

# FINDAS-IDIS CWG



## ***FINDAS-IDIS Commonality WG Mtg4 (CWG6\_4) - Minutes of Meeting***

***held at ESTEC, Noordwijk, 13 July 1999 10.00-17.45 hours***

### ***1. Welcome and presentation of members***

The following members have participated in the meeting :

Jan Tauber (JT), ESA(SSD)(Planck PS)  
Peter Claes (PC), ESA(SSD)(FIRST-FSC)  
Kevin Bennett (KB), ESA(SSD)(Planck/SA)  
Pierre Estaria (PE), ESA(SPD)  
Göran Pilbratt (GP), ESA(SSD)(FIRST PS)  
Peter Roelfsema (PR), SRON(HIFI)  
Rik Huygen (RH), K.U.L.(PACS)  
Albrecht de Jonghe (AdJ), (SRON/HIFI)  
Rodney Warren-Smith (RWS), Imperial College (SPIRE)  
William O'Mullane (WOM), ESA(SSD)(Planck)  
Adam Hazell (AH), ESA(SSD)(Planck)  
Erich Wiezorrek (EW), MPE(PACS)

Participating as well :

Johannes Riedinger (JR) (ESTEC/SA)

Excused were :

Richard Gispert (RG), IAS(HFI)  
Bart VandenBussche (BV), K.U.L.(PACS)  
Otto Bauer (OB), MPE(PACS)  
Trevor Dimbylow (TD), RAL(SPIRE)  
Fabio Pasian (FP), OAT(LFI)  
Andrew Harwood (AHa), Imperial College (SPIRE)  
Neal Todd (NT), Imperial College(SPIRE)  
Jean-Jacques Mathieu (JJM), ESA(TOS-EMS)(FIRST and Planck)  
Ekkie Wieprecht (EKW), MPE(PACS)

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## ***2. Agenda and objectives of the meeting***

### ***2.1 Agenda***

PART A : FINDAS-PROTOTYPE ACTIVITIES, TEST PLAN and TEST REPORT

10.00 - 10.15 1. Introduction (15 min) (PC)

10.15 - 10.30 2. Presentation/discussion of current activities (ICCs/DPCs/PC)  
(problems, lessons learnt, development phase, etc.)

10.30 - 10.45 COFFEE (15 min)

10.45 - 11.45 2. Presentation/discussion of current activities (ICCs/DPCs/PC)  
(problems, lessons learnt, development phase, etc.)(cont'd)

11.45 - 12.45 3. Test Plan review + discussion (ALL) and schedule for the Test Re-  
port (PC).

12.45 - 14.00 LUNCH

14.00 - 14.45 4. Common Object Model and Database architecture (ALL)

14.45 - 15.00 5. Comments on Web page (ALL)

15.00 - 15.15 COFFEE

PART B : FINDAS-IDIS commonality

15.15 - 15.35 6. Strategy for progress in commonality (20 min) (PC+ALL(discus-  
sion))

PART C: FINDAS, IDIS and FINDAS-URD

15.35 - 16.05 7. FINDAS/IDIS-justification and input (PE+KB) (30 minutes)

16.05 - 16.45 8. FINDAS-URD comments and clarifications (PC+ALL) (40 min)

16.45 - 17.05 8. FINDAS-URD comments and clarifications (cont'd) (ALL) (20 min)

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17.05 - 17.20 9. FINDAS-URD Milestones (PC) (15 min)

17.20 - 17.40 10. Actions and next meeting-date (20 min)

17.40 - 17.45 11. AOB (5 min)

## 2.2 Objectives of the meeting

- Action processing.
- Presentation of schedule and status of client-development by the different test-groups
- Show-stoppers, problems encountered and lessons learnt.
- Discussion of the Test Plan : have we included all necessary tests ?
- Discussion of the schedule+structure of the Test Report
- Common data/object-oriented model for testing and database organisation
- Comments gathering on the Web Page for FINDAS-prototype support
- Back to the roots : what is FINDAS and IDIS ? and reflection on commonality
- Presentation of a strategy for progress in FINDAS-IDIS commonality
- Discussion of the FINDAS URD (structure, comments and milestones towards first issue)

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## 3. Review of Actions of CWG6\_3

**CWG6\_3-A1: ALL** to read the first draft of the URD and contribute to the overall document by sending input and comments to PC before the 30th of June.

**Actionee:** All

**Deadline:** not due yet, new deadline : 30th of July

**CWG6\_3-A2: PC** to circulate the first draft of the FINDAS URD within two weeks from this meeting. ,

**Actionee:** PC

**Deadline:** Done on the 11th of July

**CWG6\_3-A3: PC** to make the revised test-template available to all test-groups before the end of the week.

**Actionee:** PC

**Deadline:** Done

**CWG6\_3-A4: ALL** to send input for the Test Plan within 2 weeks to PC.

**Actionee:** All

**Deadline:** Done

**CWG6\_3-A5: PC** to distribute the first issue of the Test Plan within 3 weeks.

**Actionee:** PC

**Deadline:** Done

**CWG6\_3-A6:** Further request for modifications to the common data model should be sent within 2 weeks of the meeting-date to PC.

**Actionee:** Participants to the Splinter meeting

**Deadline:** Done, still input expected from HIFI and PACS before 15th of August, action replaced by CWG6\_4-A8

**CWG6\_3-A7: PC** to organise a teleconference on the 2nd of June at 2.30 pm in order to freeze the common object-oriented model.

**Actionee:** PC

**Deadline:** Done

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**CWG6\_3-A8:** ALL participants to the teleconference of the 2nd of June to provide phone-numbers to which the Service provider should connect for the organisation of the teleconference.

**Actionee:** Participants to the teleconference

**Deadline:** Done

**CWG6\_2-A5:** ICCs to look at Vega-documentation and code about the telemetry scenario and exploit lessons learnt and re-use of this scenario for their benefit.

**Actionee:** ICCs. **Deadline:** 15/04/1999.

**Status :** Done

**CWG6\_2-A6:** To read the IDIS-URD.

**Actionee:** URD-responsibles. **Deadline:** 15/05/1999.

**Status :** On-going, due date postponed

## 4. PART A : FINDAS-PROTOTYPE ACTIVITIES

### 4.1 Status and schedule for client-development

The different test-groups presented the updated status and schedule for their client-development.

The information presented in the viewgraphs is not repeated here but can be consulted in the appendix to the minutes of this meeting in which the viewgraphs are bundled. SPIRE (RWS) did not present viewgraphs (time-constraints) but gave a detailed overview of their experience so far. This is included in these minutes.

#### 4.1.1 HIFI

AdJ said during the presentation of the HIFI-client that he is, besides reading about and studying the technology, now in a requirements phase of client-development. AdJ followed also an Objectivity-course. The level was very general and not going into detail (= normal for course of only one day) but useful to understand the basic concepts of Objectivity.

AdJ pointed out that the learning curve for FINDAS-development is high and that he is alone to do the work.

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### 4.1.2 PACS

RH presented the schedule for development and integration of the PACS-client with FINDAS.

They left the analysis and design phase and are now in the implementation phase.

Integration is foreseen for August and September.

Details can be found in the addendum-presentations.

### 4.1.3 SPIRE

#### Current Status

Since the May CWG meeting we have made good progress on this client.

We now have our baseline implementation working on the findas machine at ESTEC and have completed some preliminary performance tests.

In the current arrangement, we have an object server which communicates with the O2 database in C++ and exports a CORBA interface (also implemented in C++) to the client. The client connects using a CORBA interface (in C++), and then passes information up to RSI-IDL via a C interface implemented as a shared library (the standard RSI-IDL mechanism for invoking external code). Once in RSI-IDL, the telemetry information extracted from the database is unpacked into an RSI-IDL object by invoking an RSI-IDL procedure, which is also extracted from the database.

The database itself stores a list of telemetry packet structures which contain telemetry data stored as O2 d\_Bytes objects. The telemetry is simulated using a random number generator, and is checked for correctness after retrieval by invoking the same generator in the client. The client can also measure the rate of data retrieval. Currently, we use random packet lengths between 0 and 64k bytes (average 32k bytes). We have also implemented a small suite of programs which connect directly to the O2 database and allow us to populate it with test data, etc., and to measure the performance of the database directly.

#### Lessons Learned

We have learned a few lessons from this:

- a) The performance was initially disappointing. This was traced

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to the [] subscript operator in the d\_Bytes class and the "insert\_byte\_last" method. These were initially used to retrieve and store bytes, but appear to be far less efficient than the conversion operator (to char\*) and the "assign" method, which we now use.

b) Performance depends on how many packets you transfer per database transaction (the database being locked during each transaction). If too few packets are transferred, the transaction overheads slow things down. If too many, then performance suffers when you have multiple readers/writers (see below), because clients have to wait to gain access to the database. This is similar to the effect that VEGA found, but we also see it when interacting with the database alone (no CORBA present).

We have compromised on 10 packets/transaction when writing and 40 when reading (these taking approximately equal elapsed time). If the packets were smaller, these numbers would probably have to increase.

c) It pays not to get behind with garbage collection. This has to be performed explicitly after deleting objects from the database, but can take a long time if there is a lot of space to recover. The database cannot be used during garbage collection. Our database has now grown quite large. Space within it is being re-used, but we continue to see a slow growth in size which suggests that re-use of space is not perfect.

### Performance

We have carried out some preliminary performance measurements involving reading and writing to the O2 database, and combinations of both. These tests have used programs talking directly to the database on the same machine - i.e. looking simply at the O2 database performance with no contribution from CORBA or networking. The number of O2 clients is limited to 4 by the number of licenses available. In each case below, a total of 1000 packets were written/read and the

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results are average data transfer rates in kilobytes/second:

Configuration	Write speed	Read speed (per reader)
1 writer	233	
1 reader		778
2 readers		511
3 readers		376
4 readers		290
1 writer, 1 reader	129	503
1 writer, 2 readers	98	379
1 writer, 3 readers	92	341

These results are the median of 3 runs performed during the day. At night, when the findas machine is quiet, we have seen retrieval rates for a single reader exceed 2MB/s.

It is noticeable when writing and reading simultaneously that the writer can be locked out for considerable periods while the reads complete. This might potentially be a problem in an operational system unless some mechanism can be found to give the writer a higher priority.

When we add the CORBA interface and the client (all running on the same machine), we see the performance for a single reader decline to about 250kB/s. This is irrespective of whether the RSI-IDL interface is present, suggesting that unpacking the telemetry data is not a significant overhead.

We do not think this degradation is due entirely to CORBA because, if the O2 database is replaced with a fast telemetry generator and we test just the CORBA connection, we still see retrieval rates of around 575kB/s. More probably, the slower performance is largely because the CORBA interface restricts access to 1 telemetry packet at a time. Therefore, we are accessing only one packet per database

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transaction, rather than the 40 per transaction used in the tests above. To get top performance, we may need to improve the CORBA interface to allow access to many packets at once.

## Outstanding Problems

There is one remaining problem apparently arising from our use of the freeware OmniOrb2 CORBA implementation: after approximately 2 minutes of operation, this generates an event which terminates the current RSI-IDL session. We hope that migrating to ORBIX will solve this problem.

## Future Plans

We plan to complete the testing and documentation of our baseline client by the end of July. Thereafter, further improvements may be made, as time permits. In particular, this should include integration with the common data model as this develops and further experiments to improve performance.

### **4.1.4 Discussion after the HIFI, PACS, SPIRE-presentations.**

Problems with CORBA were mentioned by SPIRE.

JR discouraged the use of CORBA as what you get is the lowest common denominator and you don't exploit fully the possibilities of the deployed OO-technologies. JR mentioned that FSC proposes JAVA as its baseline technology. In an all JAVA-environment you definitely do not need CORBA but should use RMI.

PC agreed fully on this and said that CORBA leads to Object Model Mismatch and should only be used when a Language Adapter is needed between Client and Server or when both Client and Server are implemented in C++.

We need CORBA for prototype-development as many prototype-clients are purely written in C++ or have a C++-based server tier.

PE mentioned that there are minimum and maximum allowed boundaries to the packet-size in practice.

**Action 1:** PE to distribute the allowed range of telemetry packet-size before the end of August.

### **4.1.5 Planck/SA**

The detailed results of the Planck-representation (WOM) can be found in the view-graphs associated with these minutes. Interesting comparative results were obtained for the Performance of both C++ and JAVA-clients communicating to the Objectivity and O2-databases in various user modes.

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## **4.1.6 FSC**

No work was performed on the Test Client between CWG6\_3 and CWG6\_4 due to other activities. A revised schedule and scope of testing was presented in the meeting and can be found in the addendum-presentations.

## **4.2 Test Plan**

The group discussed whether all the User Requirements are included in the Test Plan and whether the User Requirements are correct in their present state. Some modifications were agreed and will be included by PC in the next release of the Test Plan. PC will also go back to the "Statement of Work" and the "User Requirements Review"-document to make sure that the User Requirements list is complete.

The Test Tracibility Matrix was as well discussed. Some requirements may not be tested as part of the prototype exercise.

Use cases and test scenarios for testing the interoperability of clients are not included in the present draft of the Test Plan. Action on ICCs.

**Action 2:** PC to cross-check the requirements in the Test Plan with those in the Statement of work and the revised requirements by Vega and to make the necessary modifications, additions.

**Action 3:** PC to complete the test tracibility matrix and change the requirements according to the comments made in CWG6\_4.

**Action 4:** PC to distribute the updated issue of the Test Plan before the end of August

**Action 5:** ICCs to provide use cases and test scenarios to PC for testing the interoperability of clients before the end of August.

## **4.3 Test Report**

PC will distribute a report-template by the end of July to the contributors of the Test Report. PC asked whether the Test Report would be a separate document or a document integrated with the Test Plan. The Test Plan may be integrated with the Test Report according to the ESA-standard for Small Software Projects. The meeting was anonymous in the opinion that a separate document is needed.

PE mentioned that he would like to see a summary in the Test Report answering the basic questions.

Reminder (from PC) : the minutes of CWG6\_3 mention these basic questions :

1. Is the prototype useful/usable ?
2. Is O2 a suited database ?
3. Is the FINDAS-concept valid for an Operational System ?

PC presented the schedule for the Test Report. The participants agreed to modify the schedule slightly to allow for a review and comments.

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PR asked what the drivers are behind the schedule. PE/GP mentioned that the driver is basically the need for costing of FINDAS by SA-management by the end of the year.

It was agreed to provide a first issue which should be able to answer that question and in addition a second issue later which will demonstrate interoperability of clients.

**Action 6:** PC to send a template and information about the structure of the Test Report before the end of the month.

**Action 7:** All to contribute to the Test-report before the 20th of September

## 4.4 Common Data/Object Model and Database Architecture

The common data model/object-oriented model for prototype development was “designed” at an earlier splinter-meeting and updated at a teleconference :

The Present Iteration of the Prototype FINDAS-IDIS **Ground Segment Framework Package** (GSFP) can be found in Appendix A of these minutes.

**Action 8:** All contributors to the common data model should send possible modifications/missing information before the middle of August to PC.

The following responsables are identified :

**class Proposal** : Peter Claes  
**class Proposer** : Peter Claes  
**class Observation** : SPIRE  
**class Telecommand** : HIFI  
**class TM\_Packet** : PACS  
**class Satellite** : HIFI

The purpose of this framework is to enable different clients to be able to work together via FINDAS with a sort of quasi-realistic proto-operational functionality.

The Framework will be visible on the FINDAS-prototype webpage.

PC presented some viewgraphs on principles for database organisation and grouping of classes in the database valid both for the Operational phase and for the Prototype. PC asked the question whether we go for grouping of the common object model classes in one database-segment or by importing them in the different client database segments. The meeting-participants agreed that a common database area is needed for the common classes.

EW argued that we need use cases for the common object model and that they should lead to a design.

PC said that this is fully correct in principle, but that for the prototype-testing the common object model is an add-on to the testing. The testing of FINDAS by the individual clients is primordial and they have proper use cases and design. The common object

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model are then just common classes which can be re-used for demonstrating interoperability.

**Action 9:** PC to set-up a common (data)-base segment in which the common classes will be imported before the end of July.

**Action 10:** PC to generate a collection of Proposer- and Proposal objects in the database before the end of August.

## 4.5 prototype support WWW-page

PC pointed out that at present the WWW-page was still under construction due to a lack of time. He promised to make it operational before the end of the week of the meeting.

ICCs felt that a mail list-server was more effective for distributing “problems encountered and lessons learnt” than a WWW-page.

The participants pointed out that the FIL-design and architecture is available as VEGA-doc ref. FDS.PWN.009. The FIL-bullet on the WWW-page should point to this document. The participants found the WWW-page nice, but it should have a very low priority at this stage of the project.

**Action 11:** PC to complete the set-up of the WWW-page before the end of the week.

**Action 12:** JJM and PC to check the Vega-docs for completeness before the 5th of August.

**Action 13:** EW to set-up a mailing-list for problems encountered and lessons learnt.

**Action 14:** All developers to send their problems encountered and lessons learnt to this mailing list.

## 5. PART B : FINDAS-IDIS commonality

PC requested that members make actively new proposals for commonality in the next meetings and also wondered how far commonality is really desired by both groups (FINDAS-IDIS).

Some discussion about commonality was held and the conclusion was three-fold :

1. The CWG6 meetings have as goal to keep each other informed about new developments, status and serve as the information-basis whether we can re-use each others concepts, systems, approach.
2. Commonality should never be enforced as the two projects are quite different in concept.
3. Presentations of FINDAS-status and IDIS-status should keep participants informed in next meetings about each other's progress and changes as a road-map to achieve commonality in some areas.

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**Action 15:** Kevin Bennett to make/prepare a presentation of the status of IDIS at the next meeting (CWG6\_5).

**Action 16:** Göran Pilbratt to make/prepare a presentation of the status of FINDAS at the next meeting (CWG6\_5).

## 6. PART C: IDIS, FINDAS and FINDAS-URD

Going back to the root of what the FINDAS- and IDIS-concept is serves two purposes :

- recall members of the basic principles and differences between FINDAS and IDIS, explain this to people who recently joined the working group.
- understand basic principles and differences better in order to review commonality and generate new ideas about commonality.

### 6.1 What is FINDAS ?

PE presented the key-questions in relation to FINDAS. Answers are wanted in order to convince Management of the importance and need for FINDAS.

**Action 17:** ICCs to send to Pierre Estaria their answers to the fundamental FINDAS-questions.

### 6.2 What is IDIS ?

An IDIS-representative presented the key concept, architecture and development plan behind IDIS.

See addendum-presentations for details.

### 6.3 FINDAS URD contents

The participants found section 2.1 interesting, but too much of an architectural design already.

PR offered to provide replacement for the entire section 2.

Sometimes the present requirements look more like software requirements than like user requirements. PC mentioned that this was due to time-constraints he had in producing this draft. PE added that some technical non-user requirements may be added (if applicable and appropriate) to the "constraint requirements"- section. It was also agreed to simplify the present Requirements-tags from the set (importance, risk, priority, source, implementation needed from phase X onwards) into (source, completion at end of phase X). The importance shall be indicated by using the auxiliary verbs : shall(essential) or should (lower importance), instead of "must".

It was agreed not to mark the document with change bars at this stage.

**Action 18:** PR to draft a new chapter 2 "General Description" and to send this chapter before the end of July to PC for inclusion in the next draft of the FINDAS URD.

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**Action 19:** PC to rephrase the present requirements in pure User Requirements, before the 20th of August.

**Action 20:** PC to include the comments of all URD-contributors in the next draft 0.4, before the 20th of August.

**Action 21:** PC to remove the present chapter 2 in the FINDAS-URD.

## 6.4 FINDAS URD schedule

The following schedule was agreed upon :

- CWG6\_4 (13 Jul 1999)
- Deadline for comments (30 Jul 1999)
- Draft 0.4 (20 Aug 1999)
- Absolute deadline for comments (5 Sep 1999)
- New comments bundled and distributed to all reviewers (10 September 1999)
- Internal general review (ESA+ICCs meeting) (21 September 1999), may be combined with CWG6\_5 if one day would be sufficient to do the job.
- First issue (1st of October)

## 7. Next meeting

The date of the 22th of September 1999 was accepted as next meeting date.

## 8. AOB

None

### List of Actions:

#### A. New Actions

**CWG6\_4-A1:** PE to distribute the allowed range of telemetry packet-sizes before the end of August. **Actionee: PE, Deadline: 31st of August**

**CWG6\_4-A2:** PC to cross-check the requirements in the Test Plan with those in the Statement of work and the revised requirements by Vega and to make the necessary modifications, additions. **Actionee: PC, Deadline: next issue**

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**CWG6\_4-A3:** PC to complete the test tracibility matrix and change the requirements according to the comments made in CWG6\_4. **Actionee: PC, Deadline: next issue**

**CWG6\_4-A4:** PC to distribute the updated issue of the Test Plan before the end of August. **Actionee: PC, Deadline: 31st of August**

**CWG6\_4-A5:** ICCs to provide use cases and test scenarios to PC for testing the interoperability of clients before the end of August. **Actionee: ICCs, Deadline: 31st of August**

**CWG6\_4-A6:** PC to send a template and information about the structure of the Test Report before the end of the month. **Actionee: PC, Deadline: 31st of July**

**CWG6\_4-A7:** All to contribute to the Test-report before the 20th of September. **Actionee: All, Deadline: 20th of September**

**CWG6\_4-A8:** All contributors to the common data model should send possible modifications/missing information before the middle of August to PC. **Actionee: All, Deadline: 15th of August.**

**CWG6\_4-A9:** PC to set-up a common (data)-base segment, (in which the common classes will be imported later), before the end of July. **Actionee: PC, Deadline: 31st of July**

**CWG6\_4-A10:** PC to generate a collection of Proposer- and Proposal objects in the database before the end of August. **Actionee: PC, Deadline: 31st of August**

**CWG6\_4-A11:** PC to complete the set-up of the WWW-page before the end of the week. **Actionee: PC, Deadline: 16th of July**

**CWG6\_4-A12:** JJM and PC to check the Vega-docs for completeness before the 5th of August. **Actionee: JJM, PC, Deadline: 5th of August**

**CWG6\_4-A13:** EW to set-up a mailing-list for problems encountered and lessons learnt. **Actionee: EW, Deadline: 31st of July**

**CWG6\_4-A14:** All developers to send their problems encountered and lessons learnt to this mailing list. **Actionee: All, Deadline: ASAP**

**CWG6\_4-A15:** Kevin Bennett to make/prepare a presentation of the status of IDIS at the next meeting (CWG6\_5). **Actionee: KB, Deadline: 22th of September**

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**CWG6\_4-A16:** Göran Pilbratt to make/prepare a presentation of the status of FINDAS at the next meeting (CWG6\_5). **Actionee: GP, Deadline: 22th of September**

**CWG6\_4-A17:** ICCs to send to Pierre Estaria their answers to the fundamental FIN-DAS-questions. **Actionee: ICCs, Deadline: 16th of July**

**CWG6\_4-A18:** PR to draft a new chapter 2 "General Description" and to send this chapter before the end of July to PC for inclusion in the next draft of the FINDAS URD. **Actionee: PR, Deadline: end of July**

**CWG6\_4-A19:** PC to rephrase the present requirements in pure User Requirements, before the 20th of August. **Actionee: PC, Deadline: 20th of August**

**CWG6\_4-A20:** PC to include the comments of all URD-contributors in the next draft 0.4, before the 20th of August. **Actionee: PC, Deadline: 20th of August**

**CWG6\_4-A21:** PC to remove the present chapter 2 in the FINDAS-URD. **Actionee: PC, Deadline: for draft 0.4, 20th of August**

## B. Still outstanding actions of the previous meeting(s)

**CWG6\_2-A6:** To read the IDIS-URD.

**Actionee: All. Deadline: 15/05/1999.**

**Status : On-going, due date postponed**

**CWG6\_3-A1: ALL** to read the first draft of the URD and contribute to the overall document by sending input and comments to PC before the 30th of June.

**Actionee: All**

**Deadline: not due yet, new deadline : 30th of July**

**CWG6\_3-A6:** Further request for modifications to the common data model should be sent within 2 weeks of the meeting-date to PC.

**Actionee: Participants to the Splinter meeting**

**Deadline:** Done, still input expected from HIFI, (SPIRE?) and PACS before 15th of August, action replaced by CWG6\_4-A8.





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## Appendix A

