

Newcomers to the IVOA

Interop meeting 25-29 April 2022



CENTRE DE DONNÉES
ASTRONOMIQUES DE STRASBOURG



Observatoire **astronomique**
de Strasbourg | ObAS

□ Newcomers session

- A Brief History of the IVOA by G. Bruce Berriman
- Intro to the IVOA by A. Nebot
- Get a taste! Dancing the VOltz by Hendrik Heinl & Dave Morris

Intro to the IVOA

Interop meeting 25-29 April 2022

Ada Nebot



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The VO and the IVOA: what?

“A multi-wavelength digital sky that can be searched, visualised and analysed in new and innovative ways”

What is the Virtual Observatory?

- Framework for astronomical datasets, tools, services to work together in a seamless way

What is the International Virtual Observatory Alliance?

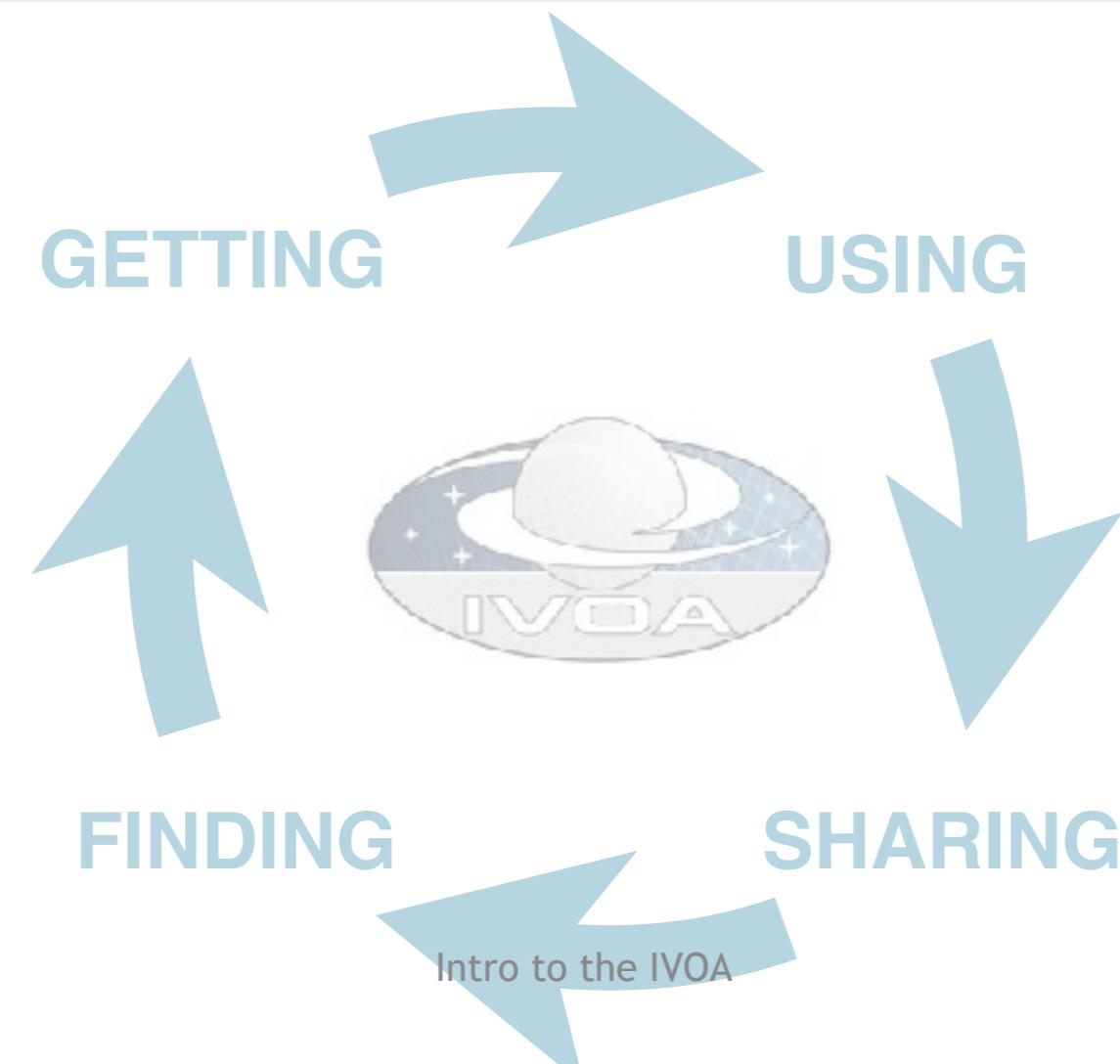
- A science driven organisation that builds the technical standards
- A place for discussing and sharing VO ideas and technology to enable science
- Promoting and publicising the VO



□ The VO and the IVOA: why?

Clear benefits

- Growth in the scientific return of data
- Capability to discover and fuse multiple data sets
- Application of the VO in planning new observations and observing strategies



□ The VO and the IVOA: who?

Who is the IVOA?

<http://ivoa.net/>

- Exec, Tech Coordination, Standards & processes, Media, Science priorities
- **6 Working Groups:**
 - Applications, access, models, grid & web services, registry, semantics
- **8 Interest Groups**
 - Time-domain, radio, solar system, education, data curation, knowledge & discovery, theory
- Completely open to participation

Want to join the IVOA?

- Meetings: 2 interoperability meetings per year
- Email list: <https://www.ivoa.net/members/index.html>
- GitHub: <https://github.com/ivoa-std>

□ The VO and the IVOA: where?

Existing global framework: populated by major data providers (space and ground based) that is heavily used by the community (e.g. Gaia data access is fully VO)



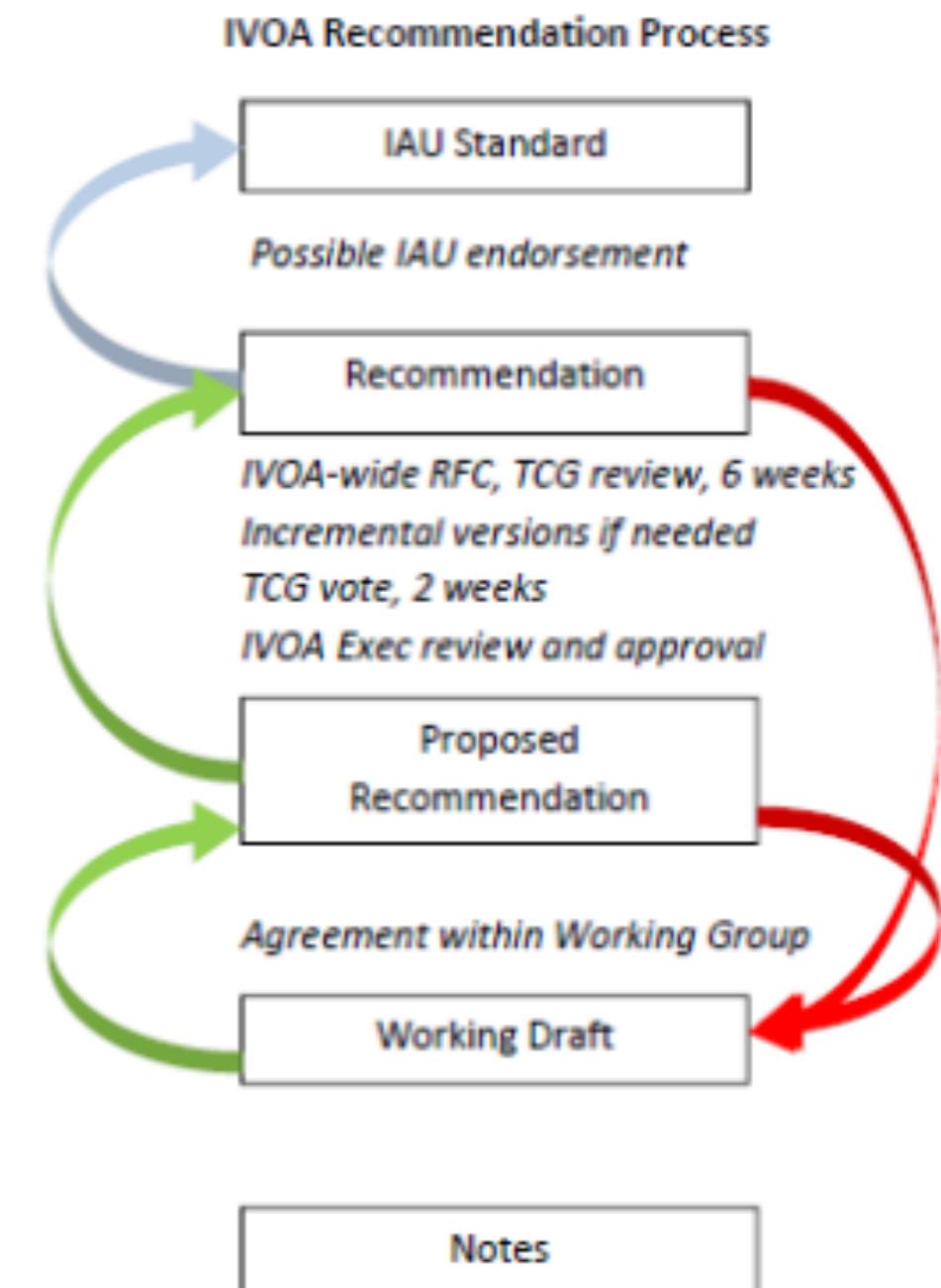
□ The VO and the IVOA: how?

Through the development and adoption of common standards scientifically driven, as an international community effort where astronomers, software engineers and documentalists are involved



□ IVOA development process of standards

- Build IVOA standards to match users needs:
 - Find and report the community needs
 - Find and report gaps in the existing standards
 - Propose new ways to fill the gaps
 - Implement & validate
 - Standardise when consensus is reached



□ OK... but where do I start?

- A science driven organisation! —> Start from a Scientific question

Let's see it with an example:

How can I explain **this**?

this : your favorite object / mechanism / etc.

What is the nature **this**?

What is the impact on **this**?

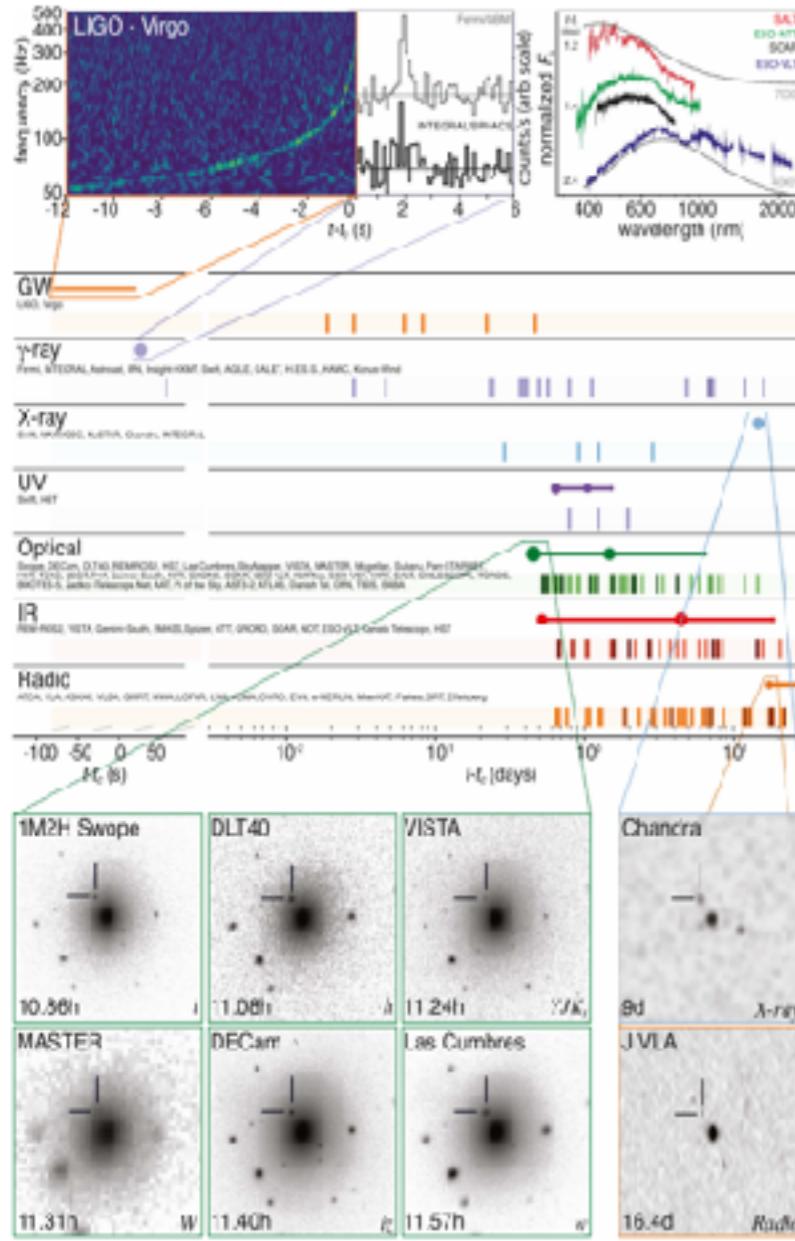
What type of data and analyses do I need to answer **this** question?

The IVOA will not give you the answers to your questions nor will it ask the questions for you.

The IVOA provides you with common formats and common ways of describing and accessing the data which when adopted will ease your work.

☐ A multi-messenger view needed

THE ASTRONOMICAL JOURNAL, 142, 12 (2011 October 20)



□ Some selected standards

1. **VOTable** the format for tabular data for allowing interoperability (coosys, timesys, ucd, utype, VOunits, datalink).
2. **HiPS** more than a format for images - tailored for large data volumes
3. Search for data:
 - **Cone search** – spatial + temporal search
 - **MOC** – spatial and temporal indexing for large data volumes and more complex areas in the sky
 - **ObsCore & ObsTAP** – description of observations (**ADQL**)
4. Planning of observations:
 - **ObjVisSAP** – visibility of object to plan observations
 - **ObsLocTAP** – facilitate coordination of observations
 - Facilities / observatory list (under dev.)
5. Alerts: **VOEvents & VOEvent Transport protocol**
6. Description of provenance **ProvenanceDM & ProvTAP**
7. Registering the services – **RM - Resource Metadata for the Virtual Observatory**
8. Communication : **Send / receive data among services & tools with SAMP**
9. **... many more! SLAP, SIAP, SSA, ... each tailored to specific use cases**

VOTable

Standardisation of coordinate system annotation (time and coordinates), UCD, utypes, VOUnits, datalink

International Virtual Observatory Alliance

IVOA Documents



VOTable Format Definition

Version 1.4

IVOA Recommendation 21 October 2019

Interest/Working Group:

<http://www.ivoa.net/twiki/bin/view/IVOA/ivoaApplications>

Author(s):

François Ochsenbein, Roy Williams, Clive Davenhall, Markus Demleitner, Tom Donaldson, Daniel Durand, Pierre Fernique, David Giaretta, Robert Hanisch, Tom McGlynn, Alex Szalay, Mark Taylor, Andreas Wicenec

Editor(s):

François Ochsenbein, Mark Taylor, Tom Donaldson

Abstract

This document describes the structures making up the VOTable standard. The main part of this document describes the adopted part of the VOTable standard; it is followed by appendices presenting extensions which have been proposed and/or discussed, but which are not part of the standard.

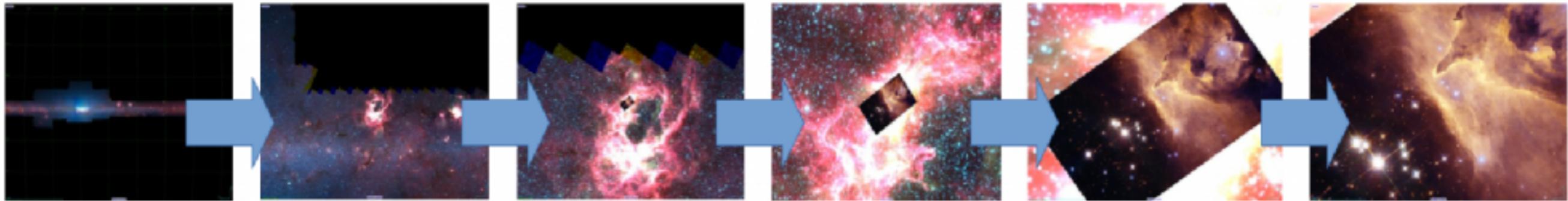
Status of this document

This document has been produced by the Applications Interest Group.

It has been reviewed by IVOA Members and other interested parties, and has been endorsed by the IVOA Executive Committee as an IVOA Recommendation. It is a stable document and may be used as reference material or cited as a normative reference from another document. IVOA's role in making the Recommendation is to draw attention to the specification and to promote its widespread deployment. This enhances the functionality and interoperability inside the Astronomical Community.

□ HiPS

IVOA Recommendation



HiPS - Hierarchical Progressive Survey Version 1.0

IVOA Recommendation 19 May 2017

Interest/Working Group:

<http://www.ivoa.net/twiki/bin/view/IVOA/voaApplications>

Author(s):

Pierre Fernique, Mark Allen, Thomas Boch, Tom Donaldson, Daniel Durand, Ken Ebisawa, Laurent Michel, Jesus Salgado, Felix Stoehr

Editor(s):

Pierre Fernique

DOI:

10.5479/ADS/bib/2017/ivoa.spec.0519F

Errata

[No errata yet](#)

Abstract

This document presents HiPS, a hierarchical scheme for the description, storage and access of sky survey data. The system is based on hierarchical tiling of sky regions at finer and finer spatial resolution which facilitates a progressive view of a survey, and supports multi-resolution zooming and panning. HiPS uses the HEALPix tessellation of the sky as the basis for the scheme and is implemented as a simple file structure with a direct indexing scheme that leads to practical implementations.

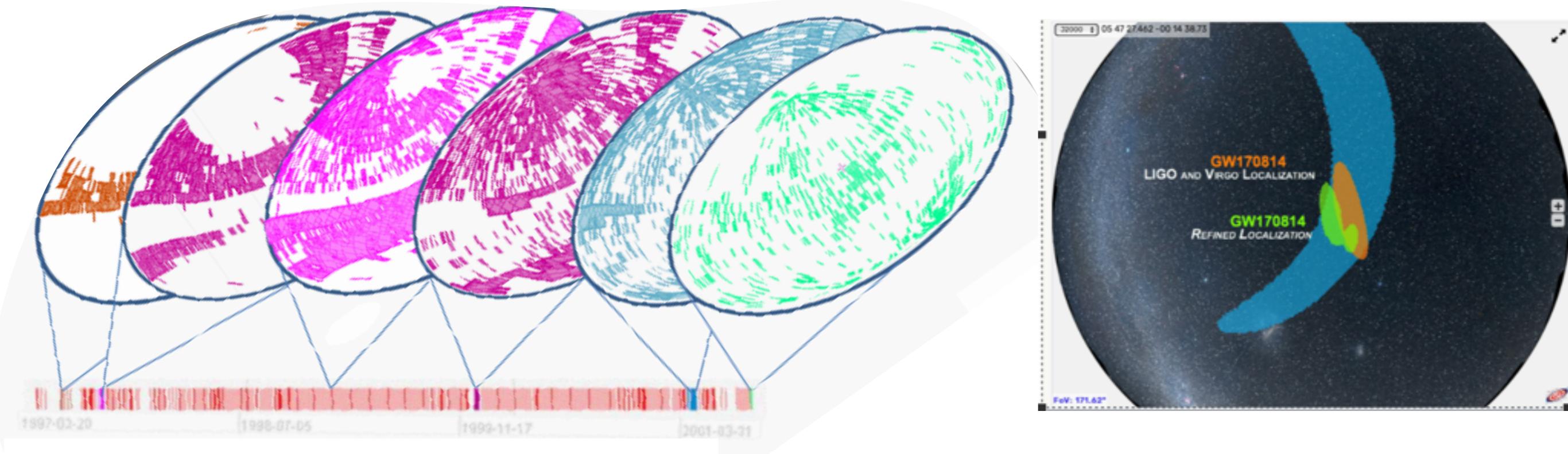
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□ Search: know where & when

- Cone search extension to add a time interval for search in cats.
- Search by temporal+spatial coverage of surveys for the more complicated areas (ST-MOC = space-time multi-order coverage map)



Search: know where & when



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MOC: Multi-Order Coverage map

Version 2.0

IVOA Recommendation 2022-03-17

Working group

Applications

This version

<http://www.ivoa.net/documents/moc/20220317>

Latest version

<http://www.ivoa.net/documents/moc>

Previous versions

Version 1.1

Version 1.0

Author(s)

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Editor(s)

Pierre Fernique, Ada Nebot, Daniel Durand

25/04/2022

Simple Cone Search

Version 1.1

IVOA Working Draft 2020-08-28

Working group

Data Access Layer

This version

<http://www.ivoa.net/documents/ConeSearch/20200828>

Latest version

<http://www.ivoa.net/documents/ConeSearch>

Previous versions

REC 1.03

PR 2007-09-14

PR 2007-06-28

PR 2006-09-08

Author(s)

Marco Molinaro, Ada Nebot, Markus Demleitner, Robert Hanisch, Raymond Plante, Alex Szalay, Roy Williams

Editor(s)

Marco Molinaro, Ada Nebot, Raymond Plante

Intro to the IVOA

□ ObsCore & ObsTAP

- Goal: “ we need to give data providers a set of metadata attributes that they can easily map to their database system in order to support queries of the sort listed below.”
- Science cases:
 - Support multi-wavelength as well as positional and temporal searches.
 - Support any type of science data product (**image, cube, spectrum, time series, instrumental data, etc.**).
 - Directly support the sorts of file content typically found in archives (FITS, VOTable, compressed files, instrumental data, etc.).

ObsCore & ObsTAP are Key IVOA standards for searching, finding and combining all sorts of data and allow for interoperability

□ ObsCore & ObsTAP



International
Virtual
Observatory
Alliance

Observation Data Model Core Components and its Implementation in the Table Access Protocol

Version 1.1

IVOA Recommendation, May 09, 2017

Approved by IVOA executive committee March 20, 2017

Working Groups: Data Model, Data Access Layer

This version:

<http://www.ivoa.net/Documents/ObsCore/20170509/REC-ObsCore-v1.1-20170509.pdf>

Latest version:

<http://www.ivoa.net/Documents/ObsCore/20170509/REC-ObsCore-v1.1-20170509.pdf>

Previous version(s):

<http://www.ivoa.net/Documents/ObsCore/20161004/PR-ObsCore-v1.1-20161004.pdf>

Editors:

Mireille Louys, Doug Tacy, Patrick Dowler, Daniel Durand

Authors:

Mireille Louys, Doug Tacy, Patrick Dowler, Daniel Durand, Laurent Michel, Francis Bonnarel, Alberto Mol and the IVOA DataModel working group

- Map the METADATA of your project data into ObsCore Keywords
- Set a TAP Service
- Register it

→ Search, find, and combine the data coming from multiple missions

□ Visibility of an object



European Southern Observatory



ESO - Evolving New Horizons in Astronomy

Public Science User Tools

Print Site Map Search

2018-05-23

Home | Events | Observations | Survey Tools and Images | Surveys and Catalogues | Observing

Object Observability

[See also: Object Observatory - Almanac - Daily Almanac - ESO Almanac](#)

This calculator uses the Observatory table based on the sky coordinates and observing period from your ESO User Profile, including ESO's survey limits when applicable.

Select the target coordinates and observing period from your ESO Almanac.

More detailed information is provided in a separate document held by the ESO's Ich Thorsten.

RA: 03:00:00.000000000 (J2000)

Object Apparent Magnitude: 10.00

From: 2018-11-15 To: 2018-11-15

Object Observability (RA/Dec)

RA: 03:00:00.000000000 | Dec: 00:00:00.000000000

Search

UVES ESO 3.6m GTC 2.2m 1.5m 1.2m 1.0m 0.9m 0.7m 0.6m

XIAN-NEWTON MULTI-

YOU CAN LOOKUP SIMBAD OR NED AGAIN, OR RUN THE VISIBILITY CHECKER

Target Name: M0 (eg. 00:42:43.00)

Please note: Results for current images should SIMBAD or NED referenced.

SIMBAD LOOKUP RESULTS:

If you are happy with these results, complete the "Visibility Details" and Submit.

TARGET DETAILS:

Target Name:	M0	RA/DEC NAME (DD:MM:SS/HH:MM:SS)
	RA: 00:42:43.00	Decimal degrees (mm:ss.sss) (eg. 12:30:52.5)
	Dec: +1° 07' 00"	Decimal degrees w/ DD:MM:SS.s (eg. +1:07:00.0)

VISIBILITY DETAILS:

Select either:

RA/Dec Range:	RA/Dec Resolution: 35s	default is AD17 resolution range: 35s to 35s
		UTC: 2010-09-01 00:00:00

or

Date Range:	From Date: 01 Mar 2010	default is AD17 range: 01 July 2010 - 10 Apr 2010
	To Date: 30 Apr 2010	

Minimum Visibility: 6000 (minimum time the bin must be visible. Default is 5000 s)

XIAN-NEWTON AD17 TARGET VISIBILITY CHECKER

MULTI-APERTURE TARGET VISIBILITY

Wavelength (Å)	Filter (A)	Filter (B)	Filter (C)	Filter (D)
All	27°	77°	177°	377°

NUMBER OF BINS FOR THIS TARGET IS: 1

Min Vis (s)	Max Vis (s)	Min Vis (s)	Max Vis (s)
5000	10000	5000	10000

Target is only visible for small fraction of available time slots. At the start of a simulation, use **Visibility** then **Find Best Bin** to find the best bin.

SEARCH INFO & TIME REPORT

Target Name:	M0	RA:	00:42:43.00
Dec:	+1:07:00.0		

Row	Vis. Best (approximate time)	Vis. Window (approximate time)	Vis. Test (approximate time)	Received Vis. (approximate time)	Available Vis. (approximate time)
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233	2010-09-01 01:19	17700	2010-09-01 01:24	17700	17700

Different services have different inputs / outputs

Facilitate the work by having some level of standardisation inputs / outputs

☐ Coordination of observations

Integral Target and Scheduling Information

Schedule: [All executed](#) [Current revolution \(1872\)](#) [Future schedule](#) Revolution 1872 to 1812 [Show...](#) [show plot](#)

Schedule for revolution 1872

(this list is also available in csv-formatted, click [here](#) to download)

Rev	Start time (LTC)	End time (UTC)	Exp. time (s)	Target	Ra (J2000)	Dec (J2000)	Pattern	PI	Propo
1872	2017-10-10 13:20:15	2017-10-13 17:10:51	12640	Gal. Bulge region	17:45:06.00	-26:56:00.0	HEX	Erik Kuulkers	142001
1872	2017-10-10 17:13:34	2017-10-11 07:55:58	50000	Galactic Center	17:52:11.21	-25:21:49.7	5x5 Seq	Joem Wilms	142002
1872	2017-10-11 08:16:48	2017-10-11 11:58:32	12640	Galaxy (l=0, b=0)	17:42:23.76	-29:38:02.4	HEX	Rashid Sunyaev	142003
1872	2017-10-11 12:26:36	2017-10-11 12:56:36	1800	Galaxy (l=0, b=-30)	20:02:16.80	-41:20:31.2	HEX	Rashid Sunyaev	142004
1872	2017-10-11 13:27:21	2017-10-11 14:20:17	3640	Galaxy (l=0, b=-30)	19:59:40.00	-41:05:16.6	HEX	Rashid Sunyaev	142005
1872	2017-10-11 15:00:12	2017-10-11 17:38:07	9000	Galaxy (l=0, b=-30)	19:59:40.80	-41:05:16.6	HEX	Rashid Sunyaev	142006
1872	2017-10-11 18:41:00	2017-10-12 08:01:56	45000	GRS 1915+105	19:18:11.79	+10:56:45.7	5x5 Seq	Jerome Rodriguez	142007
1872	2017-10-12 09:00:49	2017-10-12 10:47:54	12640	Gal. l=0, b=0	17:53:49.99	-26:56:10.0	HEX	Rashid Sunyaev	142008
							LEX	Rashid Sunyaev	142009

XMM-Newton Short-Term Schedule

The Short-Term Schedule gives an overview of scheduled observations covering the time range from the past week until the upcoming 84 weeks.

Background: The planning and scheduling process is described in [Section 1.2](#) of the [Policies and Procedures](#). In addition, the process of scheduling XMM-Newton observations is described in [Section 1.4](#) of the [XMM-Newton User Guide](#).

Description: Each row lists the revolution number (REV#), Observation identifier (ObsID), target name, pointing coordinates (RA and Dec), start and end times, prime instrument, accumulated exposure times in kiloseconds for each instrument (without overhead), and name of the Principal investigator (PI). Target and end times refer to the instrument activities required to perform the observation. The exposure times are accumulated over all exposures taken with the same instrument. Exposure for XMM, the instrument can split its total exposure time among instruments. XMM exposure times in brackets indicate that the instrument is off. Details can be examined clicking on the ObsID.

The overlined text indicates the target that is scheduled for the time of the last table update. The creation date is given at the top of the table.

General: The scheduling of an XMM-Newton revolution may have to be revised (see [Section 1.2.1](#) and [1.2.2](#) of the [Policies and Procedures](#)). Scheduling of any type and solar flaring activity may impact at different levels the allocated programme. The [Observation Log Browser](#) can be checked to see what was actually done.

Update frequency: Every 6 hours or when observability is updated (new revolution parameter or existing update). The latest available version can be viewed after clearing the browser buffer from the contents of any previous sessions.

Last updated on: 2017-10-11 12:02:00 UTC (current rev = 1871)

Rev #	Obs ID	Target Name	RA	DEC	PA	VTC Obs Start 2000 mm YYMM dd:tt	VTC Obs End 2000 mm YYMM dd:tt	Prime Inst.	PN Obs Rate	MOS1 Obs Rate	MOS2 Obs Rate	RGS1 Obs Rate	RGS2 Obs Rate	OM Obs Rate	H Obs Rate	
									PN Rate	MOS1 Rate	MOS2 Rate	RGS1 Rate	RGS2 Rate	OM Rate	H Rate	
1276	0801050401	ESO018-0006	08:24:07	-37:16:57	88.03	2017-10-20 09:17:10:30	2017-10-24 09:24:26	EPIC	16.7	18.1	18.1	18.2	18.2	18.3	Peter Brommer	
1871	0801050401	ESO018-0006	09:21:46	-09:34:17	98.03	2017-10-20 09:20:17:10:29	2017-10-24 09:35:13	EPIC	9.5	10.9	10.9	11.0	11.0	10.5	Walter Perez	
1871	0801050401	eso_Puppi	08:02:40	-40:00:36	112.80	2017-10-20 09:17:10:29	21:21:41	140:01:21	PN	46.5	44.9	44.9	45.0	45.0	47.3	Frederick Xte- Newton/MN
1871	0802000401	09:05	10:21:16	+35:43:17	118.83	2017-10-20 09:17:10:26	10:22:45	23:31:13	PN	26.6	26.8	26.8	27.0	27.0	26.8	Guido Iacobacci Nathan Sereit
1871	0802000401	09:05	10:21:16	+35:43:17	118.83	2017-10-20 09:17:10:26	10:22:45	23:31:13	PN	26.6	26.8	26.8	27.0	27.0	26.8	Guido Iacobacci Nathan Sereit
1871	0802000401	09:05	10:21:16	+35:43:17	118.83	2017-10-20 09:17:10:26	10:22:45	23:31:13	PN	26.6	26.8	26.8	27.0	27.0	26.8	Guido Iacobacci Nathan Sereit
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1871	0802000401	09:05	10:21:16	+35:43:17	118.83	2017-10-20 09:17:10:26	10:22:45	23:31:13	PN	26.6	26.8	26.8	27.0	27.0	26.8	Guido Iacobacci Nathan Sereit
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1871	0802000401	09:05	10:21:16	+35:43:17	118.83	2017-10-20 09:17:10:26	10:22:45	23:31:13	PN	26.6	26.8	26.8	27.0	27.0	26.8	Guido Iacobacci Nathan Sereit
1871	0802000401	09:05	10:21:16	+35:43:17	118.83	2017-10-20 09:17:10:26	10:22:45	23:31:13	PN	26.6	26.8	26.8	27.0	27.0	26.8	Guido Iacobacci Nathan Sereit
1871	0802000401	09:05	10:21:16	+35:43:17	118.83	2017-10-20 09:17:10:26	10:22:45	23:31:13	PN	26.6	26.8	26.8	27.0	27.0	26.8	Guido Iacobacci Nathan Sereit
1871	0802000401	09:05	10:21:16	+35:43:17	118.83	2017-10-20 09:17:10:26	10:22:45	23:31:13	PN	26.6	26.8	26.8	27.0	27.0	26.8	Guido Iacobacci Nathan Sereit
1871	0802000401	09:05	10:21:16	+35:43:17	118.83	2017-10-20 09:17:10:26	10:22:45	2								



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Observation Locator Table Access Protocol Version 1.0

IVOA Recommendation 2021-07-24

Working group

Data Model Working Group

This version

<http://www.ivoa.net/documents/ObsLocTAP/20210724>

Latest version

<http://www.ivoa.net/documents/ObsLocTAP>

Previous versions

Author(s)

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Object Visibility Simple Access Protocol Version 1.0 *IVOA Working Draft 14 May 2020*

This version:

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Latest version:

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TBC: Representatives of a large multi-observatory collaboration

□ Alerts

1. VOEvent (REC):

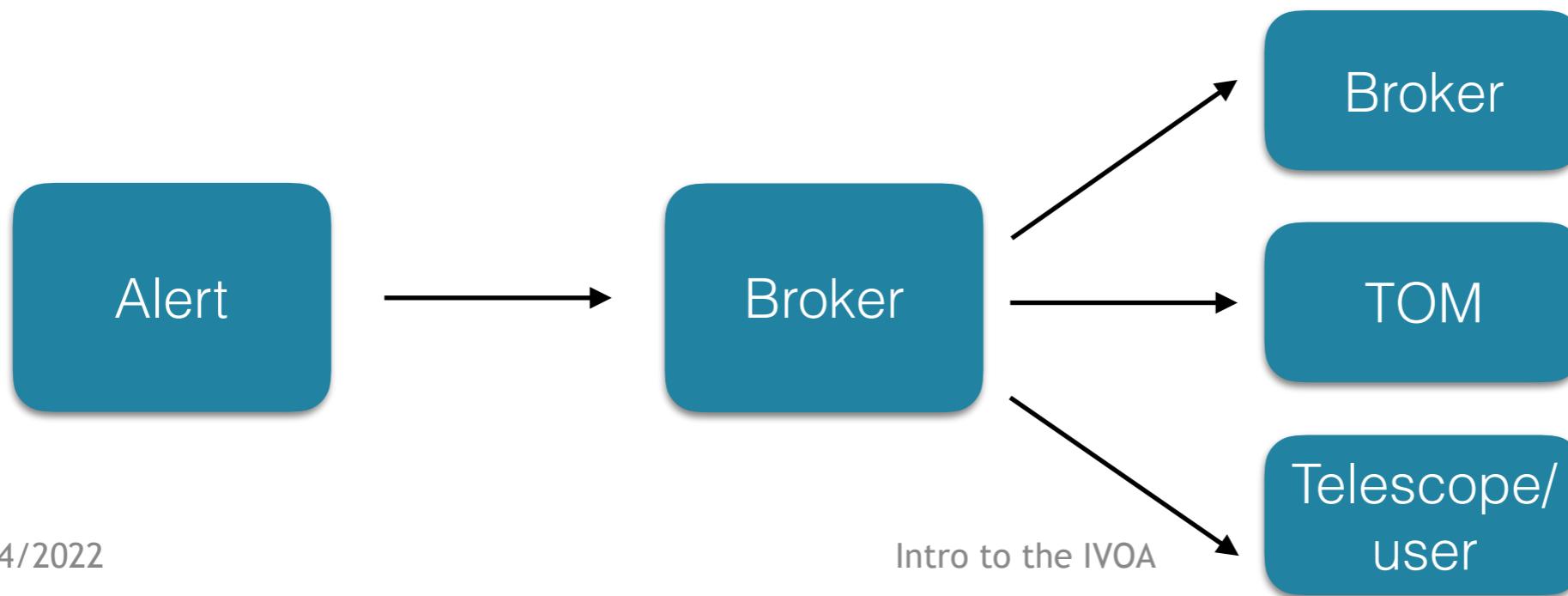
1. Container → XML
2. Content → defined by the community: FRB, (GRB, SN, Neutrino, ...)

2. VOEvent Transport protocol (REC):

1. Works for low rates (10 Hz)
2. Doesn't scale for very high rates (10^3 Hz)

3. Open questions:

1. A VOEvents validation library is missing
2. How to find who distributes alerts? Register in the registry? But needs to be fast... VOEvent + TAP service for alerts



□ Provenance

International Virtual Observatory Alliance

IVOA Documents



IVOA Provenance Data Model

Version 1.0

IVOA Recommendation 11 April 2020

Interest/Working Group:

<http://www.ivoa.net/wiki/bin/view/IVOA/IvoaDataModel>

Author(s):

Mathieu Servillat, Kristin Riebe, Catherine Boisson, François Bonnarel, Anastasia Galkin, Mireille Louys, Markus Nullmeier, Nicolas Renault-Tinacci, Michèle Sanguillon, Ole Streicher

Editor(s):

Mathieu Servillat

Abstract

This document describes how provenance information can be modeled, stored and exchanged within the astronomical community in a standardized way. We follow the definition of provenance as proposed by the W3C, i.e. that "provenance is information about entities, activities, and people involved in producing a piece of data or thing, which can be used to form assessments about its quality, reliability or trustworthiness." Such provenance information in astronomy is important to enable any scientist to trace back the origin of a dataset (e.g. an image, spectrum, catalog or single points in a spectral energy distribution diagram or a light curve), a document (e.g. an article, a technical note) or a device (e.g. a camera, a telescope), learn about the people and organizations involved in a project and assess the reliability, quality as well as the usefulness of the dataset, document or device for her own scientific work.

Status of this document

This document has been produced by the Data Model Working Group.

It has been reviewed by IVOA Members and other interested parties, and has been endorsed by the IVOA Executive Committee as an IVOA Recommendation. It is a stable document and may be used as reference material or cited as a normative reference from another document. IVOA's role in making the Recommendation is to draw attention to the specification and to promote its widespread deployment. This enhances the functionality and interoperability inside the Astronomical Community.

Available formats: [pdf](#), [tex](#)

maintained by [ivoa.document.coordinator](#):

□ Register your services

International Virtual Observatory Alliance
IVOA Documents



Resource Metadata for the Virtual Observatory Version 1.12

IVOA Recommendation 02 March 2007

Interest/Working Group:

<http://www.ivoa.net/twiki/bin/view/IVOA/iveaResReg>

Author(s):

Robert Hanisch, the IVOA Resource Registry Working Group, the NVO Metadata Working Group

Editor(s):

Robert Hanisch

DOI:

10.5479/ADS/bib/2007ivoa.spec.C302H

Abstract

An essential capability of the Virtual Observatory is a means for describing what data and computational facilities are available where, and once identified, how to use them. The data themselves have associated metadata (e.g., FITS keywords), and similarly we require metadata about data collections and data services so that VO users can easily find information of interest. Furthermore, such metadata are needed in order to manage distributed queries efficiently; if a user is interested in finding x-ray images there is no point in querying the HST archive, for example. In this document we suggest an architecture for resource and service metadata and describe the relationship of this architecture to emerging Web Services standards. We also define an initial set of metadata concepts.

Status of this document

This document has been produced by the Resource Registry Working Group.

It has been reviewed by IVOA Members and other interested parties, and has been endorsed by the IVOA Executive Committee as an IVOA Recommendation. It is a stable document and may be used as reference material or cited as a normative reference from another document. IVOA's role in making the Recommendation is to draw attention to the specification and to promote its widespread deployment. This enhances the functionality and interoperability inside the Astronomical Community.

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IVOA Documents



Simple Application Messaging Protocol Version 1.3

IVOA Recommendation 11 April 2012

Interest/Working Group:

<http://www.ivoa.net/twiki/bin/view/IVOA/IvoaApplications>

Author(s):

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Editor(s):

T. Boch, M. Fitzpatrick, M. Taylor

DOI:

10.5479/ADS/bib/2012ivoa.spec.1104T

Errata

[No errata yet](#)

Abstract

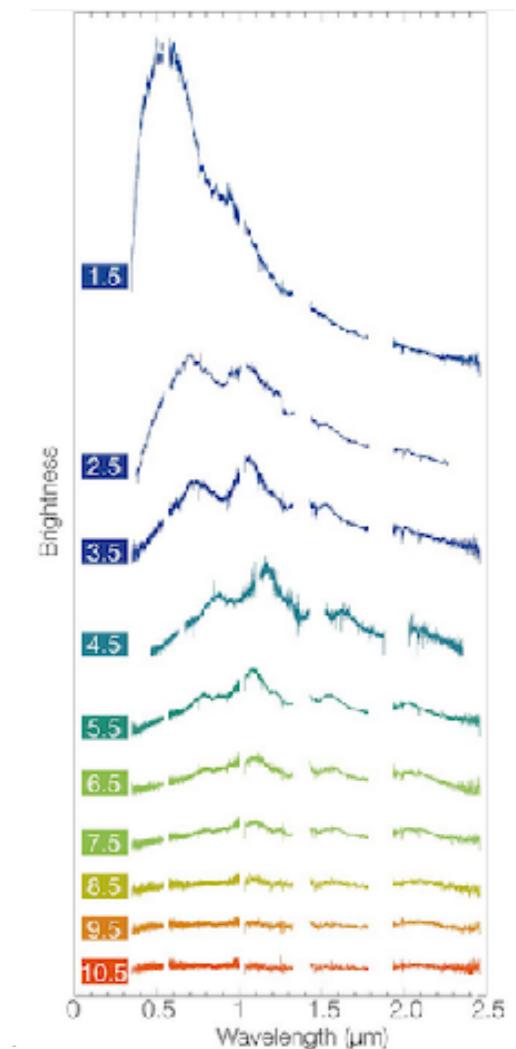
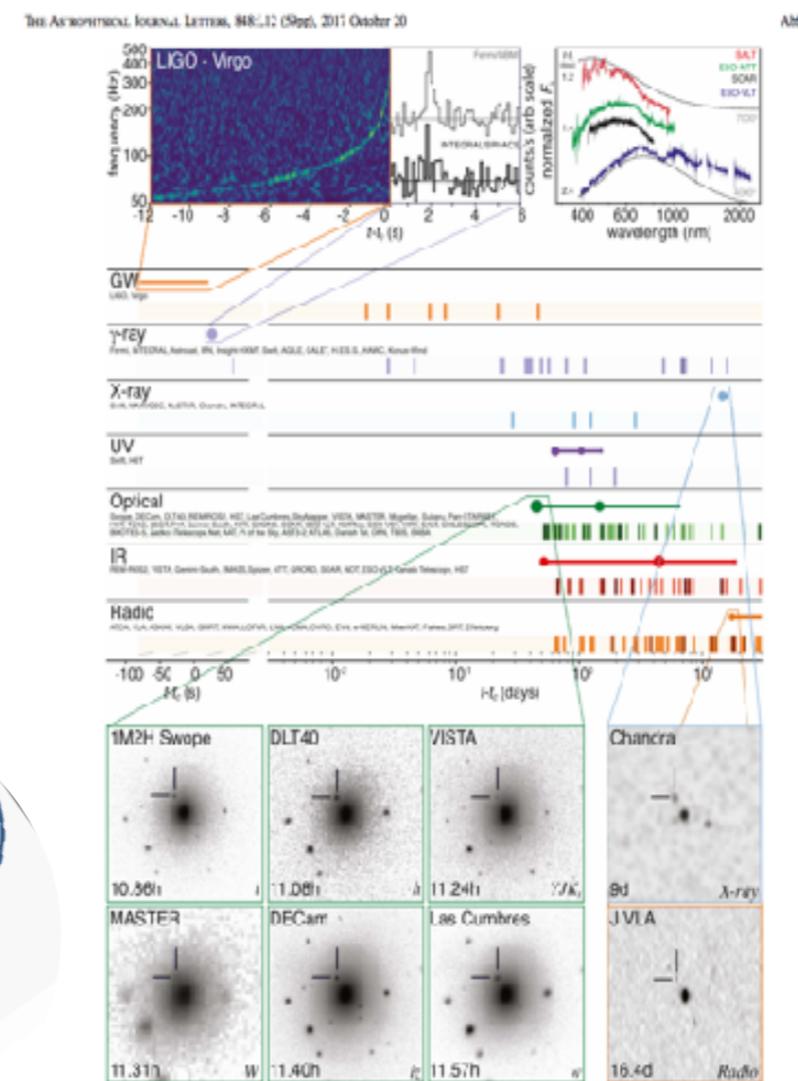
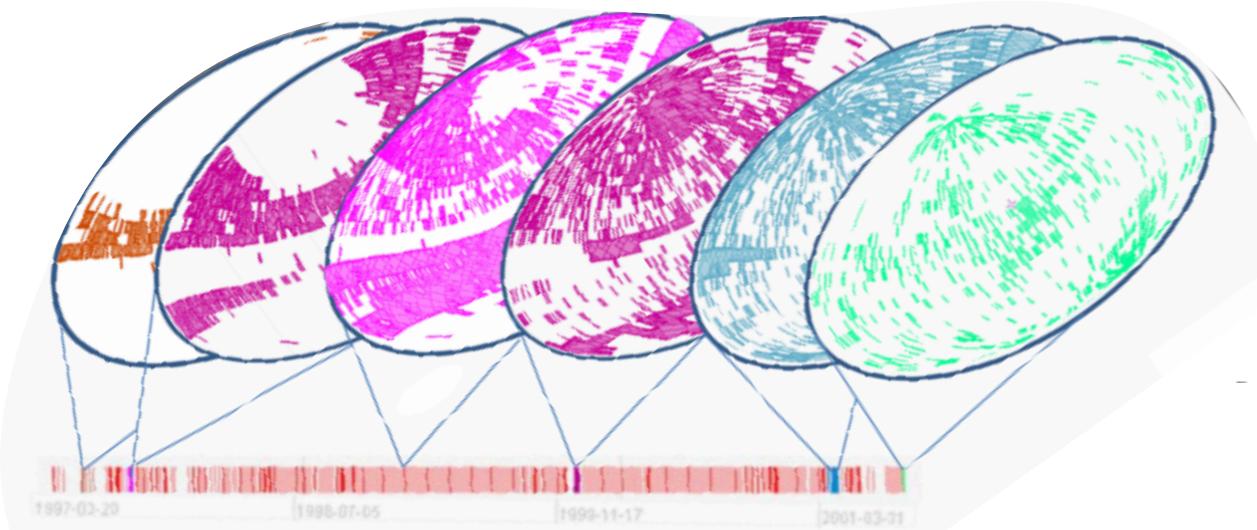
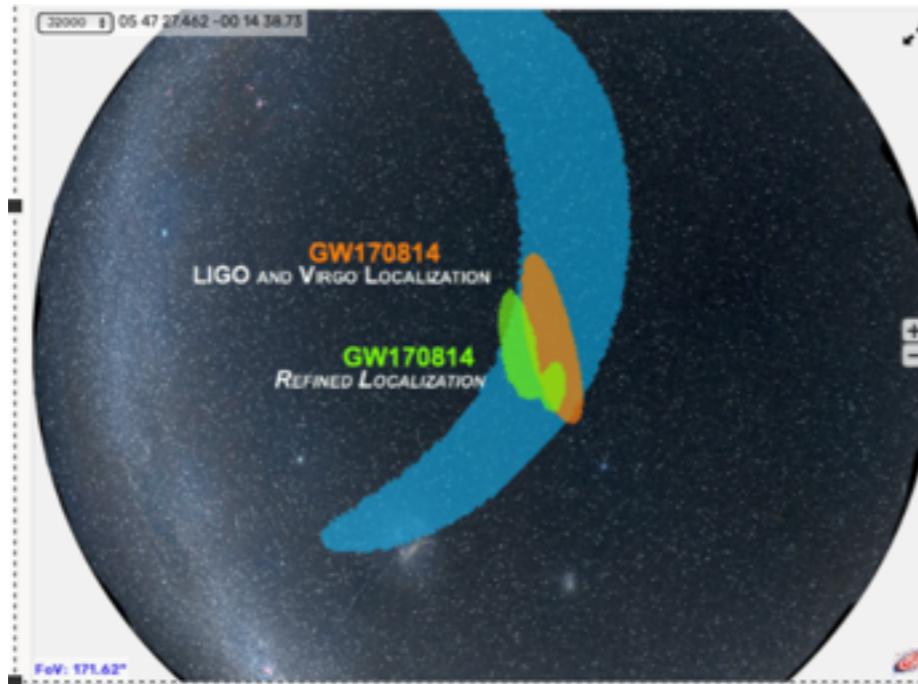
SAMP is a messaging protocol that enables astronomy software tools to interoperate and communicate. IVOA members have recognised that building a monolithic tool that attempts to fulfil all the requirements of all users is impractical, and it is a better use of our limited resources to enable individual tools to work together better. One element of this is defining common file formats for the exchange of data between different applications. Another important component is a messaging system that enables the applications to share data and take advantage of each other's functionality. SAMP supports communication between applications on the desktop and in web browsers, and is also intended to form a framework for more general messaging requirements.

Status of this document

This document has been produced by the Applications Interest Group.

It has been reviewed by IVOA Members and other interested parties, and has been endorsed by the IVOA Executive Committee as an IVOA Recommendation. It is a stable document and may be used as reference material or cited as a normative reference from another document. IVOA's role in making the Recommendation is to draw attention to the specification and to promote its widespread deployment. This enhances the functionality and interoperability inside the Astronomical Community.

□ In a multi-messenger landscape



□ Publishing your data in the VO

- <https://wiki.ivoa.net/twiki/bin/view/IVOA/PublishingInTheVO>
 - Check the Q&A section! How do I publish images? spectra? catalogues or generic data tables?

CSP Panel Session, IVOA Interoperability Virtual meeting, April 2022

Publishing your data in the VO

Tuesday April 26 - 15:00 UTC

[Session minutes \(this topic does not yet exist; you can create it\)">Session minutes](#)

Speaker	Title	Time	Materials
Ada Nebot	Summary of the Project Survey + Intro to the panel	10 + 2	
Dongwei Fan	LAMOST and the China Virtual Observatory	10 + 2	
Tamara Civera	Observatorio de Javalambre in Spain	10 + 2	
Alberto Micol	European Southern Observatory	10 + 2	
Yan Grange	Netherlands Virtual Observatory	10 + 2	
All	Open discussion	30	

□ Summary

The IVOA standards are built to enable access, discovery and ultimately **interoperability**



The IVOA needs the community to participate!

□ Some useful links

- ivoa.net
- IVOA Docs : <https://www.ivoa.net/documents/>
- IVOA GitHub : <https://github.com/ivoa>
- IVOA mailing list : <https://www.ivoa.net/members/index.html>