



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

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**Organisation of
Vision for Solar System Science
Workshop 2**
Version 0.1

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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 D4.3.2 (see DOW CASSIS (261618) 2012-07-12.pdf), viz. “Organisation of Vision for Solar System Science Workshop 2”.

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 complement 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; ii) 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

In the first Vision for Solar System Science Workshop, we established contact with the Solar Orbiter Project and brought the issues of interoperability, data formats and metadata standardisation under the attention of the Solar Orbiter instrument teams assembled in the Science Working Team (SWT). The main outcome of that was the creation of a new working group, the "Data Analysis Working Group", under leadership of Peter Gallagher (TCD IE, HELIO' Partner) and membership of Robert Bentley (UCL, MSSL (UK), HELIO and CASSIS Coordinator) and David Berghmans (ROB (BE), SOTERIA and CASSIS participant). Here we report on the activities of the DAWG meeting during the 5th Solar Orbiter Workshop in Bruges (<http://sidc.be/solarorbiter5/>).

2.1 Meeting of Solar Orbiter - Data Analysis Working Group (DAWG)

(Tuesday, 11th of September 2012 – 5th Solar Orbiter Workshop)

Agenda/Minutes

Active attendance: Daniel Müller (DM), Luis Sanchez (LS), Stein Haugan (SH), Tim Horbury (TH), Bill Thompson (BT), Robert Bentley (RB), David Berghmans (DB), Peter Gallagher (PG).

Other attendance: Solar Orbiter Instrument Teams

Chairman: PG. Notes collected by DB.

- Solar Orbiter Science Implementation Requirements Document (SIRD)
DM is bookkeeper of the SIRD. It is currently in draft. DAWG will be involved to have it reviewed. DM will contact DAWG on how to be involved in this.

- Quick look and other Data Viewers

LS: How to deal with quicklook data: everybody should be able to view and analyze these quicklook data quickly? Also in the SOC it should be available: this implies strong requirements on reliability, etc. It is a requirement on the instrument team to provide the adequate software to the SOC. This SOC quicklook viewer is limited to what is relevant for operations.

SH: There might be other viewers around that are not SOC approved.

The WG has to decide whether the operations qkl viewer belongs to the WG.
In the instrument team there are not infinite resources to develop different viewers.

TH: The existing STEREO tools could be the baseline. There is also a limit to what has to be coordinated: the neaty greaty analysis will be done in the researchers' favorite environment.

DM: He will make sure all the requirements from operations & science are neatly combined.

- Presentation by BT on STEREO heritage

STEREO: SECCHI uses FITS+WCS, In situ instruments use CDF

FITS keywords well standardized by World Coordinate System (WCS), non-coordinate keywords not well coordinated

Will the WCS metadata be provided by SOC? HEE Heliospheric Earth Ecliptic? SPICE?

Calibration of data (“prep): shall we foresee the distribution of prepped data?

- Calibration of data

It is a requirement on the SOC to provide calibrated data (with PI provided software).

The point of Solar Orbiter is to combine data from different instrument. Typically the users are expert in only 1 instrument. When using combined data sets (as for Solar Orbiter), most data users will be non-experts. This implies that calibrated data must be distributed. Nevertheless “expert mode” access to the raw data must be foreseen (and the option to calibrate the data yourself following possibly deviant ideas).

Note that for in-situ instruments the above has always been more obvious than for remote sensing data: in-situ data are distributed as analysed parameters: density, velocity, not DN. Only instrument experts will look at the DNs.

- Software libraries

DM: solarsoft is a big benefit, solarsoft could be non-IDL, version control is missing. With version control, the evolution of calibration software can be tracked.

- Data format

ESA will not impose a data format. This is in the scope of the DAWG to self-coordinate this between instruments.

BB: FITS might not be the best format: difficulties in supporting good annotation of parameters - XML annotation file might be relevant

Engineering data must be stored!

Name space tree must be kept: ESA will do this on the basis of instrument ICDs. To be discussed how this is made available to community through auxiliary data products. The DAWG can provide suggestions for requirements on this

A wide agreement is reached that calibration/languages etc. discussions can all be solved through adequate web-services.

- Way Forward:

AI DAWG: instruments to provide their current thinking on data formats

AI DAWG: instruments to provide their current thinking on analysis software

AI PG: make wiki available

Is this what came out from the meeting?



Figure 1: The Meeting of the Data analysis Working Group took place as a splinter of the 5th Solar Orbiter Workshop.



Figure 2: Robert Bentley (CASSIS PI) further explaining the benefits of interoperability to a lead Solar Orbiter scientist.

3. Conclusions

Under the impuls of CASSIS, the Solar Orbiter Team created the permanent commission “Data Analysis Working Group” (DAWG) with representatives of all instrument teams covering different scientific disciplines. The first meeting of the DAWG restates the aims brought by CASSIS. In the following years the DAWG will work on interoperability and standardisation of the Solar Orbiter data sets.