

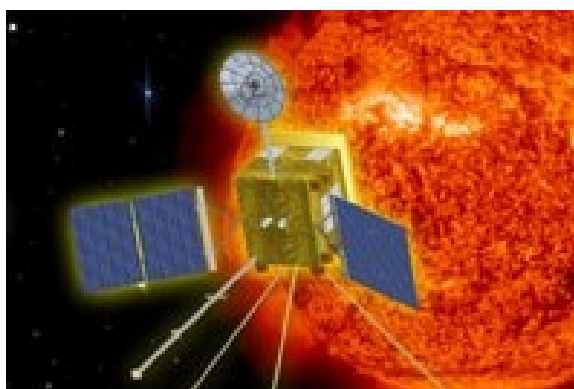


<i>Publication Year</i>	2008
<i>Acceptance in OA</i>	2023-02-09T13:49:24Z
<i>Title</i>	Neutral Solar Wind Detector (NSWD) for Solar Orbiter
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<i>Handle</i>	http://hdl.handle.net/20.500.12386/33332

Management Plan

SCENARIO NSWD (Neutral Solar Wind Detector)

ESA/NASA - Solar Orbiter



prepared by	SCENARIO NSWD TEAM		
approved by	Stefano Orsini, Principal Investigator (INAF- IFSI)		
endorsed by	Enrico Flamini (Agenzia Spaziale Italiana)		
reference	SO-NSW-PL005		
Issue	1	revision	0
date of issue	JANUARY 2008		

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DISTRIBUTION

name	organization
Solar Orbiter Project Office	ESA and related Solar Orbiter Program Science Panel & Industrial working team.

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CHANGE LOG

date	issue	revision	pages	reason for change
January 2008	1	0		1 st Issue

Acronym List

AI&V	Assembly Integration and Verification
CIDL	Configuration Item Data List
ECR	Experiment Change Requests
EIDB	Experiment Interface Document – Part. B
EM	Engineering Model
FM	Flight Model
MRR	Manufacturing Readiness Review
NSWD	Neutral Solar Wind Detector
PA	Product Assurance
PI	Principal Investigator
PMO	Project Management Office
PO	Project Office
QM	Qualification Model
SCENARIO	Solar Corona ENA Imagine Observer
STM	Structural Thermal Model
TRB	Test Review Board
TRR	Test Readiness Review

Applicable Documents

AD1: SOL-EST-IF-0050 “SOLO EID-A”, Version 1 Rev 0, 9 October 2007

SOL-EST-SP-00705, “Solar Orbiter Payload Definition Document”, 3 October 2007

SCI-S/2007/157, “Solar Orbiter Science Management Plan”, 15 October 2007

SCI-SH/2005/100/RGM, “Solar Orbiter Science Requirements Document”, 31 March 2005

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1 Introduction

Objective of this document is to provide a structured approach to the management and development of the Neutral Solar Wind Analyzer (NSWD) SCENARIO project.

The SCENARIO NSWD Management plan defines the basic requirements and overall policies for the project management.

The following objectives are considered both essential and mandatory in the frame of this proposal:

- Clarify roles and responsibilities.
- Provide an effective and appropriate organization.
- Identify activities of planning, reporting and monitoring.
- Provide a clear list of deliverables.

The content of this document has been approved by the Principal Investigator and accepted by the involved Institutes.

2 Instrument Team Organization

2.1 Management Structure

The NSWD SCENARIO instrument will be realized, under ASI contract and general management, with a common Italian effort of four scientific Institutes and one national space firm, namely:

- Istituto di Fisica dello Spazio Interplanetario (IFSI), CNR, Roma (Italy)
- Istituto di Struttura della Materia (ISM), CNR, Roma (Italy)
- Istituto di Fotonica e Nanotecnologie (IFN), CNR, Roma (Italy)
- Dipartimento di Fisica, Università di Roma 2- Tor Vergata, Roma (Italy)
- AMDL Srl, Roma (Italy)

and by the international participation of:

Europe:

- **Istituto di Fisica dello spazio Interplanetario INAF-IFSI, Via Fosso del Cavaliere 100, 00133 Roma, Italy**
Stefano Orsini, Roberto Bruno, Raffaella D'Amicis, Elisabetta De Angelis, Stefano Massetti, Alessandro Mura, Christina Plainaki, Nello Vertolli
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Andrea M. Di Lellis

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Martin Hilchenbach, Eckart Marsch, Joachim Woch
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Lunar & Planetary Laboratory: J. Randy Jokipii, Joe Giacalone, Jozsef Kota
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Mike Gruntman
- **Department of Atmospheric, Oceanic and Space Sciences, The University of Michigan, Space Research Building, Ann Arbor, MI 48109-2143, USA**
Thomas H. Zurbuchen
- **Interplanetary Physics, NASA/Goddard Space Flight Center, Greenbelt, Maryland 20771, USA**
Michael R. Collier

Moreover, Thales Alenia Space Italia - Milan (former Laben) will be involved for the NSWDL qualification activities in support of INAF and AMDL.

The flight instrument and the ground systems will be developed with the responsibilities of the Institutions as listed in Tables 2.1 and 2.2:

Table 2.1

Team Institutions	Role	Delivery Responsibility
INAF-IFSI (supported by AMDL, CNR-IFN, CNR-ISC, UNI RM2)	PI	Sensor Responsibility: design, manufacturing and integration
CESR, Toulouse, France	Co-I	High Voltages
Physikalisches Institut, Bern, Switzerland	Co-I	Ionizing surfaces, Calibration
FMI, Helsinki, Finland	Co-I	Scientific EGSE
Space Research Centre, Warsaw, Poland	Co-I	Low DC/DC power supply, supporting activity for post delivery integration & test

Table 2.2

Institution	TASK
IFSI, Italy	Scientific Coordination
	Integration
	TV tests
	Harness
	System Functional Tests
	Ion optics collimator suppresser
	MCPs detector
AMDL, Italy	Technical Coordination

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	Controller unit (Sequencer) Electronics
	Ultrasonic driver
	Sensor Electronics
	On-board Firmware and Software
	EGSE
	Mechanical design
	Electronics box housing
	Thermal, Radiation analysis
CESR, France	HV power supply boards
CB-PAN, Poland	Power Unit
Thales Alenia Space, Italy	Qualification Tests
ISC, Italy	Ultrasonic core payload design
	Ultrasonic core AIV
	Ultrasonic core testing & qualification
IFN, Italy	Nano gratings manufacturing
	Encoder pattern manufacturing
RMP, Italy	Mechanical analysis
FMI, Finland	EGSE

The involved Institutes are responsible for the design, development, acceptance and qualification of the delivered model units in accordance with the requirements and the specifications defined in the Experiment Interface Document – Part B (EIDB).

The instrument Assembly, Integration and Verification will be done at INAF-IFSI, Rome, Italy.

After the models and unit delivery for the NSW SCENARIO instrument AI&V, the Institutes will guarantee an adequate and effective support during the integration and testing phases and for the whole lifetime foreseen for the delivered item.

2.1.1 General Responsibilities

According to the general philosophy of Multilateral Agreements signed between the lead funding Agencies, the project will be organised according to the following rules.

- ASI acknowledges the well proven experience of the SCENARIO team in space-flight instrumentation development, appropriate to the tasks they plan to undertake, along with commensurate scientific expertise. The responsibilities for the various elements of the SCENARIO project will be assigned by ASI to

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the SCENARIO team, according to the ESA payload and teams selection for the Solar Orbiter mission.

In case of SCENARIO selection:

- ASI shall take the responsibility to establish proper agreements with the other international agencies/organisations mainly contributing for the full achievement of the SCENARIO project goals.
- The ASI Program Manager shall represent the single point formal interface with ESA for the development phase with the Solar Orbiter Payload manager.
- ASI will have the overall responsibility, within the project, for the correct development of the SCENARIO program. As Lead Funding Agency, formal responsibilities for all aspects of the programme shall reside at ASI, whereas specialised technical and managerial areas shall reside at the SCENARIO Institutions, according to the proper responsibilities listed in Table 1.
- ASI will carry final responsibility for all aspects of the correct provision of SCENARIO in compliance with all requirements about project management, science management, H/W procurement, S/W procurement, verification, product assurance, operations, data processing and dissemination, finance, communication and public relations, as mentioned in EID-A.

2.1.2 Structure and Responsibilities

2.1.2.1 ASI Program Team

According to ASI management rules the ASI Program Management Team shall be composed of the following key functions:

- ASI Program Manager

The ASI PM shall:

manage the contract with the SCENARIO SYS Contractor in order to ensure program and contractual objectives

represent ASI towards ESA

be responsible for deliveries toward ESA

- ASI Contract Office

The ASI CO shall support the ASI PM for the management of contractual issues during the program development

- ASI PA Manager

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The ASI PA Manager shall support the ASI PM for the management of PA issues toward ESA and the Contractor.

- ASI System Engineer

The ASI SE shall support the ASI PM for the management of engineering issues toward ESA and the Contractor.

- The MLA Contact Point shall:

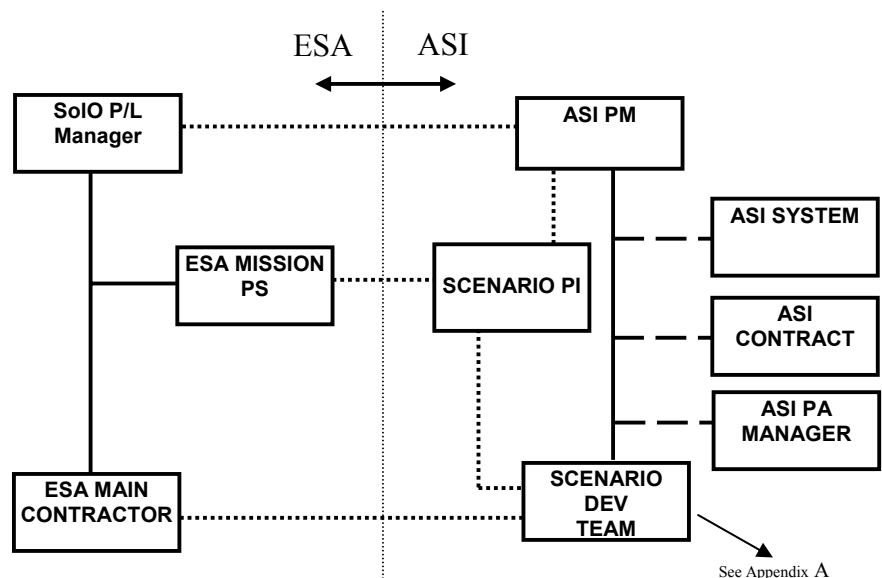
insure all the formal interfaces with ESA as per the MLA.

Support the PI and the PM for all the aspect relevant to the MLA obligations

The following diagram is the framework for the general management of the SCENARIO project.

Figure 1.
General SCENARIO
Management structure.

..... Formal Communications
 ————— Contractual Communications
 Routine Communications
 - - - - - Functional Communications



Hereinafter we provide a description of the project organization, which will support scientific and technical development, and delivery to ASI of SCENARIO. The overall program organization and structure of SCENARIO is included in Appendix A. The diagram will constitute the framework for the management of the SCENARIO project.

Hereinafter we provide a description of the project organization.

2.1.2.2 Principal Investigator (PI) and Team Leaders

The project is under the responsibility of the Principal Investigator (PI), Stefano Orsini (CNR-IFSI), supported by a Project Office (PO, Alessandro Mura). Other team leaders are the PM Andrea M. Di Lellis, the two Project Scientists (Martin Hilchenbach, Ke Chiang Hsieh) and the US team Leading Co-I, Shadia Rifai Habbal.

They take part in the Solar Orbiter Science Working Team, reporting on instrument progress.

2.1.2.3 Hardware Providers

NSWD SCENARIO will be designed and implemented under IFSI responsibility, supported by AMDL s.r.l., by other Italian public institutions (CNR-IFN, CNR-ISC, UNI RM2), and by four international institutions, respectively leaded by P. Wurz (Physikalisches Institut, University of Bern), Iannis Dandouras (CESR, Toulouse, France), Esa Kallio (FMI, Helsinki, Finland), and Andrzej Czechowski (Space Research Centre, Warsaw, Poland). All international partners have been formally endorsed by their own research institutions. Moreover, Thales Alenia Space Italia - Milan (former Laben) will be involved for the NSWD qualification activities in support of INAF and AMDL.

2.1.2.4 Project Manager (PM)

For the development of the activities, the PI will be supported by the NSWD SCENARIO PM, A. M. Di Lellis (AMDL), and the system development team.

The NSWD SCENARIO PM role is to coordinate all technical and programmatic activities, in accordance with the PI directives and in compliance with ESA requirements. He organizes regular project meetings, within the consortium and/or with ESA, covering hardware and software aspects.

He ensures the establishment of an effective management team and a structured planning of the overall activities.

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The PM is supported by a NSWDC SCENARIO system team. The NSWDC SCENARIO system team is located at INAF-IFSI (Rome) and is led by the PM. It includes the following key people:

- System Engineer Manager
- Configuration Manager
- Operations Manager
- Product Assurance (PA) Manager
- Calibration Scientist

The system team will provide the coordination, control and support for all the instrument units.

2.1.2.5 Product Assurance (PA) Manager

The Product Assurance Manager is responsible to co-ordinate the activity of PA for the whole experiment. He has to establish and control an effective PA Plan covering Quality Assurance, Reliability, Safety, Materials, EEE Components, Configuration Management

He is responsible to produce a verification PA plan coherent and compliant with the EID-A requirements.

2.1.2.6 Local Project Management Office (PMO)

At each Institute, a Local Project Management Office (PMO), led by the local PM, will be established.

The local PMO will ensure the unit development coordination in accordance with basic requirements and an effective interface with the PI and the system team. The following key persons compose the PMO:

- Local Program Manager
- System Engineer manager
- AI&V manager
- Product assurance manager
- Project control.

2.1.2.7 Science Team (ST)

The ST will support the PI in defining and monitoring the scientific requirements of the project. It is coordinated by two Project Scientists (Martin Hilchenbach, Ke Chiang Hsieh). The ST members will be:

- Principal Investigator
- Team Leaders

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- Co-Is
- Key-persons

ST members are listed below:

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Instrument Design Support (IDS):

Michael R. Collier, Iannis Dandouras, Mike Gruntman, Esa Kallio, Martin Hilchenbach, Jean-Louis Medale, Ke Chiang Hsieh, Stefano Livi, Eberhard Möbius, Peter Wurz, Harald Kucharek

2.1.3 Communications within Programme

In order to achieve the program milestones and maintain effective interfaces among all the involved parties, the following guidelines shall be followed:

- The relationship between NSW SCENARIO and Solar Orbiter Project Office are managed by the PI and the PM.
- Periodic interface meetings are held in order to verify the delivery milestone achievement in accordance with the agreed requirements and budgets.
- The interface between Solar Orbiter and NSW SCENARIO are defined in the following documents approved by the parties:
 - EID part A
 - EID part B

- Management Plan

In addition to the above documents, the SCENARIO Team has issued the Product Assurance Plan; this document, which will be approved by ESA and the PI, defines the quality assurance rules to be used in the instrument development.

2.1.3.1 Formal Communications

The PI will be the single point of contact between the NSW SCENARIO project and ESA, as shown in figure in Appendix A.

The PI may delegate the NSW SCENARIO PM for all formal communications concerning technical and programmatic aspects.

2.1.3.2 Communications at a working level

On a working level, for all technical aspects of the project, direct interfaces between ESA Project Office and NSW SCENARIO Team may be established.

2.1.3.3 Administrative and Technical Data Exchange

An interface will be established in order to allow transfer of data (documentation, progress reports, technical data, etc.) between NSW SCENARIO and Solar Orbiter Project Office.

The PI has set up a Document Office including archival facilities and software systems suitable for electronic transfer.

A central set of all project documents will be filed at PM Institute.

All the documents will be numbered and referenced adopting unique identifiers for document categories and project level. The procedure is detailed in section 5.

The electronic archive will be available via the Web pages (<http://scenario.artov.rm.cnr.it>).

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3 Project Phasing and Planning Control

3.1 Project Control Objectives

The compliance of technical and programmatic activities of each unit of the NSW SCENARIO instrument to the identified requirements and specifications will be assessed between the PM system team and the Local Project Offices through:

- regular progress reporting,
- periodical progress meetings.

The scientific objectives will be monitored and reviewed by the NSW SCENARIO Science Team within the context of regular meetings.

3.2 Instrument Baseline Schedule

The NSW SCENARIO program milestones are the following:

PHASE	OBJECTIVE	START EVENT	END EVENT
A	Design phase	Proposal Submission	AO Selection (Oct 2008)
B	Development Model, testing & Documentation	AO Selection (Oct 2008)	Pre_PDR - Sci-ICD, MM, TM
C	Development, test and delivery of EM/STM	Pre-PDR	PDR
D	Payload I/F simulator	PDR	TBD
D	Development, test and delivery of QM	TBD	CDR
D	Development, test and delivery of FM	CDR	2009
E	Post-delivery support	Launch on	

Table 4. NSW SCENARIO program milestones.

3.3 Project Reporting

3.3.1 Internal Project Reporting

Each Institute involved in the SCENARIO project will submit to the PM a monthly report on the current status of each activity. The reports will be the input for the progress report referred in the following chapter.

The SCENARIO PM will submit to ASI the monthly progress reports.

3.3.2 Reporting to ESA

A periodical progress report will be released to the ESA PO and ASI within the 5th of each month. The following activities will be reported:

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- Overall summary, covering scientific and technical performance, status of design changes and overall progress status
- Design Development and Verification status, covering status of design definition and verification of interfaces, test and calibration, GSE, operations
- Product Assurance status (PA)
- Programmatic status, including schedule and milestone reports
- Science Performance status
- Problem areas and corrective actions

The following documents will be attached:

- System master plan updated in accordance with the progress reached at the end of the month
- Non conformance status list

3.3.3 Instrument Progress Meetings

Regular Instrument Progress Meetings will be held between the PI, the system team and the institutes with the objective to assess the activity status.

Interface meetings with ESA PO will be held in order to review and manage the common areas of interest.

When necessary, meetings on specific topics may be held involving each time the relevant key people and Institutes.

3.3.4 Instrument Schedule Control and Reporting

The schedule of the project will be kept updated and notified to ESA PO and ASI with the periodic Progress Reports.

Deviation and changes to the agreed baseline schedule are subject to a formal Experiment Change Request (ECR) procedure.

3.3.5 Critical Path Analysis and Schedule Monitoring

The PMO will implement an active schedule control. Deviations and changes, including their schedule impact, will be reported and analyzed for necessary recovery actions.

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3.4 Instrument Breakdown Structures

3.4.1 Product Tree

The purpose of the NSW SCENARIO Product Tree is to provide a structured organization of all activities, define the title and the id number of each task. It is the framework for the management of the project.

The following levels of details have been identified:

LEVEL	I.D.	TITLE
LEVEL 0	INSTRUMENT	SCENARIO
LEVEL 1	SYSTEM	SENSOR CU

Table 5.

3.4.2 Work Breakdown Structure

A Work Breakdown Structure is provided in Appendix B.

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4 Reviews

4.1 Support to Mission Reviews

The PI will support the Mission Reviews with his scientific and technical team.

The PI will provide the Review Data Packages in due time and in accordance with dedicated procedures.

4.1.1 Internal Reviews

The following internal design review will be held:

Manufacturing Readiness Review (MRR) is the review where the manufacturing documentation of each deliverable item is presented by each subsystem to the PI and the PM Team. Objective of the review is to achieve the PI authorization to start manufacturing activities.

Test Readiness Review (TRR) is the review where each deliverable item, acceptance and qualification test procedure are presented by each subsystem to the PI and the PM Team for acceptance. Objective of the review is to achieve the PI authorization to start the acceptance or qualification tests.

Test Review Board (TRB) is the review where the acceptance or qualification test results, for each deliverable item, are presented to the PI and the PM Team. Objective of the review is to achieve the PI preliminary acceptance and the consent to shipment for AI&V.

4.1.2 Instrument Reviews

This section shows the major reviews associated with each phase as defined in the EID-A, par. 7.5.2.3.

Instrument Review	GS	Programme Review
Co-signature of EID-B Iss.1		Signature of B/C/D Contract
ISRR	GSRqR	SRR - System Requirements Review
IPDR	GSDR	PDR - Preliminary Design Review
STM /EM Acceptance	N/A	Start of STM / EM campaign Verification of STM / EM Build Standard
ICDR	GSIR	CDR - Critical Design Review
IQR		QR - Qualification Review Verification of FM Qual Standard
FM Acceptance		Start of FM campaign
IFAR	GSRR	FAR - Flight Acceptance Review
Table 6. Instrument Reviews.		

5 Configuration Management

Special attention will be paid by all the involved Institutes in the deliverable items configuration control.

Each item will have its own configuration control document reporting the applicable documents together with the relevant non conformance and request for waiver.

The item configuration control documents will be continuously updated and formally issued for the envisaged program review: MRR, TRR, TRB etc. The objective is to check that the instrument design is capable to achieve the science objectives and complies with requirements.

The PI will appoint a configuration control manager, who will be responsible for planning and organising the project configuration control.

5.1 Configuration Items Data List (CIDL)

For each Deliverable Item a CIDL will be issued. This CIDL is composed of:

- List of applicable documents,
- List of drawings,
- List of project documents,
- List of NCR,
- Configuration File of the Deliverable Item.

This list, updated for each review, becomes the current configuration status.

CIDL will be prepared and submitted for formal project reviews and included in the Acceptance Data Packages for qualification and flight hardware, software and GSE.

5.2 Documentation control and approval

Documents that define the instrument and are submitted to control are specifications, planning and reporting documents, drawings and the change notices.

According to the EIDA, approval is required for the following documents:

- EID-B
- Engineering Plan
- User Manual
- Database
- Declared Material List
- Declared Mechanical Parts list
- Declared Process List

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- Single Point Failure List
- Preliminary Hazard Analysis and Residual
- Product Assurance Plan
- Management Plan

All verification documents including design analyses and test reports shall make reference to the current configuration status of the design being evaluated.

Each consortium group will maintain a list of documents and drawings related to its items and will be responsible for communicating changes, revisions etc.

5.3 Documentation referencing system

5.3.1 Document numbering

Document shall be numbered as follows:

SO-NSW-mm-nnn

Where:

SO identifies the mission

NSW identifies the project

mm identifies the type of the document :

CP	Change Proposal
CR	Change Request
CS	Configuration Status List
DC	Document Change Notice
DP	Data Package
DS	Design Specification
DV	Development and Verification Plan
DW	Drawing/Diagram
EID	EID - Experiment Interface Document
HM	Hardware/Software Matrix
HO	Handout/Presentation
ICD	Interface Specification / ICD
LI	List (materials, components, parts, processes)
MN	Minutes of Meeting

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NC	Non-Conformance Report
PA	Product Assurance and Safety Requirements
PL	Plan
PO	Proposal
PR	Procedure
PT	Product Tree
RD	Request for Deviation
RP	Report
RS	Requirement Specifications
RW	Request for Waiver
SC	Schedule
SS	Scientific Specifications
SW	Statement of work
TN	Technical Note
TP	Test Plan
TP	Test Procedure
TR	Test Reports
TS	Test Specification
VP	Verification Plan
VR	Verification Report
WB	Work Breakdown Structure

nnn is a 3 digit decimal base progress number

File name coding string will contain a concatenation of the following fields:

<field 1> SO-NSW-mm-nnn

<field 2> xx-yy

<field 3> Free descriptive text

where:

- <field 1>: is the doc name according with the above established nomenclature
- xx: is the version number, being 00 reserved for all the draft issues of the file related document
- yy: is the revision number.
- <field 1>: is a text description of the content of the file, e.g. "Engineering Plan"

6 Deliverable Items

6.1 Spacecraft Deliverables

The SCENARIO model philosophy is defined in the following table.

ITEM/TYPE	STRUCTURAL. MODEL	ENGINEERING MODEL	QUALIFICATION MODEL	FLIGHT MODEL
DETECTOR MODULE; SCENARIO	ONE MODULE FOR EACH SYSTEM. FLIGHT MODEL FULLY REPRESENTATIVE IN TERM OF: MECHANICAL DESIGN, MASS, THERMAL & CENTER OF GRAVITY, ALL THE OTHERS ARE DUMMY	ONE MODULE FOR EACH SYSTEM FULLY REPRESENTATIVE FROM ELECTRICAL AND S/W P.O.V. BEFORE THE DELIVERY TO INSTRUMENT AI&V.	ONE MODULE FOR EACH SYSTEM FULLY QUALIFIED BEFORE THE DELIVERY TO INSTRUMENT AI&V. DUMMY FOR ALL THE OTHER MODULES. WITH SSC "B" OR "C" COMPONENTS	TESTED AT ACCEPTANCE LEVEL BEFORE DELIVERY TO INSTRUMENT AI&V
CONTROL MODULE SENSOR CU	BOTH REDUNDANCIES, FLIGHT MODEL FULLY REPRESENTATIVE IN TERM OF: MECHANICAL DESIGN, MASS, THERMAL & CENTER OF GRAVITY.	ONE REDUNDANCY ONLY, FULLY REPRESENTATIVE FROM ELECTRICAL AND S/W P.O.V. FUNCTIONALLY TESTED BEFORE DELIVERY TO INSTRUMENT AI&V	ONE REDUNDANCY ONLY, FLIGHT MODEL FULLY REPRESENTATIVE WITH SSC "B" OR "C" COMPONENTS. QUALIFIED BEFORE DELIVERY TO INSTRUMENT AI&V	TESTED AT ACCEPTANCE LEVEL AND DURATION BEFORE DELIVERY TO INSTRUMENT AI&V
NSWD AI&V ACTIVITIES	AI&V AND VIBRATION TESTS	INTEGRATION AND FUNCTIONAL CHECK BEFORE DELIVERY TO ESTEC	AI&V, SCIENCE TESTS AND ENVIRONMENTAL TESTS (TBC)	AI&V, ACCEPTANCE TESTS ENVIRONMENTAL TESTS (TBC), CALIBRATION
SOLAR ORBITER AI&V ACTIVITIES	INTEGRATION ON STM SPACECRAFT FOR MECHANICAL & THERMAL TESTS	INTEGRATION ON EM SPACECRAFT INSTRUMENT FUNCTIONAL TEST	IS NOT A DELIVERABLE ITEM. IT IS KEPT AS FLIGHT SPARE	INTEGRATION ON FLIGHT SPACECRAFT AND FLIGHT CAMPAIGN
Table 7. NSWDC SCENARIO model philosophy				

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This model philosophy has been adopted, in order to ensure the following goal achievement:

- Early mechanical qualification at instrument and satellite level via the Instrument STM.
- Spacecraft full functional verification via the EM boxes and detectors simulator.
- End to end test execution on flight fully representative hardware via the Instrument EM.
- Detectors modules full qualification before flight modules integration via the QM.
- Pre-calibration activities on Qualification Model.

6.1.1 Mathematical Models

The Development Model, already developed for all the sensor heads, demonstrative of the instrument technologies and the adopted design solutions, will be realized under sensor team responsibility and put under testing from the middle of the preliminary design phase.

The outcomes from this activity will be transferred into C/D phases for the development of the Engineering Model (EM). The test activities on the DM will continue, thus providing useful input for the detailed phase C/D design of the experiment.

6.1.2 Instrument Models

The EM will be flight representative for the following areas:

- Physical Parameters
- Electrical
- EMC
- Harness
- On Board S/W
- EGSE
- Mechanical Structure

The EM shall have electrical and mechanical interfaces fully flight representative. Moreover, the electrical functionality shall be guaranteed. In other words, the instrument shall be able to execute TLC, generate telemetry data, and monitor internal activities. The digital electronics shall be able to switch on and off all the subsystems and shall be capable of collecting data from the detectors and housekeeping information and deliver it to the S/C DPU. All the mechanisms shall be representative from electrical and EMC point of view, even though their mechanical representativeness could be limited.

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The Structural Model is considered essential for the characterization for the thermal and structural p.o.v.

The EM is being assembled in accordance with the design. It will be compliant with all the requirements of BepiColombo mission and it will be delivered for the CDR review.

The aims of the QM program will be:

- to perform Qualification Test Certification;
- to be a fully Ground representative copy of the FM during the whole Solar Orbiter Mission.

It is not intended to be delivered, but it will represent a flight spare model. This model is being assembled in accordance with the design. The FM hardware and software will be compliant with all the requirements of the Solar Orbiter mission.

6.1.2.1 Instrument Documentation

The SCENARIO PI will maintain all relevant interface documents throughout the project lifetime. In particular the following documents will be provided in accordance with the Solar Orbiter EID-A:

Document	ISRR	IPDR	EM/STM	ICDR	IQR	FM	IFAR	Type
Engineering								
Design Report	Iss 1	Iss 2	Iss 3	Iss 4	(1)	(1)	(1)	R
Technical Notes	(2)	(2)	(2)	(2)	(2)	(2)	(2)	R
Test Reports		(3)	(3)	(3)	(3)	(3)	(3)	R
On-Board S/W	URD	SRD	ADD/DDD	Transfer Docs				R
EID-B	Iss 2	Iss 3	Iss 4	Iss 5	(1)	Iss 6	(1)	A
Engineering Plan	Iss 2	Iss 3	Iss 4	Iss 5	(1)	Iss 6	(1)	A
End Item data P.			EM / STM			FM		
Configuration								
System Spec.	Iss 1	(1)	(1)	(1)	(1)	(1)	(1)	R
CIDL	Iss 1	Iss 2	Iss 3	Iss 4	(2)	(2)	(2)	R
Scientific								
SPR.	Iss 1	Iss 2	Iss 3	Iss 4	Iss 5	Iss 6	(1)	R
Operations								
User Manual		DRAFT	Iss 1	Iss. 2		Issue 3	Issue 4	A
Database		Iss 2	Iss 3	Iss 4	(2)	(2)	(2)	A
Product Assurance								
CIL	Part of progress report							R
DML	Iss 1	Iss 2	Iss 3					A
DMPL	Iss 1	Iss 2	Iss 3					A
DPL	Iss 1	Iss 2	Iss 3					A
DCL	Iss 1	Iss 2	Iss 3	Iss 4				R
FMECA	Iss 1	Iss 2	Iss 3	Iss 4				R
SPF	Iss 1	Iss 2	Iss 3	Iss 4				A

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RA		Iss 1	(1)	(1)	(1)	(1)	(1)	R
WCA		Iss 1	(1)	(1)	(1)	(1)	(1)	R
HA		Iss 1	Iss 2	Iss 3	Iss 4			A
HWSW	Iss 1	Iss 2	Iss 3	Iss 4				R
PA Plan	Iss 1	(1)	(1)	(1)	(1)			A
Programmatic								
Mgt Plan	Iss 2	(1)	(1)	(1)	(1)	(1)	(1)	A
Fin Plan	Iss 2	Iss 3	Iss 4	Iss 5	(1)	(1)	(1)	R
Table 8. Instrument documentation.								

Notes:

- (1) updates as required
- (2) as required to support specific topics
- (3) as required for qualification and acceptance

The documentation is classified in the column "TYPE" according the following logic:

- A are those documents requiring an ESA formal Approval
- R are those documents submitted to ESA for Review

Abbreviations:

CIL	Critical Item List
DML	Declared Material List
DMPL	Declared Mechanical Parts list
DPL	Declared Process List
DCL	Declared Component List
FMECA	Failure Mode Effect
SPF	Single Point Failure List
RA	Reliability Assessments
WCA	Worst Case Analysis
HA	Preliminary Hazard Analysis and Residual
HWSW	Hardware/Software Interaction Analysis

6.1.2.2 Instrument Hardware

Hardware deliverables are listed in par. 7.2.

6.1.2.3 On-Board Software

The instrument on-board software will be compliant with the ESA software standard PSS-05-0 and delivered together with the corresponding instrument models.

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6.1.2.4 Ground Support Equipment

GSE will be delivered as part of the instrument model.

6.1.3 Deliverables to Ground Segment

TBW

6.1.4 Deliverables to Operational Ground Segment

TBW

6.1.5 Deliverables to Science Ground Segment

TBW

6.1.6 Review Deliverables

The Review Data Packages are detailed in chapter 6.1.2.1.

7 Project Schedules

7.1 Instrument Project Schedule

A detailed schedule of the tasks to be performed for the implementation of the project, deliveries and reviews are provided as APPENDIX C.

The schedule includes:

- The nominal duration for each task according to links and constraints of the project and the required completion dates.
- Identification of deliverable items and dates.

7.2 Schedule of PI Deliveries

As defined in the EID-A, par. 7.8.3, the following hardware and software shall be deliverable items:

- Hardware
 - Structural/Thermal Model (STM)
 - Electrical Qualification Model (EQM)
 - Flight Model (FM)
 - Flight Spare (FS)
 - EGSE
- Software
 - Flight EGSE
 - Sequences required to perform experiment bench level ESA acceptance tests
 - Sequences required for system level tests
 - Auxiliary software for investigations and diagnostics on GIADA, EGSE or interfaces

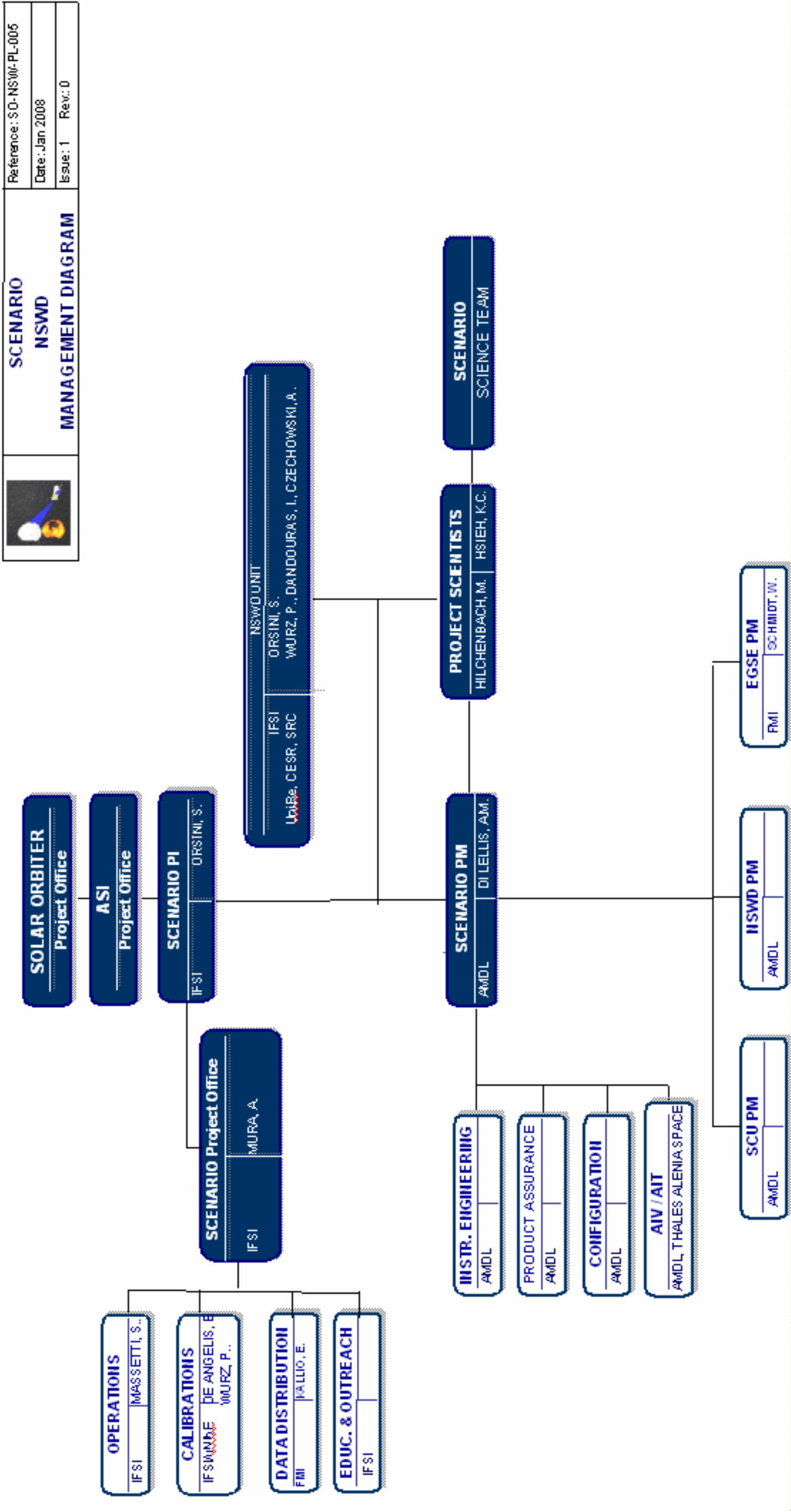
Schedule and delivery dates are provided as APPENDIX C.

7.3 Need dates of ESA Deliverables

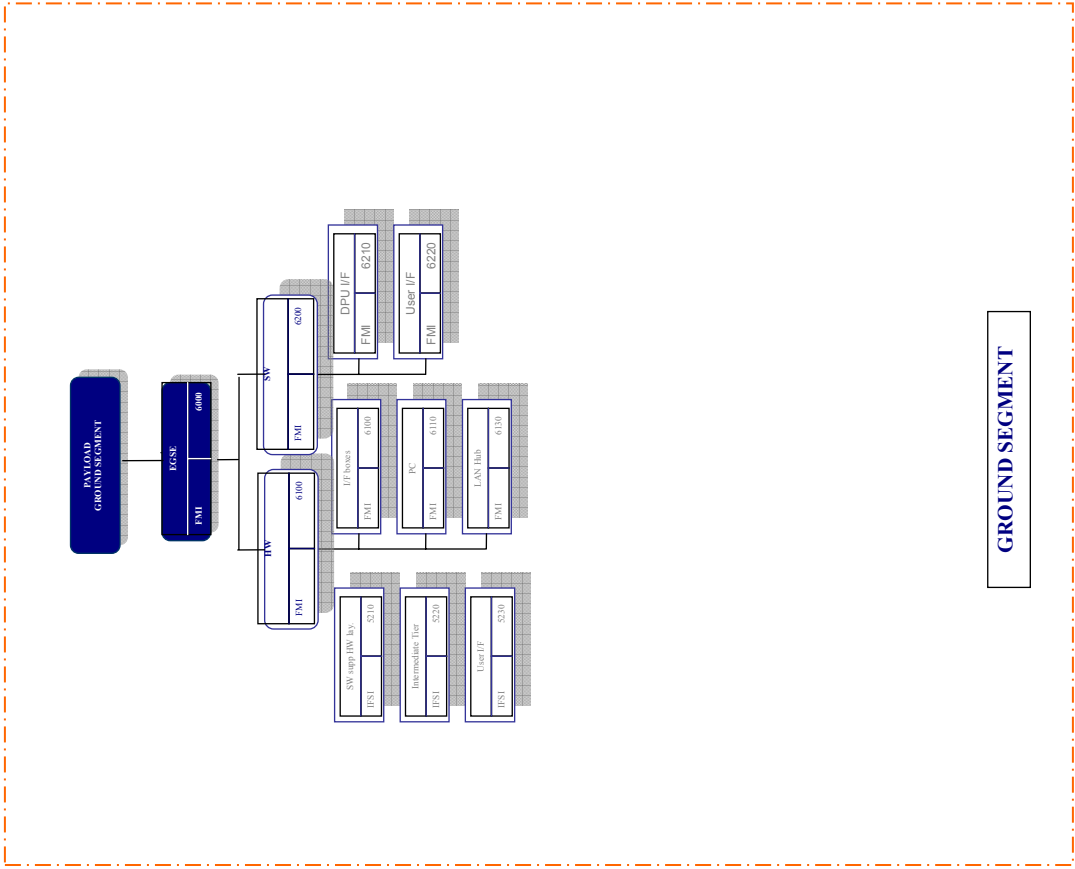
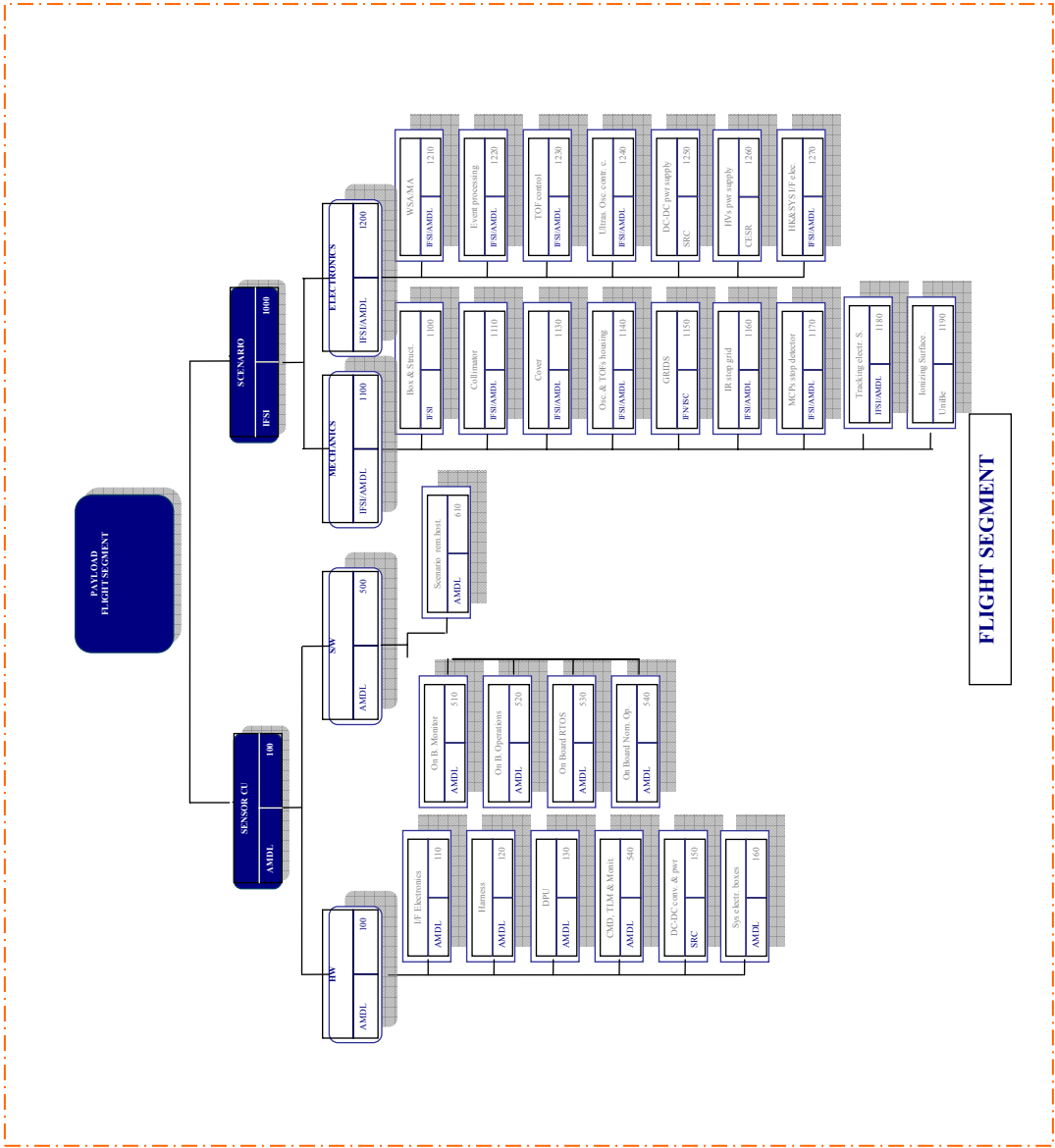
As defined in EID-A, Instrument Delivery dates will be according to the following plan:

- STM: 4 yrs prior to launch (TBC)
- EM: 3 yrs prior to launch (TBC)
- FM: 2 yrs prior to launch (TBC)

Appendix A: Management Diagram



Appendix B: Product Tree



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Appendix C: Project Schedule.

(See SCENARIO Engineering Plan, SO-NSW-PL-003-01-00)

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Appendix D: NSW - SOLAR ORBITER Team

Team leaders

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Position	PI
Responsibility	SCENARIO Coordination, Procurement and Delivery
CV	Laurea in Physics at the University of Rome 'La Sapienza' in 1976. Research Scientist at the Istituto di Fisica dello Spazio Interplanetario of the Italian National Research Council (IFSI-CNR), Roma, Italy (from 1982). Has experience in solar-terrestrial relationship studies, mostly related with magnetosphere/upper ionosphere magnetic field, plasma and Energetic Neutral Atoms (ENA). Presently, (in view of MARS EXPRESS, VENUS EXPRESS, BepiColombo, and Solar Orbiter) he is investigating the interaction of the solar wind with planetary surfaces and gas environments as a clue for understanding the planets evolution and surface composition. Has published about 90 papers on refereed journals, 25 papers on Conference Proceedings and has given about 240-contributed and 25-invited presentations in international conferences. Main activities: 1977-1981: Co-investigator (scientific data analysis) of the ISEE-2 / EGD experiment; 1984-1988: Co-investigator (GSE-S/W) of the INTERBALL / OPERA experiment; 1988-1999: Co-investigator (Software Manager and Scientific Data Analysis) of TEMAG experiment on board TSS-1 and TSS-1R (Tethered Satellite System), launched in 1992 and 1996; 1991-1997: Principal Investigator of the ISENA experiment, launched on board the ill-fated Argentinean satellite SAC-B in late 1996; 1998 - Today: Co-I as Italian Leading Investigator of the ESA Mars Express / ASPERA-3 experiment; 1999-2002: Scientific Responsible of the Italian Auroral Observatory 'ITACA' (Ny-Ålesund, Svalbard, Norway), network 'MIRACLE' (FMI, Finland); 2000 - 2003: Member of the ESA BepiColombo Science Advisory Group as contact scientist for a Neutral Particle Analyzer on board the Mercury Planetary Orbiter.; 2001 -Today: Deputy Coordinator of the ESA Topical Team 'Electromagnetic and other geophysical techniques for in-situ and orbital planetary exploration'; 2002 - 2003: Member of the ESA Solar Orbiter Payload Working Group; 2002 - 2006: Member of the ESA Physical Sciences Working Group; 2002 - 2005: Science Advisor of the ESA AURORA Program; 2005 - 2007: Member of the ESA Solar System Working Group. 2002 - Today: Co-I as Italian Leading Investigator of the ESA Venus Express / ASPERA-4 experiment. From 2004: PI of the BepiColombo SERENA particle sensor package.

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Position	Co-I
Responsibility	Project Scientist
CV	Education: Mag. rer. nat., University Innsbruck, Austria, 1983, Dr. rer. nat., University Innsbruck, Austria, 1986 Employment: research fellow, City University, Department of organic chemistry, London, Great Britain, 1986 -1990, scientist, Max-Planck-Institut für extraterrestrische Physik, Garching, Germany, 1990-1996, scientist, Max-Planck-Institut für Sonnensystemforschung, Germany, 1996 onwards Professional experience: L-Col SOHO CELIAS (high energy ion and neutral particle instrument), Co-I ROMAP Rosetta Lander Philae (ion and electron instrument), PI Rosetta COSIMA (secondary ion mass spectrometer for cometary dust analysis), Col BepiColombo BELA (Laseraltimeter instrument), Col BepiColombo MIXS (x-ray fluorescence instrument), more than 50 referred papers and 35 non-referred contributions.

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Responsibility	Project Scientist
CV	Education: B. A., Physics, cum laude, Wabash College, 1963 Ph. D., Physics, University of Chicago, 1969 Employment: University of Chicago, Research Associate, 1969-1970 University of Arizona, Assistant Professor, 1971-1976 Associate Professor, 1977-1993 Professor, 1994-present Also: MPAE, Lindau/Katlenburg, Visiting Scientist, 1978-1980 National Space Program Office (NSPO), Republic of China in Taiwan, Instrument Scientist, Payload Development Division, 1992-1993 Acting Head, Research & Development Division, 1993-1994 Project Manager, IPEI on ROCSAT 1, 1994 MPE, Garching, Visiting Scientist, Summers of 1996 & 1997 Professional experience: Studying under Prof. John A. Simpson led me to find ^3He-rich solar flares and evidence of adiabatic deceleration in solar modulation of cosmic rays, and taught me particle-detection instrumentation on NASA's early IMPs. At UA, my work in atomic and molecular physics and detection of atoms in space led to two neutral-gas analyzers that flew by Comet Halley in 1986 on Soviet Vega 1 & 2. At my urging, ENA (energetic neutral atom) capability was added to CELIAS on SOHO and detected heliospheric ENA for the first time. Applying ENA detection to planetary studies led me to serving on NASA's Inner Magnetospheric Imager Science Definition Team, the original instrument lead of HENA on IMAGE, co-investigator of MIMI on NASA's Cassini to Saturn, ASPERA on ESA's Mars Express and Venus Express. Administrative skills were gained when assisting NSPO in its beginning phase and its first satellite mission. Honors: Fellow, American Physical Society, 2000

Name	Andrea M. Di Lellis
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Position	PM
Responsibility	SCENARIO Project Manager, SCU & NSWDM PM & TM
CV	Education. Laurea in Physics (Summa cum laude) at University of Rome "La Sapienza", Dec the 18th 1987. ASI Fellowship: Interplanetary medium and magnetosphere plasma, c/o CNR-IFSI: 1989-1990. Training. First Company experience: owner of a small company for laboratory R&D and supporting space programs: 1990-1995. CNR –IFSI Research position: III liv: 1996-1998. ESA certifications: as ESA PSS-01-708 21: May 1998. Second company experience: owner of AMDL Srl- Rea/CCIA Rome/I 903737 - company operating in the Space R&D 1998-2004. ASI certifications: as expert for planetary exploration, Bando n. 7/2000 prof. n.3. Profile: Development of space instrumentation for earth and planets plasma magnetospheres, remote sensing of planets and comets atmospheres and surfaces, in situ planets science. Flight software and processing electronics for on-board data handling. CCD cameras for telescopes and development of ground support equipment for experiments control. Data handling and numerical analysis of observation data. Science Monte Carlo simulations analysis and technical simulation for optimization of key observational parameters and space instrumentation design. Management of international projects, industry control, quality assurance. Formal space programs commitments: Co-I <u>ESA Cluster 1 - CIS: Cis-2 4 x DPU Design & On-Board S/W.</u> Co-I <u>ESA Cluster 2 - CIS: Cis-2 4 x DPU Design & On-Board S/W.</u> Co-I <u>Soviet Union Mars-96 - PFS: FFT DPU Design & On-Board S/W.</u> Co-I <u>ESA MarsExpress - PFS: FFT DPU Design & On-Board S/W.</u> Co-I <u>DARA-NASA Equator-S mission -ESIC: DPU Breadboard, On-Board S/W Design, GSE.</u> TM <u>ESA Rosetta - VIRTIS: Virtis FGSE ground simulators H/W & S/W control.</u> <u>ESA INTEGRAL mission - IBIS experiment: EM & QM operation manager.</u> <u>ESA Herschel mission: SPIRE & HIFI ground simulators H/W & S/W control.</u> TM <u>ESA Smart-1 mission - AMIE Camera: Power Supply & S/C</u>

Name	Mura, Alessandro
Address	Istituto di Fisica dello Spazio Interplanetario INAF-IFSI Via del Fosso del Cavaliere, 100, I-00133 Roma, Italy Phone: (+39) 0649934386 Fax: (+39) 0649934383
E-mail	alessandro.mura@ifsi-roma.inaf.it
Position	Co-I
Responsibility	Project Office, IDS
CV	Education: 2003: PhD in Space Physics, University "Tor Vergata", Rome. Thesis title: "ENA imaging of planetary environments" 1991-1998: "Laurea" Summa cum laude in Physics, University "La

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	Sapienza", Rome Professional experience: 2003 -2007 Researcher in Space Physics at INAF/IFSI. Co-I of ASPERA-4 instrument on board ESA-VeX mission; Co-I of SERENA instrument on board ESA-BepiColombo mission; ELENA/SERENA core member, responsible of ELENA instrument operations, performance & signal simulation. Scientific activity: MEX/ASPERA-3 NPI and NPD instruments data analysis; Mercury magnetospheric/exospheric circulation numerical modelling. 2000 -2003 Researcher (contractor) in Space Physics at INAF/IFSI. Team member of ASPERA-3 instrument on board ESA-MeX mission; responsible of ASPERA-3 data display unit and web-based data display, managed the IFSI archive of ASPERA-3 data. Scientific activity: PhD in planetary (Earth, Mars, Mercury) space physics.
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Name	Habbal, Shadia Rifai
Address	Institute for Astronomy, University of Hawaii, Honolulu, HI 96822, USA
E-mail	shadia@ifa.hawaii.edu
Position	Co-I
Responsibility	Science Team Leader
CV	Education: B. A., Physics and Mathematics, University of Damascus, 1970 M. Phil., Physics, American University of Beirut, 1973 M. Sc., Physics, University of Cincinnati, 1974 Ph. D., Physics, University of Cincinnati, 1977 Employment: Harvard-Smithsonian CfA, Research Physicist , 1978-1999 University of Wales, Aberystwyth, Chaired Professor, 2000-2004 Institute for Astronomy, U. Hawaii, Professor, Faculty Chair, 2005- present Also: Editor, J. Geophysical Research – Space Physics 2002-2006 Professional experience: Extensive experience in modelling the temporal evolution of the solar wind, and the behaviour of minor ions. Data acquisition and analysis from ground- and space-based observatories, covering wavelengths from cm radio to the extreme ultraviolet, focused on the source regions of the solar wind. Proposed key observations with UVCS on SOHO. Coordinated laboratory measurements with observations of nano-size dust grains. Leadership activities involved designing and implementing coronal observations during total solar eclipses since 1995. Administrative skills gained from developing research projects, establishing research teams at three different institutions, serving on NASA review panels, working groups and committees, organizing several conferences, and more recently as Faculty Chair at the Institute for Astronomy.

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	Honors: Pioneer, Arab Thought Foundation, 2004 NASA group achievement award, Spartan 201 white Light Coronagraph Team, 2000 Adventurous Women Lecture Series Award, CfA, 1998
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H/W Providers

Name	Wurz, Peter
Affiliation Address	Space Science and Planetology Physics Institute University of Bern Sidlerstrasse 5, 3012 Bern, Switzerland
E-mail	peter.wurz@space.unibe.ch
Position	Co-I
Responsibility	H/W Provider. Neutral beam calibration, conversion surfaces
CV	Education: Engineering school, Vienna, Austria, Department: Telecommunication and Electronics, 1980; M.S. Technical Physics, Technical University of Vienna, 1987; Ph. D. Technical Physics, Technical University of Vienna, 1990; Viena Docendi, University of Bern, 1999 Employment: Electronics Engineer, 1981–1983, Datentechnik; Austria; Software Engineer, 1983–1985, Datentechnik; Austria; Research Assistant, 1985–1990, Institut für Allgemeine Physik, Technical University of Vienna, Austria; Post-doctoral appointment, 1990–1992, Materials Science/Chemistry Divisions, Argonne National Laboratory, Chicago, USA; Research Associate, 1992–2000, Physics Institute, Department of Space Research and Planetary Sciences, University of Bern, Switzerland; Docent, 2000–present, Physics Institute, Space Research and Planetary Sciences Division, University of Bern, Switzerland. Professional Experience: Lead Co-Investigator for the RTOF instrument of ROSINA on the Rosetta mission (ESA); Co-Investigator on Charge, Element, and Isotope Analysis System (CELIAS) on SOHO (ESA/NASA); Low-Energy Neutral Atom (LENA) instrument on IMAGE (NASA); Co-I on the ASPERA instruments on Mars Express and Venus Express (both ESA); Co-I on the PLASTIC instrument on the STEREO mission (NASA); Co-I on the SERENA and MPPE/ENA instruments on the BepiColombo mission (ESA/JAXA); Co-I on the LASMA instrument on Phobos Grunt (Russia).

Name	Dandouras, Iannis
Affiliation Address	Centre d'Etude Spatiale des Rayonnements 9 Ave. du Colonel Roche B.P. 44346 F-31028 Toulouse Cedex 4 France
E-mail	Iannis.Dandouras@cesr.fr
Position	Co-I
Responsibility	• Provision of all h/w for high voltage power supply; • Support to instrument design; • Support to science objectives definition and data simulation; • Support to calibration.
CV	Education: • 1980: B.Sc. degree in Physics, University of Athens, Greece.

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- 1981: *D.E.A.* (MSc) in Space Physics, Paul Sabatier University.
- 1988: *Doctorat d'Etat* (Ph.D.), Paul Sabatier University, Toulouse.
- Employment:**
 - 1984-1988: Graduate Research Associate, CNES, Toulouse.
 - 1989: Post-Doctoral Research at the Space Sciences Laboratory, Univ. of California, Berkeley, and at the Univ. of Washington, Seattle, USA.
 - since Oct. 1989: *Chargé de Recherche* at CNRS, CESR, Toulouse.
- Professional Experience:**
 - Principal Investigator, Cluster CIS Ion Mass Spectrometer.
 - Deputy Principal Investigator, Double Star HIA Ion Spectrometer.
 - Co-Investigator, Cassini MIMI Magnetospheric Imaging Instrument.
 - Co-Investigator, BepiColombo SERENA Ion and Neutral Instrument.
 - Co-Investigator, STEREO IMPACT Solar Wind Instrument.
 - Member, CNES Sun-Heliosphere-Magnetosphere Advisory Group.
 - Member, ESA Cluster Science Operations Working Group.
 - Member, CNSA / ESA DSDS Implementation Working Group.
 - Member, French Cluster Data Center Steering Committee.
 - Past Member, French Space Weather Working Group (PNST / CNRS).

Name	Kallio, Esa
Affiliation Address	Finnish Meteorological Institute, Space Research Unit Erik Palmenin aukio 1, P.O.BOX 503
E-mail	Esa.Kallio@fmi.fi
Position	Co-I
Responsibility	H/W Provider, Scientific EGSE
CV	Education: Ph.D., University of Helsinki, 1996. Employment: - 1990-1996, 1997-2001, 9/2007 -> present: Senior scientist at Space Science Unit, Finnish Meteorological Institute - 2001 - 8/2007: Academy Fellow, Finnish Academy of Science - 1996-1997: PhD student, Space Science Laboratory, the University of California, Berkeley, USA - 2003 -> present: Leader of FMI's global hybrid model team Professional Experience: - Global numerical hybrid modeling of the solar wind interaction with the Solar System objects (Mercury, Venus, the Moon, Mars, Saturnian moon Titan, asteroids) - Data analysis (ASPERA/Phobos-2, ASPERA-3/MEX, ASPERA-4/VEX, magnetometers) - Participation in experimental space projects: [currently flying instruments] Co-investigator: ASPERA-3/MarsExpress, ASPERA-4/VenusExpress and ICA/ROSETTA [instruments in preparation] Co-investigator: SERENA/BepiColombo, PHEBUS/BepiColombo and MEFISTO/BepiColombo - Publications: about 80 refereed publications (http://www.ava.fmi.fi/~kallio/publications_Esa.html) - Activity in Scientific Societies: 2005-2007: ESA's Solar System Working Group (SSWG), member.

Name	Czechowski, Andrzej
Affiliation Address	Space Research Centre, Polish Academy of Sciences, Bartycka 18A, PL 00-716 Warsaw, Poland

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E-mail	ace@cbk.waw.pl
Position	Co-I
Responsibility	H/W Provider; Low DC/DC power supply, supporting activity for post delivery integration & test
CV	Education: Warsaw University, Moscow State University, Warsaw University (PhD 1975) Employment: Space Research Centre, Polish Academy of Sciences Professional Experience: Theoretical Elementary Particle Physics; Theoretical Space Physics. ~50 original publications, scientific work in CERN (Theory Division, 1 yr), Univ. of Arizona, MPAe Lindau, topics include: multi-component solar wind acceleration; energetic neutral atoms; anomalous cosmic rays; dust in the solar system; dust in beta-Pictoris and other dust disks.

Other Co-I's and KP

Name	Austin, Claude
Affiliation Address	Centre d'Etude Spatiale des Rayonnements 9, Avenue du Colonel Roche 31028 Toulouse Cedex 4, France
E-mail	aoustin@cesr.fr
Position	KP
Responsibility	

Name	Bambert, Karin
Affiliation Address	Physikalisches Institut University of Bern Sidlerstrasse 5 CH-3012 Bern, Switzerland
E-mail	karin.bamert@soho.unibe.ch
Position	Co-I
Responsibility	
CV	Education: 2000 Master, University of Bern, Switzerland 2004 PhD, University of Bern, Switzerland Employment: 1998-2005 University of Bern, Switzerland 2005-2006 University Kiel, Germany 2006- University of Bern, Switzerland Professional Experience: Ass-CoI SOHO CELIAS (high energy ion and neutral particle instrument), more than 10 referred papers and 20 non-referred contributions.

Name	Berrilli, Francesco
Affiliation Address	Dipartimento di Fisica Universita` di Roma "Tor Vergata"
E-mail	berrilli@roma2.infn.it
Position	Co-I
Responsibility	

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CV	Position Held: Assistant (1989-2004) then Associate (2004 – present) Professor of Computational Physics and Experimental Astrophysics, Università di Roma “Tor Vergata”, Italia Research Interests: the current central interest is the dynamics of solar photosphere, particularly the convective regime present in the outer layers of the sun. This topic is tackled by means of experimental techniques, images analysis procedures and numerical simulations. Member of: • European Science Foundation (ESF) Pool of Referees (Astrophysics: Sun and Planets) • Comitato INAF di Macroarea 3 – Sole e Sistema Solare • Georgian National Science Foundation – GNSF Pool of Referees • Scientific Board Solar Telescope THEMIS (Canary Islands, Spain)
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Name	Bruno, Roberto
Affiliation Address	INAF-IFSI Via Fosso del Cavaliere 100, 00133 Rome, Italy
E-mail	roberto.bruno@ifsi-roma.inaf.it
Position	Co-I
Responsibility	Scientific requirements/data analysis
CV	Education: • Obtained Degree in Physics (Laurea) with honors, L'Aquila University 28-7-1978 • Research Fellow at Department of Physics, University of L'Aquila 1978-1980 • Research Fellow at NASA-GSFC 1980-1981 Employment: • 1982-2001 Researcher at IFSI • 2002–present Senior Researcher at IFSI Professional Experience: • Taught at Department of Physics, University of L'Aquila 1981-1982 • Head of Data Analysis Group at IFSI in 1997-1998 • Teaches at University of Calabria (Cs), Italy since 2000 • Member of IFSI Scientific Council 1993-2001 • PI of several research projects funded by the Italian Space Agency and National Research Council • Col of the proposal for an Ion Spectrometry experiment onboard the Russian mission MARS-94. • Col of Composition and Ion Spectrometry experiments onboard ESA-CLUSTER 1 and 2. • Col of the Ion Spectrometry experiment onboard the Chinese space mission DOUBLE-STAR. • Col of SERENA-MPO and MEA-MMO Bepi Colombo • Collaborated to the Solar Orbiter Assessment Study Report Research Field • Solar wind large scale structure, • MHD turbulence, • Numerical studies on electrostatic ion analysers for solar wind and magnetospheric plasmas. Bibliography • Co-author of more than 110 papers published on international refereed journals and over 30 papers on conference proceedings;

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- Received over 30 invitations at international conferences and international schools;

Name	Collier, Michael R.									
Affiliation Address	NASA/Goddard Space Flight Center, Greenbelt, Maryland 20771									
E-mail	michael.r.collier@nasa.gov									
Position										
Responsibility CV	Co-I, IDS Education: □ B.S., Physics, summa cum laude □ Univ. of MD, College Park, 1988 M.S., Physics, Univ. of MD, College Park, 1990 Ph. D., Physics, Univ. of MD, College Park, 1993 Employment: <table><tr><td>Univ. of MD, College Park</td><td>Research Associate</td><td>1993-1996</td></tr><tr><td>NASA/GSFC</td><td>Research Associate</td><td>1996-1998</td></tr><tr><td>NASA/GSFC</td><td>Astrophysicist</td><td>1998-Present</td></tr></table> Professional Experience: Michael R. Collier is a civil servant in the Laboratory for Geospace Physics at the NASA/Goddard Space Flight Center where he contributed to fabricating, calibrating, commanding and analyzing data from many flight hardware projects including the Low Energy Neutral Atom (LENA) imager on the IMAGE spacecraft and the SWICS-MASS-STICS package on the Wind spacecraft. His research interests include solar wind particles and fields and the study of low energy neutral atoms. He participates heavily in the development of advanced particle instrumentation and served as Instrument Scientist for IMAGE/LENA. He currently supports the Wind spacecraft as Deputy Project Scientist. He is the author or co-author of about 60 peer-reviewed scientific articles dealing with, among other topics ,solar wind, heliospheric, terrestrial magnetospheric and outer planets magnetospheric physics. He has authored or coauthored several peer-reviewed papers on soft X-ray observations and simulations. Honors: NASA Group Achievement Award, LENA Imager , Development Team, 2001; NASA Group Achievement Award, GGS - Wind SMS Team 1998-Present.	Univ. of MD, College Park	Research Associate	1993-1996	NASA/GSFC	Research Associate	1996-1998	NASA/GSFC	Astrophysicist	1998-Present
Univ. of MD, College Park	Research Associate	1993-1996								
NASA/GSFC	Research Associate	1996-1998								
NASA/GSFC	Astrophysicist	1998-Present								

Name	Daglis, Ioannis
Address	Institute Space Applications Remote Sensing / National Observatory of Athens, Metaxa and Vas. Pavlou Str. 15236 P.Penteli, Greece Phone:+30 21 06138340 Fax:+30 21 06138343
E-mail	daglis@space.noa.gr
Position	Co-I
Responsibility CV	Science support Diploma in Physics from the Aristotle University of Thessaloniki in 1986, Ph.D. degree in Electrical Engineering from the Democritus University of Thrace in 1991. His Ph.D. work focused on the dynamics of magnetospheric substorms. Currently, Director of Research at the Institute for Space Applications & Remote Sensing of the National Observatory of Athens. His research interests include space plasma physics, solar-

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terrestrial physics, and magnetic storm dynamics in particular. He has published more than 100 papers; half of them appeared in refereed journals. He has given 22 invited talks and more than 110 contributed papers at international conferences. Dr. Daglis is the editor and co-author of the books "Space Storms and Space Weather Hazards" (Boston: 2001, Kluwer), and "Effects of Space Weather on Technology Infrastructure" (in press, Kluwer), and "Space Weather - Physics and Effects" (under preparation, Praxis/Springer). He is a member of many national and international science advisory committees, and chairman of European Commission FP6 evaluation committees. In 1998 Dr. Daglis was awarded the NASA Group Achievement Award for his "contribution to the highly successful exploration of geospace by the Global Geospace Science program"

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E-mail	raffaella.damicis@ifs-roma.inaf.it
Position	Co-I
Responsibility	
CV	Related Experience/ Education 2007, Ph.D. in Physics, Università degli Studi di L'Aquila 2000, Laurea in Physics, Università degli Studi di Roma "La Sapienza" Oct. 2002-Sept. 2003, Fellowship at CNR-IFSI: numerical studies of plasma analyzer Oct. 2001-Sept. 2002, Fellowship at CNR-IFSI: development of numerical techniques to design space plasma analyzers Employment Jan. 2008 Temporary research position at INAF-IFSI Oct. 2003-Oct. 2007 Research contract at INAF-IFSI: study of energetic neutral atoms coming from the solar corona Mar. 2001-Sept. 2001 Research contract at IFSI-CNR: study of ion and electron analyzers

Name	De Angelis, Elisabetta
Address	Istituto di Fisica dello Spazio Interplanetario INAF-IFSI Via del Fosso del Cavaliere, 100, I-00133 Roma, Italy Phone: (+39) 0649934621 Fax: (+39) 0649934383
E-mail	deangelis@ifs.rm.cnr.it
Position	Co-I
Responsibility	Calibrations
CV	Laurea in Physics at University of Rome 'La Sapienza'. <i>Present position:</i> PhD student at the 3 rd University of Rome "Roma Tre"; Research yearly contract at CNR-IFSI. <i>Experimental activity:</i> Studies of Quantum Super-radiant effects in an active micro-cavity; Miniaturised light sources, micro-

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	laser, microstructures; Spatial sensor development to detect Energetic Neutral Atoms (ENA); Energetic Neutral Atoms sensor development.
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Name	Esser, Ruth
Address	Department of Physics, The Auroral Observatory, Faculty of Science, University of Tromsø, N-9037 Tromsø, Norway
E-mail	ruth.esser@phys.uit.no
Position	Co-I
Responsibility	

Name	Giacalone, Joe
Address	University of Arizona, Lunar & Planetary Lab., Tucson, AZ 85721, USA
E-mail	giacalon@lpl.arizona.edu
Position	Co-I
Responsibility	

Name	Gruntman, Mike
Affiliation Address	Astronautics and Space Technology Division Viterbi School of Engineering, MC-1192 University of Southern California Los Angeles, California 90089-1192
E-mail	mikeg@usc.edu
Position	Co-I, IDS
Responsibility	Neutral solar wind physics and data evaluation; experiment/instrument internal review/validation; space mission design
CV	Education: M.S., experimental physics, 1977 – Moscow Physical-Technical Institute, Moscow PhD, experimental and space physics, 1984 – Space Research Institute (IKI), USSR Academy of Sciences, Moscow, 1984 Employment: 1977-1989, research scientist, IKI and IPM, USSR Academy of Sciences; 1990-now, Professor of Astronautics, University of Southern California Professional Experience: extensive experience in experimental, instrumental, and theoretical studies in space physics; PI and Co-I in NASA funded grants; currently Co-I of TWINS and IBEX space missions; more than 200 publications; areas of expertise: space physics, heliospheric and magnetospheric physics, space instrumentation and space sensors, space plasmas and environment, particle and photon analyzers and detector systems, astronautics, space mission and spacecraft design, spacecraft propulsion, ion and neutral particle beams, atomic collisions, and particle interactions with surfaces.

Name	Ho, George C.
Affiliation Address	Johns Hopkins University Applied Physics Laboratory (JHU/APL) 11100 Johns Hopkins Road, Laurel, MD 20723, USA
E-mail	George.Ho@jhuapl.edu
Position	Co-I

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Responsibility	
CV	Education: B.S. (Summa Cum Laude), Augsburg College, 1991 ;M.S. (1996) , Ph.D. (1998) both at University of Maryland Employment: Postdoc at the JHU/APL (1998-2001); Senior scientist at JHU/APL (2001-today) Professional Experience: <u>Lead Co-Investigator:</u> ESA's Bepi-Colombo SERENA/Strofio Investigation; <u>Instrument Scientist:</u> MESSENGER/EPPS, MMS/EPD; <u>Deputy Instrument Scientist:</u> XRS/MESSENGER, New Horizons/PEPSSI; <u>Science Team:</u> ACE, Ulysses

Name	Kota, Jozsef
Affiliation Address	Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ 85721, USA
E-mail	kota@lpl.arizona.edu
Position	Co-I
Responsibility	
CV	Education: B.Sc., Physics, <i>Honour</i>, Roland Eotvos University, Budapest, Hungary, 1967 Ph. D., Physics, Roland Eotvos University, Budapest, Hungary, 1980 Employment: University of Arizona: Sr. Research Scientist, 2003-present Staff Scientist, 1991-2003 Visiting Scientist, 1989-1991 Also: Central Res. Inst. Phys.: Sr. Research Scientist, 1984- Research Scientist, 1970-1984 Jr. Research Scientist, 1967-1970 University of Arizona: Visiting Scientist, 1985-1987 1981-1982 Durham University UK: Visiting Scientist, 1972-1973 Professional experience: Main interest is theoretical studies on charged and neutral energetic particles in the heliosphere and in interstellar field. Work include solar particles, galactic and anomalous cosmic rays, and energetic neutral atoms. Continued works on the theory of particle transport and acceleration in stochastic fields and developed several advances 3-dimensional numerical particle transport and acceleration codes. Public Service: Member IUPAP Cosmic Ray Commission 1984-1990 Associate Editor, J. Geophysical Research, 1993-1997 Honors: Excellence of Refereeing, AGU, 1996

Name	Leoni, Roberto
Address	Istituto di Fotonica e Nanotecnologie/CNR Via Cineto Romano 42, 00156 Roma – Italy Phone: +39 06 41522 239 Fax: +39 06 41522220
E-mail	roberto@ifn.cnr.it
Position	Co-I
Responsibility	SCENARIO nanotechnology manufacturing

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CV	Laurea in Physics, 1979. <i>Position:</i> Senior Researcher at CNR-IFN. <i>Field of activity:</i> Superconducting devices, electron-beam lithography and thin film technology. Using the technological tools of the Microfabrication Facility of the IFN he studied devices for experiments concerning the electron cooling effect, on-chip electronic microrefrigerators and Single Electron Transistors (SETs). More recently, he develops detectors, like bolometers and superconducting single photon detectors (SSPDs). In particular, he develops SSPDs in the framework of the EU STREP project SINPHONIA and Nanoshuttering elements for the ELENA instrument/BepiColombo. He is responsible of the Electron Beam Lithography facility of the IFN and is author and co-author of more than 100 scientific publications on International Journals. <i>Research Projects:</i> Programma Nanotecnologie legge 95/95, Italy; strep EU projects: RSFQubit and SINPHONIA, ELENA/BepiColombo ESA.
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Name	Livi, Stefano A.
Affiliation Address	Southwest Research Institute 6220 Culebra Road San Antonio, TX 78228 210-522-3310
E-mail	Stefano.Livi@SwRI.edu
Position	Co-I, IDS
Responsibility	Correlate data analysis activities and instrument operations with the in situ measurements experiment.
CV	Education: 1974–1981, Università degli Studi di Firenze, physics department 1981–1982, Ph.D. student at Max-Planck-Institut für Aeronomie (MPAe) 1982, Dr. Rer. Nat. in Physics at the Università degli Studi di Firenze (Summa cum Laude) 1987, Dr. Res. in Astrophysics at the Università degli Studi di Roma (Summa cum Laude) Employment: 1981–2000 Max Planck Institut für Aeronomie (now MPS) 2000–2006 Johns Hopkins University – Applied Physics Laboratory 2006– present Southwest Research Institute Professional experience: Principal Investigator on Strofió – PIDDP, 2003–2007 Lead Investigator: CAMMICE/Polar, MIMI/CASSINI, ISENA/SAC-B, ROSINA/ Rosetta Co-Investigator: MSIS/AMPTE, TAUS/Phobos, UVCS/SOHO, CELIAS/SOHO, Rapid/Cluster, MICS/CRRES, CEPPAD/POLAR, SWICS/Ulysses, HEP-LD/Geotail, EPD/Galileo, ASPERA-3/Mars Express, IMPACT/Stereo Instrument Scientist: EPS/MESSENGER, PEPSSI/New Horizon

Name	Mann, Ingrid
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Affiliation Address	Department of Earth and Planetary Sci., Faculty of Science Kobe University, Nada, Kobe 657-8501, Japan Phone/Fax: 81-78-803-5741
E-mail	mann@diamond.kobe-u.ac.jp
Position	Co-I
Responsibility	Theoretical support on dust in the inner heliosphere
CV	Education: Oct. 1987: Diploma in Physics, Ruhr - University, Bochum, Germany May 1990: PhD (Dr. rer.nat.) in Physics, Ruhr - University, Bochum, Germany May 1997: Habilitation (Dr. rer.nat.habil.) Braunschweig University, Germany Employment: 1987-1988: Researcher, Space Research Group, Ruhr-University, Bochum, 1989-1991: Researcher, Max-Planck-Institute, Heidelberg, Germany 1991-2000: Senior Researcher, Max-Planck-Institute, Katlenburg-Lindau, 1995-1995: Visiting Assistant Professor, Rhodes College, Memphis, Tn., USA 1997-1998: Visiting Scientist, NASA Jet Propulsion Laboratory, Pasadena 1998-2000: Visiting Associate, California Institute of Technology, Pasadena 2000-2006: Senior Researcher (Professor 12/2002), Münster University 2003-2005: Guest lecturer, Space & Environment Campus, Umeå University 2000-2002: Senior Research Fellow, ESA Space Science Department 2006-: Professor, Faculty of Science, Kobe University, Japan Professional Experience: German and US teaching and basic research institutions, ESA and NASA space centres. Previous and current activities predominantly financed through external grants. Guest researcher in Sweden, USA and Japan, international scientific collaborations, participation in space missions, expert groups and review panels including Solar Probe Science/Technology Definition Team and ESA Solar Orbiter Science Definition Team. Order of hundred publications in scientific journals, invited presentations on international conferences in the fields of astronomy, space and planetary sciences. Research Fields: Physics of cosmic dust; physical processes in the interstellar medium, the interplanetary medium and circum-stellar systems; evolution of small bodies, meteoroids and dust in the solar system and in extra-solar planetary systems.

Name	Marsch, Eckart
Affiliation Address	Max-Planck-Institute for Solar System Research, Katlenburg-Lindau, Germany
E-mail	marsch@linmpi.mpg.de
Position	Co-I
Responsibility	Solar Wind Analyser (SWA) liason and theoretical support
CV	Education: - 1973 Dipl.-Phys. (Theoretical Physics), University of Kiel

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	- 1976 Dr. rer. nat. (Theoretical Physics), University of Kiel - 1996 Extraordinary Professor of Astronomy and Astrophysics, University of Göttingen Employment: - 1976 - 1980 Staff member of the Max-Planck-Institut für Extraterrestrische Physik, Garching, Germany - 1980 - 2004 Staff member of and Senior Research Scientist (since 1990) at the Max-Planck-Institut für Aeronomie, Lindau, Germany - 2004 - 2007 Senior Research Scientist at the Max-Planck-Institut für Sonnensystemforschung Professional experience: Analysis and theoretical interpretation of the data from the Plasma Instrument and Magnetometer on the German/USA missions Helios 1 and Helios 2 since 1976 Co-Investigator of the Charge and Element Analysis System (CELIAS), Ion Mass Spectrometer CTOF, on the ESA/NASA mission SOHO since 1989 Co-Investigator of the Solar Ultraviolet Measurements of Emitted Radiation (SUMER) for the ESA/NASA mission SOHO since 1989 Co-Investigator of the Sun Earth Connection and Heliospheric Investigation (SECCHI) for NASA's STEREO mission since 1999 1999 - 2000 Coordinator of the proposal for the Solar Orbiter mission selected by ESA 2004 - 2005 Chair of the Science Definition Team for Solar Orbiter (launch in 2015) 2006 - 2007 Co-chair of the Joint Science and Technology Definition Team for the Heliophysical Explorers, HELEX, a joint NASA/ESA science program encompassing Sentinels and Solar Orbiter.
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E-mail	Stefano.Masetti@ifsi-roma.inaf.it
Position	Co-I
Responsibility	Science team member
CV	Education: Laurea in Physics, Univ. "La Sapienza", Roma, 1991 Employment: Univ. "La Sapienza", Roma, Italy, 1996-1998 Univ. Roma III, 1999-2002 CNR-IFSI, 2003-2004 INAF-IFSI, 2004-present Also: NPA-Serena (BepiColombo, ESA-JAXA) science team member; PI of ITACA² (twin high-latitude auroral monitor), INAF-IFSI, PNRA; SVIRCO (CR) science team member, INAF-IFSI, Uni. Roma III Professional experience: research on solar-neutrino physics (study of the spatial and temporal modulation of the solar-neutrino flux observed at Earth), and cosmic-ray physics (detection, Sun-Earth relationship). He contributed to the new data acquisition of the Rome Neutron Monitor, and actually maintains the real-time data visualization.

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	Since 2002, he leads a PNRA research project of stereoscopic aurora imaging, devoted to the solar wind-magnetosphere-ionosphere coupling at high-latitudes. He is involved in the study of the Mercury magnetosphere-exosphere-surface system, in the frame of the solar wind interaction with the dayside magnetosphere (modelling of the ion entry, acceleration due to magnetic reconnection processes, circulation and precipitation).
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Name	Medalle, Jean Louis
Affiliation Address	Centre d'Etude Spatiale des Rayonnements, 9, Avenue du Colonel Roche, 31028 Toulouse Cedex 4, France
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Position	
Responsibility	IDS

Name	Möbius, Eberhard
Affiliation Address	Space Science Center & Department of Physics, University of New Hampshire, Durham, NH03824, USA
E-mail	eberhard.moebius@unh.edu
Position	Co-I, IDS
Responsibility	
CV	Education: Diploma, Physics, <i>summa cum laude</i>, Ruhr-Universität Bochum, 1973 Dr. rer. Nat., Physics, <i>summa cum laude</i>, Ruhr-Universität Bochum, 1977 Employment: Ruhr-Universität Bochum Research Associate 1974-1978 MPE Garching Research Scientist 1978-1988 Senior Research Scientist 1988-1990 Univ. of New Hampshire Associate Professor 1990-1996 Professor 1996-present Also: MPAE Lindau/Katlenburg 1996 Visiting Scientist Univ. of California Berkeley 1997 Visiting Scientist Universität Bern 2004 Visiting Professor ISSI Bern 2004 Visiting Scientist Professional experience: After being trained in laboratory plasma physics Dr. Möbius worked on acceleration of particles in and their transport through space with the help of state-of-the-art instruments on spacecraft. This includes the Earth's magnetosphere, the sun's atmosphere and interplanetary space. He is also involved in the exciting studies of interstellar gas outside the solar system, a sample of cosmic material that is distinct from the sun and its planets. It thus provides clues on the evolution of matter and thus on the origin of stars, planets and us. He has been collaborator for the data analysis on IMP-8, ISEE-1 and -3 and Co-Investigator on AMPTE-IRM and Equator-S.

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	Currently, he is Co-Investigator on Cluster/CIS, SOHO/CELIAS, FAST/TEAMS, STEREO/ PLASTIC, and on IBEX, as well as Lead Investigator for ACE/SEPICA. He has also lead several international teams at the International Space Science Institute (ISSI) in Bern, Switzerland. <i>Honors:</i> Arthur K. Whitcomb Professor at UNH, 1997-2000
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Name	Nowosielski, Witold
Affiliation Address	Space Research Centre, Polish Academy of Sciences, Bartycka 18A, PL 00-716 Warsaw, Poland
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Position	
Responsibility	KP

Name	Orfei, Renato
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Position	Co-I
Responsibility	KP

Name	Orleanski, Piotr
Affiliation Address	Space Research Center Polish Academy of Sciences, Bartycka 18A, 00-716 Warsaw - Poland
E-mail	porlean@cbk.waw.pl
Position	Co-I
Responsibility	STIX digital electronics – IDPU design and manufacturing
CV	Education: MSc Diploma, Electronics, Warsaw University of Technology, 1980 PhD, Electronics, Warsaw University of Technology, 2006 Professional Background: 1980-1984 Specialist, SRC PAS, Warsaw 1984-present, Senior Specialist, Project Manager, SRC PAS, Warsaw Relevant Experience (selected): 2006 - now „MERTIS” IR Spectrometer for Beppi Colombo Mission; <i>Designer of FPGA controller of scanning system,</i> 2005 - now „MXGS/ASIM” X and Gamma Sensor for ISS; <i>Team Manager; co-designer of DC/DC and Housekeeping,</i> 2005 - now „SIR-2” IR Spectrometer for Chandrayaan Moon Mission; <i>Team Manager; co- designer of DC/DC & Housekeeping,</i> 2001 - now „HIFI” Submillimeter Telescope for Herschel Mission; <i>Project Manager; main designer of Local Oscillator Control Unit,</i> 1997 - 2003 „PFS” Planetary Fourier Spectrometer for Mars Express Mission; <i>Co-I., co-designer of DC/DC,</i> 1995 - 2003 „IBIS” Gamma-Ray Telescope for INTEGRAL Mission; <i>Project Manager; main designer of Veto Electronics Box,</i>

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	1993 - 1997 „VLF” Low Frequency FFT Analyser for CESAR Project; Main designer of the instrument, <i>Project Manager, co-designer of DC/DC Converter,</i> 1986 - 1995 „WIZJER” CID, TV Camera, ISTOK-1 / PRIRODA / MIR Station; Project Manager, main designer of Digital TV Camera,
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Name	Scheer, Jürgen
Affiliation Address	Physikalisches Institut University of Bern Sidlerstrasse 5 CH-3012 Bern, Switzerland
E-mail	jscheer@space.unibe.ch
Position	KP
Responsibility	Calibration and Hardware Education: M.Sc., Physics, University of Osnabrueck, 1999 Ph.D., Physics, University of Bern, 2005 Employment: ETH Zurich, Research Associate, 1999-2001 University of Osnabrueck, Research Associate, 2001-2002 University of Bern, Research Associate, 2002-present Professional experience: • Accelerator and medium to high energy ion beam physics at ETH Zurich. • Solid state and surface physics with special expertise in the interaction of low energy ion beams with insulating and conducting surfaces at the University of Osnabrueck. • Space instrumentation and calibration of instruments at the University of Bern. Project management skills were gained in the context of the calibration campaign for the IBEX-Lo instrument for NASA's IBEX mission, which was done at the University of Bern.

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E-mail	walter.schmidt@fmi.fi
Position	EGSE Technical Manager, Science support
Responsibility	KP
CV	CO-I and project manager on SOHO/SWAN, PI for Rosetta/PP, technical manager for Rosetta/lander mass-memory sub-system, project manager for all FMI Rosetta contributions, QA-manager for the Mars-96 Lander control system, QA-advisor for the NASA EOS/OMI instrument.

Name	Selci, Stefano
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Position	Co-I
Responsibility	SCENARIO nanotechnology AIV
CV	Senior Scientist at ISM-CNR (Rome-Italy), previously researcher at the University of Rome "Tor Vergata", author of more 80 international papers, is mainly devoted to characterization of semiconductor materials, in particular quantum confined systems, performed in full collaboration with theoreticians to develop first-principle modeling of radiation-matter interaction. In particular the study of the optical response of semiconductor systems using optical spectroscopy is grounded on a large experience gained with fundamental works on semiconductor clean surfaces (Phys.Rev.Lett. 52, 1145, 1984) while the use of scanning probe microscopies (STM), is a well consolidated activity that produced, among other results, the first scanning tunneling microscope realized in Italy (Science 245, 1226 (1989)).

Name	Storini, Marisa
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E-mail	Marisa.Storini@ifi-roma.inaf.it
Position	
Responsibility	KP
CV	Main fields: Solar Physics, Cosmic Rays, Solar Wind and Interplanetary Perturbations, Solar Induced Effects on the Terrestrial Atmosphere and Geomagnetic Field, Planets, Space Weather and Climatology, including particle detectors and environmental instruments. More than 200 scientific publications have been made on such topics. Relevant results were obtained on long-term cosmic ray modulation, coronal holes, solar relativistic particles, solar activity effects in the heliosphere, the Gnevyshev Gap identification and cosmic ray periodicities. Present Position: Senior Researcher of the INAF-IFSI of Italy and Head of the <i>SVIRCO (Rome) Observatory and Laboratory for Terrestrial Physics</i>. Carrer history: June 1970 – June 1972: Fellow of the National Research Council of Italy July 1972 - to Decembet 2004: CNR/IFSI staff January 2005 – to present: INAF-IFSI staff Relevant tasks/honours: 1987-1991: Head of the Cosmic Ray Section of IFSI/CNR; 1992-2005: Head of the International Italy/Chile collaboration for the study of cosmic rays in Antarctica; 1992-1997: Italian leader project for international research inside the CNR/SAV Agreement; 1997-1999: Italian leader project for international research inside the CNR/PAN Agreement; 1998-2000: Member of the Scientific Committee of IFSI/CNR; 1998-2001: Head of the Cosmic Ray Section of IFSI/CNR; 1999-2004: Member of the National Committee for Research Coordination of the National Antarctic Research Program (PNRA) of

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	ITALY; 2001-2003: National Coordinator of A.C.QU.A. Project (Italian Space Agency) 2002-2007: Member of the Coordination Committee of SIRIA project (ENEA/CNR); 2004-2007: Leader WP13000 of COST 724 Action. 2005-2007: Co-leader WP1400 of COST 724 Action - Organizer of national and international conferences; - Referee and Book Reviewer for international scientific journals; - Scientific project evaluator for European and non-European Countries.
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Name	Zurbuchen, Thomas H.
Affiliation Address	Dept. of Atmospheric, Oceanic, and Space Sciences, University of Michigan, USA
E-mail	thomasz@umich.edu
Position	Co-I
Responsibility	
CV	Education Ph.D., Physics (with highest honors), University of Bern, Switzerland, 1996 M.S., Physics, Mathematics, Astronomy (with highest honors), Univ. of Bern, Switzerland, 1992 Positions Held Director, Center for Entrepreneurship, College of Engineering, University of Michigan Associate Professor, 2003-present Senior Associate Research Scientist, 2002–2003 Assistant Research Scientist, University of Michigan, 1998–2002 Research Fellow, University of Michigan, 1996–98 Part-time Consultant in Space Industry (Oerlikon Contraves), 1992–94 Teaching Assistant, University of Bern, 1990–96 Awards and Professional Services Presidential Early Career Award (PECASE), 2004. Outstanding Research Scientist Award of the Univ. of Michigan College of Engineering, 2002. Swiss National Science Foundation, Young Researcher Award, 1996–97 Member, American Geophysical Union and the Swiss Society of Astronomy and Astrophysics Chair and convener of several conferences, including SHINE (3 times) Member of NASA Science and Technology Definition Teams Responsibility • Provides support in electronics system development • Contributes to data analysis and science team. Relevant Experience • Currently leads data center for composition instruments on ACE, Ulysses, and WIND, and develops new space instrumentation. Participated extensively in calibrations of Wind/MASS, ACE/SWICS, and ACE/SWIMS. Led UV-suppression tests for SOHO/CTOF and SOHO/MTOF. Participated in development of Wind/MASS. • Led design and construction of FIPS, a miniaturized mass spectrometer that is part of the MESSENGER payload to Mercury. FIPS launched, successfully tested out and en route for Mercury.

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| <ul style="list-style-type: none">• Technology developments on MEMS and new FPGA based circuits and instrument designs. |
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