SPIRE-ESA-MOM-001680

MINUTES OF MEETING

date	14 Dec 01	reference	SCI-PT-10698	page	1/2
meeting date	14-Dec-01	meeting place	ESTEC		
chairman					

participants	C. Masse Alcatel A. Dragoni LFI A. Heurtel HFI H. Igl PACS E. Clark SPIRE H. Jacobs HIFI P. Olivier, J. Rautakoski, A. Heske ESA	copy	MvH,GC,JB,JMC

Subject **Quarterly PA meeting**

Description		action	due date
Introduction by ESA. See attached slides annex 1			
HIFI presentation. See attached slides annex 2 EEE parts approval: the structure has to be clarified by ESA. What is managed by Alcatel CPPA and what is managed by ESA		ESA	
Spire: See annex 3 Work is on-going on documentation. Available documents are shown in the hand-out.			
PACS: see hand out annex 4 Half of the institute have answered with status widely varying.			
HFI: see annex 5			
LFI see annex 6 EEE requirement presented by LFI is not agreed by			

a

ESTEC
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Description		action	due date
ESA			
Alcatel presentation: see annex 7			
In particular safety documents to be delivered are described			
Alcatel to provide CA/SO/ISO 246/90 needed information to instruments		Alcatel	
Availability to be discussed in design meetings (progress and interface)			
FMECA and critical items: presentation in annex 8			
HIFI cleanliness: With the particle distribution as described in note QM/01-276/JMG total amount of particle allowed on the optical path turn to be 4140 not fitting with the contamination working group allocation of twice 5000 for the telescope.			
ESA hands over a copy of CSG safety regulation Volume 1 and volume 2 part 1 and part 2 to each instrument representative.			

ALCATEL PA activities wrt scientific instruments

ALCATEL proposed scheme for the relationship between ESA/ALCATEL/PI's.

-ALCATEL presents the needed documentation/inputs(see after)
-This documentation will be reviewed and ALCATEL will issue comments to ESA which keep the authority to bring them applicable to the PI's and to verify the compliance .

The main hypothesis is that the PI's are compliant with:

- **IID part A**
- **IID's part B**
- **PA requirements for HERSCHEL/PLANK Scientific instruments PT RQ 04410 issue 2**

PA ACTIVITIES

ALCATEL PA activities wrt scientific instruments

PA MANAGEMENT :

- Review of PA plan
- Participation to NRB (for non conformance having an impact on the interfaces and on AIT) assuming that the information have been communicated to ALCATEL
- Participation to the PM's (quarterly) / Reviews (as appropriate)
- Review of PA progress report (part of Progress Report)
- Review of ADP
- RFD/RFW approval (for those linked to I/F)

ALCATEL PA activities wrt scientific instruments

Safety:-Review of safety analyses

Each experimenters has to provide a safety analyses, this document shall provide:
a)A general description of the overall subsystems with a more accurate one of the subsystems, GSE or operation safety critical. Schematics and/or block diagram shall be included.
b)A description of the causes of the hazards
c)A description of the actions that will be implemented to eliminate, reduce or counter the hazard cause.
d)A verification of the implementation of the actions and closure of the hazards with reference of closure documents
This document shall be submitted at instrument reviews and at delivery.

ALCATEL PA activities wrt scientific instruments

Safety:-Review of data package

The following information have to be delivered with the hardware
-List of RFD/RFW , NCR related to safety
-List of open safety items
-List of procedures for operation on the launch site
-Procedures for hazardous operations , including those for a return to a safe condition and emergency procedures in the event of an accident.
-GSE (MGSE-TGSE) proof tests
-Acceptance test report for safety critical subsystem or piece of equipment

ALCATEL PA activities wrt scientific instruments

Safety:-Review of data package

The following information have to be delivered with the hardware for pressure vessels:
-Log book
-Maximum operating pressure
-Proof pressure
-Burst pressure
-Number of cycles above threshold
-Number of cycles above the maximum operating pressure
-Design cycle limit
-Maximum level to which vessel was pressurised
-Date of proof test

The ASPI doc SAFETY Requirements for subcontractors can be used as a reference document.

PA ACTIVITIES

ALCATEL PA activities wrt scientific instruments

Dependability : - Analyse of FMECA and Availability data for system activities.Preliminary issue is expected before System PDR (April 2002)

FMECA: The analyses shall evidence the failure cases which interface the space craft, the SPFs and the failures which can not be tested at system level (so can cancel the redundancy concept).

AVAILABILITY: The system level analyses requires from experiments:
-The outage duration and response time in case of failure
-An *estimation* of the failure rates leading to a breaking of scientific data transfer.
-The outage duration of deterministic events
-The deterministic procedures to the SVM for experiments reconfiguration.

ALCATEL PA activities wrt scientific instruments

M/P : - Review of lists
The lists shall identify the items which are non compliant with respect to outgassing requirements

Cleanliness : - Review of cleanliness control plan
ASPI concern is to have a good confidence that the contamination level at delivery will be acceptable

PA ACTIVITIES

ALCATEL PA activities wrt scientific instruments

Software : -Review of HSIA for non failure propagation to Spacecraft software aspects

ALCATEL PA activities wrt scientific instruments

EEE :- Participation to parts selection through CCPA management

-Each experimenter shall issue the PAD sheets for all self-procured parts and to report of the procurement progress for the self-procured parts.PAD sheets have to be approved by ASPI.

-For components manufactured in US each user shall provide to CPPA the needed information for export licence.

Product Assurance Topics

- *PA Requirements*
- *PA management*
- *EEE parts, Materials and Processes*
- *Cleanliness and Contamination*
- *Reliability and Safety*

PA Requirements

Planck LFI PA plan PL-LFI-PST-PL-003 Issue 3

- Reviewed the ESA comments during the 20/11/2001 PA meeting.

- Decided that the agreements reached shall be take into account after the IBDR in a final issue.

- Included in the issue 3 of the LFI PA Plan the *minimum* acceptable quality level of the EEE parts :

Microcircuit:	**SCC9000 lev.C, MIL-M-38510 class B, MIL-PRF-38535 Class Q**
Transistors / Diodes:	**SCC lev.C, MIL-PRF-19500 lev. JANTXV**
Hybrid Circuits:	**PSS-01-608 Lev.C, MIL-PRF-38534 class H**
Passive parts:	**SCC Lev.C, applicable MIL specification as per PPL21 grade 2**
Relays:	**SCC Lev.B, applicable MIL specification as per PPL21 grade 2**
Connectors:	**SCC Lev.B, applicable MIL specification as per PPL21 grade 2**

Parts used for flight application that do not fulfil the above quality levels (non standard parts) shall be approved by LFI PST and ESA.
Non standard parts will be identified in the DCL since the early phases of the program.
Non standard parts will be covered by issue of the relevant PAD.

PA management

- Beginning of August PA meeting at TRW: discrepancies on the way to proceed with respect to the HR EEE part procurements. Agreement shall be reached on case by case basis via the Part Approval Documents. No documents available because classified “restricted documents”.
- Participation to System I/F Meeting at Laben (October the 3rd ÷ 5th). Presentation was addressed to:
  - EEE part quality levels pointing out the minimum ones for the program (as per LFI PA Plan, issue 3),
  - status on contamination requirements,
  - EIDP content.

  A status of the LFI Suppliers EEE Parts /Materials/ Processes lists was provided.
  A PA splinter meeting was held on the LNAs evaluation proposal: the evaluation was presented in detail clarifying all the steps.
  The PST PA pointed out that the evaluation is applicable for all the parts not qualified (e.g.: phase switches, …) and shall be positively closed before QM manufacturing.
- JBO / MilliLab-Ylinen provided their comments on the LNA Evaluation

Proposal: answers from PST PA addressed to MilliLab-Ylinen the 23/11 and to JBO the 01/12. Final consideration expected in January 2002.

- Participation to the 13th Part Board Meeting held in Tecnologica the 25th of October: reviewed the LFI status for the Centralised Part Procurement. Up to know only CRISA/IAC for the REBA have issued formal ATPs for both QM and FM components requiring ESA pre-financing. On this subject SAN and his new QM subcontractor, MIER COMUNICACIONES S.A., are moving to CPPA asking ESA pre-financing.
- Laben stopped the ATPs for active / passive parts due to the running design review with respect to scientific requirements. CPPA is aware on this, allowing some more time, where possible, for design completion (fax HP-TLG-FX-70-01, 10/10/2001).
- Preparation and participation to the PA Progress meeting with ESA held in Laben the 19 - 20th of November: detailed status was presented on the activities running.
- Not yet received a Compliance Matrix to the Planck LFI PA Plan, issue 3 from the LFI Users. If no comments shall be sent to PST it will be considered applicable as it is to the Users.
- LFI suppliers advised for the PA / QA activities in order to take care the organisation for the incoming QM production.

- Sorption Cooler (SC) and SCE PA status

(AI 3 closure, from PL-LFI-PST-MM/01-018)

- New PA I/F for SC (Timothy W. Larson, Mission Assurance Manager).
- Sorption Cooler status as per Larson CDR presentation held in September at JPL.
- Sent PA request for clarification to Planck Sorption Cooler Thermo Mechanical Unit Specification, ES518265 Rev x7, via E-Mail (LFI/TES/RCB/01-148, 22/10/2001).
- Not yet received comments to LFI PA Plan.
- Asked a report updating the PA status: envisaged PA input from JPL during these days.

Sorption Cooler Electronic:

- SCE partially answered to the comments sent during the last I/F meeting held in Cannes the 28th of Nov. .
- Updated HFI SCE QM & FM Part list (dated 5th of Dec. 2001).
- No DML and DPL available up to now.

- Missing information on the ISN approach to the QA SW.
- Open point: HW/SW Interaction Analysis.
- Requested a report on the main PA topics (Materials and Processes, Safety, Cleanliness, QA Software, Configuration Management).
- Started clarification with HFI Product Assurance in order to facilitate the link among ISN-HFI-LFI.

EEE parts, Materials and Processes

- An internal review on the available data about the LFI Materials and Processes was held at PST level.
  Comments was provided to Laben, SAN, JBO, IAC/CRISA (CRISA answers just arrived) requesting their implementation in the lists for the next Design Review.
- Laben issued a second revision of the Declared Materials and Mechanical Parts List, and Declared Processes List including PST/ESA comments.

Up to now MilliLab/Ylinen have not yet provided any input for the Materials / Mechanical Parts, and Processes List. This aspect, already pointed out in many occasions it is considered critical.

- A draft issue 2 of the following documents: Planck LFI Declared Component List, Materials and Mechanical Parts List, Processes List, are available as "live" documents in order to insert all the input coming from the LFI Suppliers.
- Handed over during the 20th of November Meeting at Laben, two

samples of Carbon Fiber bound in Epoxy Resin (CFRP T300) for Outgassing Test as per PSS-01-702. Relevant Data Sheet sent last week.

The material shall be used for the struts (bipodes) as interface between Mainframe and PPLM.

- ***DAE - FEU Cryo Harness***

(AI 2 closure, from PL-LFI-PST-MM/01-018).
Soldering configuration:
Cannon connectors type MDM;
SnPb37/63 as soldering material;
Conductor materials: Manganin, Au, Cu, Al, with AWG varying among 34 and 40 (TBC);
Potting compound shall be identified from MSFC-HDBK-527;
Process for soldering and potting following Tayco Internal Procedures
Tayco Engineering Inc. is a Laben Subcontractor for the cryo-harness.
Tayco already provided cryo-harness for space programs in a temperature range from -272°C to +200°C.

Cleanliness and Contamination

- PARTICULATE CONTAMINATION

Cryo items (subsystems staying at 20 °K in the focal plane)
Obscuration factor:
300 ppm
Clean room class identification:
class 10000 (TBC) during integration and tests without protective cover
class 100000 during integration and tests with dedicated protective cover

Items at 300 °K (subsystems staying in the Back End Unit and in the Service Module)
Cleaning level:
visually clean
Clean room class identification:
class 100000
If during integration cryo items shall be assembled with “300 K” equipment, the cleaning rules for cryo items shall be applied.

Dedicated notes relevant to the use of proper dust caps will be added in the manufacturing flow records.

- MOLECULAR CONTAMINATION

The prevention of molecular contamination will start with selection of materials having lower out gassing factor or anyhow not higher than:

1 % TML and still **1 % TML (TBC)** for the materials in the focal plane;
0.1 % CVCM and still **0.1 % (TBC)** for the materials in the focal plane.

The organic deposition on surfaces of the focal plane units shall be less than:
3 x 10^{-6} gcm^{-2} (TBC) at delivery.

Bake out on the assemblies will be considered to the highest safe temperature at that level.

- *Evaluation on the Molecular Contamination is still running*
(AI 1, open, from PL-LFI-PST-MM/01-018).
Technical Note is under finalisation but considering the missing data relevant to the Ice and Hydrazine, on optical characteristic at cryo temperatures a worst case is not yet identified.

Reliability and Safety

- LFI FMECA assumption: For each frequency the loss of one acquisition chain is acceptable for the system.
- No input (Functional FMECA) from LFI Suppliers, apart IAC/CRISA, ISN and JPL presentation: certain delay for the LFI FMECA issue data package) shall be take into account; the updated issue is foreseen for the end of January 2002 (TBC).
- Provided input to HFI for cryo-chain FMECA with heat switches.
-Support to technical Redundancy Concept of Planck LFI.

Safety

- The only item identified as Safety Critical is the Sorption Cooler (see Planck LFI PA Plan, issue 3). A Safety Plan (D-16875) was issued by JPL in December 2000 and confirmed for the relevant CDR in September 2001.
- Comments on Safety aspects was provided to JPL.
- Not available the JPL "Initial Safety Data Package".

Product Assurance
General status

since the Δ 0.1K cooler review (October 10, 2001 in IAS)

Alain Heurtel
CNRS/IN2P3/LAL and IAS (France)

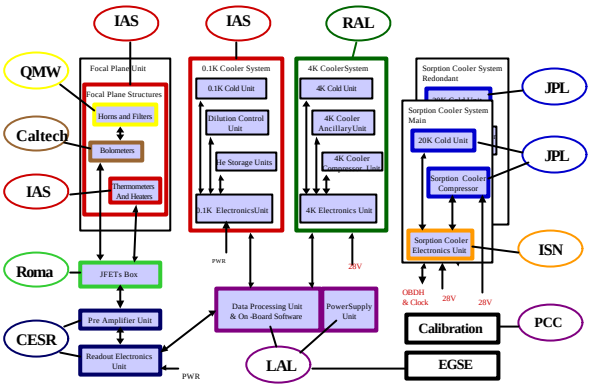
First Quarterly H/P meeting
December 14, 2001 ESTEC

Plan

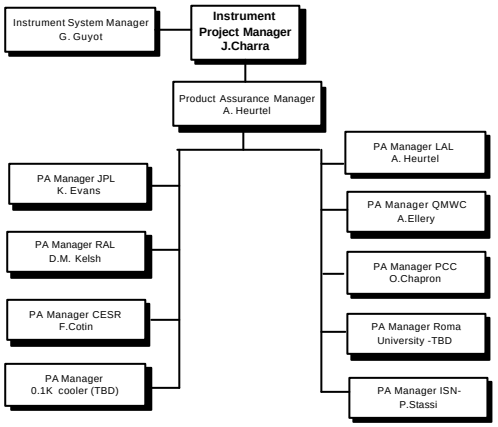
- The PA structure
- Works in progress
- The general situation of PA activities
- Needs of HFI for PA/QA
- How to manage the priorities?
- New documents to be prepared for IBDR
- Conclusions

HFI Consortium : Tasks sharing

HFI: 11 institutes , 280kg



The PA structure



PLANCK HFI

Works in progress since the Δ IIDR Review (1/2)

Document	Status	Information
DML, DPL	Issued, sent to ESA	- Waiting for definitive inputs from ISN, RAL, Cardiff, JPL for bolometers, to prepare a complete issue for the next review - Difficulties to obtain these documents
General FMECA (Cryo-chain done)	In preparation Draft can be sent to ESA	- Done with CESR for REU, LAL for DPU Board, IAS for harness (to be up-dated with delivery of cables). - Remains to do: PSU/DPU board - General hat done.
Critical Items List	Issue 2 prepared	- Issue 1 reviewed by ESA - *No definitive inputs from ISN, CESR, LAL, Roma, JPL, Cardiff, RAL etc…* - Confirmation of Critical Items by the Project is on-going with S.E. for IAS. - Final list of proposed actions must be controlled and accepted by the Project. Will be joined to the Monthly Report after approval.
Safety Plan	Issue 1 Revision 0	Issued June 2000, sent to ESA for evaluation. No information returned up-to-now.

PLANCK HFI

Works in progress since the Δ IIDR Review (2/2)

Document	Status	Information
Reliability calculations of He lines	Issue 1 Revision 0	- Demand of the Project (SE). - Issue 1 with simplest scheme sent to ESA. - Complete definition scheme issued in November from CRTBT/ Air Liquide in Grenoble. - Computations on-going.
Product Assurance Plan	Issue 2 Revision 4	Educational document written for new groups. Not presently approved by ESA. ESA has just realised a red-copy of this document removing all not applicable for HFI.
Software PA status	Issue 1 Revision 0	- Preliminary informative document written in January 2000, for LAL, ISN and CESR to define PA work to perform. Document sent to ESA for evaluation. - New software PA document to be issued. LAL asks for a clarification on documents to write.
Cleanliness Plan	Issue 1, revision 6	- Precedent issue sent to ESA. New one written with all information collected during CWG with budgets included. - Corrected by PM. Corrections will be reported for IBDR

The situation of PA activities

– HFI is a large and difficult instrument.

1. Difficulties to active Local PA Managers for lack of people and time.
2. Nevertheless, up to now, all general documents have been written in due time for the reviews .

– Now :

1. Documents asked now by ESA are deeply involving sub-systems and system.
2. The interactive ESA PA system based on in-time return of information is not the present method of work of several groups involved in HFI. I attend several meetings for internal critical cross verifications to freeze the design. In Orsay, the lab. culture is not accustomed to write interactive document during the finalization of the design phase. Documents will be written as soon as possible.

- The diffusion of PA/QA Information:

Intense efforts have been made to diffuse PA requirements: I performed internal seminaries during group meetings without real convincing results (LAL, CESR, CdF).

PA/QA needs of HFI (1/2)

- Evidence of help by other people:
  - One at the minimum for QA on-board Software,
  - One (or two) for general QA to write procedures of fabrication.
- Evidence of some clarifications coming from ESA:

  To bring some help to the project in PA/QA domain for university labs.
  - *Communication should be more institutionalised.*
  - *ESA should forewarn when new documents as ECSS on PA/QA are issued.*
  - *Documents might be reviewed quickly.*
  - *Answers to project questions might be more precise.*
- Evidence for PA/QA coordination between instruments (with LFI)

How to manage the priorities?

The management of the PA/QA work has to be done between.

- Demands of documents from ESA for reviews, preparation of meetings, FMECA, CIL, Plans etc..
- Participation in meetings to be informed of the evolution of the Project and to bring PA/QA information to groups.
- Demands of HFI at system level: Reliability calculations, reports.
- Management of PA structure.
- Responses to precise questions on PA / QA from institutes.

The preparation of the IBDR (1/2)

In addition of FMECA, CIL, Cleanliness CP, EEE parts list (consolidated), Safety Plan, PAP, participations of PA/QA is foreseen in the following documents.

New Document for IBDR	Informations
Summary FDIR (Failure Detection Isolation and Recovery).	- Complementary analyses will be made using FMECA sheets, with teams charged of electronics. .
Summary Flow Chart with MIP/KIP identified.	- AIT document. - Documents to be written at S/S level in each group of the Consortium - MIP and KIP points are PA activities.
Worst Case Analysis for electronics.	- Analyses to be made on FMECA sheets bases.

The preparation of the IBDR (2/2)

New documents for the IBDR	Information and comments
Hardware Software Interaction Analysis (HSIA)	- Made by teams in charge of writing the soft
Verification Control Document (called before Verification Matrix)	- Part of Development Plan. - For PA: Conditions of control to be written.
Qualification matrix (Can be a part of the previous document).	- Part of the Verification Control Document. - PA domain: Conditions of qualification.
Configuration Item Data List (CIDL)	For HFI, the management of configuration is not done by PA. On-going to be implemented.

Conclusions

1. For QA activities at system level, help of 1 or 2 person is absolutely necessary.
2. Local QA Managers should now be reactivated in all the Institutes.
3. For on-board software, ESA should clarify the QA needs.
4. Effort is foreseen to deliver new PA/QA documents to the IBDR.

Status PA/QA Overview

• **PA/QA Organisation**	MPE
-Who is responsible	Georg Igl

• **Plans/Procedures available**	Status
- PA plan	1.issue 23.10.01
- Inspection plan	No
- FMECA	Not updated
- DML/DPL	In process

• **Inspection (included documentation) implemented**	Status
- Incoming inspection	In process
- Metrology and calibration system	Start 01/02
- Final inspection	No

Institute	Full name	Subsystem/s Responsibilities	Project Manager	PA Manager	DDR Date	Item	FMECA	DML	DPL	DMPL	EEE Parts list	PA Plan
RAL	Rutherford & Appleton Lab	Project Office, Project Management, Product Assurance, System Engineering. AIV & Ground calibration facilities. EGSE. ICC Operations Centre.	**Ken King** **Eric Sawyer**. (Instrument Development manager)	**Eric Clark**	6 Sep 01	AIV (Cryostat)						RAL-PRJ-000017
ATC	Astronomy Technology Centre	Beam Stearing Mechanisim (BSM) ICC development & ***provide ICC operation staff (TBC)***	**Ian Pain**	**Ian Pain**	30-Jul-01	BSM						ATC_QA_PLAN_V1.0__ATC PRJ-
CDF (QMW)	Department of Physics and Astronomy, University of Wales, Cardiff,	Filters,Dichroics, Polarisers. Support Ground Calibration. Development of Thermal straps. Array Test equipment to JPL. ***(ICC ops staff ?TBC)***	**Peter Hargrave**	**Peter Hargrave**	18-Sep-01	SCAL PCAL Calibrators Filters	SCAL_FMECA_HSO HSO CDF RP 031					HSO CDF PL07 V1.0
CEA/SAp	CEA, Service d'Astrophysique Saclay	Detector readout & instrument control electronics. ICC DAPSAS Centre (Fr) **DRCU**	**Jean-Louis Augueres**	**Francoise Loubere**	13 & 14 Dec 2001	DCU PDU FCU MAC (from LAM) SCU		DML.pdf	DPL.pdf	DMPL.pdf		pap standard edi.pdf SAp-GTRBS-FLo436-
CEA/SBT	(CEA) Service du Basse Temperatures Grenoble	HE Sorption cooler	**Lionel Duband**		17-May-01	Sorption Coolers	HSO SBT-RP-008 Iss 1.0	HSO-SBT-LI-004 Iss 1.0	HSO-SBT-LI-005 Iss 1.0			HSO-SBT-PL-006-1-1
CSA/USK	Canadian Space Agency (CSA) University of Saskatchewan Canada	FPU Shutter. ***(ICC ops staff ?TBC)***	**Don Peterson. (CSA)** **Joe Taylor. (USK)**									
IFS (IFSI)	Instituto di Fisica dello spazio Interplanetario, Rome	DPU +OBS (on board S/W) & ICC ops Staff	**Riccardo Cerulli**	**Renato Orfei**	6-7 Dec 01	DPU	DPU_FMECA_doc000785	DML_Lists.PDF	DPL_Lists.PDF		EEE_Parts_Lists.PDF	IFSI PA PLAN IFSI OBS PA PLAN
JPL	JPL/Caltech, Pasadena	Bolometer Detector Arrays (BDAs), readout JFETs and RF filter modules	**Gerald Lilienthal**	**Timothy W. Larson (nasa)**	29&30 July 01							JPL-D-16642. (PA Map JPL-D-19164)
LAM (LAS)	Laboratoire d'Astonomie Spatiale, Marseille	Mirrors, FTS mechanism, BSM & FTS control and Signal processing electronics. (SMEC = FTS)	**Dominique Pouliquen**	**Dominique Pouliquen**	10-Jul-01 22&23 Oct 01	Mirrors SMEC MAC (To CEASAp)	\LAM\MCU_FMECA. 	 DML_Lists.PDF 	 DPL_Lists.PDF 		 EEE_Part_Lists. 	
MSSL	Mullard Space Science Lab Surrey	FPU structure, Mirror mounts & Thermal straps. JFET box encloures. ***(ICC ops staff ?TBC)***	**Berend Winter**	**Berend Winter, & Chris Brockley-Blatt**	29/30 Nov 01	Structure	SPIRE_structure_FMECA_1.0.doc					Structure_Product_Assurance_Plan.pdf
PAD (PADOVA)	PADOVA Observatory	ICC development & provide ICC operation staff	**Paola Andreanni**	**?**								
	Stockholm Observatory	Instrument Simulator. ICC operation staff	**Hans-Gustav Floren**	**Hans-Gustav Floren**								
DES (DESPA)	Obs de Meudon Paris	FTS design support										
GSF (GSFC)	Goddard Space Flight Center											
IAC	Instituto de Astrofisica de Canarias Tenerife	ICC development & provide ICC operation staff	**Jose-Miguel Herreros**	**Jose-Miguel Herreros**								
IAS	Institut di Astrophysique Spatiale, Orsay	Support of Ground calibration	**Francois Pajot**									
ICS (ICSTM)	Imperial College of Science, Technology & Medicine	Provision of ICC UK DAPSAS Centre & Operations Staff	**Tim Summer**	**Tim Summer**								
							Shaded box indicates Number allocated but					

Product Assurance Status

HIFI Consortium meeting

date and location

H.M.Jacobs@SRON.nl

System activities since Bordeaux:

-Quality engineering training;

Objective: set a basis for "quality assurance" and instruct for the QM phase.

-Descriptions for S/S and unit PA tasks;

Objective: provide tools for manpower/funding allocation of PA personnel.

-Critical EEE component specification definition;

Objective: technical risk reduction for the QM/FM phase and set an agreement with ESA.

-S/S support for sub-contracting critical hardware;

Objective: agreed a self-regulation system at the subcontractor for QA within the conditions of the project.

Status:

Quality assurance:

Limited progress has been made since the PDR except for the HF S/S

Cleanliness:

-On the basis of particulate fall-out measurements the size spectrum has been corrected by ESA.

-The impact on performance degradation has been calculated.

Preliminary conclusion: The Telescope / FPU / LOU must be cleaner than the current baseline to stay within the degradation budget.

-Impact on space-craft and instrument PA progress meeting ESTEC 14-12-2001

-Input to HIFI - SET will be given for final conclusions.

Parts, Materials and Processes:

Materials and processes:

Limited progress has been made since the PDR

EEE parts:

HIFI component list

is updated to issue 10; and distributed to all the users.

-Detailed comments have been transferred to the users.

Main items:

-Lack of component definition for Cryo-passives

-Input missing for -WBS; -WBO
-IF
-HRS; -DC/DC converter
-IF
-HF

Parts approval status:

-Parts procured via the CPPA are considered as approved by ESA.

-For self procured items, (Unique, Non- qualified source, Outside qualification range), approval will be on individual basis by means of a PAD.

The PAD is the justification of the user; why the part is fit to be used for Herschel/HIFI.

The PAD is a good questionnaire for the use whether items have been missed.

-Procurement specification incl. acceptance/ Lot acceptance.
-Development status (ASIC's and Hybrids)
-"Up"-screening plan.

The status is visible on the CSL (see also HIFI web-site).

Last weeks several PAD sheets have been submitted to the system, they will be Up-loaded before the end of 2001.

Recently, the HIFI users have been contacted by Alcatel to provide PAD sheets!!

HIFI system PMP/PA is point of contact for the user related to parts approval.

Critical Items:

-The progress of materials and processes definition and validation.

-The progress of establishing a hardware inspection system.

It is noted that these issues should be in place at the start of QM production!

The origin is found in the availability of personnel.

This item is brought on the agenda of the steering committee 11-12-2001.

1st PA quarterly meeting

- Objectives:
  - 1) Provide industry and instrument PA with a status of each instrument PA activities.
  - 2) Allow industry to present and clarify its detailed need in the frame of the PA requirements applicable to instruments (PT-RQ-04410).
  - 3) Allow direct interaction between all instrument PA

Agenda

- Progress status
  - HIFI, SPIRE, PACS
  - HFI, LFI
- Alcatel presentation
  - PA management
  - Safety
  - Dependability
  - Material and processes/ cleanliness
  - Software
  - EEE
- Dependability presentation
- Discussion

Safety

- The applicable requirement is to comply with the rules of national safety authorities and safety regulation of the launch vehicle and launch pad. (PT-RQ-04410).
- This makes CSG safety regulations applicable as fitted for parts of a spacecraft.
- The CSG safety regulation are available at ESA on request.

Cleanliness

- Cleanliness is part of the interfaces and must be inserted in the IIDs as far as not already present
  - Cleanliness level of instrument at delivery to ESA/Industry is specified in IID-A chapter 8 and may need up-dating.
  - Cleanliness levels of instruments and optics at EOL need to be inserted if not sufficiently covered by performance requirements.

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FMECA and Critical Items

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FMECA/FMEA procedures

- Performed according to ECSS-Q-30-02A, 7.9.2001
  - Standard describing the FMECA / FMEA process, HSIA process, and Process FMECA (process risk analysis)
- Objective of the FMECA is to identify Single Point Failures, SPFs and other weak points in the design
- SPFs are treated as Critical Items and entered into the CIL
- Critical Items followed up with the objective to render them non-critical or to control the criticality
- Process FMECA can be used to analyse and handle Critical Items

Single Point Failure SPF

- Definition according to ECSS-Q-30-02A:
  - Failure of an item which results in the unrecoverable failure of the analysed product
- 2 types of SPF
  - Removable through design changes
  - Non-removable
    - The SPF remains but it needs to be controlled in order to minimise the risk of it occurring
      - Controlled through Critical Items List
      - Analysed by Process FMECA to identify all critical operations that need special attention during MAIT

Critical Items List

- Inputs for the CIL comes from various sources
  - FMECA/FMEA
  - HSIA
  - FDIR
  - Worst Case, Reliability, Risk, and Safety analysis
  - DML/DPL, EEE Parts list
  - Cleanliness control plan
  - Schedule
  - etc.

Critical Items List

- The critical items are entered into the CIL and actions are defined for all critical items with the objective to:
  - Render them non-critical
  - Control the criticality
- Methods of controlling the critical items are:
  - Design changes
  - Improved inspections
  - Tests, etc.
- All actions are followed up until they are successfully closed
- Reporting of CIL is through the monthly progress reports and reviews

Process FMECA - Process risk analysis

- The application of the FMECA methodology to processes
  - Purpose is to identify potential weak points and to determine their effects on the product operation and the process itself
  - Possible typical weak points are human errors, failures of related hardware, or environmental stress in existing or planned processes, such as:
    - manufacturing
    - assembly or integration
    - ground operations (e.g. mating a satellite to the launcher, filling or draining of tanks, pre-cooling of cryogenic equipment)
    - tests
    - in-orbit operations

Process FMECA - Process risk analysis cont.

- Objectives
  - To initiate measures to eliminate the potential weak points in processes or to reduce their criticality to an acceptable value
- It can be supported by analyses of the areas where the tasks are performed (area analysis)
- Applied to the mission or safety critical processes as well as to processes which are critical from the programmatic point of view
- Inputs
  - Working and control plan
  - Assembly procedure
  - Integration procedure
  - Test procedure
  - Handling procedure (manual)

Process FMECA - Follow-on actions

- All unacceptable weak points shall be compiled with the recommendations for improvement made in the process FMECA in the summary of the report and presented to the project team responsible for final decisions
- Decisions after consideration of the recommendations for improvement are:
  - (a) the recommendation shall be implemented
  - (b) the recommendation is rejected
  - (c) an alternative recommendation is made

Process FMECA - Follow-on actions cont.

- Case (a) implementation of recommendation
  - Actionee and a due date for the implementation
    - Analysis of the implementation shall be compared with the original recommendation.
    - If discrepancies, a clarification shall be entered and the relevant analysis steps shall be repeated.
    - If no discrepancy, a close-out reference shall be entered
- Case (b) rejection of recommendation
  - Rejected with the rationale for rejection
- Case (c) alternative recommendation
  - Actionee and a due date for the implementation
  - The modified situation shall be treated on the same process FMECA worksheet to identify the improvements

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Process FMECA - Follow-on actions cont.

- The final closing of the action by the project can only be
  - **Acceptance according to (a)**
  - **Rejection according to (b)**