ASTERICS - H2020 - 653477

ASTERICS DADI Technology Forum Two

ASTERICS GA DELIVERABLE: D4.4

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Abstract

The Second ASTERICS DADI Technology Forum was held in Edinburgh on 7th & 8th March 2016. Many of those who attended the First Technology Forum (Strasbourg September 2015) were again present.

The meeting opened with an update of the ASTERICS project and continued with the usual

goals: information sharing between the member projects, preparation for the May IVOA Interoperability meeting (South Africa) as well as reviews of and preparations for various ASTERICS events and meetings including the first DADI School event in Madrid, December 2015. Detailed discussions (both planned and serendipitous) were catered for by the Hack-a-thon sessions and much useful, if sometimes sharp, debate was held with conclusions drawn and plans made.
This Second Technology Forum helped cement relationships and interactions between the various attendees and projects and prepared the way for the Cape Town Interoperability and forthcoming ASTERICS European Data Provider Forum and Training Event (EDP F&T) (15th-16th and 17th June 2016).

I. COPYRIGHT NOTICE

II. DELIVERY SLIP

	Name	Partner/WP	Date
From	K.Noddle	UEDIN	25 March 2016
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Reviewed by	WP4 Partners		3 June 2016
Approved by	AMST		27 June 2016

III. DOCUMENT LOG

Issue	Date	Comment	Author/Partner
1	25-Mar-2016	First Draft for discussion	K.Noddle, UEDIN
2	16-May-2016	Second draft including IVOA meeting assessment	F. Genova, CNRS-CDS
3	3-June-2016	Third draft reviewed by the partners	F. Genova, K. Noddle
4	27-June-2016	Final version including the Project Manager comments	F. Genova

IV. APPLICATON AREA

This document is a formal deliverable for the GA of the project, applicable to all members of the ASTERICS project, beneficiaries and third parties, as well as its collaborating projects.

V. TERMINOLOGY

A&A	Authorisation and Authentication
ADQL	Astrophysical Data Query Language
AIDA	Astronomical Infrastructure for Data Access (FP7 Euro-VO project)
ASTERICS	Astronomy ESFRI & Research Infrastructure Cluster
ASTRON	Netherlands Institute for Radio Astronomy
CDS	Centre de Données astronomiques de Strasbourg
CNRS	Centre National de la Recherche Scientifique
CoSADIE	Cooperative and Sustainable Astronomical Data Infrastructure for Europe (FP7)
CSP	Committee for Science Priorities (IVOA)
CTA	Cherenkov Telescope Array
DADI	Data Access, Discovery and Interoperability (ASTERICS WP4)
DAL	Data Access Layer
DALI	Data Access Layer Interface
DataLink	means of connecting one location to another for the purpose of transmitting and receiving digital information
DM	Data Model
EGO	European Gravitational Observatory
EM	ElectoMagnetic
EPN-TAP	Europlanet Table Access Protocol
ESA	European Space Agency
ESFRI	European Strategy Forum on Research Infrastructures
ESO	European Southern Observatory
Euro-VO	European Virtual Observatory
GAVO	German Astrophysical Virtual Observatory
GWSky	Probability map sky visualizer for Gravitational Waves
HiPS	Hierarchical Progressive Survey

ICE	International Cooperation Empowerment (FP7 Euro-VO project)
IG	Interest Group
INAF	Istituto Nazionale di Astrofisica
INTA	Instituto Nacional de Tecnica Aeroespacial
IVOA	International Virtual Observatory Alliance
LIGO	Laser Interferometer Gravitational-Wave Observatory
LUTH	Laboratoire de l'Univers et de ses Théories
MOC	Multi-Order Coverage
ObsCore	Observation Core Data Model
pgsphere	Provides spherical data types, functions, and operators for PostgreSQL
RAVE	Radial Velocity Experiment
RDA	Research Data Alliance
SAMP	Simple Application Messaging Protocol
SimDAL	Simulation Data Model
SODA	Server-side Operations for Data Access
SQL	Structured Query Language
SSO	Single Sign On
TAP	Table Access Protocol
TOPCat	Tool for Operations of Catalogues And Tables
UCD	Unified Content Descriptor
UEDIN	University of Edinburgh
UHEI	Ruprecht-Karls-Universität Heidelberg
UMR	Unité Mixte de Recherche
UWS	Universal Worker Service
VIRGO	Interferometer for detection of Gravitational Waves
VO	Virtual Observatory
VODSL	VO Data Specific Language (for VODML)
VODML	Modelling language for data models

VOEvent	Sky Event Reporting Metadata
VO-TECH	The European Virtual Observatory - VO Technology Centre Design Study, 2005-2008)
WG	Working Group
WP4	ASTERICS Work Package 4 Data Access, Discovery and Interoperability (DADI)

A complete project glossary is provided at the following page:
http://www.asterics2020.eu/glossary/

VI. PROJECT SUMMARY

ASTERICS (Astronomy ESFRI & Research Infrastructure Cluster) aims to address the cross cutting synergies and common challenges shared by the various Astronomy ESFRI facilities (SKA, CTA, KM3Net & E-ELT). It brings together for the first time, the astronomy, astrophysics and particle astrophysics communities, in addition to other related research infrastructures. The major objectives of ASTERICS are to support and accelerate the implementation of the ESFRI telescopes, to enhance their performance beyond the current state-of-the-art, and to see them interoperate as an integrated, multi-wavelength and multi-messenger facility. An important focal point is the management, processing and scientific exploitation of the huge datasets the ESFRI facilities will generate. ASTERICS will seek solutions to these problems outside of the traditional channels by directly engaging and collaborating with industry and specialised SMEs. The various ESFRI pathfinders and precursors will present the perfect proving ground for new methodologies and prototype systems. In addition, ASTERICS will enable astronomers from across the member states to have broad access to the reduced data products of the ESFRI telescopes via a seamless interface to the Virtual Observatory framework. This will massively increase the scientific impact of the telescopes, and greatly encourage use (and re-use) of the data in new and novel ways, typically not foreseen in the original proposals. By demonstrating cross-facility synchronicity, and by harmonising various policy aspects, ASTERICS will realise a distributed and interoperable approach that ushers in a new multi-messenger era for astronomy. Through an active dissemination programme, including direct engagement with all relevant stakeholders, and via the development of citizen scientist mass participation experiments, ASTERICS has the ambition to be a flagship for the scientific, industrial and societal impact ESFRI projects can deliver.

VII. EXECUTIVE SUMMARY

The Second ASTERICS DADI Technology Forum built upon the good work started in the First Technology Forum but with increased emphasis on technology and collaboration. A combination of formal presentations and informal discussions in the Hack-a-thon sessions were most effective at both informing and leading to decision making.

The meeting met its objectives, progressing the aims expressed in the First Technology Forum. Discussion and feedback about previous DADI events as well as plans for future events (both lead by and involving DADI partners) were especially fruitful.

Forthcoming events included the Second ASTERICS European School and the first European Data Provider Forum & Training event both planned before the next Technology Forum (expected in early 2017). In addition DADI partners attend the IVOA Interoperability meetings (Cape Town, May and Trieste, October) so preparations undertaken for those events were most timely.

An assessment of the themes discussed at the Cape Town meeting (8th-13th May 2016, ASTERICS Milestone 7) with respect to the topics addressed during the Second Technology Forum is included in this report. It demonstrates the relevance of the Technology Forum discussions to prepare the IVOA meetings. The production of this report was delayed by a few weeks to include this assessment.

The Third Technology Forum, which will be held in Strasbourg in March 2017, will continue and build upon the successes of the first two with focus on information dissemination, sharing and collaboration both technical and in the development and ratification of standards.

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1. Introduction

The European Virtual Observatory initiative began to organise regular “Technology Forums” during the VO-TECH Design Study (2005-2009). VO-TECH was led by the University of Edinburgh (UEDIN). These meetings gathered the European teams involved in the

development of the VO framework of standards and tools to disseminate information about technological activities and expertise, to build collaborations, to discuss future activities and to coordinate European participation in bi-yearly International Virtual Observatory Alliance (IVOA) "Interoperability" meetings. The astronomical Virtual Observatory is an international endeavour, and the IVOA leads the development of the interoperability standards, in which European teams have been playing a key role since the beginning.

The usefulness of these meetings was immediately obvious, and they were continued by all of the follow-up projects funded by the European Commission in the e-Infrastructure framework during FP7: the Integrated Infrastructure Initiative Euro-VO Astronomical Infrastructure for Data Access (EuroVO-AIDA, 2008-2010), as well as the two small Coordination Actions on which the coordination of European VO activities relied from 2010 to 2015: Euro-VO International Coordination Empowerment (EuroVO-ICE, 2010-2012) and Collaborative and Sustainable Astronomical Data Infrastructure for Europe (CoSADIE, 2012-2015).

Coordination of technological activities has been identified as one of the three pillars of the European Virtual Observatory[1], together with the support given to data providers to publish their data in the VO, and to astronomers in their usage of the VO. It was clear, when the Data Access, Discovery and Interoperability Work Package was set up for the ASTERICS proposal, that regular gatherings of the technical teams would be necessary. In addition to continuing the coordination of the technical work on VO development in Europe, Technology Forums were also identified as a key vehicle to put in touch the technical teams working on the VO and those from the ESFRI and pathfinder teams, to share knowledge and build collaborations on technical work. The Forums are thus part of ASTERICS WP4 Task 4.3 "Update of the VO framework from feedback and requirements", co-led by UEDIN and CNRS/UMR7550-CDS.

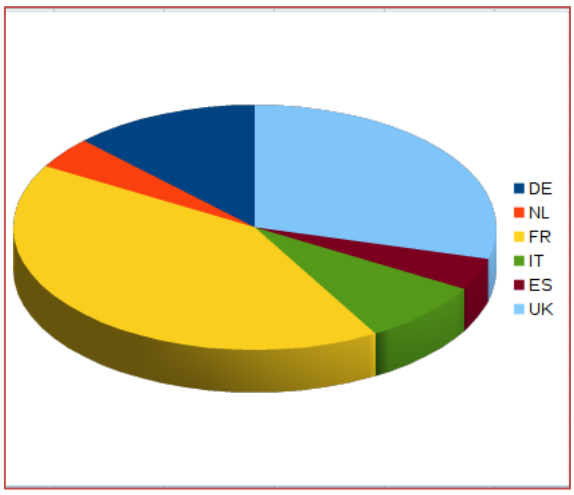
ASTERICS Deliverable 4.4 "Second ASTERICS DADI Technology Forum", organised by UEDIN in Edinburgh on 7-8 March 2016, was the fourth event organised by ASTERICS WP4 following the first Technology Forum, the First DADI School and the First ESFRI Forum & Training event. Participation in the meeting is described in Section 2 of this document. The meeting programme was organised to disseminate relevant information, in addition to technical discussions. This is detailed in Section 3, and record of the event is provided on the Wiki at https://www.asterics2020.eu/dokuwiki/doku.php?id=open:wp4:wp4techforum2. Findings and results are analysed in Section 4. The next steps are given in Section 5. The relevance of the Technology Forum for the preparation of European participation in the Cape Town IVOA meeting is assessed in Section 6.

[1] Genova,F., Allen, M.G., Arviset, C., Lawrence, A., Pasian, F., Solano, E., Wambsganss, J. : Euro-VO – Coordination of virtual observatory activities in Europe, Astronomy & Computing, Vol. 11, pp. 181-189, 2015, ArXiv 1506.06567

2. Participants

24 participants attended the meeting with others joining via Skype for one or more sessions. These included people from UHEI, ESO, ASTRON, CDS, LUTH, INAF, and UEDIN representing Germany, The Netherlands, France, Italy, Spain and the UK as well as affiliated institutions within those countries. There was a useful mix of technical and scientific representation at the meeting ensuring focus and enabling detailed discussions.

Figure 1 : Participants countries of origin



3. Programme

The programme followed the lead set in the First Technology Forum which itself was informed by earlier VO-related meetings. The programme was published on the meeting wiki page and expanded during and immediately following the meeting to provide an accurate record of the events, including the slides presented and the discussions held during the Hack-a-Thon, and access to reference materials.

Day 1 : Monday, March 7th		
10:00	Coffee	
10:15	Welcome and round table intros	Keith Noddle/ Mark Allen

10:40	DADI status	Françoise Genova
11:00	EM follow-up of gravitational wave candidates	Giuseppe Greco
11:20	HiPS - Hierarchical Progressive Survey	Pierre Fernique
11:40	A&A systems developed for CTA	Mathieu Servillat
12:00	Applying A&A to server/client VO scenario	Marco Molinaro
12:20	Applicable conditions for A&A (web, non web resources, etc.)	Marco Molinaro
12:40	VODML from a VODSL perspective	Paul Harrison
13:00	Lunch	
14:00	Links between Provenance Data Model prototype and the IVOA Dataset Metadata data Model	Mireille Louys
14:15	DAL protocols for ESFRI projects / current status	Francois Bonnarel/ Chaitra Koragappa
	- IVOA DAL context status	
	- current development at CDS : DataLink integration within Aladin	
14:50	Aladin Lite and usage of the MOCServer	Thomas Boch
15:10	SAMP over HTTPS	Mark Taylor
15:30	Afternoon tea	

15:50	Intro to Hack-a-thon	Keith Noddle
16:00	Hack-a-thon	
17:30	Close	

Day 2 : Tuesday, March 8th		
09:30	Description and discovery of VizieR resources in VO registries	Sébastien Derriere
09:50	Registry	Markus Demleitner
10:50	Coffee	
11:10	SODA – what's all the fuss about on the DAL list?	Markus Demleitner
11:30	Madrid School	Françoise Genova (on behalf of Enrique Solano)
11:50	Engaging with major astronomy projects at the next IVOA meeting	Mark Allen
12:10	Discussion : Engagement & IVOA Interop preparation	
13:00	Lunch	
14:00	Hack-a-thon	

15:30	Afternoon tea	
15:50	Hack-a-thon	
17:00	Conclusions	Keith Noddle/ Mark Allen
17:30	Close	

Figure 2: A presentation during the meeting

4. Proceedings & Analysis

The meeting continued and expanded upon the good work started in the First Technology Forum. Formal presentations provided information and updates about the projects and activities in which DADI is engaged as well as opportunities to highlight key topics to be addressed at the forthcoming IVOA Interop in Cape Town, May 2016. The Hack-a-thon events were busy, incisive and productive with detailed notes recorded on the meeting Wiki page.

To set up the context, DADI status and the engagement of large projects at the next IVOA meeting, as well as a report on the DADI School (D4.2) organised in Madrid in December 2015, were presented. Most of the main topics identified during the First Technology Forum and the First ESFRI Forum and Training Event remained on the agenda. Topics covered included:

- Electromagnetic (EM) follow-up of gravitational wave candidates: This talk showed how by building upon existing VO infrastructure an application that seeks gravitational wave candidates, GWSky, was made easily possible. Further discussion about enhancing the application was also undertaken during the Hack-a-Thon; proof positive of the usefulness of these meetings.
- HiPS - Hierarchical Progressive Survey: The latest status of HiPS was presented by the chief architect of the system and discussion followed. He also explained the usage of the MOCServer (Multi-Order Coverage Server), which serves HiPS files, in Aladin Lite. HiPS, MOC and Aladin have been used by the LIGO/EGO-VIRGO team in the GWSky tool.
- A&A: Authentication and Authorisation continues to be a hot topic with talks and detailed Hack-a-thon sessions devoted to it. Agreement was reached to progress the topic within the context of ASTERICS DADI, work being shared between delegates.
- The discussion of the usage and evolution of pgsphere, which had begun during the First Technology Forum, continued.
- IVOA Standards: Several talks and discussions centred around IVOA Standards took place including
    - in the Data Model domain, talks about the Provenance Data Model and VODML. Provenance was also discussed during the Hack-a-Thon.
    - DAL protocols, which are currently a key topic for both ASTERICS and the IVOA, in particular the “multi-dimensional standard caravan” defined following the requirements of the IVOA Science Priority Committee, which must converge soon. The last element of the caravan is the SODA protocol, with a sometimes hot debate to expand the requirements, which continued during the Hack-a-Thon and after the meeting. Evolution of the Astronomical Data Query Language ADQL was also discussed.
    - Registry, and VizieR requirements with respect to the IVOA standard (VizieR provides about 90% of the resources registered in the IVOA Registry of Resources).
    - The potentially critical problem of using the Simple Astronomical Messaging Protocol SAMP, which is the key element to ensure interoperability between VO-enabled tools, across HTTPS was also discussed.
    - UEDIN explained that they are working with a LSST team from Belfast on Time Domain.
- Preparation for forthcoming events: Talks and discussions covered the forthcoming IVOA Interoperability meeting, the Second European School and the European Data Provider Forum & Training event.

Details of both talks and Hack-a-thon sessions can be found on the meeting Wiki page.

Figure 3: Discussions in small groups during the hack-a-thon sessions

5. Next Steps

The Cape Town IVOA Interoperability Meeting was the next event on the calendar that required DADI focus. Preparations were started at the Second Technology Forum and continued afterwards. Topics to be covered included HiPS, the Provenance Data Model, SODA and A&A (Single Sign On) amongst others. The relevance of the Second Technology Forum discussions with respect to the IVOA meeting is assessed in Section 6 of this report.

The next DADI events will be the first "European Data Provider Forum & Training event" in June 2016, followed by the Second DADI School in November. The Data provider event, which is D4.6, was initially foreseen to be held in November 2016 but it was decide to hold it rather before Summer. It will be organised by UHEI in Heidelberg (Germany), whilst the School (D4.5) will be organised by CDS-CNRS in Strasbourg (France).

This will be followed by the Third ASTERICS DADI Technology Forum (D4.7) in Strasbourg early in 2017.

6. Assessment of the relevance of the Technology Forum with respect to the IVOA Cape Town Interoperability Meeting

The Cape Town IVOA meeting, which is ASTERICS Milestone 7, was held two months after the Second Technology Forum. It was thought that including information about the meeting in this D4.4 report would allow an assessment of DADI and D4.4 impact. The list of talks presented by participants from Europe at the Cape Town Interoperability meeting is given in Annex 1. All topics discussed during the Second Technology Forum are present. They are printed in red in the list.

The meeting included four Focus Sessions devoted to gathering the requirements of large projects, perfectly in line with ASTERICS DADI work Programme. CTA and Gravitational Waves were represented by DADI partners, who had participated in the Technology Forum and explicitly quoted “ASTERICS” in the programme. These Sessions will be used to define IVOA priorities for the future. One interesting new outcome is that several projects are eager to use modelling results together with their data. The IVOA has a Theory Interest Group which is completing its data access standard. This topic was not included in DADI until now but it may appear as an ESFRI requirement at a later stage. The results of the Focus Session are being analysed by the IVOA Committee for Science Priorities (CSP), which is led by M. Allen (CDS), an active DADI participant. Increased priority will certainly be given to the Time Domain standards, well in line with the needs of DADI ESFRI partners.

Another Plenary session, as well as one of the Splinter Sessions, was devoted to Education. The Chair of the IVOA Education Interest Group is M. Ramella, who participates in ASTERICS WP2 DECS on behalf of INAF.

As expected, the Data Access Layer discussion on the multi-dimensional cube standards was a major topic of the meeting. Consensus was at last reached on adopting an incremental standardization process with a first step fulfilling the minimal CSP requirements. SODA is in the Proposed Recommendation phase and should become a recommendation within a few months. Other important topics linked to discussions held in Edinburgh were Authorisation & Authentication and Provenance. The registration of VizieR resources and SAMP over HTTPS were also discussed. A splinter session on pgsphere was proposed by M. Nullmeier (UHEI) and added to the programme.

Liaison with RDA is also one of DADI activities. Two talks on RDA activities and outcomes were presented by CDS staff in the Data Curation and Preservation session.

The IVOA Interoperability meetings are key milestones for DADI. This report is an occasion to show European, and DADI, influence in the IVOA. At the beginning of the Cape Town meeting, all the IVOA Working Groups and Interest Groups, except one, the Time Domain

Interest Group, had at least one Chair from Europe, with the Data Access Layer Working Group and the Theory Interest Group having their two Chairs from Europe. Chairpersonship of the Groups is regularly renewed, and after the meeting the Time Domain Interest Group has a Vice-Chair from UEDIN, D. Morris, who is also the technical contact person for time domain in DADI. Two-thirds of the talks presented during the sessions had at least one author from Europe. DADI boosts the European participation in the IVOA by providing the direct link with the ESFRI projects which had been needed for a while to ensure the full relevance of the VO developments to their needs, and to make them active participants, and not only consumers of the VO.

ANNEX 1: Talks presented by participants from Europe at the Cape Town Interoperability meeting

All the talks presented by participants from Europe are listed here, to show the European influence in the IVOA. Many of them are directly associated to DADI (indicated by a *). ESA is also working closely with it. Talks directly related to discussions in the Second Technology Forum are shown in red.

Opening plenary

C. Arviset (ESA)	State of the IVOA
M. Allen* (CDS)	CSP Report (CSP= Committee for Science Priorities)
Charge to the Groups	
P. Fernique* (CDS), T. Donaldson	WG Applications
F. Bonnarel* (CDS), M. Molinaro* (INAF)	WG Data Access Layer
M. Cresitello-Dittmar, L. Michel (OAS, France)	WG Data Model
B. Major, G. Taffoni* (INAF)	WG Grid & Web Services
M. Demleitner* (UHEI), T. Dower	WG Registry
M. Louys* (CDS), A. Accomazzi	WG Semantics
F. Genova* (CDS)	IG Data Curation & Preservation
M. Ramella* (INAF), S. Barway	IG Education

K. Polsterer (HITS, Germany)	IG Knowledge Discovery
T. McGlynn, M. Taylor* (Bristol, UK)	IG Operations
F. Le Petit (Paris Observatory, France), C. Rodrigo* (INTA)	IG Theory

Focus Sessions : Interoperability of data from major interoperability projects

M. Allen* (CDS)	Introduction to the Focus Sessions
M. Servillat* (Paris Observatory)	ASTERICS - CTA: the Cherenkov Telescope Array
B. Merin (ESA)	ESA Euclid and Gaia
G. Greco (INFN), E. Chassande-Mottin* (APC), M. Branchesi, G. Stratta et al.	ASTERICS - EGO/VIRGO/Gravitational Waves

Application Working Group (9 talks with authors from Europe on a total of 11)

T. Boch* (CDS) & the CDS Team	The new CDS portal, built on top of HiPS and MOC technologies
M. Gangloff (IRAP, France), et al. (from IRAP, GFI Informatique Toulouse and Paris Observatory)	IVOA Standards in IRAP tools (3DView, AMDA, CASSIS) in the framework of H2020/VESPA
G. Landais (CDS), L. Michel (OAS), P. Ocvirk (CDS)	Spectra & Images in VizieR

B. Cecconi, R. Savalle (Paris Observatory, France) & the JUNO-Ground-Radio team	JUNO-Ground-Radio Observation Support
P. Skoda, D. Andresic (Czech Republic)	Overview of new features in SPLAT-VO
R. Haigron, C. Chauvin, J. Normand, P. Le Sidaner (all from Paris Observatory)	Feedback on VOTable schema declaration
S. Sanchez Esposito (CSIC, Spain)	GUIpsy: a VO compliant tool for the kinematic analysis of datacubes
D. Durand, T. Boch* (CDS)	HiPS news: standardization process & Aladin Lite improvements

Data Access Layer Working Group (6/13 talks) – chaired by F. Bonnarel* (CDS) and M. Molinaro* (INAF)

TAP/ADQL/DALI	
M. Demleitner* (UHEI)	DALI example endpoints for various services
D. Morris* (UEDIN)	ADQL updates (OFFSET, HEX and XMATCH)
D. Morris* (UDIN)	Cosmopterix (Docker containers for database platforms)
Cube DAL feedback and implementation	
F. Bonnarel* (CDS)	SODA: General introduction to the topic

M. Demleitner* (UHEI)	SODA on cubes and large images, with an XSLT-based stand-in client
F. Bonnarel* (CDS), C. Koragappa* (CDS)	SODA and Datalink implementations within Aladin (ASTERICS)

Data Model Working Group (8/12 talks) – chaired by M. Cresitello-Dittmar and L. Michel (OAS)

VO-DML	
M. Cresitello-Dittmar, L. Michel (OAS)	Introduction
J. Salgado (ESA), M. Demleitner* (UHEI)	SourceDM
Provenance	
M. Louys* (CDS)	ObsCore 1.1
K. Riebe* (AIP-GAVO, Germany)	Provenance Data Model. Introduction
K. Riebe* (AIP-GAVO, Germany)	RAVE
M. Sanguillon*, A. Palacios, A. Lèbre (all from LUPM, France)	Pollux DB
M. Servillat* (LUTH)	CTA Model
M. Louys* (CDS)	Provenance Data Model: current state

Registry Working Group (6/8 talks) – chaired by M. Demleitner* (UHEI) and T. Dower

P. Le Sidaner (Paris Observatory)	Registry requirements for EPN-TAP
S. Derriere* (CDS)	Registering data collections at CDS
M. Demleitner* (UHEI)	SimpleDALRegExt 1.1
M. Demleitner* (UHEI)	Managing managedAuthorities
M. Perdikeas (ESA)	RegTAP at ESAVO
M. Demleitner* (UHEI)	VOResource 1.1

Grid and Web Services Working Group (7/10 talks) – chaired by B. Major and G . Taffoni* (INAF)

Authorisation and Authentication	
G. Taffoni* (INAF)	INAF A&A Roadmap
M. Servillat* (LUTH)	A&A system for CTA
G. Taffoni* (INAF)	SSO 2.0 Updates
GWS Session 2	
A. Schaaff*, N. Wali, F.-X. Pineau (all from CDS)	Cross-match using Spark/Hadoop
M. Servillat* (LUTH)	OPUS: UWS web client/server

K. Riebe* (AIP-GAVO, Germany)	uws-client - A command line tool for UWS services
M. Taylor* (Bristol)	SAMP over HTTPS

Semantics Working Group (4/4 talks) – chaired by M. Louys* (CDS) and A. Accomazzi

M. Molinaro* on behalf of Sonia Zorba (INAF)	Embedding UCD user interface in a TAP_SCHEMA manager application
B. Cecconi (Paris Observatory)	A proposal for Instrument and Facility Nomenclature
B. Cecconi, S. Erard (Paris Observatory) & VESPA	UCD for planetary science update
M. Louys* (CDS)	Current update on UCD Standard

Data Curation and Preservation Interest Group (2/5 talks) – chaired by F. Genova*(CDS)

F. Genova* (CDS)	Outcome of the RDA work on Certification of data repositories
A. Schaaff* (CDS)	Some comments about my participation to RDA (Tokyo)

Education Interest Group (8/11) – chaired by M. Ramella* (INAF) and S. Barway

M. Ramella* (INAF)	Introduction
K. Riebe (AIP-GAVO)	A teacher workshop on data from cosmological simulations
H. Heinl (UHEI)	VO-DAYS – Proof of concept
A. Schaaff* (CDS)	Google Cardboard use in astronomy
M. Molinaro* (INAF)	VAPE: status and possible developments
H. Heinl (UHEI)	Gaia as an opportunity of VO education
M. Ramella* (INAF)	VO goes to school
M. Demleitner* (UHEI)	Tutorials for VO-Days and Beyond: Register them!

Operations Interest Group (9/11 talks) – chaired by T. McGlynn and M. Taylor* (Bristol)

Operations review and Validation	
M. Perdikeas (ESA)	Current Validation Results from ESA
P. Le Sidaner, R. Savalle, J. Normand (all from Paris Observatory)	Validation status – Registry content weather report
M. Demleitner* (UHEI)	IVOA ID Validation

K. Riebe* (AIP – GAVO)	UWS validation
T. Boch* (CDS)	MOC validation
P. Le Sidaner, R. Haigron, C. Chauvin (all from Paris Observatory)	Testing VOEvent Frameworks
VO implementations and operations etiquette	
M. Taylor* (Bristol)	TAPlint standards coverage
M. Demleitner* (UHEI)	VO Protocols Implementation in GAVO

Theory Interest Group (2/2 talks), chaired by F. Le Petit (Paris Observatory) and C. Rodrigo (INTA)

C. Rodrigo* (INTA)	SIMDAL implementation in Madrid
F. Le Petit (Paris Observatory)	SIMDAL implementation in Paris

Time Domain Interest Group (2/3 talks)

S. Derriere* (CDS)	Exploring Time Series in VizieR
J. Naadvornik, P. Skoda (Czech Republic)	Time Series Data using Sparse Data Cube Model

Splinter Session: PostgreSQL + pg_sphere development (proposed by M. Nullmeir* - UHEI)

Closing Plenary

P. Fernique* (CDS), T. Donaldson	WG Applications
F. Bonnarel* (CDS), M. Molinaro* (INAF)	WG Data Access Layer
M. Cresitello-Dittmar, L. Michel (OAS, France)	WG Data Model
B. Major, G. Taffoni* (INAF)	WG Grid & Web Services
M. Demleitner* (UHEI), T. Dower	WG Registry
M. Louys* (CDS), A. Accomazzi	WG Semantics
F. Genova* (CDS)	IG Data Curation & Preservation
K. Polsterer (HITS)	KDIG
T. McGlynn, M. Taylor* (Bristol)	IG Operations
F. Le Petit (Paris Observatory,France), C. Rodrigo* (INTA)	IG Theory
M. Allen* (CDS)	CSP Closing Remarks
C. Arviset (ESA)	Closing remarks