



*Coordination Action for the
integration of Solar System
Infrastructures and Science*

Project No.: 261618
Call: FP7-INFRA-2010-2

**Organisation of
Vision for Solar System Science
Workshop 1**
Version 0.1

<i>Title:</i>	Organisation of Vision for Solar System Science Workshop 1
<i>Document No.:</i>	CASSIS <i>Deliverable: D4.3.1</i>
<i>Date:</i>	2012-10-23
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<i>Distribution:</i>	Project



Revision History

Version	Date	Released by	Detail
0.1	2012-10-23	David Berghmans	Draft for internal CASSIS circulation

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1. Introduction

1.1 Scope of the Document

This document is produced in the context of the EU FP7 project CASSIS. It constitutes the deliverable report corresponding to the deliverable D4.3.1 (see DOW CASSIS (261618) 2012-07-12.pdf), viz. “Organisation of Vision for Solar System Science Workshop 1”.

1.2 Concept of the Vision for Solar System Workshops

A principal objective of CASSIS is to improve the interoperability of data, metadata and services in solar system related infrastructures in order to engender a more integrated approach to the infrastructure supporting solar system science in the future, with the possibility of reducing the cost of developing new capabilities.

While much of the work towards this aim is covered in WP2 (Interoperability of data and services) and WP3 (Networking), the Vision for Solar System Science Workshops provide a way of promoting CASSIS ideas to a wider audience, gathering and discussing opinions on how best to proceed.

The Vision for Solar System Science Workshops, in particular, aim at bringing together all stakeholders, including scientists, industry, funding bodies, government agencies and policy makers both at the national and European level in order to discuss the role and opportunities created by solar system science within the context of global research, the European jobs market and industry and to champion the concept of joined up solar system science within Europe.

Concerning the format, the Vision for Solar System Science workshops are conceived to last 2-3 days, but this is discussed with the stakeholders on a case by case basis.

Particular attention is paid to ensure that key individuals are invited to the workshop in order to attract a wider audience. Funds are available to cover the external experts’ travel costs.

Since the workshops’ aim is to define as wide a set of cross-domain user requirements as possible, CASSIS Partners have identified in the “Solar Orbiter” project a good interlocutor to interact with, given the different instruments and institutions that are involved in the project.

1.3 Solar Orbiter Mission

Solar Orbiter is a mission that was conceived to perform a close-up study of the Sun and inner heliosphere – the uncharted innermost regions of our Solar System. Carrying its compliment of ten instruments to one-third of the Earth’s distance from the Sun – closer than ever before – Solar Orbiter will pursue the following scientific objectives: i) to determine in-situ, the properties and dynamics of plasma, magnetic fields and particles in the near-Sun heliosphere; iii) to survey the fine detail of the Sun’s magnetised atmosphere; iii) to identify the links

between activity on the Sun's surface and the resulting evolution of the corona and inner heliosphere; iv) to observe and characterise the Sun's polar regions and equatorial corona from high latitudes. The Solar Orbiter mission is a collaboration between the ESA and NASA and is scheduled for launch in 2017.

The Solar Orbiter Project is now in a phase wherein the instrument teams are still focussed on the hardware but will soon turn to setting up the science operations, including planning and data management. This is therefore a unique opportunity for CASSIS to step in and advice the Solar Orbiter instrument teams (from different science communities), on interoperability, data format standards and common metadata policies.

Stepping in the Solar Orbiter context is facilitated by the fact that several of the partners of CASSIS are also involved in Solar Orbiter. FHNW is involved on X-ray spectrometer/telescope (STIX); ROB and UCL on the EUV full-Sun and high-resolution imager (EUI). Other partners in the three FP7 projects involved in CASSIS are also involved in STIX. For example, TCD, one of HELIO Project's partners, is involved in the data management on STIX.

2. Report of activities

The "Vision for Solar Orbiter Science Workshop 1" consisted of a 3-step interaction:

2.1 First step - Initial contacts with Solar Orbiter Project Scientists

Given the interest of the Solar Orbiter partners, an approach was made in October 2011 to the ESA Science Team suggesting that CASSIS could provide guidance on all issues related to data content and management and on how to produce systems that were interoperable with existing capabilities. Following this initial approach, the CASSIS was invited to participate in the following Solar Orbiter events.

2.2 Second step - Solar Orbiter SWT-8 (AGU, San Francisco US, Dec 7 2011)

A Science Working Team meeting was organised in conjunction with the AGU meeting in San Francisco on 7 December 2011 – more than 20 scientists from various instrument teams attended. At the meeting, as part of the discussion, we outlined how CASSIS could help provide for the design of data products and services. Our ideas were well received by those present particularly since they should result in improved capabilities for the mission.

Agenda/Minutes

The agenda/minutes of the full SWT meeting can be consulted here:

http://www.solarorbiter.org/documents/SWT-minutes/SolarOrbiter_SWT-8_minutes.pdf

The part relevant to CASSIS is:

- *Coordination of user analysis software and agreement on WCS-compliant metadata will be addressed by Data Analysis WG, to be kicked off at next SWT/SOWG meeting.*
 - *Key for mission success: Enable scientists to jointly analyze data from different missions easily (see also presentation file [*] by D. Berghmans). Therefore:*
 - *Make tools interoperable*
 - *Agree on standards as much as possible; use WCS standard in FITS headers*
 - *Use joint platform (TBD) for access to data analysis software.*
 - *D. Müller to collect input/suggestions to present at kick-off meeting.*

[*] http://www.solarorbiter.org/documents/presentations/SWT/SWT-9_presentations.zip

Participants of the meeting:

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2.3 Third step - Solar Orbiter SWT-9, ESA/ESTEC (Noordwijk, NL)

At the SWT-9 meeting in ESTEC, the first SOWG (Science Operations Working Group) meeting after the mission was selected, was held at ESTEC on 23-26 January 2012. At this we made a more detailed presentation of concepts and standards that could be adopted by the project including pressing the idea of considering any capabilities that they developed as part of a larger collaborative environment for heliophysics. We have been included in the Data Analysis Working Group established to consider what should be done – the group is led by Peter Gallagher (TCD) who is one of the partners in the HELIO project.

Agenda/Minutes

The agenda/minutes of the full SWT meeting can be consulted here:

http://www.solarorbiter.org/documents/SWT-minutes/SolarOrbiter_SWT-9_minutes.pdf

The part relevant to CASSIS is:

- *Lessons learned from STEREO, SOHO, and SMM: JOPS, Event Flags, SPICE Ephemerides (W. Thompson)*
- *Thursday AM: Data Analysis WG Kick-Off*
- *Data-Analysis WG (DAWG) Kick-Off: Peter Gallagher (TCD, Ireland) to lead this WG*



Figure 1: SWT-9 at ESTEC



Figure 2: Discussion of FITS keywords and coordinate systems at SWT-9.

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3. Conclusions

The involvement of CASSIS in the Solar Orbiter mission represents a significant step in the objective of the project in fostering the ideas of standards and interoperability. Around thirty groups are involved in the teams fabricating the 10 instruments for Solar Orbiter (4 in-situ and 6 remote-sensing) and all of these are of course also involved in other projects; this provides an excellent avenue through which our ideas can be spread.