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**FIRST**

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# FIRST Science Operations Definition Group

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## Presentation to the Science Operations Review Panel

**FSODG**

**2 October 1996**



# FIRST

## **Major FIRST Milestones**

*(of relevance to the FSODG work)*

- **FIRST SELECTED CS4 (SUBJECT TO RECONFIRMATION) BY SPC**      **NOV 93**
- **CRYOSTAT & CRYOCOOLER STUDIES COMPLETED**      **JUL 96**
- **RE-USABILITY OF XMM BUS  
(3 OPTIONS: ISO ORBIT, XMM ORBIT, L2-ORBIT)  
STUDY COMPLETED**      **NOV 96**
- **OVERALL COST TO COMPLETION ESTIMATE**      **JAN 97**
- **MISSION REQUIREMENTS DOCUMENT (DRAFT)**      **JAN 97**
- **SCIENCE MANAGEMENT PLAN**      **FEB 97**
- **OPERATIONS REQUIREMENTS FOR INSTRUMENTS (DRAFT)**      **APR 97**
- **MISSION RECONFIRMATION BY SPC**      **JUN 97**
- **ISSUE OF AO**      **SEP 97**
- **PAYLOAD SELECTION BY SPC**      **JUN 98**

## *Introduction - Background*

- **FIRST WELL ABOVE CS4 BUDGET IN NOVEMBER 93**  
    ⇓
- **MAJOR SAVINGS REQUIRED !!**
- **ALL AREAS OF THE MISSION INCLUDING OPERATIONS TO BE CONSIDERED**  
    BUT
- **OVERALL SCIENCE OUTPUT MUST NOT BE COMPROMISED**  
    ⇓
- **EARLY (PRE-PHASE B) DEFINITION OF THE OVERALL MISSION OPERATIONS CONCEPT**
- **TOTAL SYSTEM APPROACH : SATELLITE, OPERATIONS, GROUND SEGMENT, AIV**

## *Introduction - Background*

- FIRST SCIENCE OPERATIONS DEFINITION GROUP (FSODG)  
SET UP END JANUARY 1996

### OBJECTIVE

- DEFINE A SCIENTIFIC OPERATIONS CONCEPT WHICH MINIMISES  
OVERALL COST OF SCIENTIFIC OPERATIONS BUT  
DOES NOT SACRIFICE SCIENCE OUTPUT
- METHOD
- CONSIDER SCOPE OF FIRST SCIENCE OPERATIONS
- CRITICAL REVIEW OF ISO SCIENCE OPERATIONS  
(IMPLEMENTATION AND ACTUAL OPERATIONS)
- MONITORING OF CURRENT DEVELOPMENTS (e.g. XMM, INTEGRAL)
- OTHER RELEVANT EXPERIENCE (e.g. CLUSTER)



# FIRST

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## ***FIRST Science Operations Definition Group - Composition***

▶ <b>BOL - REPRESENTATIVE (RAL)</b>	<b>K. King</b>
▶ <b>HET - REPRESENTATIVE (SRON)</b>	<b>P. Roelfsema</b>
▶ <b>PHOC - REPRESENTATIVE (MPE)</b>	<b>O. Bauer</b>
▶ <b>PROJECT SCIENTIST (ESTEC/SSD)</b>	<b>G. Pilbratt</b>
▶ <b>SCIENCE COMMUNITY REPRESENTATIVE</b>	<b>O. Bauer</b>
▶ <b>FIRST PROJECT</b>	<b>P. Estaria (Chairman)</b>
	<b>H. Schaap (AIV)</b>
▶ <b>ESOC</b>	<b>A. Robson</b>

***Introduction - FSODG - Schedule Milestones***

- ▶ 25.06.96 PRESENTATION to SAG - PRELIMINARY FINDINGS
- ▶ 04.07.96 PRESENTATION TO D/SCI - REVIEW REQUESTED
- ▶ 12.09.96 PRELIMINARY REVIEW - FSODG MEETING #5
- ▶ 02.10.96 FORMAL REVIEW (ESA + SAG + PWG + ISO PIs)
- ▶ 31.10.96 ISSUE 1 MISSION CONCEPT / GROUND SEGMENT DOCUMENT  
(PRELIMINARY COST ESTIMATES)
- ▶ 30.04.97 ISSUE 2 - REFINED COST ESTIMATE
- ▶ 01.06.97 :
  - INSTRUMENT - GROUND SEGMENT INTERFACE DOCUMENT
  - INSTRUMENT DESIGN GUIDELINES
  - GROUND SEGMENT IMPLEMENTATION GUIDELINES
  - IMPACT OF MISSION CONCEPT ON SATELLITE SYSTEM SPECS

## ***Introduction - Background***

### **STATUS**

- FINDINGS PRESENTED TO THE SAG ON 25th JUNE 1996
- FINDINGS PRESENTED TO D/SCI ON 4th JULY 1996
- SAG FEEDBACK HAS BEEN PROCESSED
- PRELIMINARY CONCEPT AVAILABLE

### **MAJOR CONCLUSIONS**

- IMPLEMENTATION AND OPERATIONS RESPONSIBILITIES SHALL BE ALLOCATED TO THE MOST QUALIFIED ENTITIES
- AN INTEGRATED DATA ARCHIVING AND COMMUNICATION SYSTEM RIGOROUSLY CONTROLLED BUT EASILY ACCESSIBLE IS REQUIRED
- ACROSS THE BOARD COMMONALITY IS ESSENTIAL
- SOME MAJOR FUNCTIONS SHOULD BE CENTRALISED

## ***Contents***

- **INTRODUCTION - BACKGROUND**
- **MAIN ASSUMPTIONS**
- **KEY FEATURES**
- **INSTRUMENT DESIGN & TESTING**
- **OPERATIONS SCENARIO**
  - **Network and Archiving System** - **FINDAS**
  - **FIRST Science Centre** - **FSC**
  - **Instrument Control Centre(s)** - **ICC**
  - **Mission Operations Centre** - **MOC**
- **PRELIMINARY COSTING**
- **MAIN OPEN POINTS**
- **CONCLUSIONS**



***Main Assumptions (1)***

- **FIRST IS AN OBSERVATORY-TYPE MISSION (INCLUDING SURVEYS)**
- **SELECTED PAYLOAD WILL HAVE 3 INSTRUMENTS**
- **PI SELECTION TAKES PLACE MID 1998**
- **LAUNCH IN MID-2007**
- **MISSION DURATION IS 3 YEARS (COSTING)**
- **THE MISSION OPERATIONS CENTRE (MOC) IS RESPONSIBLE FOR ALL SATELLITE OPERATIONS INCLUDING EXECUTION OF INSTRUMENT OPERATIONS AND RESPONSIBILITY FOR INSTRUMENTS HEALTH AND SAFETY**
- **TM & TC ACCORDING TO ESA PACKET STANDARDS**
- **3-DAY SPACECRAFT SAFETY / AUTONOMY MODE (INSTRUMENTS SWITCHED OFF)**
- **INSTRUMENT AUTONOMY DURING NON-COVERAGE PERIOD**

### ***Main Assumptions (2)***

- **ONE SINGLE GROUND STATION (IN EUROPE) - ROUTINE PHASE -**
- **ON BOARD DATA STORAGE :**
  - **TELEMETRY**
  - **SCHEDULE**
- **MAX ON-BOARD DATA RATE 68 KBS**
- **MAX DOWN-LINK TM RATE 100 KBS**
- **MAX TC BIT RATE 2 KBS OR 4 KBS**
- **INFRASTRUCTURE-TYPE SOFTWARE USED IN THE MOC**  
(e.g. ORATOS, SCOS)
- **ISO-TYPE ORBIT**
- **NO SCIENCE OPERATIONS DURING ECLIPSE**
- **NO SCIENCE OPERATIONS IN EARTH RADIATION BELT**  
(APPROX. 40.000 KMS)
- **TYPICAL OBSERVATION DURATIONS AS ISO**



## ***Key Features (1)***

- OPTIMUM USE OF THE INSTRUMENT TEAMS' EXPERTISE
- MUST MAXIMISE COMMONALITY ON :
  - INSTRUMENT DESIGN STANDARDS
  - GROUND SEGMENT TO INSTRUMENT INTERFACES
  - INSTRUMENT TESTING AND OPERATIONS
  - SOFTWARE DEVELOPMENT AND STANDARDS
- ONE MISSION OPERATIONS CONTROL CENTRE (MOC) WITH
- ONE INTEGRATED OPERATIONS TEAM





























































































