Status of VO Standards versus ESFRI needs in CEVO Task2

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IVOA

VO standards in CEVO Task 2 goals

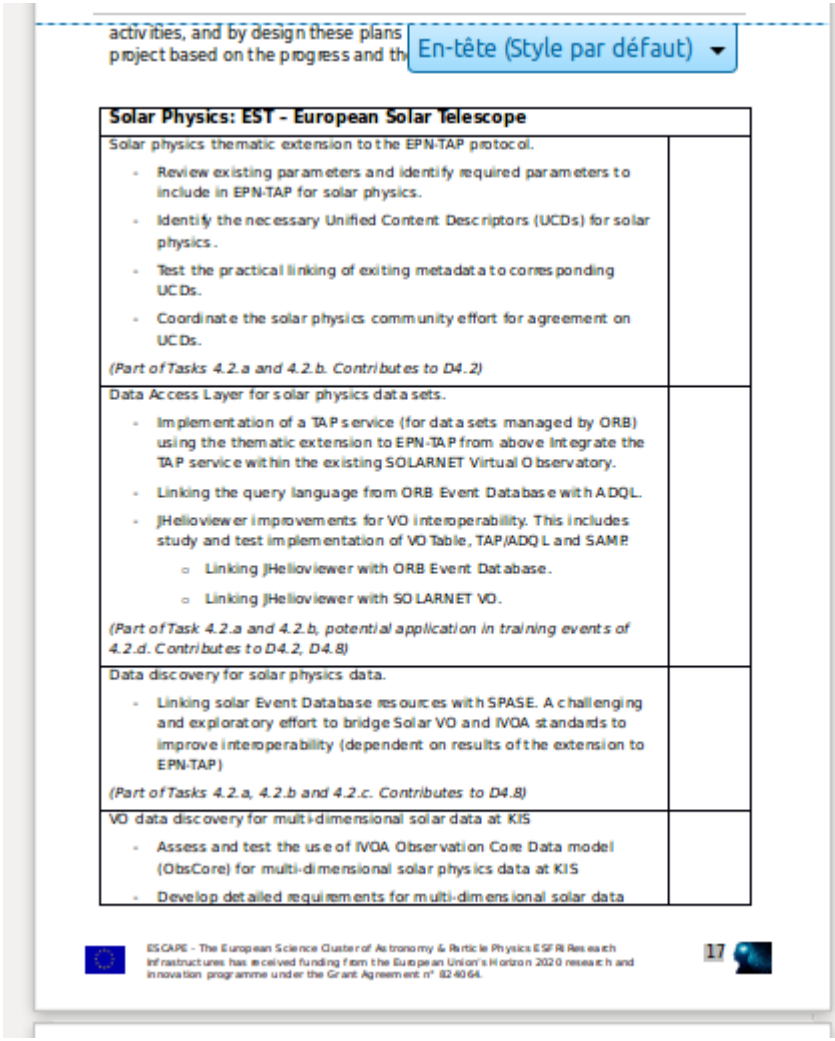
- This task will identify the ESFRI needs for common standards to enable high level data products and archive services to be interoperable in the VO framework, so that they can connect to the EOSC through the VO.
- The task will support the adoption of the VO framework and participation in IVOA for the definition and updates of the necessary standards, in particular for the inclusion of new communities introduced by ESCAPE.
- A practical problem-solving platform will be established where VO expertise is shared and developed.
- The scientific community will be supported in the use of FAIR data via VO tools and services in training events, including new capabilities enabled by the inclusion in EOSC.

Task 2 Sub tasks

- 4.2.a - Gathering of requirements from ESFRIs for their use of the VO framework and its connection to EOSC.
  - See below . ESFRI dependant
- 4.2.b - Update and definition of standards based on the requirements and priorities, and representation of ESFRI interests in the global VO framework.
  - See below. ESFRI dependant
- 4.2.c Establish a practical problem-solving platform to facilitate implementations and prototypes of interoperable access to ESFRI and pathfinder data.
  - transverse
  - VO Expert list
  - Hands on workshop for dataproviders : May 2021
- 4.2.d Support of the scientific community for the use of FAIR data
  - transverse
  - VO schools May 2020 and December 2022
  - Tutorials
  - RDA participation (eg : FAIR criteria)

D4.1 – DETAILED WP4 PROJECT PLAN

- Task 4.2 plans related to each ESFRI and Research Infrastructure:



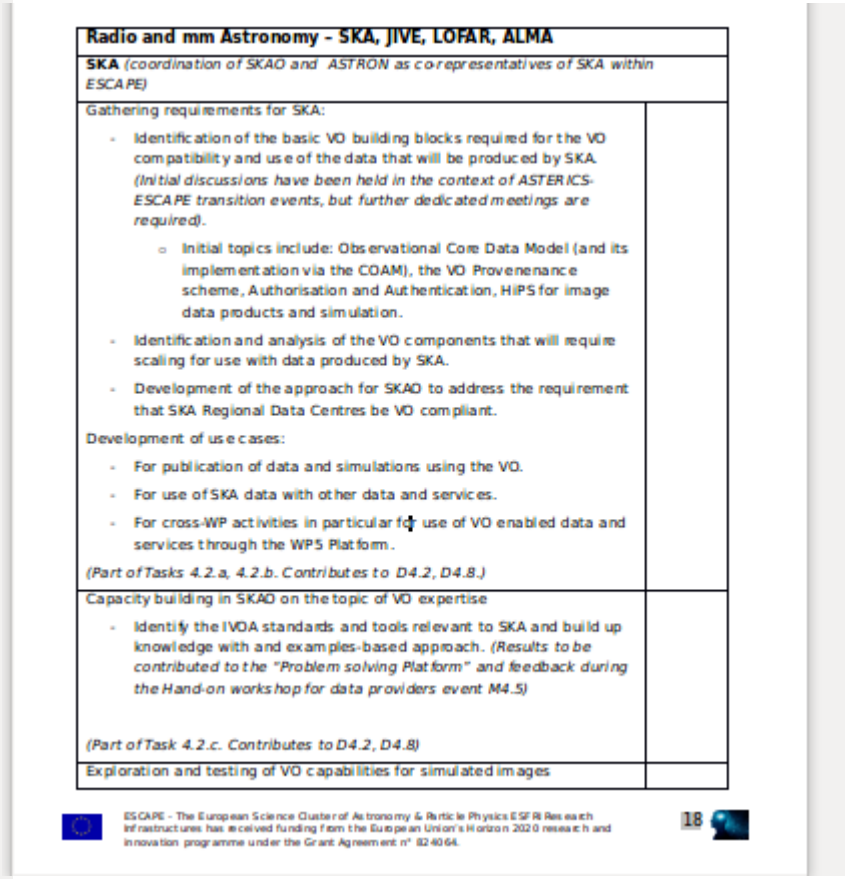
activities, and by design these plans
project based on the progress and th

En-tête (Style par défaut)

Solar Physics: EST – European Solar Telescope	
Solar physics thematic extension to the EPN-TAP protocol. - Review existing parameters and identify required parameters to include in EPN-TAP for solar physics. - Identify the necessary Unified Content Descriptors (UCDs) for solar physics. - Test the practical linking of exiting metadata to corresponding UCDs. - Coordinate the solar physics community effort for agreement on UCDs. *(Part of Tasks 4.2.a and 4.2.b. Contributes to D4.2)*	

Data Access Layer for solar physics data sets.
- Implementation of a TAP service (for data sets managed by ORB) using the thematic extension to EPN-TAP from above Integrate the TAP service within the existing SOLARNET Virtual Observatory.
- Linking the query language from ORB Event Database with ADQL.
- JHelioviewer improvements for VO interoperability. This includes study and test implementation of VOTable, TAP/ADQL and SAMP
  - Linking JHelioviewer with ORB Event Database.
  - Linking JHelioviewer with SOLARNET VO.
(Part of Task 4.2.a and 4.2.b, potential application in training events of 4.2.d. Contributes to D4.2, D4.8)	

Data discovery for solar physics data. - Linking solar Event Database resources with SPASE. A challenging and exploratory effort to bridge Solar VO and IVOA standards to improve interoperability (dependent on results of the extension to EPN-TAP) *(Part of Tasks 4.2.a, 4.2.b and 4.2.c. Contributes to D4.8)*	
VO data discovery for multi-dimensional solar data at KIS - Assess and test the use of IVOA Observation Core Data model (ObsCore) for multi-dimensional solar physics data at KIS - Develop detailed requirements for multi-dimensional solar data	



Radio and mm Astronomy – SKA, JIVE, LOFAR, ALMA	
SKA *(coordination of SKAO and ASTRON as co-representatives of SKA within ESCAPE)*	
Gathering requirements for SKA: - Identification of the basic VO building blocks required for the VO compatibility and use of the data that will be produced by SKA. *(Initial discussions have been held in the context of ASTERICS-ESCAPE transition events, but further dedicated meetings are required).* - Initial topics include: Observational Core Data Model (and its implementation via the COAM), the VO Provenenance scheme, Authorisation and Authentication, HiPS for image data products and simulation. - Identification and analysis of the VO components that will require scaling for use with data produced by SKA. - Development of the approach for SKAO to address the requirement that SKA Regional Data Centres be VO compliant. Development of use cases: - For publication of data and simulations using the VO. - For use of SKA data with other data and services. - For cross-WP activities in particular for use of VO enabled data and services through the WP5 Platform. *(Part of Tasks 4.2.a, 4.2.b. Contributes to D4.2, D4.8.)*	
Capacity building in SKAO on the topic of VO expertise - Identify the IVOA standards and tools relevant to SKA and build up knowledge with and examples-based approach. *(Results to be contributed to the "Problem solving Platform" and feedback during the Hand-on workshop for data providers event M4.5)* *(Part of Task 4.2.c. Contributes to D4.2, D4.8)*	
Exploration and testing of VO capabilities for simulated images	

VO standards

Technical Specifications

Group	Title	Most stable	In progress	Version history
App	SAMP - Simple Application Messaging Protocol	1.3		1.3 1.3 1.3 1.3 1.3 1.2 1.2 1.2 1.11 1.11 1.10 1.00
	VOTable - VOTable Format Definition	1.4		1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.3 1.3 1.3 1.2 1.2 1.2 1.20 1.20 1.10 1.00
	MOC - HEALPix Multi-Order Coverage Map	1.1		1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0 1.0 1.0
	HiPS - Hierarchical Progressive Survey	1.0		1.0 1.0 1.0 1.0 1.0 1.0
DAL	DALI - Data Access Layer Interface	1.1		1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
	DataLink	1.0		1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
	Simple Cone Search	1.03		1.03 1.02 1.01 1.00
	SIA - Simple Image Access	2.0		2.0 2.0 2.0 2.0 2.0 2.0 2.0 1.0 1.0 1.0 1.01 1.00
	SLAP - Simple Line Access	1.0	2.0	2.0 2.0 1.0 1.0 1.0 1.0 1.0 1.0
	SSA - Simple Spectral Access	1.1		1.1 1.1 1.1 1.1 1.04 1.03 1.02 1.01 1.01 1.00
	STC-S: Space-Time Coordinate Metadata Linear String Implementation	1.0		1.0
	TAP - Table Access Protocol	1.1		1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0 1.0 1.0 1.00
	TAPRegExt - A VOResource Schema Extension for Describing TAP Services	1.0		1.1 1.0 1.0 1.0 1.0 1.0 1.0 1.0
	ADQL - Astronomical Data Query Language	2.00	2.1	2.1 2.1 2.1 2.00 2.00 2.00 1.01 1.00
	SimDAL - Simulation Data Access Layer	1.0		1.0 1.00 1.00 1.00 1.00 1.00 1.00
	VOEvent Transport Protocol	2.00		2.00 2.00 2.00 1.00
	SODA - Server-side Operations for Data Access	1.0		1.0 1.00 1.00 1.00 1.00 1.00 1.00
	Observation Locator Table Access Protocol		0.5	0.5 0.4 0.4 0.2 0.2
	Object Visibility Simple Access Protocol		0.5	0.5 0.4 0.2 0.2
DaM	PHOTDM - Photometry Data Model	1.0		1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
	SimDM - Simulation Data Model	1.0		1.0 1.0 1.0 1.0 1.0 1.0
	STC - Space-Time Coordinate Metadata for the Virtual Observatory	1.33		1.33 1.31 1.30 1.21 1.20 1.10 1.00
	Data Model for Astronomical DataSet Characterisation	1.13		1.13 1.12 1.12 1.11 1.10 1.00
	SSLDM - Simple Spectral Lines Data Model	1.0	RFC	2.0 1.0 1.0 1.0 1.0 1.0
	SpectralDM - IVOA Spectral Data Model	1.1		2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 1.1 1.1 1.1 1.03 1.02 1.01 1.01 1.01 1.00
	ObsCore - Observation Data Model	1.1		1.1 1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0
	DatasetDM - Dataset Metadata Model		1.0	1.0 1.0 1.0 1.0
	CubeDM - N-Dimensional Cube/Image Model		1.0	1.0 1.0
	ProvenanceDM - Provenance Data Model		RFC	1.0 1.0 1.0 1.0 1.0 1.0
	Astronomical Coordinates and Coordinate Systems		RFC	1.0 1.0
	WCS Transform Model		1.0	1.0
	Meas - Astronomical Measurements Model		RFC	1.0
GWS	PDL - Parameter Description Language	1.0		1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 0.1
	SSO - Single-Sign-On Profile: Authentication Mechanisms	2.0		2.0 2.0 2.0 2.0 2.0 2.0 2.0 1.01 1.01 1.00 1.00
	VOSpace service specification	2.1		2.1 2.1 2.1 2.1 2.1 2.1 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 1.15 2.0 1.15 1.15 1.14 1.13 1.12 1.12 1.11 1.10 1.02 1.02 1.01 1.00 1.00
	Credential Delegation Protocol	1.0		1.0 1.0 1.01 1.01 1.00
	UWS - Universal Worker Service	1.1		1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0 1.0 1.0 1.0
	VOSI - IVOA Support Interfaces	1.1		1.1 1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0 1.0 1.0 1.0
	GMS - Group Membership Service		1.0	1.0 1.0 1.0
ReR	IVOA Identifiers	2.0		2.0 2.0 2.0 2.0 1.12 1.11 1.10 1.10 1.10 1.00
	IVOA Registry Interfaces	1.1		1.1 1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.00 1.02 1.01 1.00
	RM - Resource Metadata for the Virtual Observatory	1.12		1.12 1.12 1.10 1.10 1.01 1.01 1.00 1.00
	StandardsRegExt: a VOResource Schema Extension for Describing IVOA Standards	1.0		1.0 1.0 1.0 1.0 1.0 1.0 1.0
	SimpleDALRegExt - Describing Simple Data Access Services	1.1		1.1 1.1 1.1 1.1 1.0 1.0 1.0 1.0 1.0
	VOResource - an XML Encoding Schema for Resource Metadata	1.1		1.1 1.1 1.1 1.1 1.1 1.03 1.02 1.02 1.01 1.00
	VODataService - A VOResource Schema Extension for Describing Collections and Services	1.1	1.2	1.2 1.2 1.1 1.1 1.1 1.1 1.1 1.10
	RegTAP - Registry Relational Schema	1.1		1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0 1.0 1.0 1.0 1.0
Semantics	VOUnits - Units in the VO	1.0		1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
	UCD - An IVOA standard for Unified	1.10		1.10 1.10 1.06 1.05 1.03

EST
european solar telescope

- UCD for solar data :
  - UCD extension (similar to planetary extension). ROB
  - This is a new spec to design. Semantics
- Solar data in TAP/EPN-TAP
  - Distribute catalogs of flares, spots, etc ... ROB
  - Implement using UCD extension above and an ad hoc mapping to catalog format

EST
european solar telescope

- Visualisation tool : access via SAMP and ADQL interface
  - Jhelio viewer : jpeg2000, no HiPS
  - Implementation of current protocols to be tested.
- ObsTAP service for solar images
  - With KIS
  - Implementation to be tested
  - May require a specific ObsCore extension

SKA
square kilometer array

- Explore Obscore and CAOM to describe data
  - Science and visibility data / simple + complex observations
  - Mainly implementation
  - May require further investigation on ObsCore/CAOM « collaboration »
- Provenance
  - science data → raw and calibrated visibilities
  - Implementation of Provenance ?
  - Method to be explored. ProvTAP and ProvSAP to be completed.
- HIPS for simulated images
  - Implementation to be tested
- A&A
  - See ongoing work in GWS.

SKA

square kilometer array

- Link with WP5 (science platform)
  - Python developments
  - Feedback of recent VO notebooks
- Connection with regional centers
  - AENEAS reports feedback ?
  - European center
  - Identify regional centers needs

JIVE

Joint Institute for VLBI ERIC

european rearch infrastructure

- Standards for uv data
  - Characterisation and metadata for visibilities
  - Characterisation 2 + provenance implementation. DataLink usage
- Feedback on standards
  - Services implementation with Jive data
- Service registration
    - Implementation of services above

LOFAR
LOw Frequency Array

- ObsCore/ObsTAP implementation
  - Science data and visibility data
- Advanced discovery and access
  - Best sensitivity/target match
  - DataLinking additional metadata (uv coverage, frequency amplitude plots, etc..

ALMA
Atacama Large Millimeter Array

- Usage of VO standards and feedback
  - Obscore
  - DataLink
  - SODA + SIA2 ?
  - HiPS via AladinLite

CTA
Cerenkov Telescope Array

- Extending Provenance implementation to other ESFRI and multimessenger projects ---> KM3net
- Voevents implementation
- Contribute to data models for multi observatory and high level data
  - Char 2 , provenance extension ?
- Link to EOSC catalog
  - Registry implementation

ESO

- Time Domain, Alerts
  - VoEvent, TimeSeries
  - TimeSeries annotation. new ConeSearch (with Time constraint). TS MOC
- Authentication
  - GWS ongoing work
- Evolution of Standards and tools
  - ObsCore, SIA, SODA, DataLink, etc...
- Standard for new functionalities for astronomy archives
  - ????
- Machine Learning value-added data
  - Classification, semantics

KM3Net

Cubic kilometer Neutrino telescope

- VoEvent implementation
- Feedback on standards to IVOA
- Mapping in HDF5 formats
  - IVOA or IAU task ?
- Search of counterparts via VizieR and SIMBAD

EGO-VIRGO

- All sky GW visualization via HiPS
  - Follow up of Asterics collaboration for implementation
- TS MOC
  - implementation

Existing Standard implementations

- Applications standards :
  - HiPS, MOC, VOTable 1.4 (TIMESYS), SAMP
- DAL standards
  - ObsTAP, TAP, ADQL 2.1, SIA, SODA, DataLink, VoEvent
- Data Models :
  - Provenance
- Grid and Web services
  - UWS, SSO, credential delegation protocols
- Registry
  - All
- Semantics
  - UCD, vocabularies lists

Required Standard evolution

- Applications standards :
  - STMOC, VOTable 1.5 FILTERSYS ?, HDF5 ? Platforms ?
- DAL standards
  - Simple Cone Search 1.1 (with TIME), Time Annotation, DataLink 1.1, ProvTAP, ProvSAP, maybe VoEvent, SIA2.1, SODA 1.1
- Data Models :
  - ObsCore extensions, Characterisation 2, Provenance extensions (for instrumental configuration + STC, CAB-MSD
- Grid and Web services
  - Authorisation and Authentication standardization ?
- Registry
  - Caproles ?
- Semantics
  - UCD extension, IVOA vocabularies 2