EuroVO-AIDA

Euro-VO Astronomical Infrastructure for Data Access

D6.1

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Intermediate report on Evolution of interoperability standards and associated prototypes

Final Version

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INTRODUCTION

Work Package 6 is a Joint Research Activity (JRA1) on *Evolution of VObs interoperability standards*, led by UEDIN, with large contributions by CNRS, ESA, and INAF, and more minor contributions by other partners. Note that standards and protocols specifically relating to data access are undertaken mostly in Work Package 7 (JRA2) *Data Access Protocols and Data Models*, but with cross-link to JRA1. The bulk technical work on IVOA standards is undertaken in JRA1 and JRA2, but the co-operation between partners is a Networking Activity undertaken in WP2-3 (EuroVO-AIDA Technology Forums) and in WP2-4 (networking with the other members of the IVOA).

WP6 objectives are:

➢ To decide what technical standards and protocols are required for Euro-VO

➢ To bring forward these requirements to the IVOA

➢ To develop drafts of these standards

➢ To develop prototype software implementing the draft standards

➢ To make all possible effort to conclude international agreement on the necessary standards

➢ To ensure that deployments within Euro-VO are compatible with IVOA standards.

Its three strands of work are:

1 - Formulation of requirements and the technical plan. This takes input from other parts of Euro-VO, and formulates a plan which is used by all other parts, especially WP7-JRA2 and WP8-JRA3

2 - Participation in IVOA Working Groups. This includes coordinating our plan with the IVOA roadmap; producing draft standards; attending IVOA meetings and teleconferences; and reporting of IVOA progress to Euro-VO

3 - Development of software prototypes. Draft standards are tested by developing and deploying software prototypes which implement those standards (e.g. tools, dataset access). We will also develop recommendations for Euro-VO partners on construction of actual working infrastructure components which are compliant with VO standards

This report formally covers the first Cycle of EuroVO-AIDA project activities, until April 2009. The activities have been discussed at the Second and Third Euro-VO Technology Forums, which were held in Cambridge, UK, on 29th September - 2nd October 2008, and in Strasbourg, France, on 16th - 18th March 2009. Cycle 1 activities were assessed during the Mid-Term EuroVO-AIDA Board meeting, held in Paris on 29th June 2009, taking into account discussions at the Strasbourg IVOA interoperability meeting (24th - 29th May 2009).

1. FORMULATION OF REQUIREMENTS AND THE TECHNICAL PLAN

Broadly speaking the remit of WP6 is to cover those areas of IVOA activity not addressed by WP7 and to work closely with WP7 (and others) to ensure Euro-VO presents a unified message to the IVOA and that its needs are met.

To meet its objectives, WP6 is charged to:

> ➢ Investigate compliance testing of Euro-VO Registered resources
>
> ➢ Co-ordinate and document prototypes and standards
>
> ➢ Cover standards not addressed in WP7 (Data Access Layer, Data Models and VO Query Language):

- Applications	- VOTable
- Grid & Web Services	- Theory
- Resource Registry	- Open Grid Forum Astro-RG
- Semantics	- Data Curation & Preservation
- VO Event	

To this end Work Teams were established to focus on each of the IVOA Working Groups responsible for the standards above. More details can be found on the relevant TWiki page at: http://cds.u-strasbg.fr/twikiAIDA/bin/view/EuroVOAIDA/WP6WorkTeams.

Each Work Team decides what level of involvement within its IVOA Working Group is required and plans accordingly, within the remit of WP6.

Participation in the IVOA interoperability meetings to present EuroVO-AIDA findings and prototype and reference implementations of the standards is taken into account in the Networking task WP2-4 *International cooperation on the definition of IVOA standards*. Information sharing between partners amongst the Joint Research Activities is a networking activity undertaken in WP2-2 *EuroVO-AIDA Technology Forums*.

All IVOA documents and standards can be found at http://www.ivoa.net/Documents/.

Note:

WP6 has a wide remit and many of the IVOA activities are high-level that will only become active once key foundation problems have been addressed (typically Data Access standards, Application interoperability etc.).

WP6 activities in these derivative areas will be slow to start with and gather momentum as the IVOA heads towards more complex layered solutions.

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2. PARTICIPATION IN IVOA WORKING GROUPS

Reports from Work Team leaders on partners' participation in the IVOA Working Groups are given here, also for keeping track of the Interoperability standards development status at the time of the report (most of the developments were performed in the framework of VO-TECH and EuroVO-DCA, and on partners' resources).

2.1. Applications

SAMP (Simple Application Messaging protocol) standard: Recommendation achieved at the end of the reporting period. Since October 2008 there have been further discussions on the (IVOA) Applications/SAMP list, benefiting from contributions from various Euro-VO partners amongst others. These discussions and comments during the SAMP Request For Comments (RFC) period led to some fairly minor changes in the document.

The standard has been officially approved as an IVOA Recommendation (SAMP – Simple Application Messaging Protocol, Version 1.11, IVOA Recommendation 21 April 2009).

2.2. G&WS

➢ The VOSpace 1.0 standard has been updated to 1.14

➢ Credential Delegation protocol published- this is essentially a REST protocol for obtaining proxy certificates that complements the MyProxy protocol

➢ UWS (Universal Worker Services) 0.5 draft has been published

➢ UWS extended to accommodate DAL/TAP requirements

2.3. Resource Registry

➢ Discussions on the VODataService v1.1 schema RFC period towards end of 2008. Document was suspended until issues were resolved, in connection with TAP and VOSI discussions. These have now been addressed and VODataService can proceed to RFC as originally planned.

➢ Registry Interfaces v1.0 document in revisions to include ADQL (Astronomical Data Query Language) v1.0 definition and schema, according to comments during the RFC period.

➢ Discussions during Baltimore IVOA Interoperability meeting: expend Search possibilities with Google-like KeywordSearch and TAP-like (TAP is Table Access Protocol) search interface.

➢ Early brainstorming discussions took place between a few of the Registry Team participants about using XForms technology to improve Resources editing/creation/deletion/etc

➢ Various XForms implementations were discussed, among them: Chiba (http://chiba.sourceforge.net/) and FormFaces (http://www.formfaces.com/)

➢ The project is still being researched. Prototyping efforts are underway in CDS and France-VO.

2.4. Semantics

There is a specific strands of work on Semantics and ontologies in WP8 (Assessment of new technologies), and the Semantics activities are reported in the deliverable D8.1 (Intermediate report on Assessment of new technologies and associated prototypes).

2.5. VO Event

Nothing to report for this period

2.6.   VOTable

Steady progress towards ratifying VOTable V1.2 is being made with significant contributions from EuroVO-AIDA partners. The VOTable Working Group has also been instrumental in progressing the DAL/TAP standard by enhancing MIME types and including a new TAP field attribute.

2.7.   Theory

The coordination activity about Theory within WP6 was aimed at continuing the development of the standards building for accessing and retrieving the theoretical data begun in particular in EuroVO-DCA.

The activity is performed as collaboration between the partners involved in the Theoretical Virtual Observatory construction, born and developed within the IVOA Theory interest group and nurtured through the EuroVO-DCA FP6 Coordination Action.

In particular, the following points are in phase of developing or analyzing:

> Discussion of and interface between SimDAP (the Simulation Data Access Protocol) and SimDB (Simulation Data Base)

> Discussion about IVOA document note "S3: Proposal for a simple protocol to handle theoretical data (microsimulations)" [1]

> Analyzing the feasibility of overlapping graphics of theoretical and observational data using S3 protocol and STILTS tool

> Discussion inside the SimDAP group for including the S3 protocol inside the custom part of SimDAP

> Discussion and prototypal implementation of spectra in theoretical services based on SimDB

> VisIVO Server and VisIVO Web implemented using distant databases for visualization, download or/and cut-out of theoretical data

> Semantics for simulation

2.8.   OGF Astro-RG

The team actively participated in the 23rd OGF Barcelona meeting.

2.9.   Data Curation & Preservation

More activity is expected in the coming period at the IVOA level in this domain because of the recent selection by NSF of a DataNet project led by Johns Hopkins University, in which colleagues from the US Astronomical Virtual Observatory project are heavily involved.

Active participation in the RECURSE (Repository Curation Service Environment) workshop showed (again) the relevance of astronomy and the astronomical VObs visions of the domain.

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[1] http://www.ivoa.net/Documents/latest/S3TheoreticalData.html

3. DEVELOPMENT OF SOFTWARE PROTOTYPES

3.1. Applications

SAMP Prototypes:

- ➢ JSAMP (library/toolkit): New release with various new features, especially better graphical monitoring v0.3 (December 08)
- ➢ TOPCAT: First public release with full SAMP compatibility v3.4 (December 08)
- ➢ STILTS: First public release with table output to SAMP v2.0-2 (January 09)
- ➢ Aladin: Beta version has full SAMP compatibility; SAMP in public release expected 1-2 months
- ➢ SPLAT: SAMP compliance expected within a couple of months.
- ➢ GAIA: SAMP compliance expected before next public release; which however will likely not be before Summer 09 (GAIA's release schedule is determined by JAC Hawaii)

3.2. G&WS

VOSpace is the International Virtual Observatory Alliance interface to distributed storage. It is the visible side of the storage system.

To make a VOSpace usable in the real life we need an efficient storage mechanism. After a few experiences CDS has focused on iRODS which is a new data grid software system developed by the SDSC Storage Resource Broker team and collaborators. iRODS is easy to implement and provides a good solution to ensure the robustness of a VOSpace. The installation is simple and can be done without much manpower. It is possible to start with a small configuration and to follow the evolution of the needs.

VOSpace interface for iRODS has been implemented and the experience documented by CDS [2]

3.3. Registry

A prototype of the XForms technology can be found at the Euro-VO Registry, developed by ESA-VO:

http://registry.euro-vo.org/registry2/insert.jsp?identifier=esa://empty.doc/ Resource&action=new.

The technology has much improved since then. The discussion oriented itself towards a "plug-in" component that could be used by various Registries and Applications, instead of being intrinsically part of a specific software. If feasible and modular enough, the benefices of this project could be reaped by many partners in the Euro-VO and IVOA.

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[2] http://www.ivoa.net/Documents/cover/VOSpace-iRODS-20081025.html

3.4. Theory

The implementations described below have been started in the framework of the Theory pre-standardization activities of the EuroVO-DCA project. Relay has been taken by EuroVO-AIDA to consolidate them as important elements for the establishment of IVOA standards for Theory.

- ➢ Implementations of S3 protocol on BaSTI (A Bag of Stellar Track and Isochrones) web portal (http://wwwas.oats.inaf.it/IA2/index.php?option=com_content&task=view&id=50&Itemid=95)

- ➢ A first implementation of SimDB on micro-physics simulations has been done thanks to Laurent BOURGES. The test case concerned the development of a PDR database based on SimDB aiming at providing a set of pre-calculated simulations to help the community to prepare and interpret Herschel and ALMA observations in the field of molecular interstellar medium. This test showed that SimDB can fulfil some of the most important use cases. Some lacks of VO standards have been identified during this work, mainly concerning the need for precise vocabulary to describe micro-physics quantities, which will be done in close interaction with key persons of the IVOA Semantics Working Group. The prototype can be found at: http://pdr.obspm.fr/PDRDB/PdrQuery.do

3.5. VOEvent

CDS has begun a prototype implementation of VOEvent, to test the possibility to build a plugin to handle VOEvent information in Aladin.

ACRONYM LIST

ADQL	Astronomical Data Query Language
AIDA	Astronomical Infrastructure for Data Access
Aladin	Sky atlas and data discovery tool
ALMA	Atacama Large Millimetre Array
Astro-RG	Astronomical Grid Community Research Group (within OGF and IVOA)
BaSTI	A Bag of Stellar Track and Isochrones
CDS	Centre de Données astronomiques de Strasbourg
CNRS	Centre National de la Recherche Scientifique
D#	Deliverable number
DAL	Data Access Layer
DataNet	NSF program which aims to create "a set of exemplar national and global data research infrastructure organizations that provide unique opportunities to communities of researchers to advance science and/or engineering research and learning"
DCA	Data Centre Alliance
ESA	European Space Agency
ESA-VO	ESA - Virtual Observatory
Euro-VO	European Virtual Observatory
EuroVO-AIDA	Euro-VO Astronomical Infrastructure for Data Access (EC funded, FP7 Call "Scientific Digital Repositories")
EuroVO-DCA	Euro-VO Data Centre Alliance (EC Funded, FP6 eInfrastructure Communication Network Development)
G&WS	Grid and Web Services
GAIA	Graphical Astronomy and Image Analysis Tool, different from Gaia (ESA mission, Global Space Astronomy for the 21st century)
INAF	Instituto Nazionale di Astrofisica
iRODS	I Rule Oriented Data Systems
IVOA	International Virtual Observatory Alliance
JAC	Joint Astronomy Centre
JRA	Joint Research Activity
JSAMP	Java toolkit for use with the SAMP
MIME	Multipurpose Internet Mail Extensions
NSF	National Science Foundation (USA)
OGF	Open Grid Forum
PU	Public

RECURSE	Repository Curation Service Environment
REST	Representational State Transfer
RFC	Request For Comments (phase in definition of IVOA standards)
S3	Simple Self-Described Service
S3P	S3 Protocol
SAMP	Simple Application Messaging Protocol
SDSC	San Diego Supercomputer Centre
SimDAP	Simulations Data Access Protocol
SimDB	Simulation Data Base
SPLAT	Spectral Analysis Tool
STILTS	Starlink Tables Infrastructure Library Toolset
TAP	Table Access Protocol
TOPCAT	Tool for Operations of Catalogues And Tables
UEDIN	University of Edinburgh
UK	United Kingdom
US	Unites States
UWS	Universal Worker Service
VisIVO	Visualisation Interface to the VO
VO	Virtual Observatory
VOEvent	Virtual Observatory Event (Standardized library to report astronomical events)
VOSI	Virtual Observatory Support Interface
VOSpace	VObs-compliant user storage area
VOTable	Virtual Observatory Table format standard
VO-TECH	The European Virtual Observatory - VO Technology Centre (EC-funded project, Infrastructure Design Study, 2005-2008)
WP#	Work Package number