

meeting date <i>date de la réunion</i>	16-03-2000	ref./réf.	FIRST/FSC/MOM/0107	page/page	1 / 13
meeting place <i>lieu de la réunion</i>	KUL	chairman <i>président</i>	SV		
minute's date <i>dates de minute</i>	29-03-2000	participants <i>participants</i>	see attached		
subject/objet	<b>FGSSE Mtg #4 MoM</b>		copy/copie		
description/description		action/action		due date/date limite	

NP recalled that JD could not attend the meeting due to activities linked with the end of the ERS-1 operational life.

## **Objective & Agenda**

See SV's VG#1

There were no comments on the proposed agenda

There were no comments on the FGSSE#3 MoM.

## **FGSSE Work plan and schedule**

SV recalled the FGSSE activities schedule up to October in relation with the FSC System activities as presented at the FSC System development K.0. Meeting, see SV's VG#3.

FGSSE activities include:

- issue of IRD v1.0. This is taken care of by the internal review at this meeting and the review on the 28<sup>th</sup> in Garching
- elaboration of the system interfaces design, which is to be an on-going activities of the group to be conducted closely with and baseline together with the FSC system architecture and COM for Oct 2000.
- issue of the FINDAS TS for Oct 2000.

Regarding the FINDAS TS, SV showed what the activities leading to this TS and what the content of the TS should be, see SV's VG#10. It was noted that these activities starting with use cases identification would be led by the FSC System development team, the role of the FGSSE group being mainly to ensure that the FINDAS TS meet FSC, ICCs and MOC (if any) requirements.

Beyond the FGSSE group itself, as already mentioned at the FSC System development K.O. meeting it was recalled that ICCs will need to get actively involved in the identification and definition of use cases related to the FSC System in general and FINDAS in particular. A first meeting was proposed by SV on the 17/04 in ESTEC between FSC and ICCs to get ICCs started on this activity and to prepare for the already planned workshop on use cases by Mid-may. Detailed agenda for this meeting will be sent by the FSC at a later stage.

### **IRD review (draft 0.3 dated 10/03/00):**

#### 1.2 Scope

It was agreed that the requirements regarding the accessibility of ILT/IST data from the FIRST GS operational environment which were proposed to be added to the IRD at the [FGSSE#3] do not fall within the scope of this document. It was proposed to add them instead to the FSC URD (TBC). To be confirmed at March 28 IRD/FSC System URD review meeting.

#### 2.2.3 ICC related information flow:

The information flow from ICC to FSC regarding the status of the scientific validation of instruments observing modes is missing in the IRD and shall be added (SS).

#### 3.1 MOC to FSC interfaces

##### Consolidated TM

The three following requirements:

- It shall be possible for the FSC to detect missing consolidated TM data.
- The consolidated instrument and spacecraft TM data shall include the necessary information for the FSC to be able to associate each instrument science TM data to the context of an observation.
- The consolidated instrument and spacecraft TM data shall include the necessary information for the FSC to be able to associate each instrument science TM data to the context of an observation measurement.

had been removed from the IRD, see [FGSSE#3] on the ground that they were not applicable to MOC but to the on board SW.

Checking with project (AH), SV reported that these requirements did not have any obvious placeholders in the project documentation. It was therefore agreed to put them back into the IRD with the comments that their implementation is not MOC responsibility and with the understanding that they could be forwarded from MOC onto the Satellite via the OIRD document (TBC) referring to the IRD for justification

meeting date 16-03-2000  
date de la réunion

ref/réf FIRST/FSC/MOM/0107

page/page 3

13

PR indicated that HIFI could ask for more than one APID for their science TM data as HIFI is thinking of using the APID to differentiate the data from their different detection systems (TBC). For HIFI, this would be an APID per backend (i.e. one for the High Resolution Spectrometer and one for the Wide band Spectrometer).

NP indicated that as the MOC-FSC communication line will be a leased/dedicated line, MOC is not opposed to push the TM to the FSC instead of FSC pulling them (To be further discussed). That would obviously mean that the FSC has the resources to accept/store the store the data as pushed by MOC.

W.r.t. to the performance requirements in 3.1.1.3, a later discussion (see DDS discussion below) concluded that this requirement could certainly not be met for live TM. It was also noted that this requirement does not cover the ground station – MOC link. ICCs believed that end-to-end TM distribution performance requirements may be relevant in commissioning and PV phase and therefore that this requirement may have to be extended to cover the ground station – MOC link. See action on PR below. NP pointed out that performance requirements on the ground station – MOC link may have significant cost impact.

#### TC history

On ICCs request, it was clarified by NP that the TC history for a given operational period will be available at the same time as the consolidated HK TM covering this period. This is OK with ICCs and is to be captured in the performance requirement section for TC history in the IRD.

#### S/C attitude pointing history.

It was clarified that the ICC will provide the FSC and MOC with the information on misalignment between the S/C attitude pointing reference and their instrument (virtual) apertures. This information will be needed by the FSC to reconstitute the instrument pointing from the S/C pointing information delivered by MOC and by MOC to derive the S/C pointing commanding from the instrument aperture pointing requests included within the observation schedule commanding request.

The ICCs will measure these misalignments using dedicated calibration procedures.

Requirements capturing these information flows have to be added to the IRD.

#### SSO Database

It was clarified that even if MOC is responsible for the SSO database (SSO list and their ephemeris), the request for new SSOs (leading to SSO database update) will come from observers or ICCs via the FSC. This information flow shall also be captured in the IRD.

#### S/C trend analysis data

S/C trend analysis data are not mentioned in the IRD. It was clarified that ICCs would perform S/C trend analysis data directly from the S/C TM using S2K. NP mentioned that the S/C trend analysis facilities at MOC (PAS) is an S2K client.

### 3.3 MOC to ICC@MOC interfaces

It was clarified by ICCs (PR) that considering the mission of ICC@MOC as defined in the scenario document, ICCs are only interested in getting the TM of their own instruments and not all TM.

Ancillary data could be needed at ICC@MOC (PR). This can only be confirmed or otherwise when the role of ICC@MOC will have been further detailed for each ICC. PR proposed for now to put a placeholder in the IRD to capture this possibility.

This is not expected to raise any particular technical issues at least with regard to the MOC/DDS interface.

### 3.4 FSC to MOC Interfaces

#### Instrument On Board SW

The scenario document (5.11.1) states that the FSC will receive any new instrument memory image from ICC and will validate/accept it before handing it over to MOC. This is reflected in IRD 2.2.2 and 3.4.2. For NP it is not clear what the FSC can perform in terms of instrument memory validation 1) any active validation by the FSC will require the availability of a MOC simulator (mini-MOC), S/C simulator and instrument simulator 2) instrument simulator are normally only representative of the instrument primary processor (ICU or DPU) but not of the instrument secondary processors, which are only simulated by stubs. This casts some doubt on the feasibility of any validation by the FSC of new instrument memory images. It remains that the PS will have to accept new instrument memory images before uplink by MOC.

Also it was pointed out that in any case information in addition to the memory image itself will be needed by the FSC to assess the impact of the update on the scientific operation of the instrument (e.g. longer observation time duration) and on the quality of the observation data. Depending on the acceptance process performed by the FSC only this information may be needed by the FSC. This is to be further discussed within the FSC. Reference to this additional information will be added in the IRD.

### 3.5 FSC to ICC Interfaces

#### Consolidated TM data

The performance requirement asking for having consolidated science TM data in the ICC@ICC within 20 minutes the TM being received by MOC raises feasibility issues for live TM, see DDS discussion below. The performance requirement include the consolidation process in MOC which should not be the case, this should only be a requirement on the FSC. The TM consolidation process performance requirement is

meeting date <i>date de la réunion</i>	16-03-2000	ref/réf	FIRST/FSC/MOM/0107	page/page	5	13
---	------------	---------	--------------------	-----------	---	----

already included in the section covering the MOC to FSC interfaces. An action was taken by PR to revisit the (overall) TM distribution performance requirements in time for the IRD review on the 28<sup>th</sup>.

**AI#160300-1: PR to review TM distribution requirements (FGS-IR-3.1.1.3.1 & FGS-IR-3.5.1.3.1).  
Due Date 28/03/00 (IRD review meeting).**

FSC System SW

It was confirmed by PR that the ICCs do not put specific requirements on the FSC System to support the generation of non-AOT observations.

3.6 ICC to MOC interfaces

Instrument procedures and commanding sequences

A discussion started on whether the instrument procedures updates (e.g. update to the instrument activation/de-activations and PCS) should be accepted by the PS before being transferred to MOC. This is TBD with the PS. For now, the IRD assumes this is not the case and that there is a direct flow from ICC to MOC for instrument procedures updates.

## ***System interfaces Design discussion (downlink)***

SV presented the summary of previous discussions on this issue, see SV's VG # 7. Remaining issues identified were:

- commonality of DDS distribution for NRT TM and consolidated TM (see discussion related to DDS presentation below)
- need or not for a direct interface between RTA (S2K based) and the DDS bypassing FINDAS. On this issue PACS (BV) noted that according to the FINDAS evaluation report, FINDAS could support TM distribution in RT and therefore that bypassing FINDAS would not allow much performance gain for NRT TM (TBC). PACS believes that the DDS is probably more a bottleneck than FINDAS.

It was also clarified that the flow between the FINDAS node at the FSC and the FINDAS node at the ICC@MOC should be both way and not only from FSC to ICC@MOC, as e.g. calibration observation and data will also be generated at ICC@MOC (in line with IRD).

It was also clarify (SV + PR), following a question from SS, that no support will be provided to transfer back NRT TM from ICC@MOC to the FSC. If ICC@ICC needs to acquire the TM received at ICC@MOC, that will have to be supported by the ICC itself in a way transparent to the FSC.

DDS presentation by NP:

See NP's VGs

The presentation triggered the following discussions:

Ground Station-MOC link:

Although not directly a DDS issue, NP clarified that (dump & live) TM were planned to be retrieved from the Ground Station to MOC on an APID basis. In the context where more than one instrument is operated in a given OD, this means that one instrument science TM would be received at the MOC as the last TM for this OD, independently of when the observations for this instrument had been scheduled on board. This is not going against any IRD performance requirement as IRD requirements do not cover (so far, see discussion above) the Ground Station- MOC link. However, ICCs have still to think whether this is a problem or not, especially in commissioning and PV. PR saw it as an additional argument to schedule only one instrument / OD in commissioning and PV.

NP, if needed, will look at the feasibility of retrieval of TM from the ground station on a time basis (versus APID basis).

NRT distribution of TM by the DDS:

NP clarified that the DDS is planned to implement only a file-based interface. NRT TM would therefore be distributed as a sequence of files sized to meet the NRT performance requirements of the ICC@MOC (at most one-minute delay at MOC level as per IRD). For NRT TM, the DDS would push these files to the client instead of the client polling the DDS, concept of continuous feed, see NP's VG#5.

All agreed that although it could work, a file-based interface is not ideal to serve NRT TM to the ICC@MOC, as it will significantly lower RT performance. It was pointed out by ICCs that a data stream interface (with TCP/IP protocol) where TM packets could be sent to ICC@MOC, as they become available from the DDS would be much more suitable.

NP restated that a data stream interface was not part of the DDS development as planned and budgeted today and that to add it would have cost impact which would have to be somehow supported. In particular, this would change the way the interface between the MOC internal archive (DAS: MOC archive within the firewall) and the DDS would work. This interface is planned today as a file interface. In addition, NP had some concerns that a data stream interface would introduce uncertainties w.r.t. the number of ICC@MOC IP addresses to be served by the MOC/DDS and beyond to the HW resources needed for the MOC DDS. PR replied that the number of ICC@MOC IP addresses to be served should only be one. Indeed in the situation when RT TM are needed by ICCs, e.g. commissioning, instrument emergency, only one instrument will be active at a given time.

TM consolidation process:

NP clarified that the consolidation process was purely sequential, i.e. that consolidation of TM generated between T and T + DeltaT cannot take place before all TM generated before T have been consolidated. SV pointed to a possible clash with the IRD performance requirement (3.5.1.3) which reads that ICC@ICC

should be able to access (consolidated) TM within 20 minutes (TBC) after reception of the TM by MOC (and ICC@MOC) during commissioning, PV and instrument emergencies. In the case of live TM, the FSC will have access to these TM as consolidated TM only after the dump TM of the previous OD have been consolidated, i.e. after up to 16 hours after these live TM have been received by MOC.

One solution put forward by PR would be for the FSC to ingest in the commissioning phase and in cases of emergency non-consolidated TM in addition to consolidated TM. SV pointed out that this is against the FSC current baseline that the FSC imports TM only once for a given operational period.

Owing to the potential clashes mentioned above between the MOC TM distribution concept and the TM distribution performance requirements from the ICCs, analysis of this issue will need to be pursued actively. In a first step, it was agreed to wait until the 28<sup>th</sup> of April and the result of the action on PR to clarify the ICC TM distribution performance requirements in the IRD before taking further actions.

#### DDS storage:

NP clarified that data can only be stored in the DDS for a limited period of time which will have to be negotiated with the different parties.

*[SV's post meeting comment: that should be captured in the IRD]*

### **System interfaces Design discussion (uplink)**

For lack of time, this discussion was limited to the (partial) presentation of the CUS concept by RH. PACS held an internal meeting on this subject in week 10. The presentation from RH reported on some out come of this meeting (see RH's VGs). The presentation will be continued at the next FGSSE meeting.

RH presented the different levels of abstractions supporting the CUS concept (see RH's VG)

- Observation (AOT or non-AOT) which is defined as a sequence of functional units.
- Functional Unit (equivalent to measurement) which is defined as a sequence of procedures or functions or as a sequence of instrument commands
- Function or Procedures (equivalent to instrument macro-command). A procedure has an internal logic not a function. Functions and procedures can be directly interpreted by instruments, i.e. a function or a procedure will lead to one instrument TC only.
- Instrument commands: lower level of instrument commanding. This level of abstraction will be used mainly for engineering and calibration observations.

From an FSC mission planning, this means that all observations can be seen as sequence of functional units, be AOT or non-AOT observations.

The instrument commanding delivered as part of an observation schedule from FSC to MOC will therefore be an absolute time tag sequence of instrument procedures, functions and instrument commands all having a one-to-one correspondence with instrument TC.

meeting date 16-03-2000  
date de la réunion

ref/réf FIRST/FSC/MOM/0107

page/page 8

13

This concept is agreed by all ICCs.

The concept is to documented in the next issue of the PACS SW URD.

*[SV's post meeting comments: The concept of procedures raises the issue of observation time estimation on ground: the duration of observation implemented on board through procedures can only be estimated on worst case basis, leading potentially to idle time on board]*

*[PR's post meeting comment: I would think the onboard procedures MUST be totally predictable... otherwise you would not know on ground what could happen onboard. Procedures are really a means to 'compress' the amount of information that has to be uplinked; you send up a procedure call to do the expansion into instrument commands onboard in stead of having to send up every individual command up. In the end the 'worst case' duration should be only slightly longer than the 'true duration' because long 'idle times' are not acceptable.]*

## **AOB & Next Meeting**

Next meeting FGGSE will be in ESOC on the 20<sup>th</sup> of April 2000, i.e. the day after the S2K meeting planned in ESOC on the 18<sup>th</sup> and 19<sup>th</sup>.

The use case meeting (FSC/ICC only, see above) is planned on the 17<sup>th</sup> of April 2000 in ESTEC.



meeting date 16-03-2000  
date de la réunion

ref/réf FIRST/FSC/MOM/0107

page/page

9

13

### ***Attendees***

Rik Huygen (KUL)  
Bart Vandenbussche (KUL)  
Nestor Peccia (ESA-ESOC)  
Peter Roelfsema (SRON)  
Sunil Sidher (RAL)  
Stephane Veillat (ESA – FSC)

### ***Cc:***

O. Bauer (MPE)  
J. Brumfit (Aurora – FSC)  
P. Claes (ESA – FSC)  
T.G. Dimbylow (RAL)  
John Dodsworth (ESA – ESOC)  
Pierre Estaria (ESA - FIRST/PLANCK project)  
K. Galloway (Aurora – FSC)  
A. Heras (ESA-FSC)  
S. Lord (IPAC)  
J.J. Mathieu (ESA)  
G. Pilbratt (ESA – FSC)  
J. Riedinger (ESA - FSC)

meeting date 16-03-2000  
date de la réunion

ref/réf FIRST/FSC/MOM/0107

page/page

10

13

**NP's VGs: (to be attached)**

# GENERIC DATA DISPOSITION SYSTEM (DDS)

N. Peccia (TOS-GCM)

16th March 2000



Presentation to FGSSE Group

***FIRST***

TOS-GCM

# Overview

---

- **Presentation will cover the following topics :**
  - Generic DDS Overview
  - On-line Data Delivery
  - Off-line Data Delivery
  - Generation of on-line data files
  - Web Interface
  - Access via leased lines
  - Hardware Configuration



Presentation to FGSSE Group

***FIRST***

TOS-GCM

# Generic DDS

---

- **It supports the I/F to the Science Community (SOC, SDC, PIs, etc.)**
- **Access is configurable**
  - general via public lines
  - authorised users via public and / or leased lines
  - both
- **Three data types are covered:**
  - Requests for on-line data sent by the users to the DDS ( via Web I/F)
  - The on-line data sent by the DDS to the users according to their requests (via FTP to a specified user node using public / leased lines)
  - Off-line full data sets on Raw Data Media (RDM) (i.e. CD-ROM or DVD) sent from the DDS to the users
- **Data is packaged using the CCSDS Panel 2 Standard Formatted Data Unit (SFDU) Concept**



Presentation to FGSE Group  
**FIRST**

TOS-GCM

# DDS On-Line Data Delivery

---

- Access restricted to a list of authorised users / data types
- Data delivered by file transfer (FTP)
- Each transfer is performed as a result of a user request of data
- DDS functions in a client-server mode, with DDS acting as a server
- A single user request shall be able to request
  - a subset of packets from a specified data set (I.e process ID and packet category for TM)
  - a single auxiliary file (e.g. orbit, attitude, TC History, etc.)
  - a catalogue of data
- The DDS response contains
  - an acknowledgement of the request
  - a catalogue information identifying the data supplied
  - the data itself

# DDS On-Line Data Delivery

---

- **Performance issues are mission specific and agreed with Project, SSD and PIs. Examples are :**
  - **delay to receive data from user request reception**
  - **maximum period for on-line availability of data**
  - **maximum number of outstanding requests per user**
- **In the event of invalid on-line data requests or to errors in transferring the on-line data, error messages are reported to the users**
- **In case of transmission failure of on-line data the DDS will try to re-transmit the file a configurable number of times.**
- **An special case of on-line data delivery is the continuous feed of near real time data to the users (file based)**



Presentation to FGSSE Group  
**FIRST**

TOS-GCM

# DDS Off-Line Data Delivery

---

- **Two cases are considered:**
- **Pls Mission**
  - Each Raw Data Media (RDM) contains a configurable integer number of days
  - RDMs are delivered to an authorised distribution list
  - RDMs contains in general the whole set of data
- **Observatory**
  - RDMs are only delivered to authorised users (proprietary period)
  - RDMs are delivered on request (public data)
  - RDMs contain in general different set of data (according to user needs)



Presentation to FGSE Group  
**FIRST**

TOS-GCM



# Generation of on-line Data Files

---

- **On-line data files are generated by extracting data from the Mission Control System (MCS) Data Archiving System (DAS).**
- **DAS is a repository for all MCS data and provides services to allow other MCS components to read from and write to the archive.**
- **DDS accesses the DDS from outside the ESOC Operational LAN**
- **Size and frequency of transfers are mission specific and to be agreed with Project, SSD and Pls.**
- **Data is only extracted if it is consolidated. Consolidation time depends on users needs and has to be agreed.**



Presentation to FGSSE Group  
**FIRST**

TOS-GCM

# WEB Interface

---

- **This I/F is mainly used during routing operations via public lines.**
- **The main functions are :**
  - Define and submit an on-line data request
  - Monitor the status of the user queue requests
  - View catalogue data
- **The DDS catalogue is structured hierarchically by defining Data Item Types (DITs), e.g. TM, Orbit File, TC History, etc., and for each DIT a number of catalogue keywords are defined , on which the user could query that DIT.**
- **Each DIT in the catalogue has a down-loadable configurable flag. If the flag is set, the DIT could be downloaded via the network, otherwise only with RDMs.**



Presentation to FGSSE Group  
**FIRST**

TOS-GCM

# WEB Interface

---

- **The concept of “Shopping Basket” is supported:**
  - user browses the catalogue selecting a number of data items which are then delivered to the user together either on-line or via RDM
- **The concept of “thumbnail data” is supported**
  - user that is not sure of what he wants, can receive a reduced amount of data that allows him to decide whether to request the full set of data
- **Authorisation for access of data includes**
  - the condition on the couple DIT / USER, i.e. not all users are allowed to access the same DITs
  - the proprietary period for individual items (public access after 1 year)



# Access via leased lines

---

- **It is an special case**
- **To be agreed with Project, SSD and PIs**
- **There are several options to address :**
  - automatic file transfer using generic File Transfer System (FTS)
  - FSC / PIs requesting automatically the data
  - FSC / PIs requesting non-automatically the data

# DDS Typical Hardware Configuration

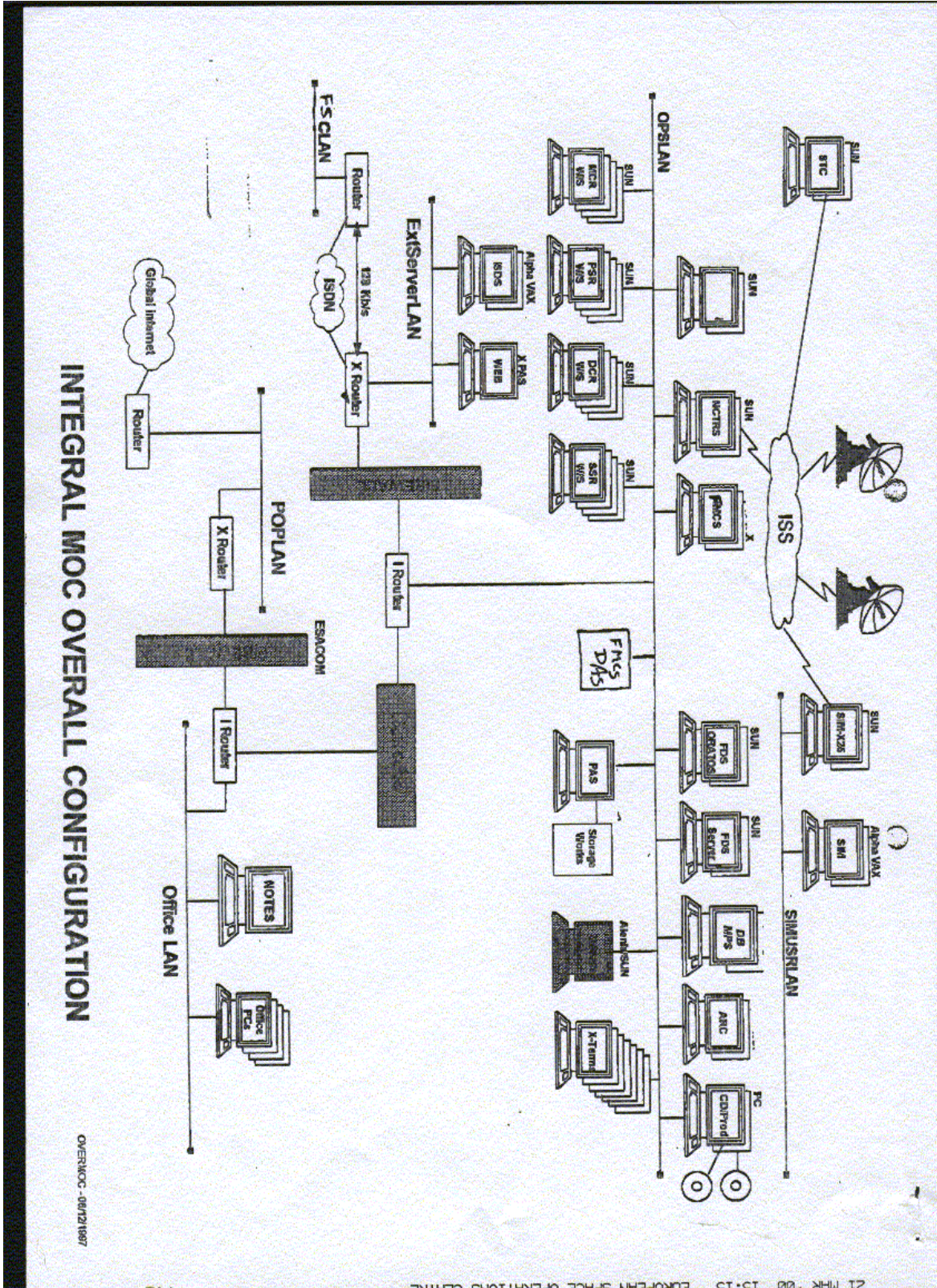
---



Presentation to FGSSE Group

***FIRST***

TOS-GCM

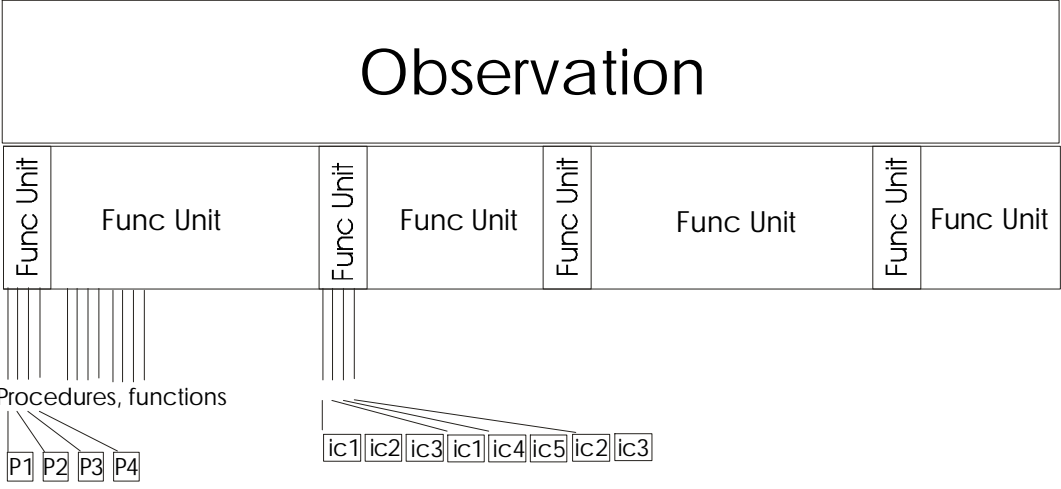


meeting date 16-03-2000  
date de la réunion

ref/réf FIRST/FSC/MOM/0107

page/page 12 / 13

***RH's VGs: (to be attached)***





meeting date 16-03-2000  
date de la réunion

ref/réf FIRST/FSC/MOM/0107

page/page 13 / 13

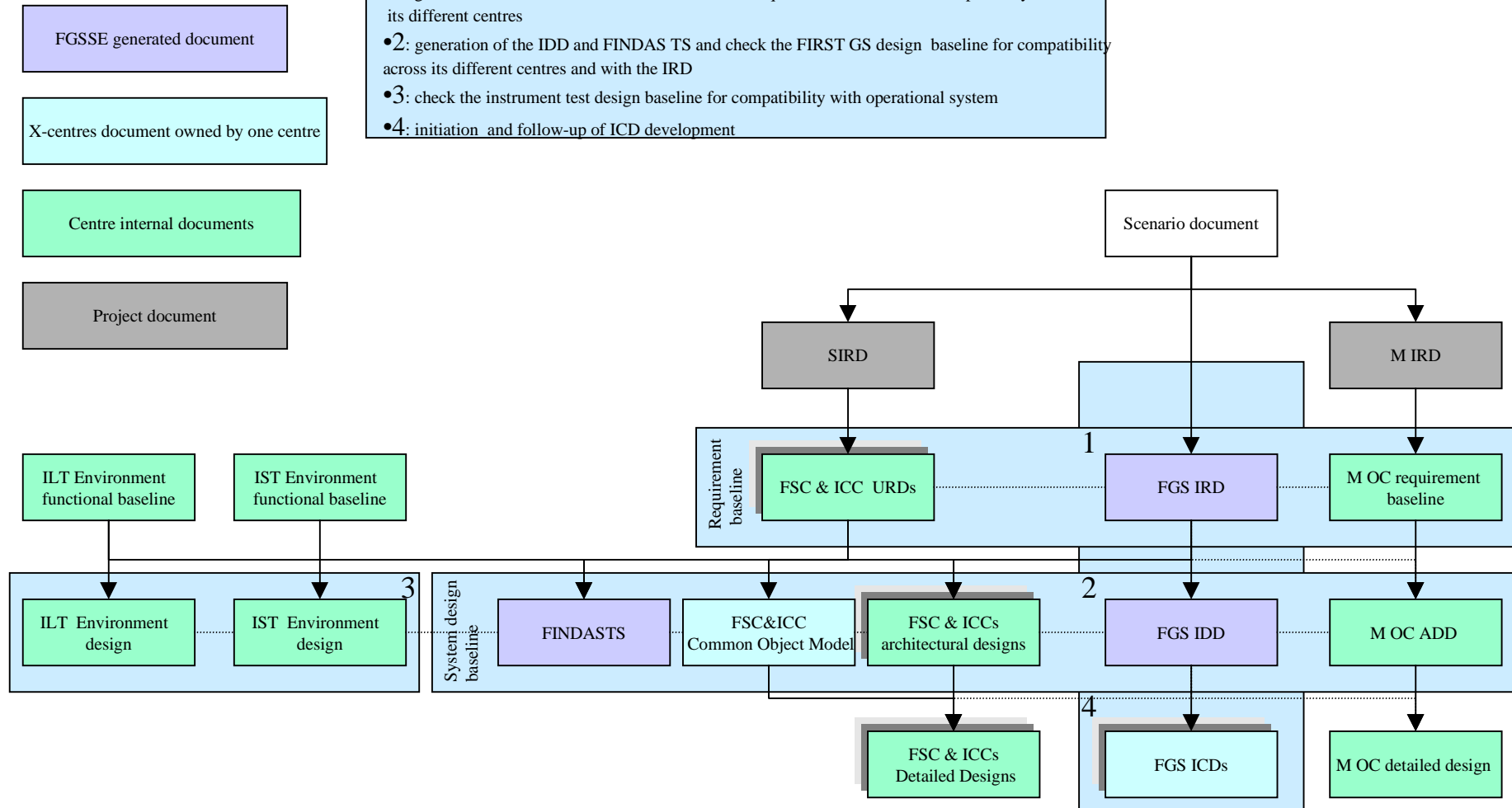
***SV's VGs: (to be attached)***

## Agenda

- Comments on FGSSE Mtg#3 MoM, FGSSE#4 agenda (all) (09h15-09h30)
- Schedule issues regarding FGSSE activities after FSC K.O. meeting (SV + all ) (09h30-10h00)
- **IRD v0.3 internal review: (10h00-12h00) (all):**
  - The IRD was extensively modified following last round of comments, in particular its scope was extended to all information flow vs data flow only.
  - The discussion should allow to
    - confirm scope of documents in view of last updates
    - confirm level of details of requirements
    - identify possible missing interfaces
    - discuss individual requirements
  - As part of the discussion, we shall also make sure that all previous comments have been properly handled.
- Lunch (12h00-13h00)
- **System design discussion (13h00-16h30)**
  - ICC EGSE meeting (14/03) feed-back (???)
  - Downlink issues (13h00-15h30):
    - Recap. from previous discussion (SV) (13h00-13h30)
    - MOC DDS presentation (NP) (13h30-14h00)
    - Discussion/consolidation (all) (14h00-14h45)
- Break (14h45-15h00)
- Uplink issues (15h00-16h30):
  - Introduction (SV) (15h00 – 15h15)
  - CUS presentation (RH) (15h15-15h45)
  - Discussion (all) (15h45-16h30)
- FGSSE actions (status) (16h30-16h45)
- Next meeting(s) (16h45-17h00)
  - Next FGSSE meeting
  - use cases meeting (TBC)

## FGSSE work in context:

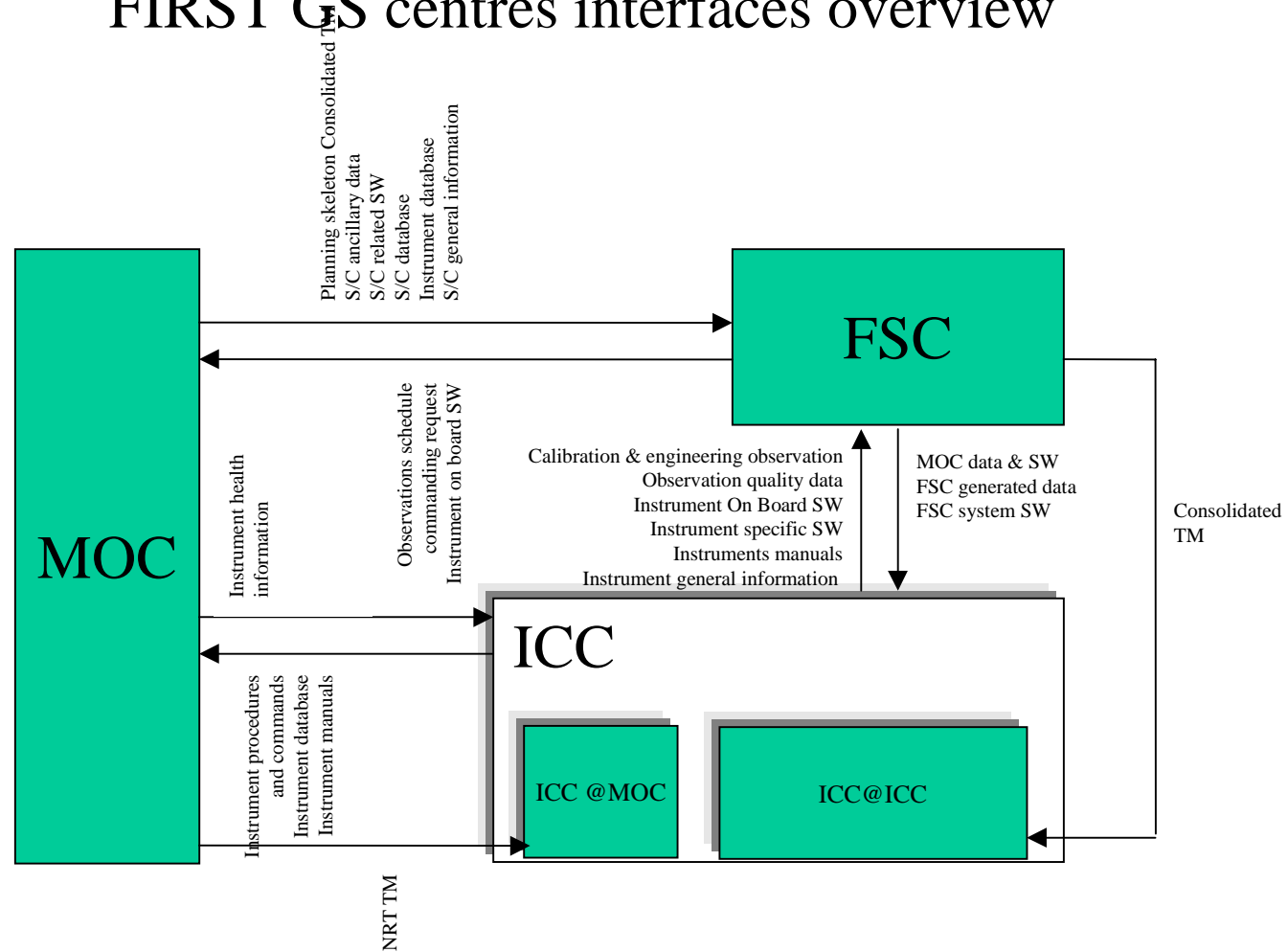
- 1: generation of the IRD and check the FIRST GS requirements baseline for compatibility across its different centres
- 2: generation of the IDD and FINDAS TS and check the FIRST GS design baseline for compatibility across its different centres and with the IRD
- 3: check the instrument test design baseline for compatibility with operational system
- 4: initiation and follow-up of ICD development



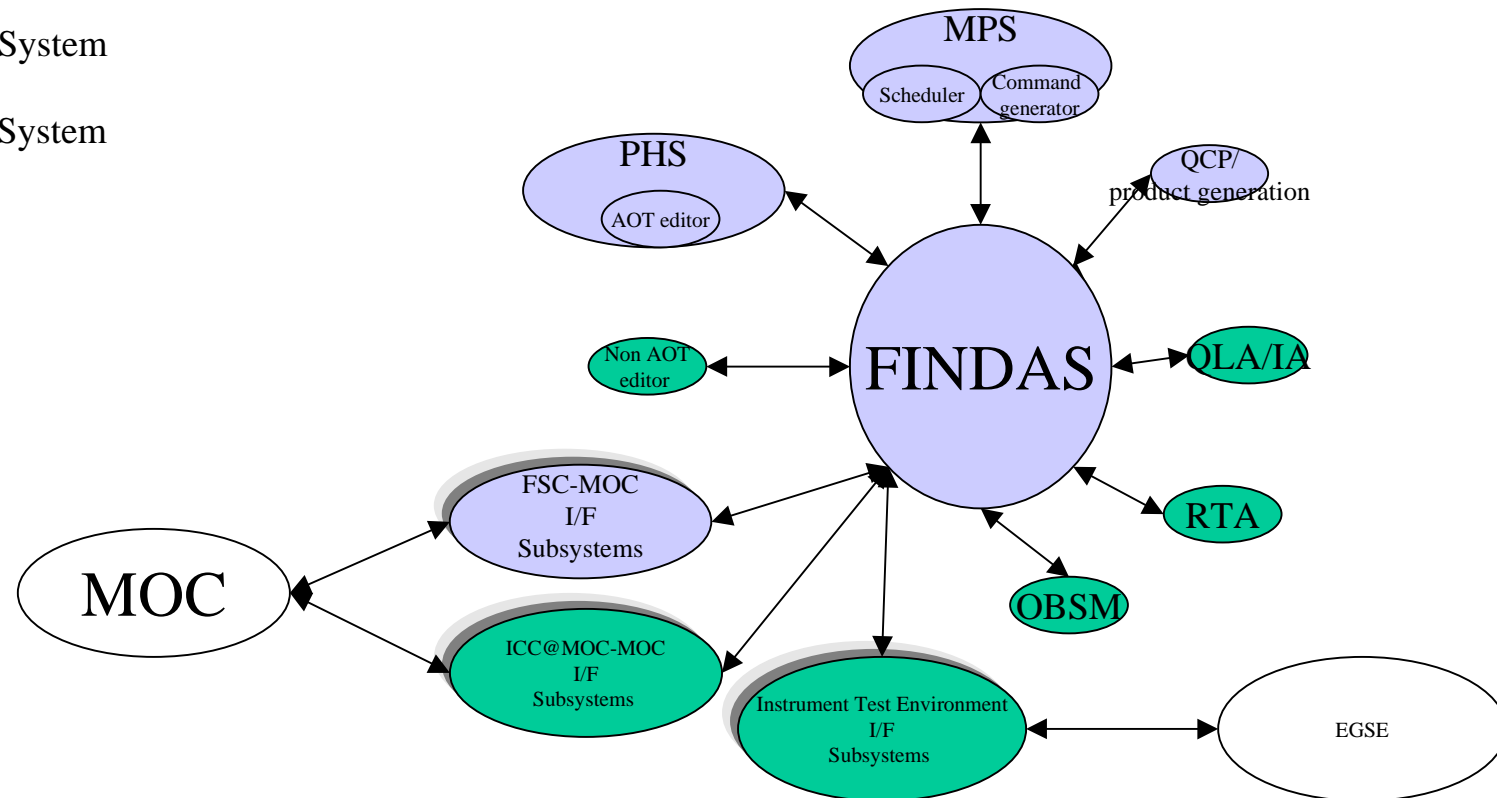
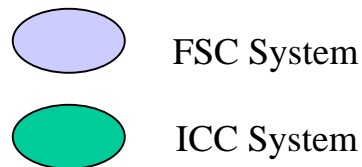
## FSC schedule (from K.O. Meeting)

To reach	End of Elaboration Phase, Part I
by	Oct 2000
the following prerequisites have to be met	<p>Inception Phase outputs</p> <ul style="list-style-type: none"> <li>• Near-term schedule and WPs for Elaboration Phase: Mar 2000</li> <li>• SPMP Issue 1.0 agreed: Mar 2000</li> <li>• ICC URDs: draft Mar 2000, v1.0 Apr 2000</li> <li>• Initially agreed FSC System URD v1.0: Apr 2000</li> <li>• FGS IRD v1.0: Apr 2000</li> <li>• FST agreement on FIRST Operations Scenario Document: Apr 2000</li> </ul>
leading to...	<p>Elaboration phase, Part I outputs</p> <ul style="list-style-type: none"> <li>• First completed iteration of use cases: Jun 2000</li> <li>• FSC system architecture: Oct 2000</li> <li>• FSC/ICC COM: Oct 2000</li> <li>• FINDAS Technical Specification: Oct 2000</li> <li>• Development environment: Oct 2000</li> <li>• Tools confirmation: Oct 2000</li> </ul>
resulting in...	Readiness to start work on FSC v0.1
Proposed steps	<ul style="list-style-type: none"> <li>• FSCDT generates initial COM by end June 2000</li> <li>• Iteration of this model with ICCs through discussion and colocation in the period Jul-Sep 2000</li> </ul>

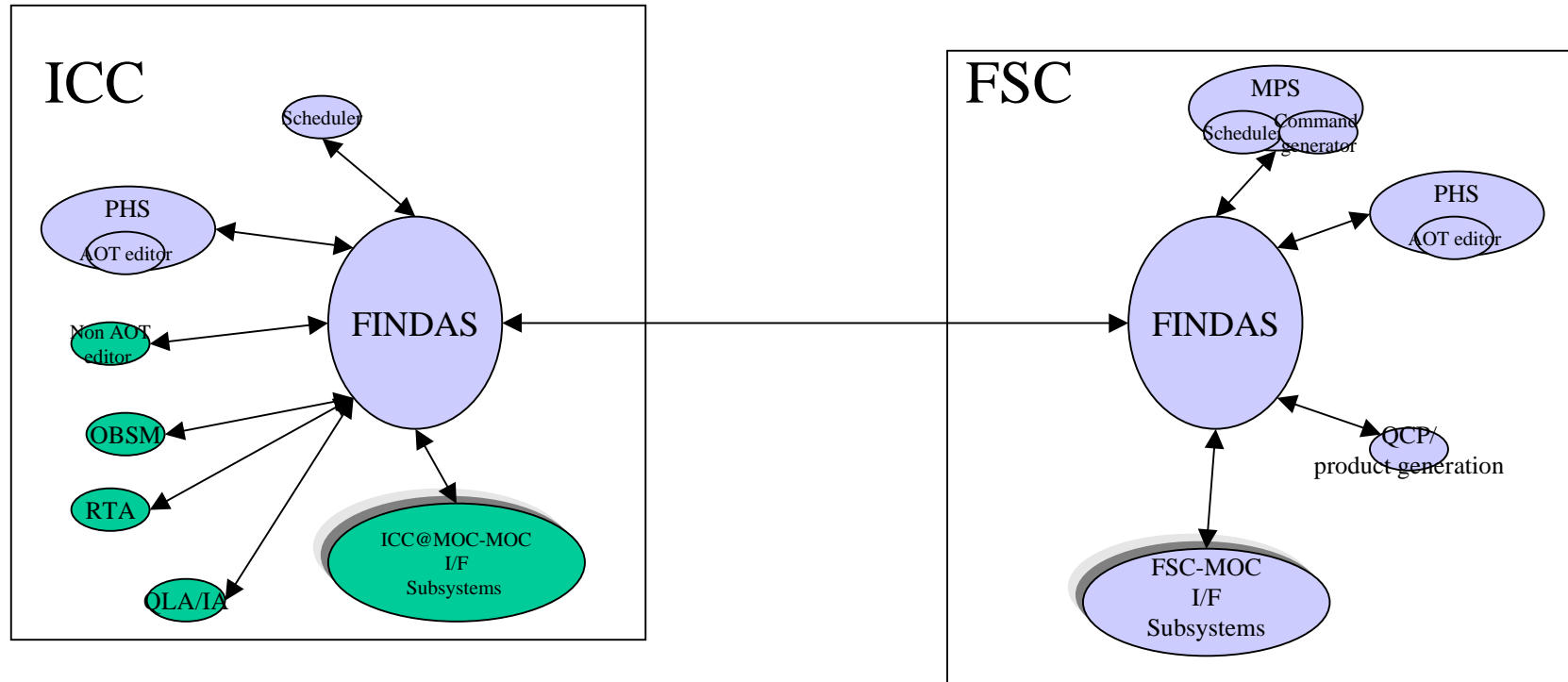
## FIRST GS centres interfaces overview

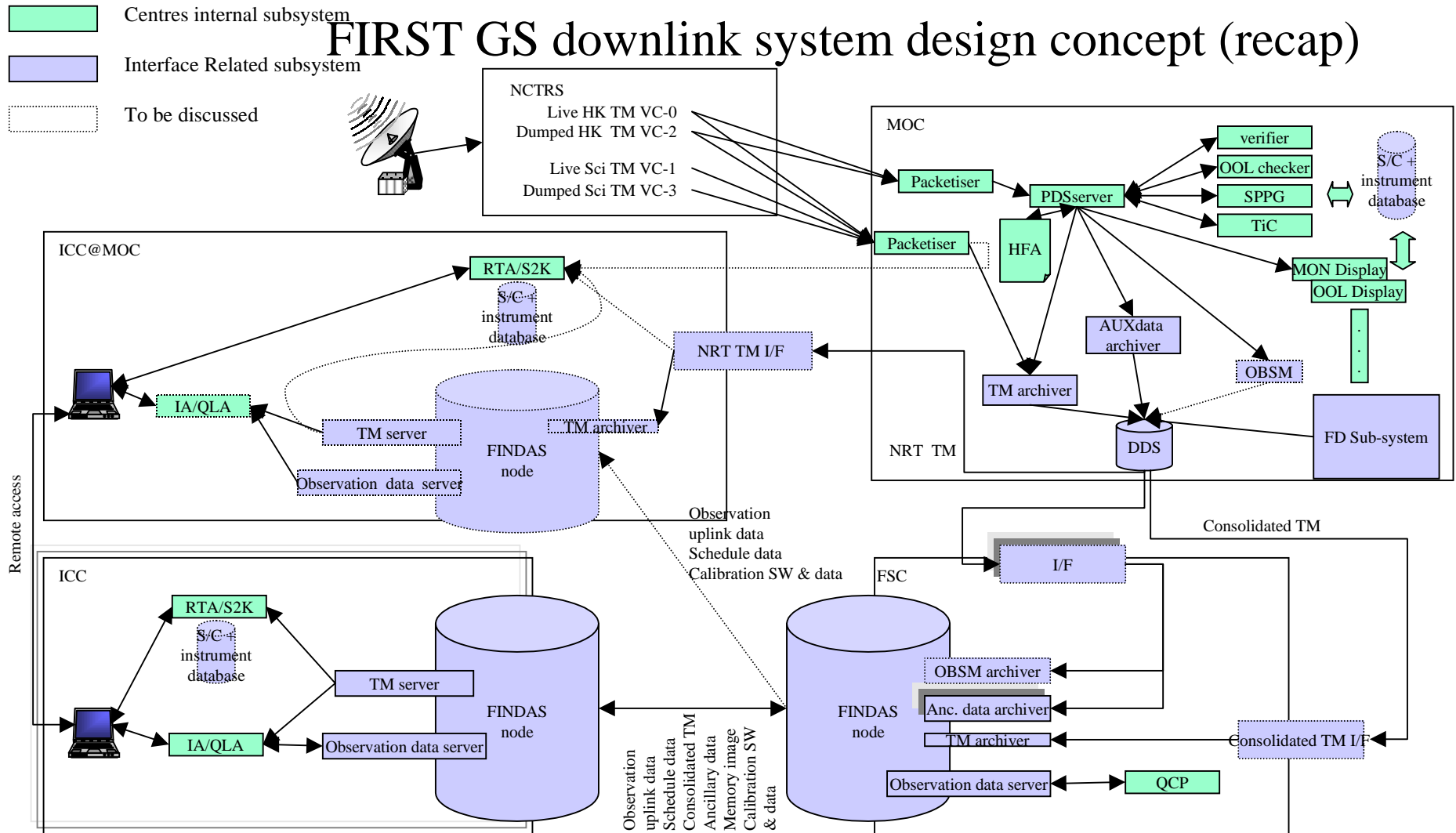


## FGS systems (architectural design view)



## FSC-ICC systems (deployment view)



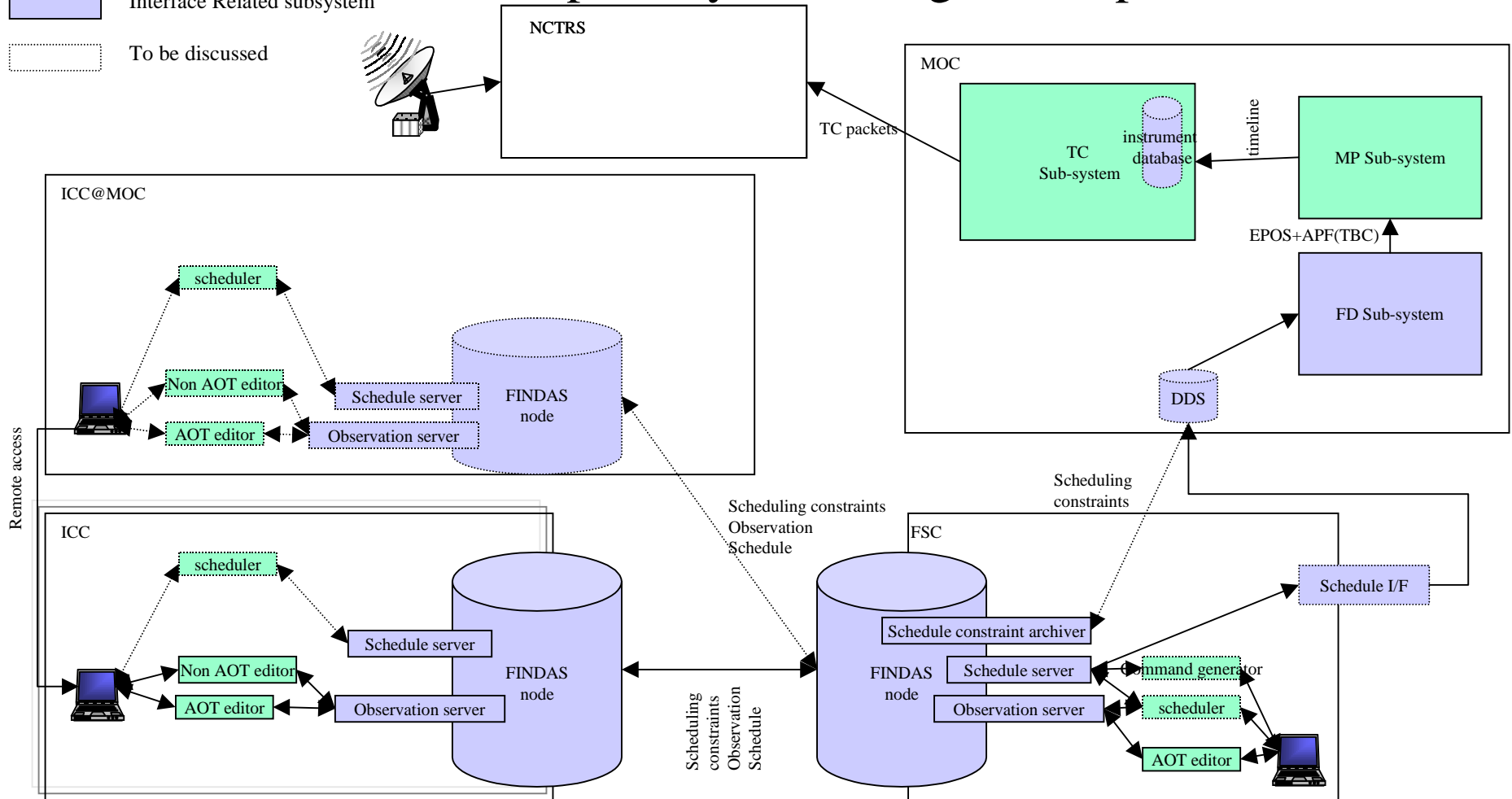






- Centres internal subsystem
- Interface Related subsystem
- To be discussed

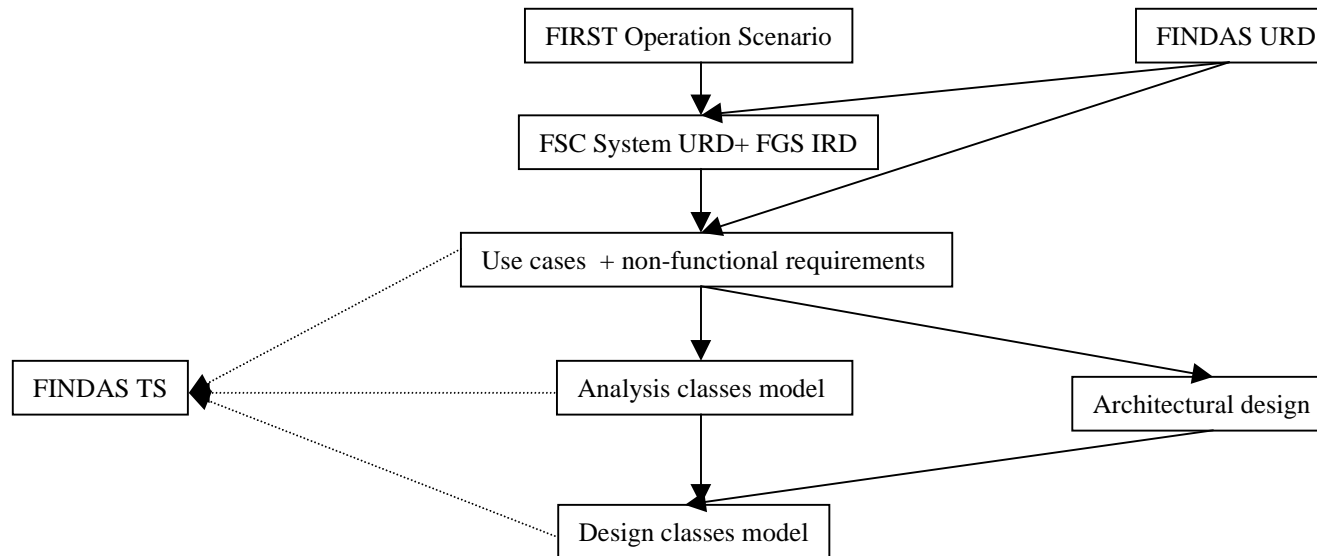
## FIRST Uplink system design concept



## FIRST GS system design (issues)

- Commonality/SW Re-use to be studied:
  - NRT TM I/F subsystem - Consolidated TM I/F Subsystem
  - NRT TM archiver - Consolidated TM archiver
  - ILT/IST Downlink Subsystem - NRT TM I/F + archiver

## FSC System development stages & FINDAS TS



The FINDAS TS will include the use cases, non functional requirements, analysis and design class models relevant to FINDAS.  
 This will constitute the starting point of the FINDAS development