Developing Standards and an Environment for the Solar Orbiter data system

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Background

- CASSIS is a Coordination Action that grew out of three projects funded under FP7
  - Heliohphysics Integrated Observatory (HELIO)
  - Europlanet Research Infrastructure
  - Solar Terrestrial Investigations and Archives (SOTERIA)
- Objective is to improve interoperability in Solar System science
- Projects of CASSIS address similar problems in different areas
  - All providing access to multiple archives although scale varies
  - Handling the foibles of the data created by different communities
  - HELIO addressing the widest range of disciplines and problems
    - Using a virtual observatory approach to many issues
- Projects now looking at how to improve interoperability
  - Many things are harder than they should be
  - Standards seen as the way to improve things

Making things easier

- Solar Orbiter could benefit from the lessons learnt in order to maximize its scientific output
- Many of the problems caused by the lack of standards
  - Each project has found its own ways of doing things
- Working within an overall framework will improve things
  - Standards needed for data and for service interfaces
- Proposal is that CASSIS should help develop standards and guidelines in a number of areas
  - Recommendations intended to improve quality and interoperability of data and capabilities
  - Desirable not to re-invent the wheel – better to improve it…
  - Very simple, low level decisions can make a bit difference

Data provision

- No matter how access to data is to be provided, following a few simple rules can help
  - Hierarchical directory structure based on time
    - Granularity of tree depends on quantity of data
  - Filenames that help identify the file contents
  - Filenames that have meaning outside of their "normal" environment
- File format possibly be determined by the type of data
  - FITS may not be the best format for everything
  - Other formats, including CDF should be considered
  - General difficulties in supporting good annotation of parameters
- Intelligent providers most useful to the community
  - Requests by users are satisfied by the service
- Resource-poor providers could also be important
  - Well structured archive makes access much simpler

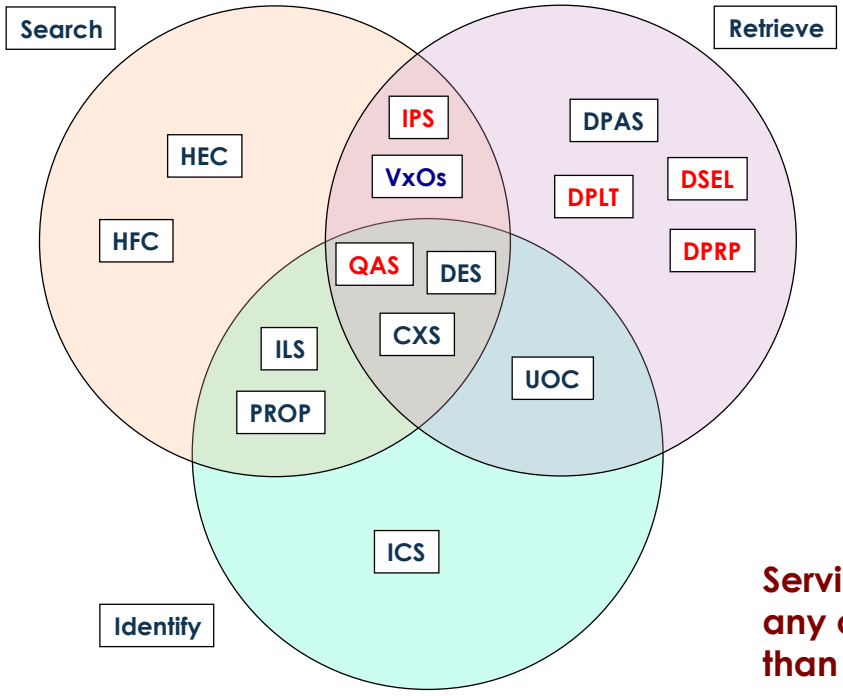
File content

- File metadata should be as comprehensive as possible
  - information should be complete and accurate
    - Files could be of limited use if information is missing
  - Minimize the amount of assumed knowledge
  - Include key engineering information (incl. why not working…)
- Metadata should be thought of in two parts
  - Common area with information that is always needed
  - Domain and/or instrument specific area
- Try to maximize the common metadata
  - Use restricted family to define temporal and spatial coordinates
  - Ensure other information provided in standard way
- VOs should be able to accommodate all formats
  - They cannot always manage if key information is missing
- XML definition of file contents may be an option

A collaborative environment

- HELIO has adopted a service oriented architecture (SAO)
  - Proving to be a very flexible way of addressing issues
- Required capabilities split into set of services
  - Developed and maintained independently
  - Interfaces compliant with standards developed by the IVOA, etc.
  - Approach makes it easy to provide additional capabilities
  - Components can be used independently or within workflows
- Capabilities needed by Solar Orbiter should be seen as components within larger environment
  - Use or enhance existing capabilities where possible
  - Creating new compliment capabilities to enrich the environment
- Ultimate objective:
  - Create a Collaborative Research Environment for Heliophysics

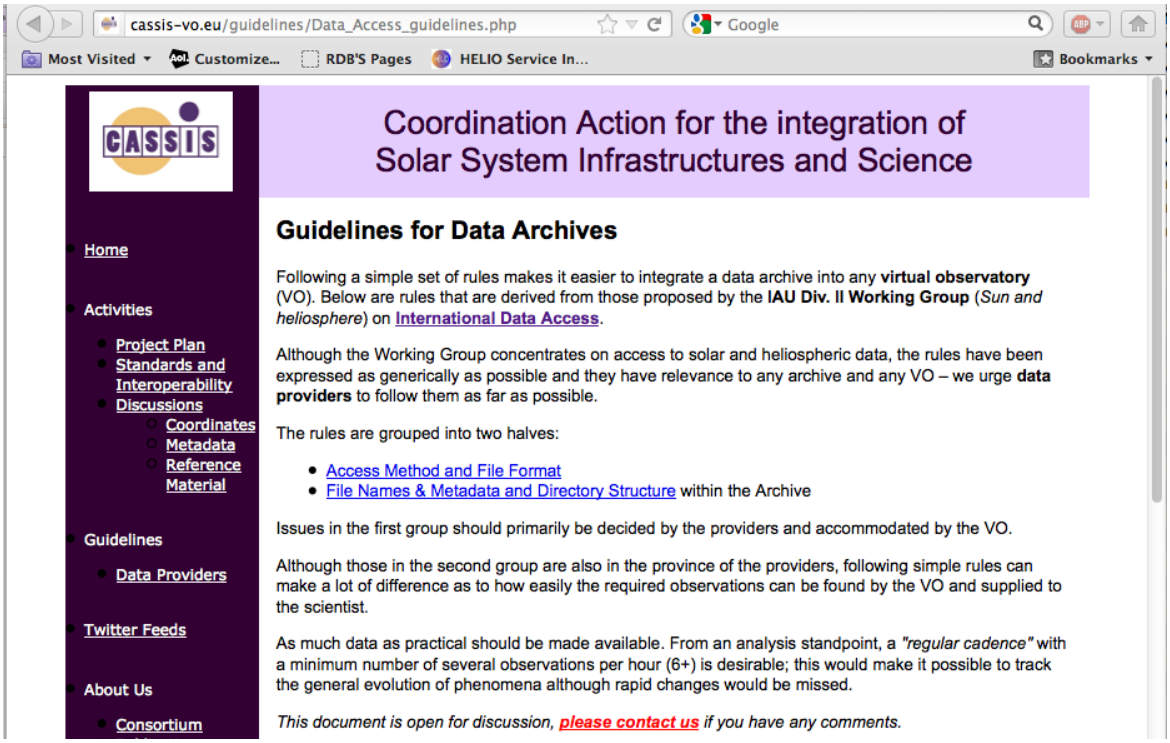
Services as Building Blocks



CTS	Coordinate Transformation
CXS	Context Service
DES	Data Evaluation Service
DPAS	Data Provider Access
DPLT	Data Plotter
DPRP	Pipeline Processing
DSEL	Data Selector
HEC	Heliophysics Event Catalog
HFC	Heliophysics Feature Catalog
HPS	Processing Service
HRS	Registry Service
HSS	Storage Service
IAS	Index Access Service
ICS	Instrument Capabilities
ILS	Instrument Location
PROP	Propagation Modelling
QAS	Quick-look Access
SMS	Semantic Mapping
UOC	Unified Observing Catalog
VxO	HSD Virtual Observatory

Services can be used in any order and in more than one way

Some guidelines already open for discussion

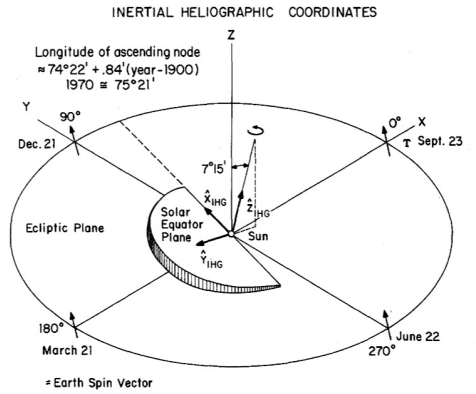


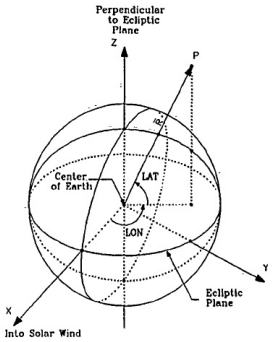
HELIO

Heliophysics Integrated Observatory

Project No.: 238969
Call: FP7-INFRA-2008-2

Coordinate Systems
Version 1.0





Conclusions

- **Solar Orbiter must work with a wide range of data products from other parts of the Solar System to maximize the scientific return**
  - **Improving its interoperability will help in this requirement**
- **The project could save time and effort by building on the understanding develop by the three projects of CASSIS**
- **Working within a framework should facilitate progress**
  - **Quality and content of data enhanced**
  - **Interoperability greatly improved**
- **Some guidelines are already available for discussion**
  - **Data storage and coordinates**
- **Recommendations for file contents available shortly**