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FIRST PROJECT TELEFAX

Priority :	Originating signature :	Authorised by :
NORMAL		

Date : 20 January 1997
Ref. : PT-03823

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From : P. Estaria, ESTEC/PT

To : FIRST Science Operations Definition Group :

ESOC -- A. Robson (MOD)	Fax.: (49)-6151-903409
RAL -- K. King	Fax.: (44)-1235-446667
MPE -- O. Bauer	Fax.: (49)-89-3299-3569
SRON -- P. Roelfsema	Fax.: (34)-1-813-1353
ESTEC -- H. Schaap (PT)	
ESTEC -- G. Pilbratt (SA)	

Cc. : ESOC -- A.F. Smith (MOD)
ESTEC -- K. Hjortnaes, J-J. Mathieu (WMS), J. Riedinger (SAX) w/o attachments #1, #2, #3 and #4;
ESTEC -- J.A. Steinz (PI), B. Taylor (SA), G. Drechsel (SAI)
VILSPA -- M. Kessler

Subject : **Minutes of the 7th FSODG Meeting**

Please find attached the minutes of the 7th FSODG meeting. There are four attachments to the minutes.

Regards,

P. Estaria

P. Estaria

Mail address: Postbus 299 - 2200 AG Noordwijk - The Netherlands
FIRST Project - Tel.: (31) 71-5653475 - Fax.: (31) 71-5656244

Ref: PT-MM-03822 20 January 1997

MINUTES OF THE SEVENTH FSODG MEETING

The seventh meeting of the FIRST Science Operations Definition Group (FSODG) was held in ESTEC on January 14-15, 1997.

AGENDA

The agenda (attachment # 1) was adopted.
There were no comments on the minutes of FSODG meeting # 6, held on November 13-14, 1996.

1. DEVELOPMENTS SINCE FSODG MEETING # 6

The major developments since the last FSODG meeting were summarised in a E-mail from Estaria, dated 17th December 1996 (attachment # 2). In addition the following points were mentioned.

- The procurement proposal for the development of the aluminium telescope by competitive tender action has been approved by the AC on 19.12.96. and is submitted to the IPC. The preparation of the ITT is proceeding, released planned for March 1997.

- Small problems with the 4K and the 20K coolers are under investigation. corrective actions concerning the jamming of the pistons in the 20K cooler compressors are being implemented. Investigations are running at MMS following failure of one displacer to pass the stiction test. No new results on the 4K TRP coolers.

- Stressed Ge:Ga detectors: situation is satisfactory. small delays being encountered. The predicted end of development is now mid-1997.
  Ga:As detectors: contract was kicked-off on 12.12.1996. Planned duration: two years.

- All three instrument groups (BOL, HET and PHOC) have positively confirmed that they could meet an advanced launch date (end-2005) without compromising the science objectives. Instrument designs will have to be conservative using proven technologies.

- Since it is only a small additional work, Bauer and King will produce ICC and FSC cost estimates (due 31.01.97) both for a launch mid-2007 and end-2005.

- Pilbratt will give a short overview of the FIRST Science Operations concept at the AWG on the 20.01.97 in Geneva.

- The scientific advantages of an L2 orbit were discussed. Attachment # 3 (taken from the presentation made by J. Cornelisse to the SAG on 13.12.96) provides a summary.

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2. REVIEW OF ACTION ITEMS FROM PREVIOUS MEETING

AI # 6/3: due on 31.01.97

AI # 6/4: postponed till 11.03.97

AI # 6/8 and 6/9: long term. on-going

All other action items have been closed.

3. SCIENCE IMPLEMENTATION REQUIREMENTS DOCUMENT (SIRD)

The ISO SOC (Drechsel, Hansson, Kessler, Riedinger, Sternberg, Oldeman) will produce the first draft of the Science Implementation Plan (SIP) for the FSC by end-January 1997. This draft is the formal response to the draft SIRD issued by the Project on 29.11.96. It will contain only the information required to cost the FSC (without FINDAS). The FSODG felt that it was essential that Drechsel's team make an attempt at costing FINDAS (see AI # 7/1).
SOC's costing will cover (i) development costs (ii) costs of the 1st year of operations, (iii) cost of any subsequent year. It will also include the post-observation Archive. During the preliminary discussions (meetings of 9.01.97 and 13.01.97) between Estaria and the SOC's team, several points/concerns were raised by the SOC team. These aspects were discussed during the FSODG meeting and provided an opportunity to clarify several aspects of the overall FSODG concepts. The key points are summarised below:

- co-location of the various teams might be required, alternatively, non-colocation could drive up the costs of the overall science operations (note that the FSODG holds the opposite view) -see also paragraph 6-

- without systematic processing of all observations and subsequent distribution of the data products to the observers, FIRST might be too much of a PI-type mission (in particular if the FSC is not implemented by ESA). These issues should be addressed in the "Science Management Plan" (SMP).

- the issue of " Data Quality Control" of the observations and derived products must be addressed more thoroughly than in the draft SIRD, if ESA wants to "guarantee" "quality" to the maximum extent possible (see also previous bullet). This implies that the FSC must be able to run the "pipeline" provided by the ICCs. This "data quality" issue, the extent of control ESA can/want to exercise on the final quality and the implications for the ICCs and FSC must also be addressed in the SMP.
  In ISO, 90% of the data quality problems are found by RTA/QLA. The 10% remaining require extensive and arduous investigations which can only be carried out by the IDTs, or home-institute teams, not by the instrument builders. In view of these practical difficulties "scientific" validation of the pipeline in ISO has been replaced by "functional" validation i.e. if the data pass through the pipeline without crash, if the "right" amount of data is collected, etc., the quality criterion is deemed to be satisfied.

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The same scheme is proposed for FIRST. Starting point should be "clean" raw data from the MOC. The ICCs should check that this is the case-.
It is felt that the burden on the FSC/ICCs would be much too high if systematic "scientific" validation of every data product were required.

- It is a dangerous assumption to rely on a "free" INTERNET (or equivalent), in particular if observers have to download a large amount of data in order to process their observations. (note that "remote logging" to the FSC, under well specified conditions, is included in the FSODG concept. Obviously a limit must be set. The FSC costing should take into account the necessary hardware resources -storage, CPU, etc.- required to support this option. In the remote logging option, "standard" data products would be generated for the user, and stored by FINDAS -TBC-

- It is not clear from the SIRD that "competence" of the FSC to respond to observer queries (helpdesk), in particular in case of tricky data reduction problems, can be guaranteed in the FSODG concept. (note that this is addressed in the SIRD under "training", and "participation" in instrument-related activities but must be extended and made more explicit. The FSODG concept foresees that some FSC staff will spend "extended" (TBD) periods of time at the ICCs prior to joining the FSC, and will be allocated "guaranteed" time (TBC) . This ensures that they will have "first hand" knowledge of the data reduction aspects. In addition, it is expected that the formation of international "key project" consortia will foster building up of a large pool of expertise upon which the FSC could draw.

- The role of the Project Scientist Team w.r.t. the FSC needs to be clarified in terms of technical and managerial interfaces, as well as operational role. The FSODG agrees. To be clarified in the "Science Management Plan" and reflected in the next issue of the SIRD).

- based on the INTEGRAL experience the SOC team suggests that, for the FIRST instruments, the MOC-based RTA processing (to be carried out by the SPACONs) might not be sufficient to ensure instrument health and safety. This will **not** be the case for FIRST; (i) due to the extended periods without ground coverage the task of ensuring instrument health and safety will have to be carried out by the instruments' on-board software (autonomy feature), (ii) It will be a requirement on the instruments that the instrument TM HK packets contain the information required to ensure this MOC-based RTA, where each instrument is considered as a spacecraft "subsystem", without the need for extra MOC facilities.

- It was felt that some sort of data "pre-processing" (similar to the TDF-ERD conversion in ISO) should be carried out by the FSC prior to distributing the data to the ICCs. This will be included in the FSC task for costing. The FSODG felt that this task would not be required for FIRST provided the MOC would deliver packets sorted out by instruments, in the correct sequence and with the proper information about timing and data quality.(to be discussed with ESOC in phase B).

Estaria gathered marked-up copies of the draft SIRD from the members of the FSODG.

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The comments will be included in the next version of the SIRD, planned for July 1997. The following (main) points were discussed/agreed:

- In order to be more self-sufficient the document will include a section specifying the major products/services provided by the MOC. Expand section 1.3.3
- the scope should include the post-observation Archive and section 2.4.7 should be expanded.
- mission phases should be made consistent with other documents, i.e. include calibration phase into PV phase.
- PV phase might have to overlap with routine phase (e.g. staggered release of observing modes).
- Requirements for instrument autonomy should be emphasised, (see requirements ICCF-011 and ICCF-012)
- The Instrument Command Translators (ICTs) should be implemented by the ICCs in accordance to MOC-supplied requirements.
- FINDAS basic functionality should be in place much earlier than 6 months prior to the Instrument Level Tests (i.e. handling of FIRST documentation). It is suggested that a dedicated FINDAS working group be established between Issue of AO (Sept. '97) and PI selection (June '98). -see PERF-058-
- Electronic standards for documentation submission should be established e.g. the minimum set supported (for example LATEX, Word, etc.) -see PAQA-011
- After ICCs and FSC selection, agreements must be made on the environments under which ICC and FSC software will be produced. Number and types (must be set to a minimum) of the hardware platforms supported, as well as the commercial software packages required must be agreed. A clear and binding policy must be established before embarking on software development activities.
- RTA/QLA should be able to run several times (TBD) faster than real-time. - see PERF-062-

4. FINDAS

- Presentation by the MATISSE group was cancelled by them on very short notice (illness). It will be rescheduled (see AI # 7/2).

- Mr Silberstein, European representative of ISE, the developer of the Object-Oriented language EIFFEL gave a general presentation on the advantages of O-O techniques and major features of the EIFFEL language. These are listed here:

- emphasis on re-usability, support of abstract data types.

- use of pre-conditions/post-conditions to promote reliability (excellent also for debugging and documentation -extracted by the compiler-)
- strong static data typing (increased reliability)
- very portable and fast (compiler generates ANSI-C code)
- extensive libraries (graphics, communications, maths, etc.) and development environment.
- interface to the O-O MATISSE database already exists, interfaces to other O-O databases will be implemented when these have matured.

- A follow-up session with EIFFEL will be organised by WMS in ESTEC on the 18th February 1997. This session will be ESTEC-wide but some time will be set aside to discuss FINDAS-specific features. The FSODG members resident in ESTEC will attend.

- Mr W. van Leeuwen (COLUMBUS group) gave a presentation on the Mission Data Base system implemented by DASA for ESA/COLUMBUS. The viewgraphs have been distributed at the meeting and are not attached. Main features:

- The system is already operational on many sites in the US, Russia and Europe, is free for ESA to use, is modular, well documented, and maintenance is covered under an ESA contract.
- It contains many of the features required by FINDAS e.g.
  - strong configuration control.
  - object-oriented user's view of the data.
  - support for distributed use, ownership control, multi layer consistency checking capabilities.
  - many integrated tools (data definition and management, report generator, display builders, graphic editor, etc.) as well as an interface to allow import of "external" tools.
- The "uplink" and the "downlink" Data Bases are physically separated, to improve performance but logically linked via the system.
- The system is based on ORACLE (Agency standard) and uses the SQL interface. It is implemented in ADA, with some C code and is provided and supported as COTS (Commercial Off The Shelf)
- Help desk facilities, training courses and support are available. A reference system is available for training and demonstrations.

It was decided that a demo of the system will be organised (-see AIs # 7/3 and 7/4). At a later stage a reference system will be secured and more extensive investigations will be carried out using the ISO data model (or a derivative) elaborated by the ISO-SOC for the implementation of ISO post-observation Archive (see AI # 7/5). The

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FSODG will need WMS support for these investigations (see AI # 7/6).
It is believed that the COLUMBUS approach is very relevant to the ISO Archive problem and that a joint FIRST-ISO effort (extent TBD) should be undertaken. To be discussed at the meeting on 19-20 February in VILSPA.

- Estaria will contact the Space Telescope European Coordinating Facility (ST-ECF) to try and arrange a demo on the object-oriented database system for the management of ST data that they are currently installing. - see AI # 7/7-

- Following the recommendations from the FIRST Science Operations Review Board at the review of 3-4 October 1976, a Statement Of Work will be prepared for the implementation of the FINDAS prototype (see AI # 7/8). The same SOW can be used for the COLUMBUS investigations and to specify the requirements on a completely new prototype. Decision to be taken when more information will have been gathered on the COLUMBUS and ST-ECF systems.

5. FIRST POST-OBSERVATION ARCHIVE

The topic was introduced by Pilbratt (see attachment # 4). The approach is endorsed by the FSODG, although a 3-year period is proposed instead of the original 2-year period which seems too short. It was agreed that the following sub-phases should be considered:

- mission consolidation phase (half a year)
- "active" archive phase (two years)
- archive "consolidation" phase (preparation for the historic Archive phase) - half a year.
- "historic" Archive phase (many years)

The FSODG costing of the post-observation Archive (both for the ICCs and the FSC) will take these sub-phases into account. The "historic" Archive phase shall not be costed.

6. FIRST DISTRIBUTED CONCEPT

The technical note (ref.: PT-03654 dated 29.11.96) analysing the capability of the FIRST decentralised ground segment to cope with contingency situations was sent by Estaria on behalf of the FSODG to the ISO-SOC (Taylor, Clavel, Kessler and Todd) Comments were sent from K. Leech and T. Prusti on behalf of M. Kessler. The FSODG welcomes this feed back seen as an incentive to focus on potential problems. The FSODG position is summarised below:

- The interfaces (technical and managerial) between FSC, ICCs, MOC, Project and Project Scientist team will be examined with great care as definition work

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progresses. Clear operational procedures will be designed (and revised as required) to regulate the operational interfaces between all centres.

- Collocation of all teams on one central location can be advantageous when things go wrong (provided that the overhead introduced by large teams is manageable) but the distributed approach can work and reduce the overall costs. With modern communication means and adequate tools collocation is not seen as critical.

- In the FSODG concept, the IDT and the Home-Institute team are de-facto co-located at the ICC. This is seen as a sensible approach since the home team has an important role to play, pre- and post-launch.

- The FSODG was required specifically to concentrate on the interactions as described in the ISO SFOH (Clavel's input)

- Configuration Control activities shall be easier with FINDAS since this is a top level requirement on the system.

- The FSODG does not feel that it is appropriate at this stage of definition to expand on the assessments contained in the technical note.

- The original brief of the FSODG was to reduce costs cf. ISO.

7. A.O.B.

The Draft of the FIRST Science Management Plan produced by Pilbratt has been commented by the SAG chairman (with inputs from Bauer and Poglitsch), in particular the section on observing time has been expanded and a proposal for definition of key projects has been added. Composition of the FIRST Science Team has been revised. The amended document has been discussed within the FSODG. Minor editorial changes have been suggested. A section on post-observation Archive will be added. The document needs to be reviewed within SSD.

The FSODG noted again that a second ground station was required, during satellite commissioning, in order to carry out this activity (were real-time interaction is essential) within a reasonable period of time. Ideally, downlink options should include; (i) stored TM only, (ii) Real-time TM only, (iii) simultaneous transmission of R-T and stored TM. There was no other AOB.

8. LIST OF ACTIONS

The following actions have been allocated as a result of this meeting:

- **AI 7/1: Estaria: Due date: 31 Jan. '1997**
  Provide to the ISO team responding to the SIRD the input required to cost FINDAS.

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- **AI 7/2: Estaria: Due date: 31 Jan. '1997**
  Arrange with WMS the rescheduling of the MATISSE presentation for the next FSODG meeting

- **AI 7/3: Estaria: Due date: 31 Jan' 1997**
  Arrange with COLUMBUS (W. van Leeuwen) the Data Base demo in Bremen.

- **AI 7/4: Estaria: Due date: 31 Jan' 1997**
  Generate with WMS (J-J Mathieu) the list of topics to be covered by the COLUMBUS demo. Check with van Leeuwen. Circulate to FSODG for info/comments

- **AI 7/5: Roelfsema: Due date: 28 Feb. '1997**
  Generate, in collaboration with the ISO-SOC team , the ISO (or ISO-derived) Data Model to be used for the FINDAS prototyping activities. Gather (for comparison) the ISO-SOC requirements on the post-observation ISO Archive.

- **AI 7/6: Estaria: Due date: 31 Jan' 1997**
  Request from FIRST Project, WMS support for 1997. Support to FINDAS-related activities.

- **AI 7/7: Estaria: Due date: 31 Jan '1997**
  Contact the ST-ECF group to organise a presentation of their object-oriented Data Archive System

- **AI 7/8: Estaria/Mathieu: Due date: 10 Feb. '1997**
  Produce the requirements (functional, managerial, logistics) for the implementation of the FINDAS prototype.

From previous meeting:

- **AI 6/4: Roelfsema: Postponed to: 11 March '1997**
  Contact COBRA C group and Westerbrook group to obtain more information about their systems and plans. (FINDAS). Gather and distribute to FSODG relevant documentation

9. NEXT FSODG MEETING

The next FSODG meeting will take place on the 11-12 March 1997. Start time: 13:00 on the 11th. End-time: end of the day on the 12th. Location is TBD (ESTEC, MUNICH or VILSPA). Estaria will provide the agenda.

P. Estaria

P. Estaria

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From: PESTARIA--ESTEC Date and time 97-01-06 16:36:58
To: HSCHAAP --ESTEC AROBSON --EXTERNAL
BAUER --EXTERNAL bauer KJK --EXTERNAL Ken King RAL
PJOTR --EXTERNAL Peter Roelfsema PILBRATT--EXTERNAL Goeran Pilbratt

FROM (my name)
Subject: 7th FSODG meeting

Attachment # 1

Dear FSODG members,

The 7th meeting of the FSODG will take place, as planned on 14-15 January 1997 in ESTEC room Fb022 (ISO barracks) starting at 9:00 on the 14th and ending at lunch time on the 15th. I propose the following agenda:

1. Developments since last FSODG meeting (Pilbratt + Estaria)

2. Review of Action Items from last meeting (FSODG # 6 13-14 Nov. 1996)

3. SIRD review:
   - I would like to collect from you marked up copies of the Draft SIRD distributed end-November 1996.
   - discussion of MAJOR problems (if any)
   - A working meeting will take place on 8th Jan. with Riedinger/Hanssen/Drechsel/Oldeman who have been charged by BGT to respond to the SIRD (FSC costing). I will report on this meeting.

4. FINDAS:(starting at 13:30 on the 14th)
   - presentation on MATISSE. Questions/answers + demo.
   - presentation on COLUMBUS Archive Management System. Questions/answers.
   - other FINDAS-related topics (e.g. AIs 6/4 and 6/7) and "common" prototype with ISO.

5. FIRST post- obs archive.
   discussion to be introduced by G. Pillbratt.

6. FIRST distributed concept.
   (comments have been received from Kessler's people on the technical note sent by Estaria and discussed in last FSODG meeting. I will send these comments separately. We should work out a common answer. No reaction from Clavel and Todd)

7. AOB

Regards

End of Message

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From: PESTARIA--ESTEC Date and time 96-12-17 17:49:24
To: HSCHAAP --ESTEC AROBSON --EXTERNAL
BAUER --EXTERNAL bauer KJK --EXTERNAL Ken King RAL
PJOTR --EXTERNAL Peter Roelfsema PILBRATT--EXTERNAL Goeran Pilbratt

FROM (my name)
Subject: Latest news from FIRST.

Attachment # 2

Dear FSODG members,

In a nutshell the latest news:

System:

- Study of re-usability of XMM bus for FIRST. System study completed. XMM bus can be re-used both with cryostat and cryocooler options. Very attractive (programmatics and costs). Favoured orbit L2 (would offer 4.5 years lifetime with cryostat).
- CFRP reflector abandonned: cannot meet specs + large costs overruns.
- Al reflector recommended by Project. Accepted by D/SCI. SiCa technology looks good but put on hold.
- D/SCI has requested Project to assess if FIRST launch date could be brought forward to end-2005. No problem from S/C side. PWG shall say by 15/01/97 if also possible for the instruments.

SAG meeting: (date 13/12/96)

- SAG favour cryostat and L2 orbit.
- SAG chairman urges members to increase PR efforts in favour of FIRST.
- Not much progress on mission definition i.e. surveys, key-programmes, open-time, guarantedd-time.

SIRD:

- Draft 1 issued end-Nov. SAI will cost FSC (i) pre-launch costs, (ii) costs first year of operations, (iii) costs subsequent years (iv) costs post-operations archive. ESOC will be requested to cost FINDAS. Basic idea is to face mission re-confirmation with credible estimates.

FINDAS:

- 14/01/96: starting 13:30 presentation of MATISSE. WMS has sent letter to them stating our objectives. Tutorial + questions/answers + demo. No sales pitch. towards end of afternoon COLUMBUS presentation (about 1 hours). A few SSD staff will attend (keen interest overall in SSD).
- have contacted ESO. They take delivery of 1st system for VLT in January. They took the decision a few years ago to go O-O. Very pleased. Have problems very similar to ours. We can visit them in Feb.
- No reaction from ISO-SOC on possible collaboration for a prototype. I will try again in January (Clavel on Holidays, cannot reach Kessler)
- 18/02/97: Eiffel Guru in ESTEC for a presentation. We should plan our next FSODG meeting around this date.

AOB:

- will send agenda for next FSODG meeting early January.
- would like to discuss SIRD (only major issues)

A very merry X-mas and a happy New Year.

Pierre
PS: I will be on holidays from 19/12 to 6/1 included. Cheers

End of Message

Attachment # 3

FIRST - OPTIONAL ORBIT

Libration point orbit around Sun- Earth/Moon L2 point
Halo or Lissajous orbit

distance to Earth	1,500,000 km (L2)
period	180 days
time outside radiation belts	100 %
ground station coverage	9 - 13 h (Perth) 30 m dish for Rosetta
maximum eclipse time	no eclipses
launch window	all year

20 JAN '97 14:55 ESA FIRST PROJECT P.12/14

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20 JAN '97 14:55 ESA FIRST PROJECT

FIRST - OPTIONAL ORBIT

Advantages

Maximum operational time (no restriction due to radiation belt passage)

Minimum radiation dose

No eclipses

Maximum thermal stability (increased pointing accuracy)

Lower telescope temperature

Increased lifetime (cryostat option)

Maximum sky coverage (no earth constraint)

Relatively modest delta V for orbit injection

Disadvantage

Large telecommunications distance (1.7 million km)

Fixed high-gain antenna (store and dump)

Steerable medium/high-gain antenna (S-or X-band)

From: GPILBRAT--EXTERNAL Date and time 96-12-15 15:09:55

Message-Id: <9612151411.AA21083@astro.estec.esa.nl>
To: PESTARIA@profs (Estaria Mr. P.G. 4585 Fb001 PIP Pierre)
Cc: gpilbratt@estsa2.estec.esa.nl
Subject: FIRST post-obs archive
Date: Sun, 15 Dec 1996 15:10:36 +0100
From: "G. Pilbratt, ESA Astrophysics Division" <gpilbrat@astro.estec.esa.nl>

Attachment # 4

Dear Pierre,

Although we ran out of time and energy to discuss this in the SAG meeting my proposal for a working assumption regarding a FIRST post-operations archive is the following:

1. In the design of FINDAS the requirements for the long-term archive period should be taken into account: The "real" requirement is that at any time in the future an astronomer who so wishes to do so should be able to retrieve any FIRST data, and reduce it in order to do astronomy. Since there will be limited or no staff available at the time the system must be user friendly. (At this point it really MUST be !) This is the "Historical Archive", cf. item 4 below.

2. During operations (before "boil-off" or "turn-off" depending on s/c concept) the necessary routines, data reduction strategies etc. will be developed in the course of the "normal work" (primarily att he ICCs, but there will be feed-back from FSC and from users via FSC) and made available via FINDAS. Since we do not intend to deliver "products" but instead will deliver "means" some degree of user-friendliness is required, this should improve with time as knowledge and experience is built up.

3. After "boil-off" (eqv) there must be a consolidation period to finalise the calibration routines (now no more data can be obtained), data reduction strategies etc. This period should be in the planning up-front (ICCs, FSC) also for financial reasons. For ISO this period will be 3.5 years. FIRST is a longer mission, 3+ years, we ought to be in better shape, also because we thought about this already now. Perhaps 2 years (TBC) is reasonable. (This is called the "Active Archive" period for ISO; 3.5 yrs, 9.63 MAU.)

4. After the "Active Archive" period there will the "Historical Archive". It will be proposed to house this in SSD for ISO, no funds from the project required. I propose the same for FIRST.

Regards, G"oran
(this concludes action 6/2)

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G\"oran Pilbratt (\"o TeX convention)
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End of Message

========== REST OF RFC822 HEADER ==========

Received: from astro.estec.esa.nl by vmprofs.estec.esa.nl (IBM VM SMTP V2R2)
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id AA21083; Sun, 15 Dec 1996 15:11:42 +0100

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