



**MINUTES OF MEETING
(MoM)**

Spacecraft/Project	HERSCHEL PLANCK	Document No	SPIRE-RAL-MOM-001557		
Instrument/Model	N/A	Issue No / Rev	1.0	Page	1 of 5
Subsystem	N/A	Date	11 March 203		

Title / Subject	5 th Quarterly PA managers meeting	Chairman	Pierre Olivier
Meeting Place	RAL CR3 R61	Secretary	

Participants		Agenda
(Print Name)	(Signature Required)	
Pierre Olivier		AS PER E-MAIL ATTACHED
Jan Rautakoski		1st HERMAN JACOBS SKON HIFI
Christian Masse		2nd HANS GEORGE IGL PLANCK
Herman Jacobs		3rd ERIC CLARK RAL SPIRE.
Stephane Rideau		4th ANTONIO DRAGONI LABEN LFI.
Timothy Larson		5th STEPHANVE RIDEAU HFI
Eric Clark		6th TIM LARSON JPL -
		7th JAN RAUTAKOSKI ESA (PRESENTATION NOT COMPLETED)
	8th CHRISTIAN MASSE ALLUPTEL (PRESENTATION NOT GIVEN.)	
Additional Distribution		Attachments
Antonio Dragoni Hans George Igl		



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Instrument/Model	N/A	Issue No / Rev	1.0	Page	2 of 5
Subsystem	N/A	Date	11 March 203		

Action No	Title and Description	Action Responsibility	Action Deadline
A1	<p>S Ron H Jacobs</p> <p>GRON TO PRODUCE ^{Tech.} NOTE ON PURCHASING.</p>	H. JACOBS	END MARCH.
A2	<p>HANS GREN CREIG & M JENKINS. FROM ASTRUM.</p> <p>HANS TO PROVIDE LIST OF NCR TO JAM</p>	HANS & Jgl	24th MARCH NEXT
A3	<p>2 MORE WAIVERS HQ TO SEND DETAILS.</p> <p>SOLUTION COOLER DOCUMENT FROM CEA</p>	HANS & Jgl.	
A4	<p>RAL FILL</p> <p>OBTAIN CIL FOR PIERRE AND GET A CLEARER DEFINITION OF WHAT IT SHOULD COVER.</p>	FILIC CLARK	END MARCH 03



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Action No	Title and Description	Action Responsibility	Action Deadline
A5	<p>RAL</p> <p>RE-SEND COPIES OF WAIVERS TO JON/PIERRE AFTER GETTING THEM SIGNED</p> <p>SIGNED WAIVERS WILL BE ASSENT TO ESA ESA WILL DISTRIBUTE THEM TO ALCATEL. ALCATEL SHOULD BE SENT THEM FOR INFORMATION ONLY TO "CHRISTIAN MARSE", "GONSALO GERRA", "BERNARD COLLAUDIN"</p> <p>WAIVER SHOULD BE DISCUSSED IN INTERFACE MEETING BEFORE SUBMISSION</p>	ERIC CLARK	END MARCH
	<p>LABEN ANTONIO DRAGONI</p> <p>NO ACTION</p>		



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Action No	Title and Description	Action Responsibility	Action Deadline
A6	<u>HFI STEPHANIE RIDGALL</u> CLARIFY RFW'S URGENT ON VIBRATION LEVEL FOR THE DCPU. AND ORGANISE MEETING WITH ALCANTARA/ESA.	STEPHANIE	END MARCH 03
A7	NEXT INTERFACE MEETING HFI WILL PRESENT WAY FORWARD FOR PROPOSING VCD.	STEPHANIE	NEXT INTERFACE MEETING.
A8	SEND IHD ON INTERIM PROCEDURE TO HFI PROJECT OFFICE ORCED.	JIAN	END MARCH 03.
	TIM JPL		



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A9.

Action No	Title and Description	Action Responsibility	Action Deadline
	<p><u>JAN ESA.</u></p> <p>HIFI CIDL WILL BEAS AGREED AT START OF PROJECT.</p> <p>JAN COULD NOT COMPLETE PRESENTATION DUE TO TIME CONSTRAINTS</p>		
	<p>CHRISTIAN MARIE ALCATEL</p> <p>COULD NOT GIVE HIS PRESENTATION DUE TO TIME CONSTRAINTS AND RETURN FLIGHT TIMES</p> <p>IT WAS SUGGESTED THAT THE TIME ALLOWED FOR THESE MEETINGS SHOULD BE EXTENDED TO 1 1/2 DAYS.</p> <p>NEXT MEETING WEEK 25. JUNK ALCATEL?</p>		

AGENDA Extracted from Jan's Email Wed 5th March 2003

Instrument PA status and outlook including the following items:

- Problem areas and solutions
- Critical items status
- NCR status
- RFW status
- Parts materials and processes activities, PADs
- Cleanliness activities
- System FMECA and effect on S/C (propagation of failures)/HSIA
- Results on derating, WCA status
- Status on VCD
- Configuration status
- Software PA
- MIP planning
- AIT procedure preparation
- Hardware status and qualification planning
- Future planning
- SW status discussion
- Waiver procedure
- NCR procedure
- Pa requested documentation for IHDR
- Instrument Safety analysis update for IHDR
- Self-procured components and PADs. Arranging of PAD meetings with all instruments
- Verification control
- Configuration control, CIDL
- Action Items from previous meeting
- AOB

HIFI PA status

March 11, 2003

General concerns:

LO subsystem product assurance:

There is a candidate but he may not have experience as desired.
To be resolved Prior CDR.

System PA manpower:

Hans Goulooze will retire Sept. 2003.

Critical items:

FMECA

FMECA status: SRON-U/HIFI/RP/2000-001. (under update as per CDR's)

FMECA related items:

- Chopper: Contains **pivots**,
- Calibration source: PID for assembly is being developed.
- Diplexer mechanism: Contains **pivots**.

Reliability or Qualification Status Items, self manufactured or self procured

Main topics:

Focal Plane Unit:

Mixers:

A CDR has been performed to assess the PID status and the PID qualification status of the mixer designs.

For all the mixer units pre-qualification items concerning parts, materials and processes has been identified. The evaluation and application of components and interconnection technology versus substrate and clamping approach is on-going within the Focal plane S/S.

Pivots:

Evaluation program is visible and on-going.

Visit manufacturer Nov. 2002 resulted in an improved production process but the CuBe types failed vibration test. The cause is known and precautions are taken in an alternative manufacturing sequence and an INCONEL 718 type.

Up-converter:

Due to frequency change in band 6, an up converter is needed.
Parts procurement and subcontracting is under definition.

Critical items as per Nov. 2002:

All items are now in the process of PAD approval.

Local Oscillator unit:

Main topics:

Local Oscillator Source Unit:

- The unit contains mainly electronic components and some of them are not available from qualified sources but have a successful application history. Some components require further development. Further development of the component list will be undertaken and is discussed at CSA (Canada). At present, a preliminary list is available.
- A number of components will be procured through the project CPPA, the remainder will be self procured by COMDEV. PAD have been requested and in process.
- Next FPCB the procurement package is on the agenda.

Wide Band Spectrometer:

Main topics:

Critical items as per Nov. 2002:

All items are now in the process of PAD approval.

General concern:

Shock test levels for the WBO. This item is on the agenda with ESA.

One EEE component failed acceptance at Miteq for which no real back-up is available.

Miteq is evaluating an alternative.

High Resolution Spectrometer:

Main topics:

Critical items as per Nov. 2002:

All items are now in the process of PAD approval.

General concern:

One EEE component failed acceptance at Miteq for which no real back-up is available.

Miteq is evaluating an alternative.

Tantalum capacitors are applied in the DC/DC converter which may not be inline with PSS-301. The application is under evaluation.

NCR status:

One batch HRS ASIC's is rejected for the FM.
See also HRS-NCR-160

Available on HIFI web-site.

RFW status:

Available on HIFI web-site.

Are agenda item of interface meeting 11 March. 2003 at Estec

PMP status:

PMP lists and are available HIFI web-site.
EEE component list issue 15 draft is available.

PAD sheets:

PAD status is available HIFI web-site.

Activities: -see also critical items.

-A lot of PAD sheets are approaching final status and will be sent for approval.

Pad meeting March 4th ,2003 at Estec, no reporting available yet.

Contact points are [Jan Rautakoski](#) and Jan Minee.

Cleanliness:

No major activities other than arguing with ESA/Industry of implementing Purging/flushing of FPU and LOU.

A tech-note to justify purging is under construction. LO and FP inputs are required and JPL input desired.

HIFI design analysis:

FMECA/WCA part-stress are part of S/S CDR and will be built-up from S/S level to system.

Guidelines are available in procedure SRON-U/HIFI/PR/2002-003.

HIFI DVM:

Is available on IID- and instrument spec level.

S/S level will be available at S/S CDR to major sub-contractor level.

Configuration status:

Is available on HIFI web-site.

S/S level conf. Control will be ready at each S/S CDR.

MIP planning:

Is under inclusion at S/S planning.

PACS PA / QA STATUS

- Critical items
- NCR, RFW (and procedures)
- Parts, Materials, Processes, Pads
- Cleanliness
- Safety
- FMECA / HSIA
- Derating / WCA
- VCD status
- Configuration status
- Software PA
- MIP planning
- AIT procedure preparation
- Hardware status, qualification
- Pa documentation for IHDR
- Action Items from 13.11.02

Critical Items

- Some not qualified technologies, processes, parts and EEE components
 - Missing procedures to qualify these processes
 - Missing test equipment for some processes
-
- Not working PA/QA Management at some suppliers and institutes

Critical item list

PACS-ME-LI-007 (1) 07 Feb 2002

NCR status updated 03/03

ANTEC 6 open

CEA nothing reported

CSL nothing reported

IAC nothing reported

IMEC nothing reported

KT 4 open

MPE 3 open

MPIA 7 open

IFSI 0 open

Request for Waiver

PACS-RFW-0001: change of qualification level of AD590MF chips
0002: change of cryo-vibration procedure
0003: change of outgassing requirements

ESA decision requested for all RFW (or missing information)

DCL, DML, DPL, Self procured parts list, PADs

All lists (without self procured parts) confirmed by all (as stored in PACS central file)

Self procured parts list available from IAC, KT, IMEC.

Self procured parts lists were requested several times from all !!!

Some self procured parts lists are included in EEE or DML parts lists and not completed.

Cleanliness: Plan Issue 1 26.04.02 is submitted for signature

Some requirements as procedures and inspection methods are under discussion. Critical problems with FPU (black paint)

Safety:

Nothing to report

FMECA: no progress

PACS-ME-GR-004 draft (2) 07 Feb 2002

FPL-AN-1214-03-CRS (1) 25 Jul 2001

HSIA : no progress

DERATING ANALYSIS :

Nothing to report,
No derating analysis available

WCA

Nothing to report
No WCA available

VCD status

PACS-ME-PL-019 (1) 07 Feb 2002

CONFIGURATION STATUS:

PACS-ME-LI-011 status 27.06.02

SOFTWARE PA:

DEC/MEC Software Product Assurance Plan
PACS-CL-PL-007

DPU/ICU On board Software Product Assurance Plan
IFSI/OBS/PL/2000-001

SOFTWARE QUALITY ASSURANCE PLAN for the
PACS Data Compression S/W PACS-JR-PL-001

MIP - PLANNING:

A review of qualification procedures, test processes, equipment, responsibilities and clearance procedures is running at MPE.
(only for MPE responsibilities)

This might be a base of fixing MIPs.

This effort shall streamline existing test plans of subunits with instrument
Test plan. PACS-ME-PL-012 (1)24 Jan 2002

AIV/AIT:

Plans available for

Detector Array, Sorption Cooler, PACS Instrument (draft)

DPU, FPU, SPU, Grating, Chopper

- Hardware status, qualification
See page 2 – critical items –
Details available for subunits

- PA documentation for IHDR
see page2 – critical items –
PA meeting is planned for 24 March with all subunits.
This meeting was planned several times without success.
Institutes have to organize support from their suppliers.
See also FMECA etc.

Action Items from 13.11.02

- Open issue: Internal and external PA/QA cooperation (AI4)

INTRODUCTION

Product Assurance

Eric Clark

RAL

AGENDA

- **Problems & Solutions**
- **Critical Items Status**
- **NCR & RFW Status**
- **Parts, Materials, Processes & Pad's**
- **Cleanliness**
- **FMECA & HSIA**
- **WCA & Derating**
- **VCD**
- **Configuration Status**
- **Software PA**
- **AIT, MIP's & KIP's**
- **Hardware Status & Qualification Planning**
- **Future Planning**
- **AOB & Actions from previous meeting**

AGENDA Discussion Points

- **SW Status Discussion**
- **Waiver & NCR Procedures**
- **PA Requested Documentation for IHDR**
- **Instrument Safety analysis update for IHDR**
- **Arranging of PAD meeting etc**
- **Verification Control**
- **Configuration Control, CIDL**
- **Action Items from previous meeting**
- **AOB**

PROBLEMS & SOLUTIONS

- ❖ **The Main problem area is still resource, Money & person power.**

Solutions:- Spire Project management is monitoring and controlling resource very closely. Travel to Subsystems is now much easier.

- ❖ **The Usual problems of delayed / late delivery.**

Typical problem of too much to do by too few people.

Solution:- Keep chasing subsystems as required

- ❖ **Otherwise Project Level problems and solutions are reported on at the regular Interface Meetings.**

CIL,

❖ CIL

Update on the IBDR review Board Recommendations were sent to Astrid in Mid January 03.

- ❖ For the IHDR we will use a template of the form ESA provided. (Matt Griffin would like to see an example from a previous instrument)

NCR'S & RFW Status

❖ Non-Conformance Report

NCR

No Major or Flight NCR's

Any NCR's concerning Safety are Classed as Major.

❖ Request for Waiver

RFW

HR-SP-CEA-RFW-001 Open

HR-SP-CEA-RFW-002 Open

HR-SP-JPL-RFW-001 Open

Parts Materials & Processes. PAD's

❖ Parts, Materials & Processes

Currently no changes to the combined lists however:
All subsystems have been asked to provide updates.

Some subsystems have promised the updates but not all have replied.

❖ PAD's

Two PAD's from IFSE on the DPU Submitted
DPU-PA-CGS-001 Is.1 & DPU-PA-CGS-002 Is.1

Two PAD's from RAL Withdrawn No longer required.
HR-SP-RAL- PAD-001. & HR-SP-RAL- PAD-002.

PAD expected from CEA re OP400 no information as yet.

CLEANLINESS

- ❖ **The Cleanliness Plan has defined the cleanliness for the instrument, However The comments on the cleanliness plan SPIRE-RAL-PRJ-1070 ref Meeting SCI-PT/14768 are accepted and will be implemented.**

FMECA - HSIA

- ❖ **FMECA and effect on short circuit (propagation of failures). Now on Live Link Configured items.**

SPIRE-RAL-PRJ-001260

The System FMECA including interfaces for Launch and Flight, has been supplied.

- ❖ **Hardware/Software Interaction Analysis (HSIA).**

The preparation of this has been held up awaiting information, this is now available.

Bruce Swinyard is managing it, but no time scale for it's completion has as yet been set.

WCA, & DERATING

❖ **Worst case analysis and Derating analysis**

Have been requested from IFSE & CEA/Sap.

Who I believe are the only subsystems required to produce them for SPIRE.

Currently I have:-

- **IFSI Derating-WCA_Issue11.pdf (Jan sent copy Jul 02)**
- **Nothing from CEA/Sap. (I have sent a reminder nothing yet).**

VCD.

❖ Verification Control Document. (VCD)

- The Test Plan is completed
- All Documentation / Plans etc are completed some awaiting Issue.
- The Database is Progressing but not quite completed.

CIDL & CONFIGURATION STATUS

❖ CONFIGURATION ITEM DATA LIST CIDL

SPIRE-RAL-PRJ-001134. Still at draft issue 2.
Configuration Management Plan Issued

❖ **No new subsystems CIDL's added.**
Some still require updating and putting into document format.
Additions Suggested by Jan Ref SCI-PT/14768 incorporated

❖ Configuration Status.

SPIRE still has to many documents not signed, however all the documents that would come under configuration control are being controlled accordingly.

Who has to Sign what document list now completed, Documents are starting to be signed off accordingly.

Still require authorisation (by ESA etc) of top level documents before the lower ones can be authorised

Software PA

➤ **Ground Segment Software.** (ICC)

This is being developed and controlled Via the ESA CVS system.

Both individual Source Code & Packets are tracked.

SPR (Software Problem Reports) & SCR (Software Change Requests) are notified and tracked.

Automatic Email notification if any Editing is performed

We have requested Automated test of our System & Run Test Harnesses, Software.

➤ **EGSE.**

This is effectively in two Parts.

SCOS System supplied by ESA our involvement are the Data bases (MIB's) that contain the instrument Data.

CDMS space craft buss simulator

Both have changes etc recorded in logbooks until ready to be released then any changes will be Via change request ECR's etc

AIT, MIP's & KIP's

❖ AIT Procedure Preparation.

- AIT Plan for STM and CQM is completed, with all the Test plans, issue, date, etc included.

Awaiting approval signatures.

❖ Mandatory & Inspection Points (MIP's)

❖ Key Inspection Points (KIP's)

- Are detailed in the AIT plan above

ESA will be informed of the place, time and date of a MIP
Typically Four weeks before, by fax or Email, and reminded
two days before, by Email or Telephone.

Hardware Status & Qualification Planning

- ❖ Cryostat, Optical bench & Laser are in place in the Clean room and commissioning is taking place.
- ❖ SPIRE Support frame (Structure), trolley & Hob plate Simulator (X 2), Delivered and Checked.
- ❖ BSM + EIDP (updated) Delivered and Checked
- ❖ 2 JFET Boxes delivered (one Sent to JPL)
- ❖ Qualification Planning ?

FUTURE PLANNING

- *Inspection of some subsystem deliverables have taken place, with more expected over the coming months, requiring incoming/outgoing inspections and EIDP(ADP) reviews etc.*
- *TRR's (Test Readiness Review) will be require for the Qualification testing etc.*
- *Cryostat clean room the ESD protective equipment to be installed.*
- *Complete the actions from the last PA Managers meeting etc.*

AOB & ACTIONS

- **AOB**

- ❖ **SPIRE Product Assurance Plan**

SPIRE-RAL-PRJ-000017 Issue 1

Changes To the Plan Now at Issue 1.1

Most of the comments from Pierre have been incorporated Due to be completed by Dec 02. still in progress.

- **ACTIONS**

- ❖ **All Actions on Spire from the meeting at LAL have not been completed.**

Product Assurance

Tailoring approach to fulfil the
program requirements

RAL, PA Meeting 11/03/2003



LABEN
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At system level:

LFI PA Plan already agreed with ESA to be formally approved asap.

Effort shall be produced vs. those procedures to speed up the submission / approval of documentation.

Review of the foreseen instrument testing flow identifying preventive actions in terms of environment / handling / procedures need.

RAL, PA Meeting - 11/03/2003



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Design Failure Analysis at system level to be updated.

Critical Items Review and agreed actions identified with implementation planning.

Strict link with ESA PA shall be maintained in order to highlight and manage the identified criticalities.



RAL, PA Meeting - 11/03/2003

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At Sub System / Unit level:

Detailed Report on PA topics requested to each LFI Supplier in March, where, among others, it is asked an up-to-date on Flight Materials / Processes / EEE parts.

Status on each LFI Suppliers facilities for Readiness on Flight Production (Manufacturing and Testing): visit is foreseen asap.



RAL, PA Meeting - 11/03/2003

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Particular attention shall be addressed to the training of the manufacturing / testing operators and QA inspectors.

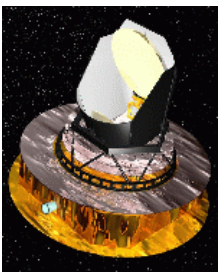
Suppliers PA reporting shall be mandatory.

A detail of the above activities shall be presented during a dedicated PA meeting with ESA (ASPI is invited) foreseen for the end of March.

RAL, PA Meeting - 11/03/2003

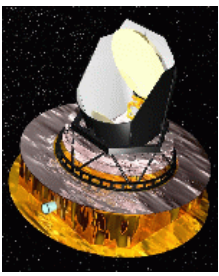


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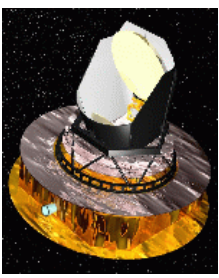
HFI PA Status and outlook

RAL, March 11th 2003



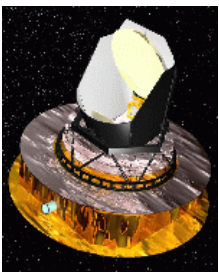
News!

- HFI Management organisation evolution:
 - Alain Heurtel is now in charge of PA for the LAL part (Main Electronics) and I am now in charge of Instrument PA.



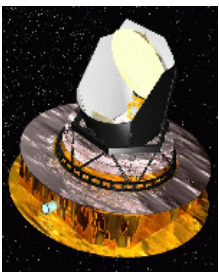
Configuration Elements

- NCR Treatment is described in the Product Assurance Plan
 - No NCR opened so far
- RFW Treatment is described in procedure:
 - PR-PH195-200193-IAS Issue 1 rev 2 (being validated)
 - 12 RFW opened so far:
 - 6 in preparation
 - 6 emitted to ESA (no approval so far)



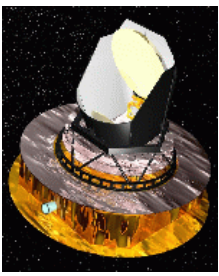
Parts, materials and processes activities

- Lists need to be updated:
 - EEE Parts (exists at S/S level only)
 - Materials (needs an update)
 - Processes (needs an update)
- PAD's
 - After inquiry we realized that we need to process PAD's.
 - Cryo harness has self procured cables
 - Connectors are not all coming from technologica
 - We agree to take appointment with Jan Rautakosky to analyse the needs...



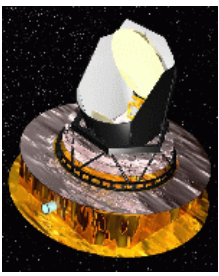
Cleanliness activities

- Cleanliness Control Plan:
 - PL-PH191-100033-IAS issue 2 rev 2 August 29th 2002.



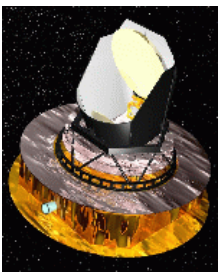
System FMECA

- We have received Air Liquide's FMECA, it will be included in the system's FMECA.
- System's FMECA exists (without 4K coolers) AN-PH192-100143-IAS



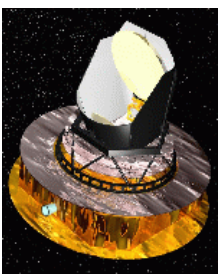
derating

- Derating is still on going, analysis takes longer time than expected.



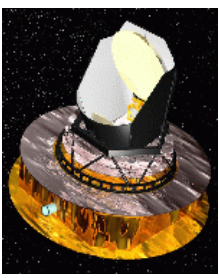
Verification Control Document

- Level of implementation is low



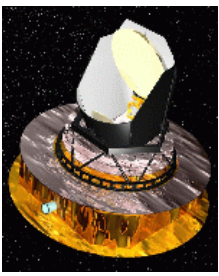
Configuration status

- Document configuration is implemented at system level.
 - CIDL is done and being updated for IHDR.
 - Documents are all going through a validation process at the time they are edited.
- Product configuration is at initial version, being prepared and should be finished for the IHDR.
- Need for HFI Project of clarification of content needed for IHDR



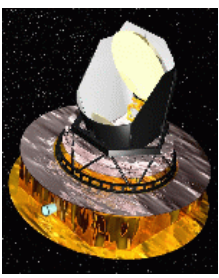
Software PA

- After request from ESA to rewrite Software management plan, incoming of extra resources in Software Validation and Software PA is being studied.
- An On-Board software manager has been nominated last week. (Bruno Mansoux from LAL)



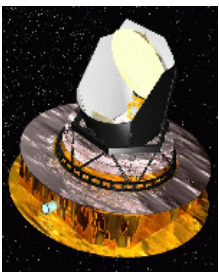
MIP Planning

- So far only Main Electronics (LAL) planned KIP on the DPU electronic boards.



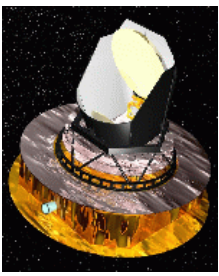
AIT Procedures Preparation

- AIT Procedure status:
 - level of implementation is low
 - Test plans for S/S is progressing (main electronics, readout unit, ISN...)
 - AIT PA activities are being defined, ADP for S/S, incoming inspections and reviews, tests readiness reviews, tests review boards...



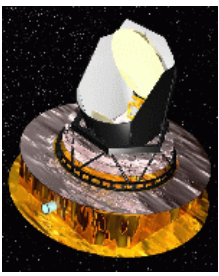
Hardware Status

- New inputs have been transmitted by S/S on March 3rd 2003, a new Master Planning is being written.



IHDR

- As said earlier:
 - HFI project needs clarification on the content of the documentation expected for IHDR.



Action Items

- CIL has been given mid december 02, a new version will be prepared for IHDR.
- Air Liquide's FMECA is available.



Herschel/Planck Project

JPL PA Status

Tim Larson

JPL H/P Mission Assurance Manager

5th Quarterly PA Managers Meeting

11 March 2003

Abingdon, UK

- **LFI**

- **JPL proposed LFI 100GHz radiometer option not funded by NASA**
- **Alternative approach of replacing HFI 100GHz spiderweb bolometers with 100GHz polarization sensitive bolometers has been agreed with HFI instrument team and proposed to NASA – waiting decision**

- **SPIRE Kevlar performance**

- Repeated test failures (excessive shifting of suspended array) were traced to loss of tension in Kevlar suspension
- Extensive suite of tests on Kevlar led to new approach to stringing the suspension assembly and conditioning the Kevlar in a way that results in sufficient tension at launch
- Last design details are being worked, with a series of qualification tests upcoming
- A meeting is planned for March 19 at ESTEC to discuss results with others using Kevlar

- **HIFI Band 5 LO Chain failure**

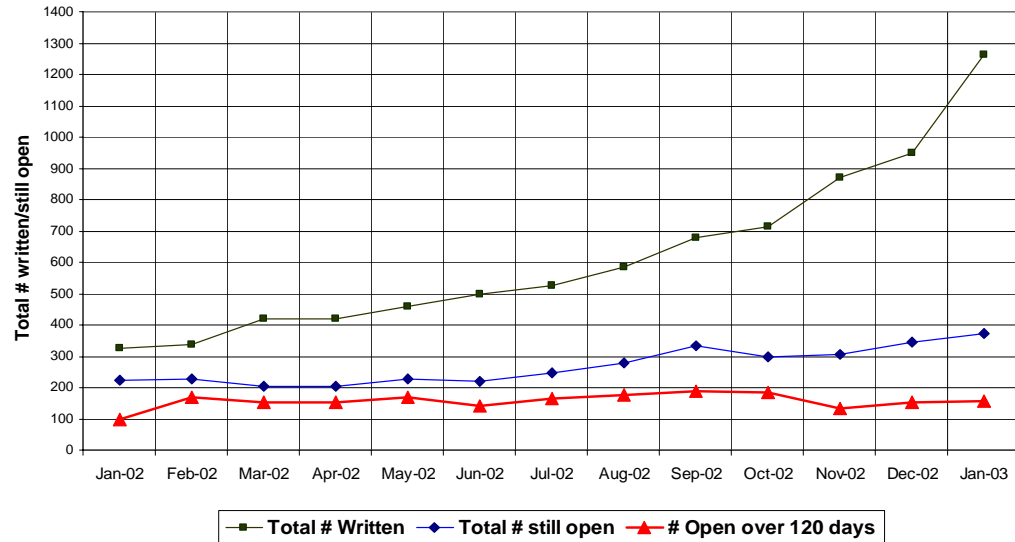
- MRB is concluding (participation of SRON, MPIfR, RPG, and JPL)
- Cause of failure has been identified – primarily linked to how the power amplifier is used to pump the multiplier. First stage diode is particularly susceptible to overstress due to excessive RF power (either electrical or thermal overstress will cause problems)
- Need to make sure the following happens
 - **Clearly identify operating constraints in EIDP**
 - **Make sure all relevant restrictions and cautions are flowed into all the relevant test procedures**
 - **Each multiplier design must have an appropriate stress analysis performed**

on the diode

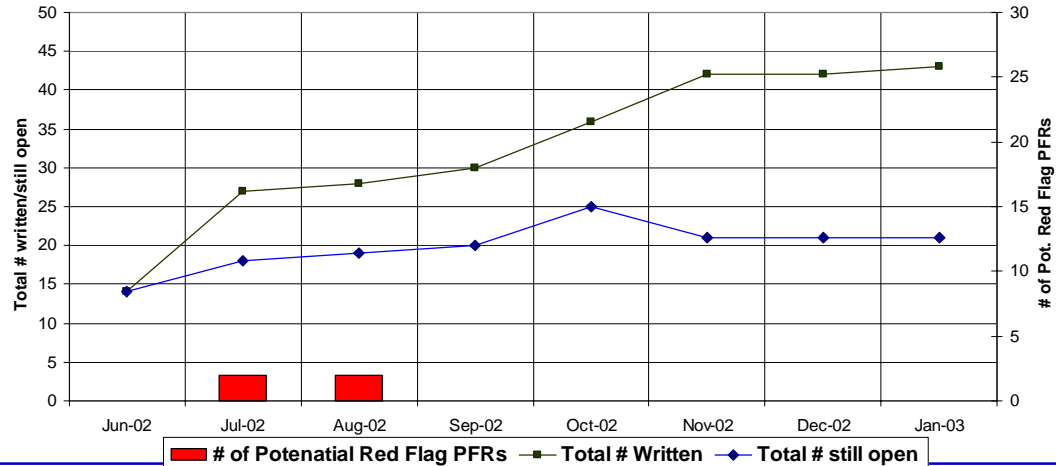
- **HIFI**
 - Qualification plans are in place
 - Some component qualification has been done
 - Assembly qualification tests for multipliers and mixers coming soon
- **SPIRE**
 - BDA – qualification in progress
 - Extensive work has been done on understanding behavior of braided Kevlar
 - JFET Modules – qualification model has been assembled and has undergone initial testing, environmental testing is next
 - RFF Modules – qualification model delivered and tested
- **Cooler**
 - Weld schedules being developed and qualified
- **HFI**
 - SWB qualification is complete
 - PSB qualification is in progress
 - PFM build is under way

-
- **Equivalent system at JPL – Inspection Reports (IRs) and Problem/Failure Reports (P/FRs)**
 - **Both are on-line system that can be accessed anywhere within JPL intranet**
 - **IRs are used to document results of inspections – receiving, in-process, pre- and post-test, etc.**
 - IRs list all discrepancies observed on item inspected
 - Each discrepancy requires Cognizant Engineer to disposition (use as is, rework, scrap, retest, etc.)
 - QAE concurs with each disposition and stamps off on item when action has been completed
 - IR is not closed until all discrepant items have undergone appropriate action
 - **P/FRs are used to note all functional anomalies as well as physical failures for flight hardware**
 - P/FR contains description of problem, analysis and verification, disposition/fix, and verification of corrective action
 - P/FR requires signature of Cog/E, Project Element Manager, discipline engineers as necessary, and is closed by MAM (Red Flag P/FRs require Project Manager signature for closure)

Inspection Reports (IRs)



PFRs



-
- **2 Requests for Deviation for Sorption Cooler**
 - **Fundamental frequency for cooler (waive from 140Hz required, to 100Hz requested)**
 - Has been sent to LFI/Alcatel, discussed in weekly Alcatel/ESA/LFI/JPL telecons, and has received preliminary approval from Alcatel (Chambelland)
 - **Temperature stability of cold end (waive from 100mK required to 450mK at LR1 and LR2)**
 - Has been sent to LFI/Alcatel, under discussion, submitting a detailed justification

- **All materials are reviewed and approved as design progresses**
- **Declared Materials and Processes Lists**
 - **HIFI – almost complete pending last few changes**
 - **SPIRE – final outgassing tests being performed**
 - **HFI – list complete, has been transmitted to Cardiff**
 - **Sorption Cooler – Compressor Element list is complete, Compressor Assembly and PACE expect completion in April**
- **PADs**
 - **Detailed information passed on to HIFI for preparation of PADs**

-
- **Business as usual – all facilities have been surveyed and certified, procedures are in place to maintain cleanliness throughout the AIV process**

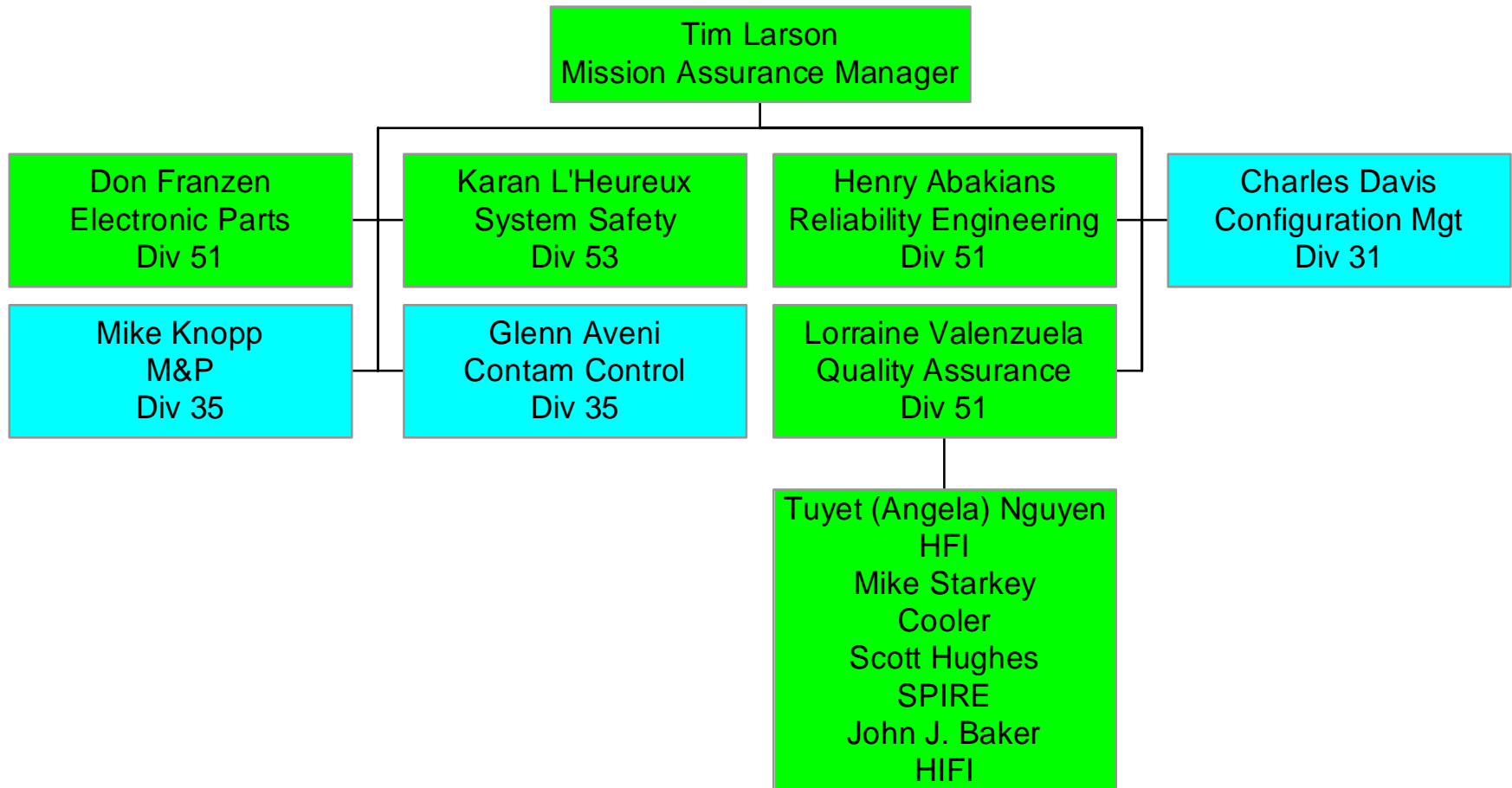
-
- **SPIRE: BDA & JFET FMECA updated, GSE FMECA for BDA test cryostat completed, GSE FMECA for BDA and JFET test boxes completed**
 - **HFI: Band 5 multiplier and mixer FMECAs done, test equipment FMECAs are in work, multiplier part stress analysis complete (addressing both RF and DC stress)**
 - **HFI: Bolometer module and test set FMECAs done**
 - **Cooler: TMU FMECA has been updated, joint SCE/TMU HSIA updated in January 2003**

-
- **HIFI – RF stress analysis completed for multiplier diodes**
 - These diodes have limitations on the RF power applied, as well as on the associated operating temperature and environment
 - Since the power amplifiers can supply more power than the diode can handle under certain conditions, each user of these diodes needs to perform a similar analysis

-
- **All controlling documents are listed in the Business Agreements and Specification Documents**
 - **Drawing Trees list all drawings that define the hardware**
 - **All test and engineering procedures, plans, AIDS, other documents, and drawings are placed in JPL PDMS (Project Data Management System) database**
 - **This system is used to store and track release status of drawings and documents**
 - **ECRs are part of this system, and are used to track changes to controlled documents and drawings**
 - **All IRs (Inspection Reports) are also tracked in this database for CogEngineer disposition and QAE concurrence**

- **All assembly and test operations are controlled by procedures called AIDS (Assembly Instruction Data Sheet)**
- **These are detailed assembly procedures that identify all inspection points**
- **These also are used to install assemblies into test facilities, outlining the mounting method, connector check-out and mating, etc.**
- **Test procedures are used to document environmental and functional tests**
- **QA approves each AIDS prior to use – no flight hardware activity is performed without it**
- **Test procedures are in place prior to each test**

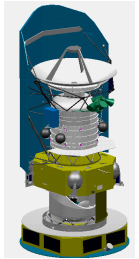
Mission Assurance Discipline Leads



- **HIFI – many diode qualification tests are complete, various assembly and packaging qualification tests have been performed, multiplier and mixer qual models to be completed soon for assembly level qualification**
- **SPIRE – recently completed Kevlar tests have led to definition of new assembly process for BDAs, initial characterization tests of qual array have been completed, will mate the detector assembly with a new suspension assembly for environmental qualification tests; JFET qual model is ready for environmental testing**
- **HFI – SWB qual tests complete, PSB qual tests will get started soon**
- **Sorption Cooler – many component qual tests have been performed, functionality has been qualified via the EBB model, some more qual and protoflight tests to come**

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- **Each project element maintains a verification/qualification matrix**
 - **It is responsibility of element manager and MA manager to track completion of verification activities**

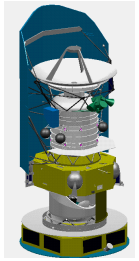
-
- **Completing qualification tests**
 - **Support PFM builds – all project elements will be assembling flight hardware this year**
 - **Distribute latest version of the Sorption Cooler Safety Data Package for approval signatures (LFI, Alcatel, ESA) – goal is April 03**



Safety Analysis Update for IHDR

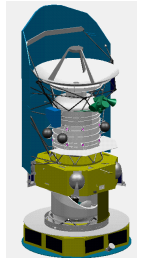
ESA-ESTEC

J. Rautakoski



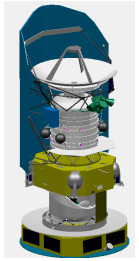
Safety Analysis for IHDR

- Updating of the safety submissions submitted for the spacecraft PDR, for the instrument IHDR
 - Safety analysis including safety hazard checklist
 - Residual hazard sheets to be filled out for all identified safety hazards describing
 - The hazard
 - Hazard causes
 - Hazard control methods
 - Safety Verification methods
 - Status of verification
 - Refer to H-P-1-ASPI-SP-0029 Safety Requirements for Subcontractors for examples, or ECSS-Q-40-02A from 14.2.2003



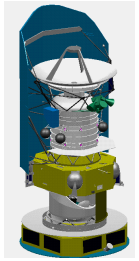
Some Safety Hazard Sources

- Hazardous electrical systems (e.g. high voltage)
- Electro explosive devices (pyrotechnics)
- Propellants, solid, liquid
- Pressurised Items
- Chemical products
 - Corrosive (e.g. battery)
 - Toxic or asphyxiating
 - Explosive (also pyros)
 - With biological effect
- Radiation-
 - Non-Ionising
 - Ionising
 - Visible, Ir, Uv-
 - Acoustic / Vibration emission
- High/low temperature (e.g. cryogenic)
- Deploying mechanism
- Other hazard sources



Safety Analysis Updates

- Identification and classification of the hazard scenarios according to the severity of the consequences shall be included (causes, events and safety consequences to be identified, see ECSS-Q-40-02A, hazard analysis)
- The hazard reduction policy shall be clearly stated
 - A column in the hazard table could be enough
 - Where hazards cannot be eliminated, clarify the measures taken
- An "acceptability assessment"/ rationale for retention, or recommendation made to the Project shall be given
- Identification and communication of the evolution of the hazards over the project life cycle is done by using residual hazards sheets



Safety Analysis Updates

- The analysis shall prove that the equipment conforms to the requirements by the adequacy of the:
 - Test program
 - Qualification program
- For the pressurised items different sequences needs to be assessed
 - Situation in warm
 - During filling
 - Sequence of operation
 - Different pressures in different parts

CIDL, Configuration Item Data List

The CIDL is divided into separate sections for requirements, design, verification, and change control with the relevant documents listed.

- **Requirements**
 - Design
 - Interface
 - etc.
- **Design**
 - Design description
 - Analysis
 - FMECA
 - HSIA
 - WCA
 - PSA
 - Radiation
 - Structural
 - Thermal
 - etc.
 - DCLs, DMLs, DPLs
 - Drawings (design, manufacturing, interface)
 - Sub-system CIDLs
- **Verification**
 - Manufacturing Inspection flow charts including KIP/MIP
 - Inspection reports
 - Test plan
 - Test procedures
 - Test reports
 - Calibration reports
 - VCD
- **Change documentation**
 - Change requests, change notices
 - RFW / RFD
 - NCRs

CIDL layout (Doc. No. CIDL-1)

CIDL baseline at review IHDR (1.5.2003)			
CI number	Description	Doc. ref	Issue / date
1111	DPU box	P-DRW-001	2.0 / 2.12.2002
1111-1	DPU MB	P-DRW-002	1.1 / 2.2.2003
1111-2	DPU PCB	P-DRW-003	1.0 / 20.12.2002
2222	SPU box	P-DRW-004	3.0 / 11.9.2002
3333	Optics	P-DRW-005	2.2 / 1.3.2003
4444	Structure	P-DRW-006	3.0 / 4.12.2002
5555	Harness	P-DRW-007	3.2 / 2.2.2003

The CIDL will be frozen at the IHDR and forms the baseline for the manufacturing. When the CIDL is frozen changes to the documentation follows the formal change procedure. From the baseline CIDL the as-built configuration data list (ABCL) is built up and controlled by the change documentation.

CIDL - ABCL

Example of how the ABCL is built up by changes to the CIDL that was the baseline at a certain review and how it is controlled and verified that the changes are correctly implemented. This example shows the actual design documents as drawings. Explanatory text in *Italics*.

The document referred to in the ABCL is the same document as in the CIDL but it might be amended by change documents that have to be implemented and verified, and when the changes are incorporated in the document a new issue is released.

ABCL layout (Doc. No. ABCL-1)

CIDL baseline at review IHDR (1.5.2003)				ABCL (Doc. No. ABCL-1)		
CI number	Description	Doc. ref	Issue / date	Document issue / date	Change doc ref / issue (change applies towards the document in the CIDL)	Reconciliation of change
1111	DPU box	P-DRW-001	2.0 / 2.12.2002	2.1 / 10.6.2003 NCR-5, 1.0 (<i>this NCR is made towards issue 2.1</i>)	NCR-1, 1.0 RFD-1, 1.0	<ul style="list-style-type: none"> Dimensional changes (NCR-1, RFD-1) <i>Changes NCR-1 and RFD-1 implemented, verified and incorporated into new issue 2.1 of P-DRW-001. Verified in P-TR-001, 1.0.</i> <i>Change NCR-5 verified in P-TR-004, 1.0 but drawing has not been updated</i>
1111-1	DPU MB	P-DRW-002	1.1 / 2.2.2003	1.1 / 2.2.2003		<i>No changes</i>
1111-2	DPU PCB	P-DRW-003	1.0 / 20.12.2002	1.2 / 10.6.2003	NCR-2, 1.0 NCR-3, 1.1 RFD-2, 1.1	<ul style="list-style-type: none"> Material change (NCR-2, RFD-2) Different design (NCR-3) <i>Change implemented, verified and incorporated into new issue 1.2 of P-DRW-003. Verified in P-TR-001, 1.0 and P-TR-002, 1.0</i>
2222	SPU box	P-DRW-004	3.0 / 11.9.2002	3.1 / 10.6.2003	CR-1, 1.2	<ul style="list-style-type: none"> Different design (CR-1) <i>Change implemented, verified and incorporated into new issue 3.1 of P-DRW-004. Verified in P-AN-001, 1.0</i>
3333	Optics	P-DRW-005	2.2 / 1.3.2003	2.2 / 10.6.2003	NCR-5	<ul style="list-style-type: none"> Dimensional changes (NCR-5) <i>Change implemented, and verified but not incorporated into new issue. Verified in P-AN-001, 1.0</i>
4444	Structure	P-DRW-006	3.0 / 4.12.2002	3.0 / 4.12.2002		<i>No changes</i>
5555	Harness	P-DRW-007	3.2 / 2.2.2003	4.0 / 10.6.2003	CR-2, 1.0 CR-3, 1.1 NCR-4, 1.1	<ul style="list-style-type: none"> Material change (CR-2) Dimensional changes (CR-3) Cosmetics (NCR-4) <i>Change implemented, verified and incorporated into new issue 4.0 of P-DRW-007. Verified in P-TR-003, 1.0 and P-AN-002, 1.0</i>

Documents requested by PA for IHDR – release for flight standard hardware

A = for approval
R = for review
I = for information

	Title	Class	Responsible	Remarks
	Design review procedure			Top level document
1	PA plan	A	PA	If not yet approved
2	SW PA plan (can be part of PA plan)	A	PA	If not yet approved
3	Configuration Management plan	A	CM, PA	If not yet approved
4	Cleanliness control plan	R	PA	
5	CIDL, Configuration Item Data List	R	CM, PA	To be frozen before IHDR
6	CIL, Critical Items List with risk reduction methods	R	PA, PM, ENG, AIT	
7	Safety submission, including Safety Analysis	A	PA, ENG	
8	FMECA	R	PA, ENG	
9	WCA, Worst Case Analysis	R	ENG	
10	PSA, Part Stress Analysis, Derating analysis	R	ENG	
11	HSIA (Hardware/software interaction analysis)	R	ENG (SW)	
12	Summary FDIR (Failure detection Isolation and Recovery)	R	ENG (SW)	
13	Manufacturing flow chart with MIP/KIP identified	R	ENG, AIT, PA	
14	EEE parts list, PAD sheets/references	R/A	ENG, PA	References to approved PAD sheets
15	Material, process (consolidated) and mechanical parts list	R/A	ENG, AIT, PA	
16	VCD, Verification control document	R	ENG, AIT, PA	
17	Qualification matrix (can be part of VCD)	R	ENG, AIT, PA	
18	Test Procedures	R	AIT	
19	Test reports	R	AIT	
20	NCR, NCR status list	R/A	PA	
21	RFW, RFW status list	A	PA, PM	