State of the IVOA

Christophe Arviset
Chair of the IVOA Executive Committee

IVOA Interop Meeting Opening Session
Cape Town, South Africa, 09/May/2016

South African Astroinformatics Alliance
A National South African Virtual Observatory

Brian Schmidt
Nobel Laureate

Inspiring talk at
ADASS 2015 in
Sydney !

Astronomy is a Leader

- Astronomy (along with High Energy Physics) - thanks to this community - has done a better job integrating data and making it accessible across the our discipline than any other community

- FITS - ADS - VO data formats

- Others learn and follow - and this leadership helps keep Astronomy relevant
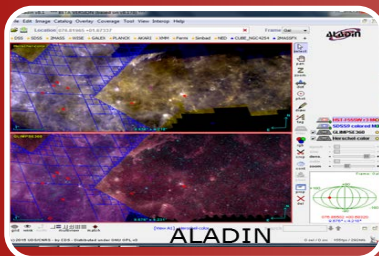
Brian Schmidt, Nobel Laureate
Big Data and Big Astronomy
ADASS 2015, Sydney

Vision of the IVOA
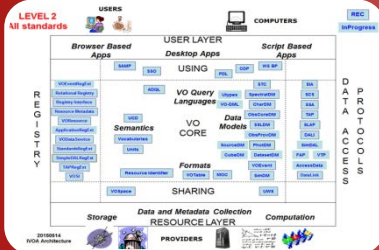
Develop an interoperable data management framework for astronomy

- Interoperability standards (VO framework) amongst astronomical (ground and space based) archives
- Publishing tools for data centres

ALADIN

Enable new science through the VO

- Multi wavelength science, combining datasets from multiple sources
- Data discovery and data access tools
- Data analysis and visualization tools

World wide collaboration amongst astronomical VO projects

- Created in 2002, 20 projects today
- No formal funding, nationally funded projects
- Diversity makes IVOA's richness

Standards Matter!

- Astronomy has done better than most at keeping to standards.

- This allows everyone to write software to the standard - It worked for the web, its worked for Astronomy

- But we need to be vigilant! WCS systems as an example...

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IVOA stable Architecture

Stable IVOA Architecture, with well established interoperability standards

➢ tables, images, spectra, registries

➢ New standards to support science cases

➢ Updated standards required from implementation feedback
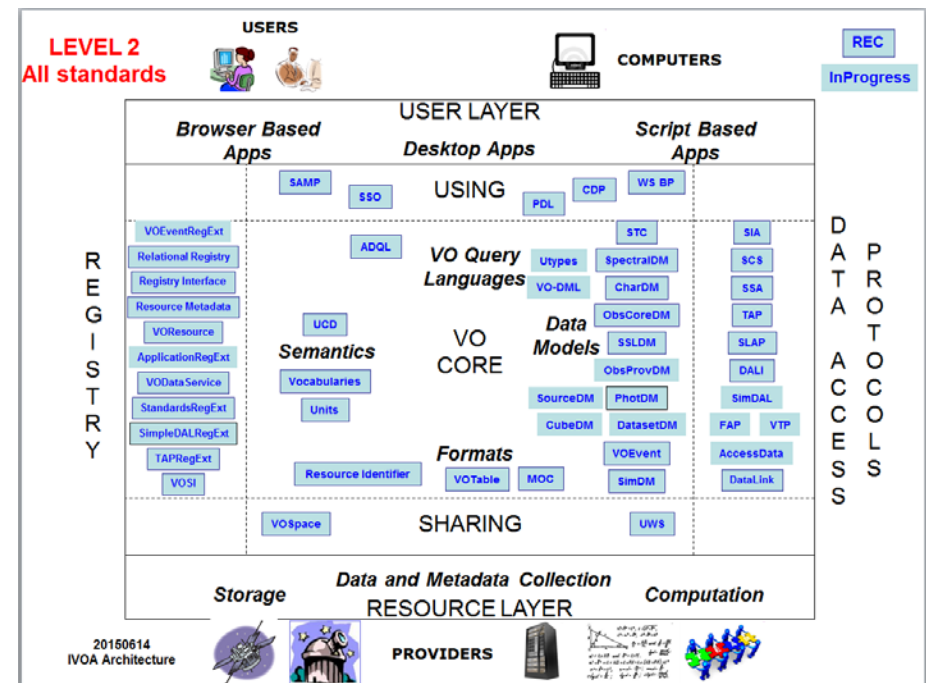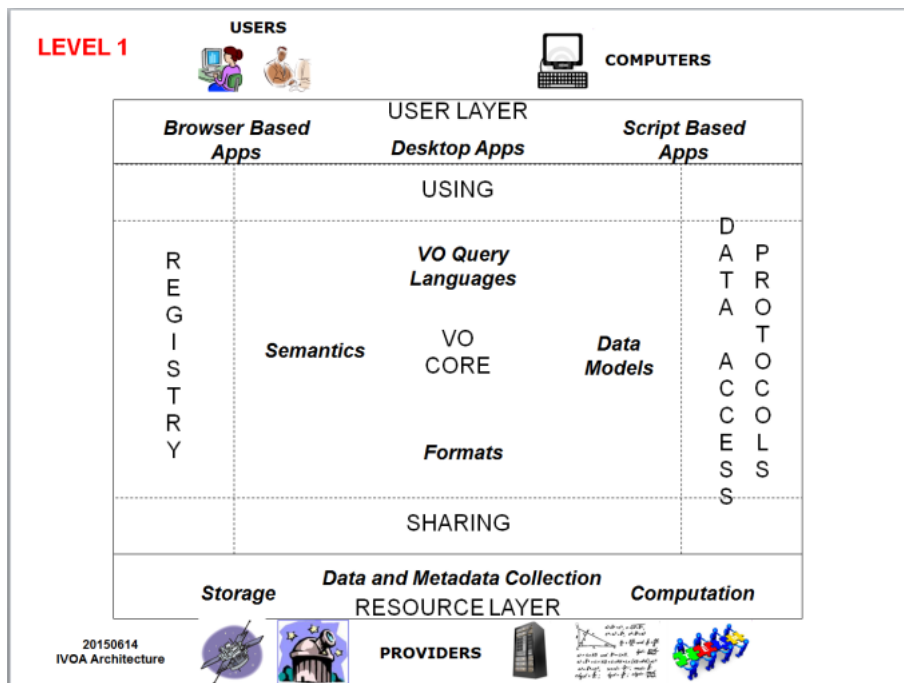
VO compliant major data collections

1. Major astronomical data collections accessible through the VO
   a. CDS, CADC, MAST, ESA, Chandra, ...
   b. More and more coming in...

VO built in astronomy data archives

1. VO being used to build new astronomical data infrastructure
   a. CADC, Gaia, Euclid, …

VO interoperable applications

Topcat, Aladin, VOSpec, SPLAT-VO, ESASky, Iris, and <u>many more</u> ...

ALADIN

SPLAT-VO
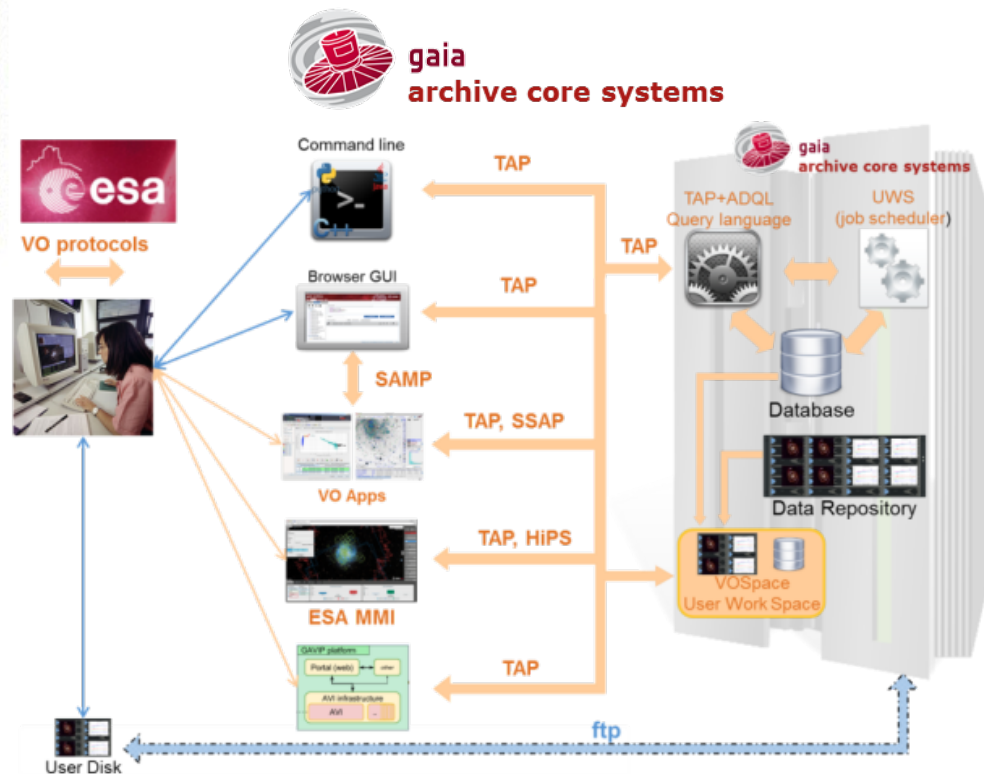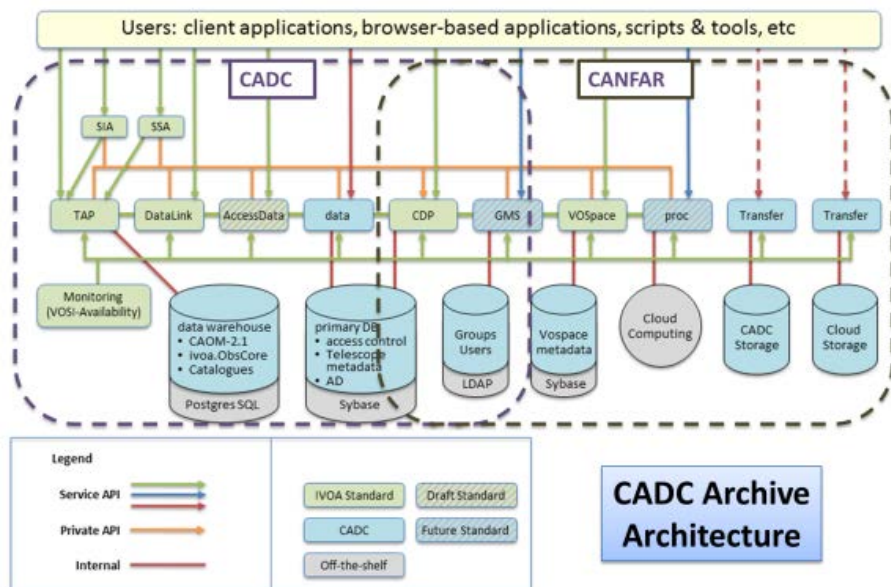
Warning !

*The VO is **not** an astronomy "killer" application*

*It is **not** either a magic solution to all astronomy data management challenges*

*but it offers a **powerful tool** and **useful solutions** to some of them*

a. Interoperability amongst datasets

   – and VO science applications will be the key

b. IVOA Standards to help building archive data centre infrastructure

c. And there are still some science cases to be addressed

*If one wants to **take something out** of the IVOA, one needs to **bring something in***

a. Need to convince big projects to participate in standards development so they can better fit their needs

b. And IVOA needs to go faster so we can meet projects deadlines

> "If You want to go quickly Go alone
> If you want to go far Go together."
>
> **African Proverb**
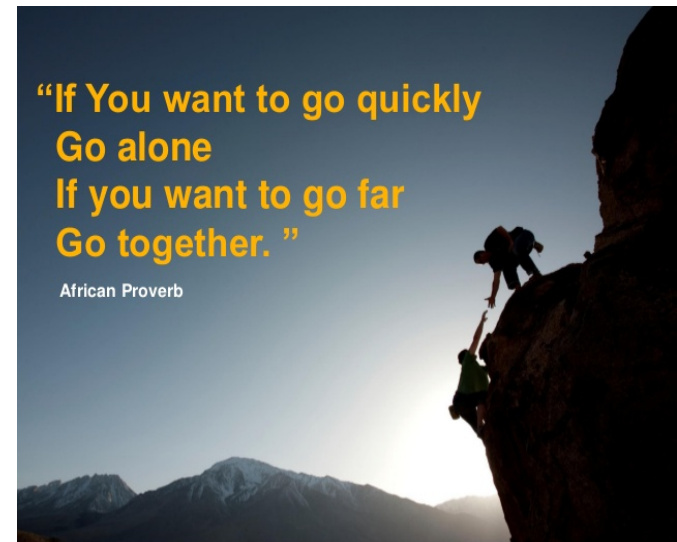
VO Challenges – take up

1. Engagement of big projects and how the VO can help them ?
    a. How to capture their requirements into IVOA standards development process ?
    b. How to adapt to their development timelines and constraints ?

2. Facilitate and improve VO take-up by Data Centres
    a. Two different models of VO implementations (VO layer or VO built-in)
    b. VO publishing tools for small data centres with little IT expertise
    c. VO software libraries for bigger data centres with more IT expertise
    d. Simple services (S*AP) vs advanced services (TAP, DM)

Need to make big projects and data centres
"participants" not "customers"

Engage big projects with IVOA
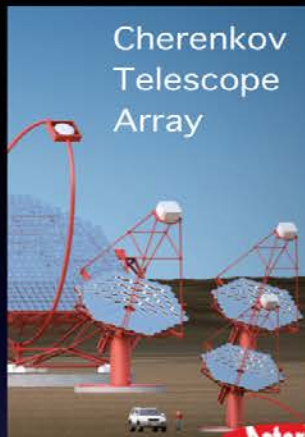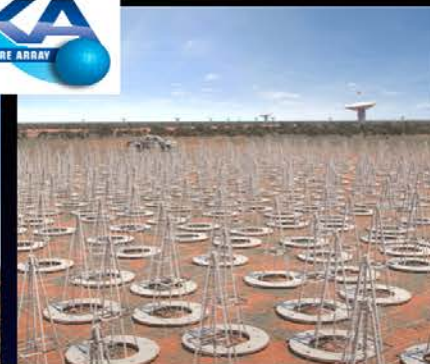
VO Challenges – Operations

1. VO is in use, but how to see it ?

2. How to define VO success (or failure) metrics ?

   a. Counting scientific publications ?

      – But doesn´t capture VO use...

   b. VO services access statistics ?

      – But not uniformly collectable and comparable...

3. VO Services Operations

   a. Reliability of existing VO Ecosystem

   b. Hundreds of VO services in the IVOA Registries...

      – Compliance of VO services ?, VO Services validators

   c. IVOA to become more active in this

   Is the VO success to be "invisible" ?

IVOA Organization

1. Executive Committee

    ➢ IVOA Chair, IVOA vice-Chair (rotating, 18 months term)

    ➢ Representatives from all national VO projects

2. Committee on Science Priorities

    ➢ Identify research needs of the worldwide astronomy community that can benefit from VO related tools and services,

    ➢ Take action within the context of the IVOA to assist in placing such tools and services into the research community

3. Technical Coordination Group

    ➢ Develop IVOA interoperability standards to support science cases

    ➢ 6 active Working Groups defining interoperability standards

    ➢ 7 Interest Groups

New IVOA chair and vice-chair

1. Christophe Arviset's IVOA chair 18-month term normally ended in May 2016
2. Usually IVOA vice chair is recommended for becoming chair, but Enrique Solano declined the nomination

3. Agreement at IVOA Exec telecon in 21 Dec 2015
   a. Extend Arviset's IVOA chair term by 6 months up to Trieste interop
   b. Nominate a new IVOA vice chair at beginning of Cape Town interop
   c. IVOA vice chair and new IVOA vice chair can work together during two interop meetings
   d. New IVOA chair and vice chair to be nominated at Trieste interop

4. At IVOA Exec meeting on 9 May 2016
   a. Pepi Fabbiano (USVAO, SAO-CXC) nominated new IVOA vice chair

IVOA TCG terms renewal

1. Kai newly appointed KDD chair

2. Massimo and Sudhanshu terms extended by 1 year in Education IG

3. To be decided at this interop
   a. Theory IG Chair
   b. Time Domain IG chair and vice-chair

	Chair	Vice-Chair
TCG	Matthew Graham	Pat Dowler
Working Groups		
Applications	Pierre Fernique	Tom Donaldson
Data Access Layer	François Bonnarel	Marco Molinaro
Data Model	Mark Cresitello-Dittmar	Laurent Michel
Grid and Web Sevices	Brian Major	Giuliano Taffoni
Registry	Markus Demleitner	Theresa Dower
Semantics	Mireille Louys	Alberto Accomazzi
Interest Groups		
Data Curation & Preservation	Françoise Genova	n/a
Education	Massimo Ramella	Sudhanshu Barway
Knowledge Discovery in Databases	Kai Lars Polsterer	n/a
Operations	Tom McGlynn	Mark Taylor
Theory	Franck Le Petit	Carlos Rodrigo
Time Domain	John Swinbank	Mike Fitzpatrick
IVOA Committees		
Exec	Christophe Arviset	Enrique Solano
Standard and Processes	Francoise Genova	n/a
Science Priorities	Mark Allen	n/a

Participants per Interop

Number of Participants per IVOA Interoperability Meeting
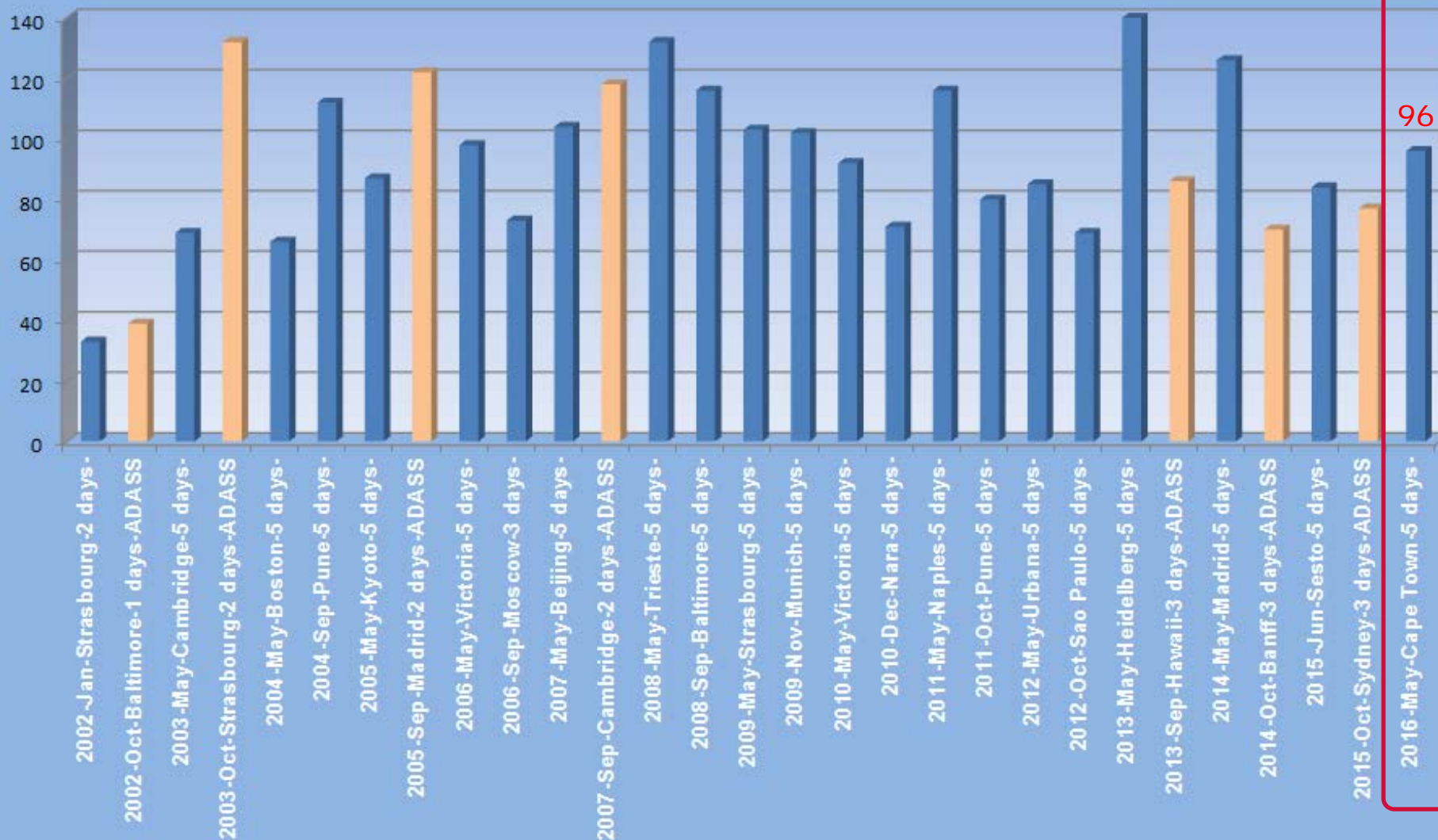
1st IVOA interop in South Africa

FirstName	Surname	Institution	Country
Burcu	Beygu	Center for Space Research, NWU	South Africa
Christopher	Schollar	SKA SA	South Africa
Thomas	Bennett	SKA SA	South Africa
Kerry	Paterson	UCT	South Africa
Lazarus	Matizirofa	NRF	South Africa
Rosalind	Skelton	SAAO	South Africa
Mattia	Vaccari	UWC	South Africa
Steve	Crawford	SAAO	South Africa
Catherine	Cress	CHPC	South Africa
Adrianna	Pińska	IDIA / UCT	South Africa
Wendyam Blaise	Tapsoba	SAAO/UCT	South Africa
Lindsay	Magnus	SKA SA	South Africa
David	Aikema	UCT	South Africa
Russ	Taylor	UCT/UWC	South Africa
Khadija	EL Bouchefry	HartRAO	South Africa
Patricia	Whitelock	SAAO/UCT	South Africa
Sudhanshu	Barway	SAAO	South Africa
Patricia	Whitelock	SAAO/UCT	South Africa

1. 18 people from SA, great local participation !

2. Importance to engage national VO project

3. Link with SKA South Africa & MeerKAT

CDS Workshop:

Accessing and Analyzing Multi wavelength Astronomical Data

at SAAO for Postgraduate Student

Two 1-day VO education schools

1. at SAAO for high school teachers
2. at University of Zululand for students at university level, but for non-astronomers

"Random" News from VO projects (non exhaustive list) - 1

1. Argentina VO (NOVA): imminent on-line publication of data from the national observational facility. Continuing digitizing the Argentinian historical plate collection. The NOVA database grows: New spectra and other catalogues have been incorporated (e.g. CHIPA) …

2. Armenian VO (ArVO): Initiated project of Byurakan Astrophysical Observatory (BAO) Plate Archive digitization and scientific usage (shortly, BAO Plate Archive Project, BAO PAP). BAO electronic plate database will be accomplished and an interactive sky map will be built allowing access and using the digitized data

3. Australia-VO: CSIRO ASKAP Science Data Archive, fully VO compliant, and serves catalogues, image cubes and calibrated visibilities with ASKAP test array data. Adding a VO interface (TAP service) to the Australia Telescope Online Archive for unprocessed data from the Australia Telescope Compact Array and Parkes radio telescopes. New functionality has been added to the Australian All-Sky Virtual Observatory (ASVO) node for the theoretical data TAO.

4. Canadian VO (CVO):lots of activities continuing in IVOA WGs

"Random" News from VO projects (non exhaustive list) - 2

1. ChileanVO (ChiVO): IVOA-compatible services to a new data centre acquired recently, with 1 PB of storage capacity. ALMA data (only fits) should be again publicly available through SCS, SIA and TAP soon. Working on integrating all the prototype applications developed as stand-alone examples into a coherent package strongly-based on astropy (ACALib). ChiVO is now starting a second phase of development with funding for the next 2 years

2. ChinaVO: Astronomical observatories in China are jointed together to form Center of Astronomical Mega-Science, Chinese Academy of Sciences (CAMS), which will build Astronomical Technic Service Platform based on Chinese Virtual Observatory (China-VO). A whole life-cycle management and application platform for astronomical data will be powered by VO.

3. ESA-VO: Release of ESASky this week. New GUI for the Euro-VO Registry, development of VO built-in Gaia Archive (public release in Sept 2016), release of VO services for Herschel Archive, work on VOSpace

4. GAVO: GAVO has stepped up its outreach to astronomy institutes (6 events in winter). In June, GAVO/Asterics will have a workshop for the operators of data centers, with a focus on reaching out to small ones, on taking part in VO efforts. If you know people who might want to participate: http://www.g-vo.org/edp-forum-2016. GAVO has released a new DaCHS version, with support for DALI 1.1 parameters, a SODA prototype, and many other improvements.

"Random" News from VO projects (non exhaustive list) - 3

1. Euro-VO: ASTERICS gathering project European VO teams and large projects (CTA, EGO/VIRGO, E-ELT, KM3Net). ESFRI Forum & Training Event 1 in Trieste, Dec 2015 - identify large project needs, all projects were represented. VO School 1, Madrid, Dec 2015 - participants from all over Europe; revised tutorials on VO science usage available on Euro-VO page. Technology Forum 2, Edinburgh, March 2016 - discussion on standards and VO-enabled apps.

2. Japan VO: new version of NOAJ ALMAWebQL system, enables users to access already published ALMA archival data on the browser, to browse images and spectra with variable "beam" size and/or frequency range. As of today, the largest file size is about 23 GB which can be displayed within a few seconds.

3. OV France : France VO now has an official mandate to be the place for technical excahnge between people who develop data services, in addition to coordinating French participation in the VO and similar initiatives in 'nearby' disciplines. It works well.

"Random" News from VO projects (non exhaustive list) - 4

1. South African Astroinformatics Alliance (SA[3)]): Inter-University Institute for Data Intensive Astronomy (IDIA) has joined SAAO, SKA SA and HartRAO within SA[3,] bringing expertise in simulation and visualization of multi-wavelength data. Hope to receive NRF funding to extend VO Data Archive for SALT (VODAS) with data from other new telescopes. Work within SKA SA is progressing well in developing a data output stream for MeerKAT that is fully compliant with VO standards. Mirrors of international data archives have been installed to show that the South African hardware infrastructure is capable of dealing with future data challenges. VO education infrastructure has been developed and is being used to train new generations of students, teachers and astronomers

2. Spanish VO (SVO): Funds guaranteed for 2015-2019, development of Gran Telescopio Canarias Source Catalogue, development of VO Tools (Clusterix, Toucan) for large projects (Gaia, PLATO), growing involvement of the data provider and astronomical communities in VO related topic

"Random" News from VO projects (non exhaustive list) - 5

1. USVOA: JHU SDSS DR13 release for this summer including SciDrive and VO services, working on a release of NOAO Data Lab systems with VO interfaces, GFSC working on VO access to obs data for various missions, NRAO team is rebuilding the NRAO archive and making it VO-enabled, SAO Iris 3.0 development continues with a fall public release planned (added STILTS library for plotting/coords, accepts spectral data (not just SEDs)), SAO upgrades to RofR are in the release stages

2. VObs.it: VObs.it and CVO (INAF-OATs and CADC teams) continue their collaboration on the federation of the European EGI and the Canadian CANFAR clouds. This pilot activity is part of EGI-Engage, another project funded by the European Horizon 2020 programme, and expected to be expanded within EOSC, the European Open Science Cloud initiative.

3. More details per projects here.

Let's now go with it !

1. Thanks to Patricia and SA^3 for organizing this interop !

2. Thanks to Pat and Matthew for putting the programme together

3. Thanks to Mark and the Focus session organizers

4. Looking forward for a fruitful and constructive week ...

Program for May 2016 Interop in Cape Town, South Africa

Session	Time	Room	Session	Notes
Sunday May 8				
	09:30–12:00	Manor House Meeting room	TCG Meeting	WG/IG Chairs/Vice-chairs
	12:00-12:30	Lunch		
	12:30-15:30	Manor House Meeting room	TCG Meeting	
	15:30-16:00	Coffee Break		
	16:00–18:00	Manor House Meeting room	IVOA Exec Meeting	Exec + WG/IG Chairs/Vice-chairs
	18:00-20:00	Foyer	Reception	Exec + WG/IG Chairs/Vice-chairs
Monday May 9				
1	09:00–09:10	Auditorium 1 & 2	Welcome and Logistics	Patricia Whitelock
	09:10–09:30		Opening by CEO SA National Research Foundation	Molapo Qhobela
	09:30–10:00		State of the IVOA	Christophe Arviset
	10:00–10:30		State of the TCG	Matthew Graham
	10:30-11:00	Break		
2	11:00–12:30	Auditorium 1 & 2	Charge to Working Groups	WG/IG Chairs
	12:30–14:00	Lunch		
3	14:00–15:30	Auditorium 1	Ops 1 Operations Review and Validation	Ops IG
		Auditorium 2	Semantics	Semantics WG
	15:30–16:00	Break		
4	16:00–17:30	Auditorium 1	Apps 1	Apps WG
		Auditorium 2	Registry 1	Registry WG
Tuesday May 10				
5	09:00–10:30	Auditorium 1 & 2	Focus session 1: Interoperability of data from major astronomy projects	(Session Chair: Mark Allen)
	10:30–11:00	Break		
6	11:00–12:30	Auditorium 1 & 2	Focus session 2: Interoperability of data from major astronomy projects	(Session Chair: Pepi Fabbiano)
	12:30–14:00	Lunch		
7	14:00–15:30	Auditorium 1	GWS 1 - Authentication & Authorization	GWS WG, Apps WG