DOCUMENT

Euclid XXXX Experiment Interface Document - Part B

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Prepared by **Ludovic Duvet**
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1 GENERAL

1.1 Background

The ESA Cosmic Vision Plan objective is to define and implement the future ESA science missions through a competitive process starting from open "Calls for Missions" to the science community and ending by a selection of the missions to be adopted through two down-selection steps. The down-selection decisions involve ESA science advisory structure and require SPC approval. The science return value, the design and technical maturity and the budget are the key mission elements supporting this decision process. For the M-class missions, the selection process is being conducted according to the following schedule:

Assessment Phase in 2008- Aug 2009 (completed)
ESA internal review: Sep – Oct 2009 (completed)
First down-selection of M-class missions to enter the Definition Phase (A/B1): Feb 2010 (Completed)
Second and last down-selection for M1/M2: June 2011
Completion of the Definition Phase (A/B1): by December 2011
Final adoption for the Implementation Phase (B2/C/D/E1): before Feb 2012
Start of the Implementation Phase: by July 2012
Launch: by end 2018

EUCLID is one of the M-class mission candidates selected to enter the Definition Phase (A/B1) which is supposed to last 18 months. The Definition Phase Study (A/B1) is structured in three phases which reflect the decision process. The related work content is tailored to provide the Agency with the relevant timely inputs to make possible the decisions at Science Programme level.

- Phase A1 – Optimization of EUCLID mission;
This Phase shall be completed by October 2010 and include the elaboration of the interface with the experiments. It is foreseen that by the end of this Phase, decision will be made regarding who is providing the science payload instrumentation hardware.

- Phase A2 – Consolidation of EUCLID mission;
This Phase shall be completed by June 2011 and includes the spacecraft design and performance consolidation, the elaboration of the spacecraft development plan and the consolidation of the space segment industrial cost. At the end of this Phase, the objectives to be achieved are:
To finalize the spacecraft design and ensure that the mission objectives can be met. This shall be supported by a detailed modelling of the spacecraft (mechanical, thermal, AOCS, etc) in order to demonstrate the spacecraft compatibility with the science performance requirements and the launcher capability,

To provide programmatic inputs for the spacecraft development in view of the down-selection process i.e. development plan, compatibility with the implementation schedule, development and schedule risk analyses, space segment cost estimate ...

- Phase B1 – Preparation of EUCLID implementation phase.
This Phase will be implemented only if the mission is selected at the end of Phase A. It will be devoted essentially to the preparation of the Implementation Phase (B2/C/D/E1), and shall be completed by December 2011. In particular, a major activity will be the preparation of the bid packages for the subsystem layer procurement.

1.2 Scope

The EID-B of each instrument contains the Instrument Provider response to the technical requirements in part A defining in detail the interface information applicable to the corresponding instrument. Part B will form the sole formal and binding document for all technical and programmatic agreements between the ESA Euclid study team and the Instrument Provider.

1.3 Document concept & architecture

The XXXX instrument EID-B flows down from the Euclid Mission Requirements Document through the Euclid EID-A.
For all EFE (ESA furnished equipments[1], as potential NASA payload contributions) within the XXXX instrument, the XXXX instrument provider generates an IRD (Interface Requirement document), ESA will respond to the IRD with a dedicated ICD (Instrument Control Document) per EFE, with inputs from NASA if applicable. Both IRD and ICDs are respectively under instrument provider and NASA responsibilities (if applicable) but require ESA approval.

General comments for the instrument providers: many TBD have been left in the EID-B since there are TBDs in the corresponding section for the EID-A. However we strongly encourage the instrument provider to insert any important information or comments in the corresponding sections of the EID-B; the EID-A will be then updated accordingly.

1.4 Hardware interface responsibilities

List of all institutes + relevant responsibilities and key personnel.

[1] E.g. Focal plane assembly for NISP.

1.5 Product Tree

To be filled by instrument provider.

2 DOCUMENTS

Following the definitions of the ECSS (European Cooperation for Space Standardization), documents relevant to the Euclid mission are classified as Normative and Informative documents. Normative documents are referenced in the text of the EID-B as specific requirements which call up the section in the specified document. Informative documents are listed for information but are not formally requirements documents.

2.1 Normative references

NR1. Euclid Experiment Interface Document – Part A, Issue 1, rev. 1, 26/04/10
NR2. Margin philosophy for Euclid Definition Study, SRE-pA/2010.028
NR3. ECSS-E-30 Part 1A
NR4. ECSS-E-10-02C

2.2 Informative references

IR1. *****

2.3 Acronyms

CCD: Charge coupled device
CFE: Customer Furnished Equipment
FPA: Focal plane assembly
HK: House keepings
H2-RG: HAWAII 2-RG (HgCdTe Astronomy Wide Area Infrared Imager with 2k2 Resolution, Reference pixels and Guide mode).
MLI: Multi layer insulation
PLM: Payload Module
SCA: Sensor Chip Assembly
SIDECAR: System for Image Digitization, Enhancement, Control And Retrieval.
SVM: Service module
TC: Telecommand
TM: Telemetry

To be filled by instrument provider.

3 INSTRUMENT DESCRIPTION

3.1 Scientific objectives

To be filled by instrument provider.

3.2 Scientific performance Summary

To be filled by instrument provider.

3.3 Instrument description

3.3.1 Functional description

To be filled by instrument provider.

3.3.2 Hardware description

To be filled by instrument provider.

3.3.2.1 Optical design

To be filled by instrument provider.

3.3.2.2 Focal plane assembly

To be filled by instrument provider.

3.3.2.3 Mechanical design

To be filled by instrument provider.

3.3.2.4 Mechanisms

To be filled by instrument provider.
List of all mechanisms

3.3.2.5 Thermal design

To be filled by instrument provider.

3.3.2.6 Electrical architecture

To be filled by instrument provider.
Block diagram for each units and overall block diagram

3.3.2.7 Data handling architecture

To be filled by instrument provider.

3.3.3 On-board-software description

To be filled by instrument provider (processing, storage)

3.3.4 On board calibration

To be filled by instrument provider.

Other sections can be added if applicable

3.3.5 Operation modes description

To be filled by instrument provider.

3.3.6 Instrument datasheet

To be filled by instrument provider.

Summary of the main characteristics of the instrument

Parameter	Units	Value/Description	Remarks

4 INSTRUMENT INTERFACE REQUIREMENTS

4.1 Identification and labelling

4.1.1 Project code

TBD

4.1.2 Unit identification code

TBD

4.1.3 Connector identification code

TBD

4.2 General design requirements

4.2.1 Standard metric system

Drawings, specifications and engineering data use the International System (SI) Metric Standard, with the exceptions allowed in NR3– Table E-3 and 5 . The key and derived units are specified in:

- Dimensions in Millimetres [mm]
- Angles in degrees
- Temperatures in degrees Celsius
- Power / Heat in Watts [W]
- Energy in Joules [J]
- Mass in Kilogram [kg]
- Magnetic Field in Tesla [T]
- Time in seconds [s]
- Electric Current in Ampere [A]
- Amount of substances in moles
- Luminous Intensity in candelas

4.2.2 Lifetime requirements

TBD

4.2.3 Maintainability

TBD

4.2.4 Fault tolerance

TBD

4.3 Co-ordinate system

4.3.1 S/C reference coordinate systems

4.3.1.1 Euclid physical reference frame

The Euclid Physical Reference Frame is defined in NR1, section 4.3.1.1

4.3.1.2 Euclid Optical Reference Frame

The Euclid Optical reference Frame is defined in NR1, section 4.3.1.2

4.3.1.3 XXXX instrument co-ordinate System

To be filled by instrument provider.

4.4 Instrument location and alignment

4.4.1 Instrument location

To be filled by instrument provider (iteration with EID-A will be carried out later on).

4.4.2 Instrument alignment

To be filled by instrument provider (iteration with EID-A will be carried out later on)

4.5 External configuration Drawings

As defined in NR1, section 4.5.

4.6 Size and mass

4.6.1 Mass tolerances

TBD

4.6.2 Centre of gravity Location and tolerances

TBD

4.6.3 Moments of Inertia and tolerances

TBD

4.6.4 Instrument mass breakdown

To be filled by instrument provider.

4.7 Mechanical interfaces

4.7.1 Mechanical interface Control documents

Drawings with dimensions of the different units... (as defined in section 4.5) to be put in appendix but list of the drawings to be provided here.

4.7.2 Payload generated disturbances

To be filled by instrument provider.

4.8 Thermal interfaces

4.8.1 Thermal control definitions and responsibilities

4.8.1.1 Thermal control definitions

The control definitions given in NR1, section 4.8 will be used.

4.8.1.2 Spacecraft thermal control system responsibilities

The spacecraft thermal control system responsibilities defined in NR1, section 4.8.2 will be used.

4.8.2 Thermal interface definition

The thermal interface definition given in NR1, section 4.8.2 will be used.

4.8.3 Thermal interfaces – margins

The thermal interface margins defined in NR1, section 4.8.3 will be used.

4.8.4 Thermal interfaces for units mounted on the EPLM

The thermal interface for units mounted on the EPLM will be as described in NR1, section 4.8.4.1.

4.8.5 Thermal interfaces for units mounted on the SVM

The thermal interface for units mounted on the ESVM will be as described in NR1, section 4.8.5.

4.8.6 Thermal interface requirements

4.8.6.1 In flight temperature limits

Unit	*Operating temperature (Celsius)*		*Switch on temperature (Celsius)*		*Non –operating temperature (Celsius)*	
Unit#1						
Unit#2						

Table 1 Instrument XXXX operating and non-operating temperature limits

4.8.6.2 Thermal schematics

Thermal schematics of the instrument units showing the different thermal links with the spacecraft and the different heat load (in response to table 10 in EIDA)

4.8.7 Temperature stability

To be filled by instrument provider

4.8.8 Temperature monitoring

To be filled by instrument provider

4.9 Optical interfaces

4.9.1 XXXX instrument optical interface

To be filled by instrument provider.

4.9.2 Straylight

To be filled by instrument provider.

4.9.3 Thermal background

To be filled by instrument provider.

4.10 Power

The power margins applied are defined in NR1, section 4.10.

4.10.1 Thermal dissipation in the Euclid payload module

Power dissipation of the units in the Euclid payload module for the different modes of operation.

4.10.2 Thermal dissipation in the Euclid service module

Power dissipation of the units in the Euclid Service module for the different modes of operation.

4.10.3 Power supply- Load on main bus

Overall power supply load on the main bus for the different modes of operations.

4.11 Connectors, harness, grounding, bonding

TBD

4.12 Data handling

4.12.1 Data handling hardware interface

To be filled by instrument provider.

4.12.2 Telemetry

To be filled by instrument provider

4.12.3 Telecommand

To be filled by instrument provider

4.13 Attitude and orbit control/pointing

4.13.1 Definition

The definitions are given in NR1, section 4.13.1

4.13.2 Pointing requirements

APE, AME and RPE will be as defined in NR1, section 4.13.2

4.14 On board hardware/software and autonomy functions

TBD

4.15 EMC

TBD

4.16 Instrument handling

TBD

4.17 Environment requirements

4.17.1 Pressure

TBD

4.17.2 Mechanical environment

Instrument XXXX will be designed to withstand the mechanical environment during all phases of AIV/AIT, qualification and acceptance testing (see TBC) and that produced at launch.

4.17.3 Thermal environment

TBD

4.17.4 Radiation environment

The XXXX instrument will be designed to operate within specifications for the mission duration.

4.17.5 Micrometeorite environment

The XXXX instrument will be designed to operate within specifications for the mission duration.

5 GROUND SUPPORT EQUIPMENT

TBD

6 INTEGRATION, TESTING AND OPERATIONS

TBD

7 PRODUCT ASSURANCE

TBD

8 DEVELOPMENT AND QUALIFICATION

TBD

9 MANAGEMENT, PROGRAMME, SCHEDULE

TBD