPIRE instrument database (MIB). Separate MIB's will be required for different instrument models and different test phases.

Start Date: July 2001	**End Date:** End of operations	**Type:**

Inputs:

- Instrument parameters (from sub-system teams)
- Mnemonic definitions (WP??)

Activities:

- Liaison with the DPU OBS Development Team in IFSI
- Compile list of all instrument parameters (includes the ranges for each parameter e.g. number of bits, Hard/Soft limits/Status and its location in a TM packet - Is the definition of TM packets covered by another WP?) *The information could both be gathered from documentation and from the following forums: Systems and Sub-systems Team Meetings, EGSE Meetings, HGSSE Meetings, HGSAG Meetings and DPU OBS Meetings*

Compile list of telecommand mnemonic definitions (*The mnemonics are defined by WP?? Operating the SPIRE instrument document*)

- Liaison with SCOS-2000 Development Groups
- Training in MIB editor and MIB architecture (ICD name?)
- Liaison with MIB Editor Developers (ICC Development Manager)
- Enter the instrument parameters and mnemonic definitions using MIB editor and generate MIB
- Updates to the MIB as a result of parameter or mnemonic definition changes.
- Test, validate and verify the MIB (does this imply any validation S/W WPs?)
- Produce/update MIB documentation
- Ingest MIB into HCSS (*this will include liasing with the HSC*)

Outputs:

- new version of MIB

Assumptions:

- None

Notes:

- None

Resources:

	2001	2002	2003	2004	2005	2006	2007
Total	**0.1**	**0.4**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**

WP Title: Definition of Instrument Observations		**WP Number**	GHS12X3000
		Version:	1.0
WP Manager:		**Date:**	01 April 2001
Description: This work package covers all SPIRE ICC activities concerned with the definitions of observations.			
Start Date:	**End Date:**	**Type:** Continuous	

Inputs:

Activities:

- Generation of the CUS Database based on the definition of the instrument operating modes and the instrument commands
- Definition of the AOTs in the CUS
- Testing of AOTs on the instrument and simulators
- Liaison with Instrument Team and Consortium
- Liaison with other ICC's
- Liaison with the HSC to ensure that the observation definitions are consistent with the HCSS and Herschel GS design

Outputs:

Assumptions:

Notes:

Resources:

	2001	2002	2003	2004	2005	2006
ICC Development Manager	**5**	**5**	**10**	**10**	**5**	**5**
ICC Operations Scientist			**5**	**5**	**5**	**5**
ICC Scientist			**5**	**10**	**10**	**10**

WP Title: Provision of CUS Database	**WP Number**	GHS12X3100
	Version:	1.0
WP Manager:	**Date:**	04 Jan 2002

Description: The CUS database contains the information required to produce observation requests using the CUS. This includes building block and observing mode definitions.

Start Date: March 2002	**End Date:** Start of Flight Spare testing	**Type:**

Inputs:

- SPIRE DATA ICD
- SPIRE Operating Modes definition
- MIB

Activities:

- Definition of how to operate the instrument (Operating the SPIRE Instrument document)
- Define building blocks
- Training in use of the CUS
- Determine what high level commands are needed to build the building blocks within the CUS
- Definition of higher level commands within the CUS
- Define building blocks within the CUS
- Define observing modes with the CUS
- Update the CUS following proposed changes to observing modes or building blocks or parameter changes
- Test and commit to database

Outputs:

New/updated CUS database

Assumptions:

None

Notes:

It is likely that there may be multiple CUS databases implemented in development phase as new ways to command the instrument observing modes are tested. This may also extend to different CUS users having different personal sandbox copies.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total							

WP Title: Definition and Test of AOTs		**WP Number**	GHS12X3200
		Version:	1.0
WP Manager:		**Date:**	04 Jan 2002
Description: This work package describes the steps taken to define and test the AOTs			
Start Date: Jan 2003	**End Date:** Start of IST?	**Type:**	

Inputs:

- SPIRE Operating Modes Document
- Operating the SPIRE Instrument Document
- CUS Database

Activities:

Definition of AOT s

Gather information on:

- Observing modes (observatory functions)
- Instrument performance (*presumably the CQM performance*)

Assess whether AOT (observatory function) scheme described fits in with measured instrument performance.
Define AOT template in the CUS database
Run CUS for defined parameter set to produce a set of observation definitions

Definition of AOT Test Plans

Assess what level of testing can be achieved with SPIRE ILT setup.
If necessary define alternative observing strategies
Check time available
Determine optimal way to test AOTs on instrument and select parameter ranges for tests
Write test plan including an outline test schedule

Carry out Tests on Instrument

- Prepare the test procedure ensuring all observation definitions are present and the timings are consistent with the plan.
- Execute the test procedure on the instrument.
- Assess quality of the results and analyse test data
- Prepare test report
- Update the test plan if necessary

Outputs:

- Tested AOTs

Assumptions:

- We are assuming a test procedure is a script which is passed to test control manually. This script can contain any number of observations, including full AOTs, enabling us to schedule a set of AOTs to be carried out using just one test procedure in a given time period e.g. 1 day.

Notes:

-

Resources:

	2001	2002	2003	2004	2005	2006	2007
Total							

WP Title: Definition of Operating Procedures	**WP Number**	GHS12X4000
	Version:	1.0
WP Manager:	**Date:**	01 April 2001

Description: This work package covers all activities concerned with the definition and testing of the SPIRE instrument operating procedures.

Start Date:	**End Date:**	**Type:** Continuous

Inputs:

Activities:

- Test Plans (ICC Test Scientist)
- Execution of ILT's and IST's (ICC Test Scientist, ICC Development Manager)
- Liaison with the HSC (ICC Software Manager)
- Liaison with the EGSE group (ICC Development Manager)

Outputs:

Assumptions:

Notes:

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**
ICC Development Manager			**5**	**5**	**5**	**5**
ICC Software Manager				**5**	**5**	**5**
ICC Test Scientist		**20**	**20**	**20**	**20**	**20**

WP Title: Provision of Observers Manual		**WP Number**	GHS12X5000
		Version:	1.0
WP Manager:		**Date:**	04 Jan 2002
Description: The SPIRE observers manual is a document which describes to the general astronomical community how to use SPIRE to achieve their scientific goals.			
Start Date: January 2005?	**End Date:** January 2006?	**Type:**	

Inputs:

- Time estimator
- AOTs defined and tested

Activities:

- Plan observers manual layout and determine what information needs to be gathered.
- Liaison with the HSC to ensure timely deliveries and that the information content is what the HSC require.
- Gather required information.
- Keep up to date with instrument team/ICC activities to ensure most up to date information is included in the observers manual. This is particularly relevant for sensitivities and uplink calibration.
- Define examples and determine times or S/N using the time estimator.
- Compile/update observers manual.
- Seek comments from the consortium and agree proposed updates.

Outputs:

- SPIRE observers manual

Assumptions:

- The time estimator will allow a S/N ratio to be calculated with a flux/time input or allow a time to be calculated with a flux/S/N input.

Notes:

- None

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total				**10**	**10**	**10**	

WP Title: Get External Information		WP Number	GHS12X6000
		Version:	1.0
WP Manager:		**Date:**	04 Jan 2002
Description: There is information that will be required from external sources. This will include information on the spacecraft (e.g. parameter database)			
Start Date: Jan 2001	**End Date:** January 2007	**Type:**	

Inputs:

-

Activities:

Determine what information about the spacecraft is needed by the ICC.
Gather information on e.g.

- Focal plane
- Temperatures
- S/C H/K
- Other stuff?

Outputs:

- Dependent on information gathered, could be used for QLA/IA input e.g. information on focal plane geometry, instrument modelling e.g. temperatures feeding into thermal model or may just be documented.

Assumptions:

- Spacecraft parameters which are acquired in T/M are dealt with elsewhere in this set of WPs.

Notes:

- The information gathering is likely to be an iterative exercise as the S/C design develops. We should scope for requiring new information throughout development phase.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total							

WP Title: Development Activities	**WP Number**	GHS13
	Version:	1.0
WP Manager:	**Date:**	15 Mar 2002

Description: This is the high-level summary workpackage covering ICC software development activities throughout the ICC Development Phase.

Notes:

Software maintenance is considered separately.

This workpackage also covers the ICC contributions to the HCSS.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Test Engineer							
Calibration Scientist							
Total							

WP Title: SPIRE contributions to External Development Activities	**WP Number**	GHS13X1000
	Version:	1.0
WP Manager:	**Date:**	15 Mar 2002

Description:.

This is a summary-level work package covering SPIRE's contributions to the development activities of other groups e.g. the HSC and the HCSS Development Team

Notes:

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Test Engineer							
Calibration Scientist							
Total							

WP Title: SPIRE Contribution to HCSS		**WP Number**	GHS13X1100
		Version:	1.0
WP Manager:		**Date:**	02 Jan 2002
Description: This is a summary level work package covering the SPIRE contribution to the HCSS.			
Start Date:	**End Date:**	**Type:**	
Inputs:			
Activities: ➢			
Outputs:			
Assumptions: ➢			
Notes: The HCSS is developed in 5 stages before release of version 1.0. SPIRE makes contributions to this work at all stages.			

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: SPIRE Contributions to the HSC		**WP Number**	GHS13X1200
		Version:	1.0
WP Manager:		**Date:**	02 Jan 2002
Description: This is a summary level work package covering the SPIRE contribution to the HSC.			
Start Date:	**End Date:**	**Type:**	
Inputs:			
Activities: ➢ Definition and provision of software for the Time Estimator			
Outputs:			
Assumptions: ➢			
Notes.			

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: ICC Design	**WP Number**	GHS13X2000
	Version:	1.0
WP Manager:	**Date:**	15 Mar 2002

Description:.
This is a summary-level work package covering SPIRE's activities related to design of the ICC itself

Activities:
The ICC will be designed and developed following an object–oriented methodology employing the following steps:

- Definition of ICC User Requirements
- Definition of ICC Conceptual Model and Use Cases
- Definition if ICC Operations Scenario(s)
- System Design
    - Definition of ICC Workpackages
    - Definition of Internal ICC interfaces
    - Provision of Design documentation

Notes:

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Test Engineer							
Calibration Scientist							
Total							

WP Title: Provision of Software Infrastructure	**WP Number**	GHS13X3000
	Version:	1.0
WP Manager:	**Date:**	15 Mar 2002

Description:.
This is a summary-level work package covering the work necessary to set up an infrastructure for software development.

Activities:
Provision of:

- A problem reporting system
- An information handling system
- A configuration control system
- A sandbox environment

Notes:
The infrastructure will make use of much of the HCSS development infrastructure. This workpackage covers the work needed to configure this for use by the ICC.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Test Engineer							
Calibration Scientist							
Total							

WP Title: Problem Reporting System		**WP Number**	GHS13X3100
		Version:	1.0
WP Manager:		**Date:**	02 Jan 2002
Description: This work package covers provision of a software problem reporting system.			
Start Date: July 2001	**End Date:** April 2002	**Type:**	

Inputs:

Activities:

- Define requirements for handling problem reports.
- *Develop a system for handling problem reports.*

Outputs:

Assumptions:

- The three instruments, together with ESA, will use a common system. Activities in italics are then the responsibility of ESA.

Notes:

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
Total							

WP Title: Information Handling System	**WP Number**	GHS13X3200
	Version:	1.0
WP Manager:	**Date:**	02 Jan 2002

Description: This work package covers provision of an information handling system. It includes facilities for the ICC helpdesk, information distribution and web site.

Start Date:	**End Date:**	**Type:**

Inputs:

Activities:

- Create web site
- Set up mailing lists or equivalent
- Set up helpdesk facility

Outputs:

Assumptions:

Notes:

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
Total							

WP Title: Configuration Control System		**WP Number**	GHS13X3300
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This work package covers provision of a software configuration control system.			
Start Date: July 2001	**End Date:** July 2007	**Type:**	

Inputs:

Activities:

- *Install and configure tools for configuration control*
- *Document the procedures*
- *Maintain the system*

Outputs:

- *Configuration Control Procedures document*
- Input to SPIRE Configuration Management plan

Assumptions:

- The three instruments, together with ESA, will use a common system. Activities in italics are then the responsibility of ESA, though it will still be necessary to provide input to the procedures document.

Notes:

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
Total							

WP Title: Access Control System	**WP Number**	GHS13X3400
	Version:	1.0
WP Manager:	**Date:**	03 Jan 2002

Description: This work package covers the development of software to control access to data, both for internal and external users.

Start Date:	**End Date:**	**Type:**

Inputs:
- HCSS 0.1 or later
- Network infrastructure (possibly Web access)

Activities:
- Requirements definition
- Development of software
- Documentation
- Creation and updating of a "user database"

Outputs:
- User database

Assumptions:
- Much less functionality is needed in ILT than in Operations.

Notes:
- This may well be common software within the HCSS. The ICC will need to create and maintain the user database in any case.
- Privileges include read/write, access to different data, certain tools etc.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
Total							

WP Title: Sandbox Environment		**WP Number**	GHS13X3500
		Version:	1.0
WP Manager:		**Date:**	02 Jan 2002
Description: This work package covers provision of a sandbox environment to support software development.			
Start Date:	**End Date:**	**Type:**	

Inputs:

Activities:

- Set up system for development and test in a sandbox environment
- Document the procedures

Outputs:

Assumptions:

Notes:

- This may well be common, i.e. form part of the HCSS
- There may be more than one sandbox level, e.g. individual developer and system

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
Total							

WP Title: IA Framework		**WP Number**	GHS13X4000
		Version:	1.0
WP Manager:		**Date:**	04 Jan 2002
Description: This work package covers development of a framework in which to build the SPIRE IA.			
Start Date:	**End Date:**	**Type:**	

Inputs:

Activities:

- Framework design
- Specification of interfaces
- Development of components and tools

Outputs:

- Interface definitions
- SPIRE IA Programmers' Guide
- Library of components

Assumptions:

- Some of the framework will be provided by the HCSS
- It will be possible to reuse some of the QLA framework software

Notes:

- Components include those for data selection, visualisation, manipulation, import/export etc.
- The Programmers' Guide only needs to serve the ICC at this stage. It is expected that the IA will have a "pluggable" architecture to the extent that observers outside of the ICC (and consortium) will be able to add their own modules. The Guide can be expanded for this purpose post-launch.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
Total							

WP Title: Quick-Look Analysis		**WP Number**	GHS13X5000
		Version:	1.0
WP Manager:		**Date:**	02 Jan 2002
Description: This is a summary level work package covering the development of the Quick-look Analysis (QLA) software.			
Start Date: July 2001	**End Date:** July 2007	**Type:**	

Inputs:

Activities:
- Requirements definition
- Analysis and design
- Implementation
- Maintenance

Outputs:
- QLA Version 1.0 (AVM)
- QLA Version 2.0 (CQM)
- QLA Version 3.0 (FM)
- QLA Version 4.0 (Ops)

Assumptions:
- QLA is outside the scope of the HCSS, though it will make use of it.

Notes:
- The versions correspond to milestones. It is envisaged that development will be an incremental one with other versions between milestones as new features are added.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: QLA for AVM		WP Number	GHS13X5100
		Version:	1.0
WP Manager:		**Date:**	02 Jan 2002
Description: This summary-level work package covers the development of the SPIRE quick-look analysis to support the AVM.			
Start Date: May 2001	**End Date:** June 2002	**Type:**	

Inputs:

Activities:
System Level Analysis
Requirements
Systems Analysis
Domain modelling

Architecture
System Design
Interface Definition
Framework

Data Interfaces
Data acquisition
Interface to display/plot tools
Data storage and retrieval
Data import/export

User Interfaces
Data selection and control
Parameter display
Tables (visualisation and update)
Detector selection
Display management

Image Displays
Visualisation of detector arrays
Plotting
Timeline

Data Analysis
Timeline reconstruction – instrument packets

Outputs:
- QLA Version 1.0 (AVM)
- User Requirements
- Use Cases
- User Guide

Assumptions:
-

Notes:

-

Resources:

	2001	2002	2003	2004	2005	2006	2007
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: QLA for CQM	**WP Number**	GHS13X5200
	Version:	1.0
WP Manager:	**Date:**	02 Jan 2002

Description: This work package covers the development of the SPIRE quick-look analysis to support the CQM.

Start Date: July 2002	**End Date:** January 2003	**Type:**

Inputs:

- QLA Version 1.0 (AVM)

Activities:

Image Displays	Interactivity Colour Table Manipulation
Plotting	General 2-D
Data Analysis	Timeline reconstruction – test equipment Conversion to Volts Frequency/response Crosstalk Curve fitting Statistics FFT Demodulation – basic subtraction Deglitching – manual
Specific Test Support	Peak-up Load curves Noise level Time constant Beam steering Filtering OOB rejection? VI monitoring

Outputs:

- QLA Version 2.0 (CQM)
- User Guide

Assumptions:

-

Notes:

-

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: QLA for PFM	**WP Number**	GHS13X5300
	Version:	1.0
WP Manager:	**Date:**	02 Jan 2002

Description: This work package covers the development of the SPIRE quick-look analysis to support the FM.

Start Date: February 2003	**End Date:** August 2003	**Type:**

Inputs:

- QLA Version 2.0 (CQM)

Activities:

User Interfaces	Comparison of current and stored data Scripting Integrated printing
Plotting	3-D
Data Analysis	Demodulation – Fourier Deglitching – algorithmic SMEC processing Spectrum conversion RSRF determination Calibrate interferogram Combine interferograms Data cube construction for spectrometer

Outputs:

- QLA Version 3.0 (PFM)
- User Guide

Assumptions:

-

Notes:

-

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP TITLE: QLA for Operations	**WP Number**	GHSX135400
	Version:	1.0
WP Manager:	**Date:**	02 Jan 2002

Description: This work package covers the development and maintenance of the SPIRE quick-look analysis from delivery of the FM up to the start of Operations.

Start Date: September 2003	**End Date:** July 2007	**Type:**

Inputs:

- QLA Version 3.0 (PFM)

Activities:

- Implementation of new and improved features as necessary.
- Maintenance.

Outputs:

- QLA Version 4.0 (Ops)
- User Guide

Assumptions:

-

Notes:

-

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: Data Processing Modules		**WP Number**	GHS13X6000
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This is a summary level work package covering the development of the data processing modules for the SPIRE Interactive Analysis (IA) software.			
Start Date: January 2001	**End Date:** July 2007	**Type:**	

Inputs:

Activities:

- Develop generic data processing modules
- Develop data processing modules for the photometer
- Develop data processing modules for the FTS

Outputs:

Assumptions:

-

Notes:
The framework under which these modules run is the subject of another workpackage.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: Common Modules	**WP Number**	GHS13X6100
	Version:	1.0
WP Manager:	**Date:**	03 Jan 2002

Description: This work package covers the development of generic data processing algorithms, i.e. not specific to the photometer or the FTS.

Start Date:	**End Date:**	**Type:**

Inputs:

- SPIRE IA Programmers' Guide
- Use cases for data processing

Activities:

- Develop modules to:
  - Read and prepare data-frames for IA processing
    - Import non-IA format data
  - Conversion of output data to popular data formats
  - Information and error messaging system
  - Record data reduction history
  - Transform between sky and spacecraft coordinate systems
- Produce documentation (includes online, interactive and hardcopy)

Outputs:

- Parts of Users' Guide

Assumptions:

-

Notes:

- Some items might be common software.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
ICC Scientists							
Total							

WP Title: Photometry Modules	**WP Number**	GHS13X6200
	Version:	1.0
WP Manager:	**Date:**	03 Jan 2002

Description: This work package covers the development of data processing algorithms specific to the photometer.

Start Date:	**End Date:**	**Type:**

Inputs:

- SPIRE IA Programmers' Guide
- Use Cases for Photometer processing

Activities:

- Develop modules to:
  - Identify and flag bad data.
  - Filter data on any criteria
  - Visualize any data product
  - Remove pixel-to-pixel sensitivity variation (flat-field)
  - Identify and flag data on any criteria
  - Perform background subtraction
  - Resample and combine data spatially and/or temporally (includes statistics)
  - Convert from engineering units to astrophysical units (flux calibration)
  - Determine color correction
  - Apply color correction
  - Detect sources
  - Examine observation and data reduction history (including software and calibration file versions and relevant house-keeping data)
  - Remove effects of instrument cross-talk
  - Subtract off-source data (demodulate data)
- Produce documentation (includes online, interactive and hardcopy)

Outputs:

- Part of Users' Guide

Assumptions:

-

Notes:

- Some of these might be generic rather than specific to the photometer.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
Calibration Scientist							
ICC Scientists							
Total							

WP Title: Spectrometry Modules		**WP Number**	GHS13X6300
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This work package covers the development of data processing algorithms specific to the FTS.			
Start Date:	**End Date:**	**Type:**	

Inputs:

- SPIRE IA Programmers' Guide
- Use Cases for FTS processing

Activities:

- Develop processing modules to:
  - *Flag bad and missing data*
  - *Reconstruct each scan/interferogram*
  - *Visualise raw data (interactive)*
  - *Remove electrical cross-talk*
  - *Oth order deglitch*
  - *Convert position counter to mechanical mirror position*
  - *Generate array of signal vs. position*
  - *Convert mechanical position to OPD (optical path difference) for each detector*
  - *Phase correct*
  - *Re-grid*
  - *Correct responsivity*
  - *Correct for time-dependent variation in flux*
  - *Correct for position-dependent variation in flux*
  - *Correct for telescope pointing drift*
  - *1st order deglitch (median-like method)*
  - *Apodise (removal of outlying frequency signals)*
  - *Fourier Transform individual scans*
  - *Remove instrument signature*
  - *Remove pixel-to-pixel sensitivity variation (flat-field)*
  - *Convert to relevant units (flux calibration)*
  - *Produce a spectrum per sky pixel*
  - *Produce 3D data cube*
  - *Select and display map over spectral range*
- Filter data on any criteria
- Visualize any data product
- Identify and flag data on any criteria
- Transform between sky and spacecraft coordinate systems (TBD)
- Conversion of output data to popular data formats (TBD)
- Detect sources (TBD)
- Examine observation and data reduction history (including software and calibration file versions and relevant house-keeping data) (TBD)
- Convert from digital to engineering units (for the detectors) (TBD).
- Define default parameters for flagging bad data (TBD)
- Subtract off-source data (demodulate data)

- Develop modules to detect and identify lines
- Produce documentation (includes online, interactive and hardcopy)

Outputs:
- Part of Users' Guide

Assumptions:
-

Notes:
- Some modules might be generic rather than specific to the FTS.

Resources:

	2001	2002	2003	2004	2005	2006	2007
Software Manager							
Software Engineers							
Calibration Scientist							
ICC Scientists							
Total							

WP Title: Calibration Analysis Modules		**WP Number**	GHS13X7000
		Version:	1.0
WP Manager:		**Date:**	02 Jan 2002
Description: This workpackage covers the development of modules for Calibration Analysis.			
Start Date:	**End Date:**	**Type:**	
Inputs:			
Activities: ➢			
Outputs:			
Assumptions: ➢ This workpackage is outside the scope of the HCSS.			
Notes:			

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: Trend Analysis		**WP Number**	GHS13X8000
		Version:	1.0
WP Manager:		**Date:**	02 Jan 2002
Description: This workpackage covers the development of modules for Trend Analysis.			
Start Date:	**End Date:**	**Type:**	
Inputs:			
Activities: ➢			
Outputs:			
Assumptions: ➢ This workpackage is outside the scope of the HCSS.			
Notes:			

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: Diagnostic Tools		**WP Number**	GHS13X9000
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This work package covers the development of any required diagnostic tools.			
Start Date:	**End Date:**	**Type:**	

Inputs:

Activities:

- Development of diagnostic tools as needed.

Outputs:

Assumptions:

- It is not possible to identify all the tools in advance, though it can be assumed that some will be needed. This package then – to a certain extent – represents a planned contingency.

Notes:

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total		**0.1**	**0.1**	**0.2**	**0.3**	**0.25**	**0.2**

WP Title: Support Tools		**WP Number**	GHS13XA000
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This is a summary level work package covering the development of various support tools required for development of the ICC software systems			
Start Date: January 2001	**End Date:** July 2007	**Type:**	
Inputs:			
Activities: ➢ Develop a science simulator ➢ Develop an engineering simulator			
Outputs:			
Assumptions: ➢			
Notes:			

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: Science Simulator	**WP Number**	GHS13XA100
	Version:	1.0
WP Manager:	**Date:**	02 Jan 2002

Description:
The science simulator is used to model the behaviour of the instrument in order to produce synthetic data. The data will be used for producing and testing data reduction algorithms for use in QLA/IA, for validating a new observing procedure, or for investigating the consequences of a modification in the instrument properties. The science content of the data output should contain all relevant instrument characteristics (those that impact on the scientific output).

Start Date:	**End Date:**	**Type:**

Inputs:
Telescope Model

Activities:
➢

Outputs:

Assumptions:
➢

Notes:

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: Engineering Simulator	**WP Number**	GHS13XA200
	Version:	1.0
WP Manager:	**Date:**	02 Jan 2002

Description:
The Engineering simulator is required to provide basic housekeeping, event and science data for use by the data processing and display software systems

Start Date:	**End Date:**	**Type:**

Inputs:

Activities:
-

Outputs:

Assumptions:
-

Notes:

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: Quality Control		**WP Number**	GHS13XB000
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This work package covers the development of software tools to support quality control of data products.			
Start Date:	**End Date:**	**Type:**	

Inputs:

Activities:

- Requirements definition
- Develop software to support quality control of data products
- Documentation

Outputs:

Assumptions:

Notes:

- It is possible that this package could form a part of the Interactive Analysis.
- It is also possible that some of this package could form a part of QCP.
- Tools developed could include production of standard plots and images, product browser(s)

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
Total							

WP Title: Key Programmes		**WP Number**	GHS13XC000
		Version:	1.0
WP Manager:		**Date:**	02 Jan 2002
Description: This work package covers the development of procedures to support the processing of data from the key programmes by the ICC.			
Start Date:	**End Date:**	**Type:**	

Inputs:
- IA, QCP/SPG

Activities:
- Development of software to process key programme data
- Documentation

Outputs:
- Users' Guide

Assumptions:
- Operational support for key programme processing is costed in another work package.

Notes:
- This might be the same as SPG.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
Total							

WP Title: Instrument Simulator	**WP Number**	GHS13XD000
	Version:	1.0
WP Manager:	**Date:**	02 Jan 2002

Description:
The Instrument Simulator(s) is used to model the behaviour of the instrument in order to (1) make sure that the command sequence is safe or (2) produce synthetic data. The data can be used for producing and testing QLA/IA, for validating a new observing procedure, or for investigating the consequences of a modification in the instrument properties. Data output should have the right telemetry format, and the house-keeping data should be complete.
The simulator has to be able to execute commands that have been flagged as dangerous for the instrument or the satellite, and to produce the resulting output and indicate the consequences for the instrument and satellite.

Start Date:	**End Date:**	**Type:**

Inputs:

Activities:
- User Requirements Definition
- Software Requirements Definition
- Documentation of Design
- Implementation and Test of Simulator
- Maintenance

Outputs:

Assumptions:
-

Notes:

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: Software Development Meetings	**WP Number**	GHS13XE000
	Version:	1.0
WP Manager:	**Date:**	15 Mar 2002

Description:
This workpackage covers the meetings of the ICC Software Development Team (ISDT) throughout the Development Phase. These activities will take place regularly and at the different sites of the ISDT members

Start Date:	**End Date:**	**Type:**

Inputs:

Activities:
- Attendance of ISDT at Meetings

Outputs:

Assumptions:
- Average size of team is 6 members
- Meetings take place once per month throughout the development period
-

Notes:

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: Training	WP Number	GHS14
	Version:	1.0
WP Manager:	**Date:**	15 Mar 2002

Description: This is the high-level summary workpackage covering the training necessary for software development in the ICC

Notes:

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Test Engineer							
Calibration Scientist							
Total							

WP Title: Training in the use of HCSS Systems		WP Number	GHS14X1000
		Version:	1.0
WP Manager:		**Date:**	02 Jan 2002
Description: This workpackage covers the training necessary to understand the use of HCSS systems. This will involve visits to other HCSS sites for demonstrations and working with the developers.			
Start Date: July 2002	**End Date:**	**Type:**	
Inputs: ➢			
Activities:			
Outputs: ➢			
Assumptions: ➢			
Notes: ➢			

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: Training in the use of External Systems	WP Number	GHS14X2000
	Version:	1.0
WP Manager:	**Date:**	02 Jan 2002

Description: This workpackage covers the training necessary to use systems delivered to the ICC from external collaborators. These include SCOS200, the MIB Editor, The OBS Maintenance Facility etc.

This will involve visits to other sites.

Start Date: July 2002	**End Date:**	**Type:**

Inputs:

-

Activities:

Outputs:

-

Assumptions:

-

Notes:

-

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: Other Training	WP Number	GHS14X3000
	Version:	1.0
WP Manager:	**Date:**	02 Jan 2002

Description: This workpackage covers the training necessary to allow developers to use the software development tool necessary to develop the ICC software. This includes training in programming languages, operating systems, databases etc

This will involve visits to other sites.

Start Date: July 2002	**End Date:**	**Type:**

Inputs:

-

Activities:

Outputs:

-

Assumptions:

-

Notes:

-

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
Test Engineer							
Total							

WP Title: ILT Support	**WP Number**	GHS21
	Version:	1.0
WP Manager:	**Date:**	10 Jan. 2002

Description: This is a summary workpackage covering all ICC activities associated with supporting the SPIRE Instrument Team in carrying out the Instrument–Level Testing

Notes:

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: Provision of ILT System(s)	WP Number	GHS21X1000
	Version:	1.0
WP Manager:	**Date:**	08 Jan 2002

Description: This workpackage describes those aspects of the ILT system which must be provided by the ICC, or where the ICC has responsibility in the support or integration of the ILT system.

Start Date: 2001?	**End Date:** End of ILT	**Type:**

Inputs:

➢

Activities:

- Integration of HCSS with EGSE_ILT
- Integration of QLA with EGSE_ILT
- Integration of IA with EGSE_ILT
- Setup and integration of OBS Maintenance Facility
-

Outputs:

➢

Assumptions:

➢

Notes:

➢ Which parts of the ILT system is produced by the ICC?

➢ Which parts of the ILT system is produced by another group but becomes the responsibility of the ICC?

➢ Which parts of the ILT system must be integrated by the ICC?

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total							

WP Title: Produce Validation Software		**WP Number**	GHS21X2000
		Version:	1.0
WP Manager:		**Date:**	08 Jan 2002
Description: This software is used to process the output of the CUS (a schedule?) in order to check that the command stream to be sent to the instrument is correct.			
Start Date: July 2002	**End Date:** January 2003	**Type:**	
Inputs: ➢			
Activities: •			
Outputs: ➢			
Assumptions: ➢			
Notes: ➢			

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							

WP Title: Produce Command Validator		**WP Number**	GHS21X3000
		Version:	1.0
WP Manager:		**Date:**	07 Jan 2002
Description: This work package describes the steps taken to produce an instrument command evaluator, which can be used to verify commands generated from scripts and observation requests.			
Start Date: July 2002	**End Date:**	**Type:**	

Inputs:

-

Activities:

- For each command define any preconditions that need to be met (*much of this will be defined in the operating modes document)*
- Define which aspects of instrument status are required for instrument safety
- Design S/W that tracks instrument status after each command (*this may include a command/precondition database)*
- Write simulator S/W
- Define and produce test scripts and observation requests specifically to test the simulator and then run using the simulator S/W
- Document simulator S/W

Outputs:

- Instrument simulator

Assumptions:

- None

Notes:

- We envisage that as our understanding of the instrument evolves there will be an evolution of a set of rules governing how the instrument will be commanded. If certain pre-conditions are (or are not) met then a command will be deemed unsafe. An obvious example of this is switching on a subsystem before another subsystem is switched off. The instrument simulator will track in software the instrument status and will be used for our development of command sequencing in test scripts and observation requests. Checks for telecommand parameter out of limit cases are done directly by SCOS2000 using the MIB.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							

WP Title: Populate Calibration Database (ILT Data)		WP Number	GHS21X4000
		Version:	1.0
WP Manager:		**Date:**	07 Jan 2002
Description: This workpackage covers the activities necessary to generate the data needed in the calibration database as a result of ILT Tests and to store it in the database			
Start Date: July 2002	**End Date:** End of ILT	**Type:**	

Inputs:

- Analysed test data

Activities:

- Assemble all data required (*this could be simply the analysed results from an individual test or may include data already stored if a calibration table is being generated from a series of tests).*
- Further analyse test data (optional - *see notes*)
- Format the analysed test data into a form suitable for the calibration database
- Store data in the database

Outputs:

- New/updated calibration database

Assumptions:

- All aspects of calibration database design are covered in WP GHS23?? 'Define and create calibration database'

Notes:

- In order to generate certain tables the results from a whole series of tests will be needed. The support ILT work package deals with analysing and storing the results from individual tests. This WP includes any analysis which may need to be done once a set of tests has been completed.
- It is possible/likely that not all test data will be analysed by the ICC (e.g. some bolometer characteristics may be derived at Cardiff).
- When all tests are analysed together, there is a possibility that a test (or set of tests) will show bad results meaning that these tests will need to be repeated. This would then feedback into the 'Support ILT Tests' work package.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total							

WP Title: Support to ILT Tests		**WP Number**	GHS21X5000
		Version:	1.0
WP Manager:		**Date:**	07 Jan 2002
Description: This work package describes the activities, which are done by the ICC in support of ILT.			
Start Date: Spring 2002	**End Date:** End of ILT	**Type:**	

Inputs:

- HCSS (e.g. for MIB, test procedures, CUS database)
- EGSE-ILT

Activities:

- Support the generation of the test plans.
- Write OBS test plans
- Give input on testing priorities
- Define and implement data storage strategies for the agreed tests
- Define what outputs are required by this work package and how this information will be stored e.g. test reports
- Define and write test procedures
- Participation in carrying out tests
- Analysis of results from tests
- Production of new calibration tables (*also see WP ?? Populate calibration database*)
- Writing of test reports
- Participate in test reviews

Outputs:

- TBD

Assumptions:

- None

Notes:

- Although there will be an overall test plan it is expected this will be divided into individual test plans for each instrument model. As it is unlikely that there will be time to carry out all possible tests, the ICC will contribute towards optimising the tests to achieve the most relevant and accurate information possible for a particular model.
- Not all tests will be done via test procedures. In early ILT the ICC will also participate in testing by sending individual commands to the instrument.
- Although the end date is 'end of ILT' the costing will need to scope instrument level tests which will occur after the formal ILT time period. This is likely to include FS testing for characterisation purposes pre-launch and FS testing in the event of FM problems post-launch.

Resources:

	2001	2002	2003	2004	2005	2006	2007
Software Manager							

WP Title: IST Support	**WP Number**	GHS22
	Version:	1.0
WP Manager:	**Date:**	10 Jan. 2002

Description: This is a summary workpackage covering all ICC activities associated with supporting the SPIRE Instrument Team in carrying out the Integrated Payload and System Testing

Notes:

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: Provision of IST System(s)	WP Number	GHS22X1000
	Version:	1.0
WP Manager:	**Date:**	08 Jan 2002

Description: This workpackage describes those aspects of the IST system which must be provided by the ICC, or where the ICC has responsibility in the support or integration of the ILT system.

Start Date: 2001?	**End Date:** End of ILT	**Type:**

Inputs:

➢

Activities:

- Support to ntegration of HCSS within the IST environment
- Integration of QLA within the IST environment
- Integration of IA within the IST environment
- Setup and integration of OBS Maintenance Facility within the IST environment

Outputs:

➢

Assumptions:

➢

Notes:

➢ Which parts of the ILT system is produced by the ICC?

➢ Which parts of the ILT system is produced by another group but becomes the responsibility of the ICC?

➢ Which parts of the ILT system must be integrated by the ICC?

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total							

WP Title: Populate Calibration Database (IST Data)		WP Number	GHS22X2000
		Version:	1.0
WP Manager:		**Date:**	07 Jan 2002
Description: This workpackage covers the activities necessary to generate the data needed in the calibration database as a result of IST Tests and to store it in the database			
Start Date: July 2002	**End Date:** End of ILT	**Type:**	

Inputs:

- Analysed test data

Activities:

- Assemble all data required (*this could be simply the analysed results from an individual test or may include data already stored if a calibration table is being generated from a series of tests).*
- Further analyse test data (optional - *see notes*)
- Format the analysed test data into a form suitable for the calibration database
- Store data in the database

Outputs:

- New/updated calibration database

Assumptions:

- All aspects of calibration database design are covered in WP GHS23?? 'Define and create calibration database'

Notes:

- In order to generate certain tables the results from a whole series of tests will be needed. The support IST work package deals with analysing and storing the results from individual tests. This WP includes any analysis which may need to be done once a set of tests has been completed.
- It is possible/likely that not all test data will be analysed by the ICC (e.g. some bolometer characteristics may be derived at Cardiff).
- When all tests are analysed together, there is a possibility that a test (or set of tests) will show bad results meaning that these tests will need to be repeated. This would then feedback into the 'Support IST Tests' work package.

Resources:

	2001	2002	2003	2004	2005	2006	2007
Total							

WP Title: Support to IST Tests		**WP Number**	GHS22X3000
		Version:	1.0
WP Manager:		**Date:**	07 Jan 2002
Description: This work package describes the activities, which are done by the ICC in support of IST.			
Start Date: Spring 2002	**End Date:** End of ILT	**Type:**	

Inputs:

- HCSS (e.g. for MIB, test procedures, CUS database)
- EGSE for IST

Activities:

- Support the generation of the test plans.
- Write OBS test plans
- Give input on testing priorities
- Define and implement data storage strategies for the agreed tests
- Define what outputs are required by this work package and how this information will be stored e.g. test reports
- Define and write test procedures
- Participation in carrying out tests
- Analysis of results from tests
- Production of new calibration tables (*also see WP ?? Populate calibration database*)
- Writing of test reports
- Participate in test reviews

Outputs:

- TBD

Assumptions:

- None

Notes:

- Although there will be an overall test plan it is expected this will be divided into individual test plans for each instrument model. As it is unlikely that there will be time to carry out all possible tests, the ICC will contribute towards optimising the tests to achieve the most relevant and accurate information possible for a particular model.

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Software Manager							

WP Title: Calibration Support	**WP Number**	GHS23
	Version:	1.0
WP Manager:	**Date:**	10 Jan. 2002

Description: This is a summary workpackage covering all ICC activities associated with supporting the SPIRE Instrument Team in defining and populating the Calibration Database prior to operations

Notes:

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: Define Calibration Requirements		**WP Number**	GHS23X1000
		Version:	1.0
WP Manager: Bruce Swinyard		**Date:**	08 Jan 2002
Description: This work package describes the ICC contribution to the activities involved in producing the calibration requirements document.			
Start Date: July 2001	**End Date:**	**Type:**	

Inputs:

- Science Requirements Document
- Instrument Qualification Requirements

Activities:

- Gather requirements from input documentation
- Determine how these requirements will be met by testing
- Produce draft version of requirements document
- Provide comments on the draft document
- Maintain requirements document (via meetings for example)
- Review and update documents which may be affected by the requirements

Outputs:

- Calibration requirements document

Assumptions:

- None

Notes:

- None

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total	**0.1**	**0.1**					

WP Title: Define Calibration Plan		**WP Number**	GHS23X2000
		Version:	1.0
WP Manager:		**Date:**	02 Jan 2002
Description:			
Start Date: Jan 2002	**End Date:** End of operations	**Type:**	

Inputs:

- Calibration Requirements Document
- Operating Modes Document

Activities:

1.1.1.1 Test Campaign

- Determine which calibration information is needed for uplink purposes and how this should be structured *(i.e. what tables are required and what information is in each table)*
- Determine which calibration information needed for downlink purposes and how this should be structured *(i.e. what tables are required and what information is in each table, the IA design might feed into this)*
- Determine how the data obtained from tests described in the calibration requirements document and the test plan need to be analysed in order to produce the defined calibration information structures (tables).
- Write a calibration plan indicating how the test campaign will meet the calibration requirements
- Review calibration plan at regular intervals during test campaign

1.1.1.2 Preparatory Observations

- Determine what preparatory observations are required before launch.
- Prepare plan for making requests to ground based or space based observatories for observations to be carried out

1.1.1.3 In-flight Calibration

- Define how calibration tables will be populated in-flight including what data is needed and how it will be analysed (*this includes obtaining information on the best available models*).
- Determine what observations need to be made by SPIRE to establish (or check ground values of) the calibration in flight (*essentially PV phase, this includes gatheringinformation on selected sources from pre-existing observations*).
- Determine what calibration observations need to be made by other Herschel instruments in flight
- Determine what observations are needed to monitor the calibration in flight
- Check scheduling constraints (*e.g. visibility*).
- Prepare in-flight calibration plan
- Maintain calibration plan on a regular basis during operations

Outputs:

- Calibration Plan

Assumptions:

- None

Notes:

- The calibration plan actually covers three distinct phases, initial establishment of the calibration on the ground, establishment of the calibration in-flight (including preparatory observations) and monitoring of the calibration in-flight. We may consider documenting these phases separately.

Resources:

	2001	2002	2003	2004	2005	2006	2007
Total							

WP Title: Define and create Calibration Database	**WP Number**	GHS23X3000
	Version:	1.0
WP Manager:	**Date:**	08 Jan 2002

Description: This work package describes the activities connected with the definition and creation of the calibration database. It is currently envisaged that this database will contain all test data, raw, intermediate and analysed, the derived calibration tables in accordance with the calibration plan and analysed data from calibration observations made during operations.

Start Date: Jan 2002	**End Date:** End of ILT	**Type:**

Inputs:

- Calibration Plan(s)
- Test Plan

Activities:

- Assemble calibration table definitions from calibration plan
- Identify which data will be gathered to produce each calibration artifact
- Determine whether this data (either raw or analysed) should be included in the calibration database
- Determine if any other tables need to be produced (e.g. trend analysis tables, intermediate products from data analysis)
- Define what external data will be stored in the database (e.g. models, preparatory observations, laboratory data)
- Define how the data will be stored (from a user point of view)
- Design database architecture(s) (*note we should include contingency for changes to our calibration scheme such as a value initially thought to be constant may be found to have a dependency e.g. time, flux etc.*)
- Create database(s)
- Test database(s)
- Document database(s)

Outputs:

- Calibration database

Assumptions:

- There are no restrictions due to the choice of a Versant database.

Notes:

- None

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total							

WP Title: Populate calibration database		**WP Number**	GHS23X4000
		Version:	1.0
WP Manager:		**Date:**	09 Jan 2002
Description: Activities needed to populate the calibration database			
Start Date: July 2002	**End Date:** January 2003	**Type:**	

Inputs:

- Calibration plan
- Calibration database definition

Activities:

Gather external data as defined in the calibration plan

- Obtain models and perform theoretical modelling
  - planetary models
  - stellar models
  - asteroids
  - TNOs
  - galaxy SEDs
- Perform preparatory observations and analyse results

Determine what observations are needed
Set up collaborations
Submit proposals
Perform observations
Analyse and store results

- Collection of data from literature
- Collection of data from archive sources - *may require some analysis of archival data*

Produce or update calibration database in ILT

- Analyse test data
- Store analysed data (*raw test data should be automatically stored in the database by QLA*)

Produce or update calibration database in operations

- Analyse in-flight calibration observations
- Store results (e.g. into calibration tables, trend analysis tables etc.)

Outputs:

- Populated calibration database

Assumptions:

- None

Notes:

- What about the logging of observations/tests? Where should this information be kept?

Resources:

	2001	2002	2003	2004	2005	2006	2007
Total							

WP Title: Science Verification	**WP Number**	GHS24
	Version:	1.0
WP Manager:	**Date:**	10 Jan. 2002

Description: This is a summary workpackage covering all ICC activities associated with preparing for the Science Verification of the SPIRE instrument in Flight

Notes:

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: Science Verification Plan		**WP Number**	GHS24X1000
		Version:	1.0
WP Manager:		**Date:**	15 Mar 2002
Description: This workpackage cover activities related to writing the SPIRE Science Verification Plan			
Start Date: Jan 2002	**End Date:**	**Type:**	

Inputs:

➢

Activities:

•

Outputs:

➢ Science Verification Plan

Assumptions:

➢ None

Notes:

➢

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total							

WP Title: Pre-Launch Science Verification	**WP Number**	GHS24X2000
	Version:	1.0
WP Manager:	**Date:**	02 Jan 2002

Description: This workpackage cover the activities to be carried out pre-launch in order to be able to carry out the SPIRE Science verification.

Start Date: Jan 2002	**End Date:**	**Type:**

Inputs:

- Science Verification Plan
-

Activities:

- Identification of sources for Science Verification
- Others TBD

Outputs:

-

Assumptions:

-

Notes:

- .

Resources:

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total							

WP Title: Facilities	**WP Number**	GHS31
	Version:	1.0
WP Manager:	**Date:**	15 Mar. 2002

Description: This is a summary workpackage covering all ICC activities associated with preparing the ICC infrastructure and facilities.

Notes:

Facilities to be provided are:

- ICC Operations centre at RAL
  - Provision of infrastructure
  - Provision of Operations hardware/software
  - System Administration (including installation of systems)
  - Database Management
  - Web Management
- DAPSAS (UK) at ICSTM
  - Provision of infrastructure
  - Provision of Operations hardware/software
  - System Administration (including installation of systems)
- DAPSAS (Fr) at Saclay
  - Provision of infrastructure
  - Provision of Operations hardware/software
  - System Administration (including installation of systems)
- OBS Maintenance Facility
  - Installation and training
- ICC Test Facilities
  - Preparation of Cryolab and test facilities for standby
  - Installation of test instrument model(s), including AVN to test MIB and SCOS2000 updates
  - Instrument Simulators

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: Operations Planning	**WP Number**	GHS32
	Version:	1.0
WP Manager:	**Date:**	15 Mar. 2002

Description: This is a summary workpackage covering all ICC activities associated with planning for the Operations Phase

Notes:

These activities are:

- Provision of an Operations Plan and procedures
  - Provision of Operations Plan
  - Provision of ICC Operational procedures
  - Provision of IFOP
  - Provision of Data Analysis Procedures
- Definition of ICC/HSC Operational Interactions
  - Definition of interactions
  - Definition of procedures
- Definition of ICC/MOC Operational Interactions
  - Definition of interactions
  - Definition of procedures
- Operations Team Setup and Training
- Training of external staff (e.g. HSC staff, consortium members etc)

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: Integration and Test	**WP Number**	GHS33
	Version:	1.0
WP Manager:	**Date:**	15 Mar. 2002

Description: This is a summary workpackage covering all ICC activities associated with integrating and testing the ICC facilities

Notes:

Activities are:

- ICC Integration
- Herschel Ground Segment Integration
- Ground Segment Testing
  - SVT
  - End-to-End Testing

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: Commissioning Phase	**WP Number**	GHS34
	Version:	1.0
WP Manager:	**Date:**	15 Mar. 2002

Description: This is a summary workpackage covering all ICC activities associated with integrating, testing and operation of the ICC@MOC

Notes:

Activities are:

- Provision of the Commissioning Phase System (ICC@MOC)
- Support to the Commissioning Phase

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: ICC Operations Continuous Tasks	**WP Number**	GHS41
	Version:	1.0
WP Manager:	**Date:**	15 Mar. 2002

Description: This is a summary workpackage covering all continuous ICC activities carried out during the Operations Phase

Notes:

Activities are:

- Operations management
- Provision of a Project office
- Product/Quality Assurance, including configuration Control for ICC and IA
- Consortium Support – e.g. arranging meetings,
- Recurrent Costs

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: Routine Operations Activities	**WP Number**	GHS42
	Version:	1.0
WP Manager:	**Date:**	15 Mar. 2002

Description: This is a summary workpackage covering all routine ICC activities during the Operations Phase

Notes:

Activities are:

- Monitor Instrument Health
- Calibration Processing
  - Process Calibration Observations
  - Populate the Calibration Database
- Performance monitoring
- Trend Analysis
- Quality Control
- Help Desk
- Information Dissemination (inside and Outside the ICC)
  - Asses usefullnes of information to outside parties
  - Determine distribution list and methos of delivery
  - Distribute information
- Generate Calibration Observations
- Scheduling Observations
  - Use of HSC to prepare schedules and view them
  - Submission of prepared schedules

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: Non-Routine Activities	**WP Number**	GHS43
	Version:	1.0
WP Manager:	**Date:**	15 Mar. 2002

Description: This is a summary workpackage covering all ICC activities that are not done routinely, or cannot be planned in the Operations Phase

Notes:

Activities are:

- Performance verification
- Key programmes
- Problem Handling
  - Analysis of problems (including MRBs) – may generate Engineering Observations
  - Implementation of solution – may generate Engineering Observations
  - Testing of solution
  - OBS Maintenence
- Calibration evolution
  - Define new Calibration Requirements
  - Update Calibration Plan
  - Define and test new Calibration Observations
- Use of Test Facilities
  - Routine upkeep of facilities
  - Operation of test facilities for a test campaign

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: Software Evolution	**WP Number**	GHS44
	Version:	1.0
WP Manager:	**Date:**	15 Mar. 2002

Description: This summary level work package covers all the ongoing software development activities within the ICC.

Notes:

- Interactive Analysis framework evolution
- Data processing modules evolution
- Calibration Analysis evolution
- Trend Analysis evolution

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							

WP Title: IA Framework Evolution		**WP Number**	GHS44X1000
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This work package covers evolution of the framework in which the SPIRE IA runs.			
Start Date:	**End Date:**	**Type:**	

Inputs:

- IA framework

Activities:

- Identify which improvements are desirable
- Identify which improvements are cost-effective
- Plan and prioritise for new versions
- Improve the user interface
- Add new/better data visualisation modules
- Add new/better functionality as the need arises
- Regression testing
- Documentation

Outputs:

- New versions of IA
- New version of SPIRE IA Programmers' Guide (suitable for wider community)

Assumptions:

- Some framework elements (e.g. import/export) will be common software.

Notes:

Resources:

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Software Manager							
Software Engineers							
ICC Scientists							
Total							

WP Title: Data Processing Modules Evolution		**WP Number**	GHS44X2000
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This work package covers the evolution of existing algorithms and the development of new ones for data processing.			
Start Date:	**End Date:**	**Type:**	

Inputs:

Activities:

- Plan software development cycles
- Develop new algorithms and tune existing ones
- Evaluate and integrate ICC-external algorithms
- Integrate modified algorithms into the IA
- Scientific validation
- Documentation
- Delivery and testing

Outputs:

- New versions of IA.
- New versions of IA Users' Guide
- Science validation reports

Assumptions:

-

Notes:

- This work package applies to both the photometer and the FTS, as well as generic algorithms.
- Integration into QCP/SPG is covered under the SPIRE contribution to HCSS maintenance.

Resources:

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Software Manager							
Software Engineers							
Calibration Scientist							
ICC Scientists							
Total							

WP Title: Calibration Analysis Modules Evolution	**WP Number**	GHS44X3000
	Version:	1.0
WP Manager:	**Date:**	03 Jan 2002

Description: This work package covers the evolution of existing modules and the development of new ones for Calibration Analysis.

Start Date:	**End Date:**	**Type:**

Inputs:

Activities:

- Plan software development cycle.
- Develop new modules and refine existing ones
- Documentation

Outputs:

- New versions of Calibration Analysis
- New versions of Users' Guide

Assumptions:

- This work package is outside the scope of the HCSS.

Notes:

Resources:

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Software Manager							
Software Engineers							
Calibration Scientist							
Total							

WP Title: Trend Analysis Evolution		**WP Number**	GHS44X4000
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This work package covers the evolution of existing modules and the development of new ones for Trend Analysis.			
Start Date:	**End Date:**	**Type:**	

Inputs:

Activities:

- Plan software development cycle.
- Develop new modules and refine existing ones
- Documentation

Outputs:

- New versions of Trend Analysis
- New versions of Users' Guide

Assumptions:

- This work package is outside the scope of the HCSS.

Notes:

Resources:

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Software Manager							
Software Engineers							
System Engineer							
Calibration Scientist							
ICC Scientists							
Total							

WP Title: Software Maintenance		**WP Number**	GHS45
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This summary level work package covers all the software maintenance activities for the ICC.			
Start Date:	**End Date:**	**Type:**	

Inputs:

Activities:

- SPIRE contribution to HCSS maintenance
- Interactive Analysis (framework and modules) maintenance
- Software Infrastructure maintenance
- Other ICC software maintenance

Outputs:

Assumptions:

Notes:

Resources:

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Software Manager							
Software Engineers							
Total							

WP Title: SPIRE contribution to HCSS maintenance		**WP Number**	GHS45X1000
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This work package covers maintenance of the software items supplied by SPIRE as part of the HCSS.			
Start Date:	**End Date:**	**Type:**	

Inputs:

Activities:

- Bug fixes.
- Necessary reengineering (for software rot)
- Documentation of changes
- Attendance at meetings

Outputs:

Assumptions:

-

Notes:

- This work package includes the maintenance of QCP/SPG.
- IA maintenance itself is covered in its own work package.

Resources:

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Software Manager							
Software Engineers							
Total							

WP Title: Interactive Analysis Maintenance		**WP Number**	GHS45X2000
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This work package covers the maintenance of all the IA modules. This includes the IA that is part of the HCSS ("Observer IA"), Calibration Analysis and Trend Analysis.			
Start Date:	**End Date:**	**Type:**	

Inputs:

Activities:

- Planning and prioritisation
- Team coordination
- Bug fixes.
- Necessary reengineering (for software rot)
- Documentation of changes

Outputs:

Assumptions:

-

Notes:

Resources:

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Software Manager							
Software Engineers							
Total							

WP Title: Software Infrastructure Maintenance		**WP** Number	GHS45X3000
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This work package covers the maintenance of the software development infrastructure. This includes the problem reporting, configuration control, information handling and sandbox systems.			
Start Date:	**End Date:**	**Type:**	

Inputs:

Activities:

- Bug fixes.
- Necessary reengineering (for software rot)
- Documentation of changes

Outputs:

Assumptions:

-

Notes:

Resources:

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Software Manager							
Software Engineers							
Total							

WP Title: Other ICC Software Maintenance		**WP Number**	GHS45X4000
		Version:	1.0
WP Manager:		**Date:**	03 Jan 2002
Description: This work package covers the maintenance of all the ICC software elements that do not fit into any of the other categories. This includes diagnostic tools for example.			
Start Date:	**End Date:**	**Type:**	

Inputs:

Activities:

- Bug fixes.
- Necessary reengineering (for software rot)
- Documentation of changes

Outputs:

Assumptions:

-

Notes:

Resources:

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Software Manager							
Software Engineers							
ICC Scientists							
Total							

WP Title: Facilities Maintenance	**WP Number**	GHS46
	Version:	1.0
WP Manager:	**Date:**	15 Mar. 2002

Description: This is a summary workpackage covering all ICC activities associated with maintaining the ICC facilities

Notes:

Activities are:

- Infrastructure Maintenance
  - ICC Control Centre Maintenance
  - DAPSAS (UK) Maintenance
  - DAPASA (Fr) Maintenance
- Computer System Maintenance

Resources:

	2000	2001	2002	2003	2004	2005	2006
ICC Scientist							
ICC Development Manager							
ICC Systems Engineer							
ICC Software Manager							
Software Engineer(s)							