



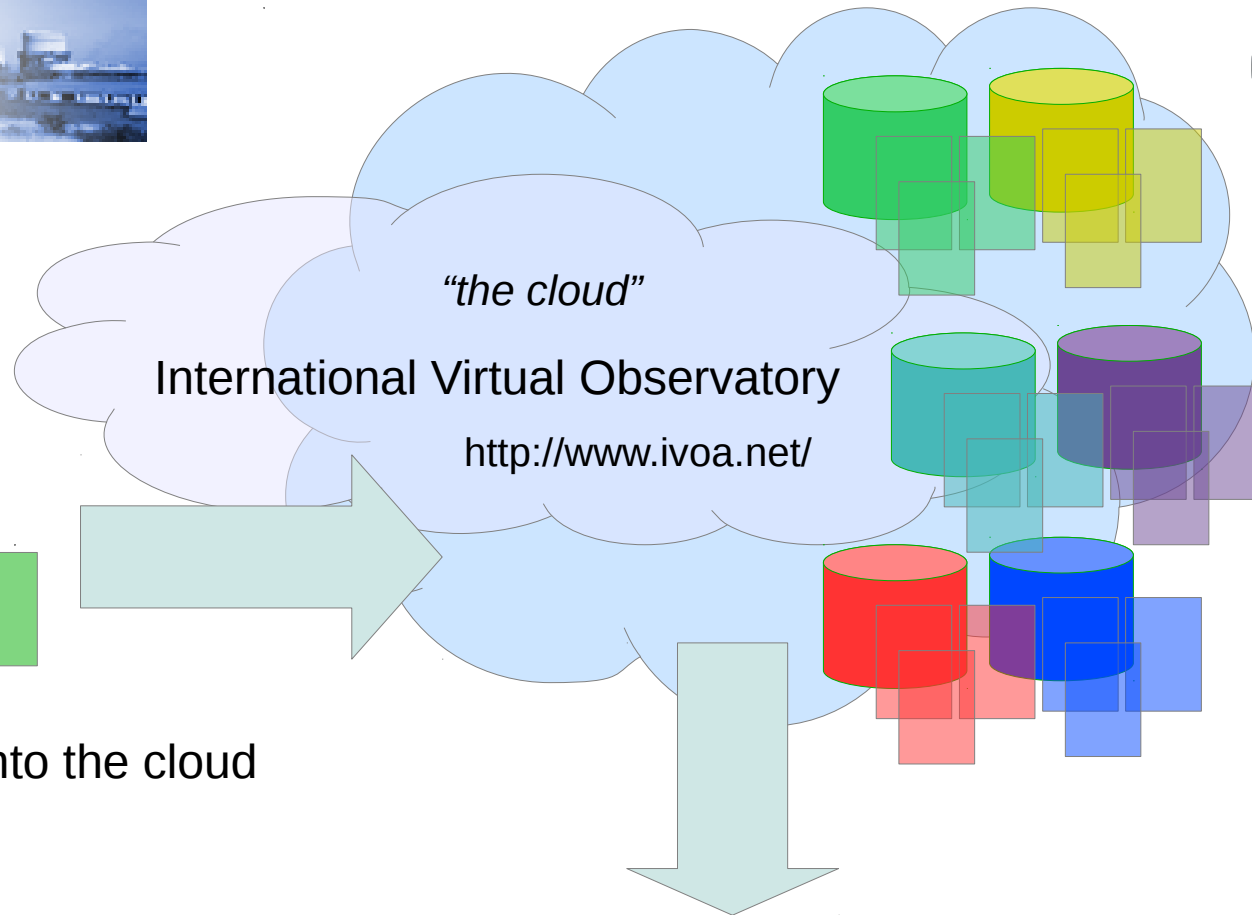
International Virtual Observatory Alliance

specifications
and
software

D.Morris <dmr@roe.ac.uk>
Institute for Astronomy,
Edinburgh University
Sep 2017



Rγ Transient Alert Mechanisms
September 2017, Amsterdam



Publishing our data into the cloud

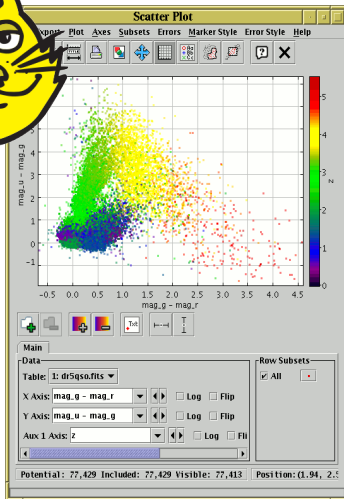
Access to other people's data from the cloud

[our data] + [their data] => [interesting stuff]

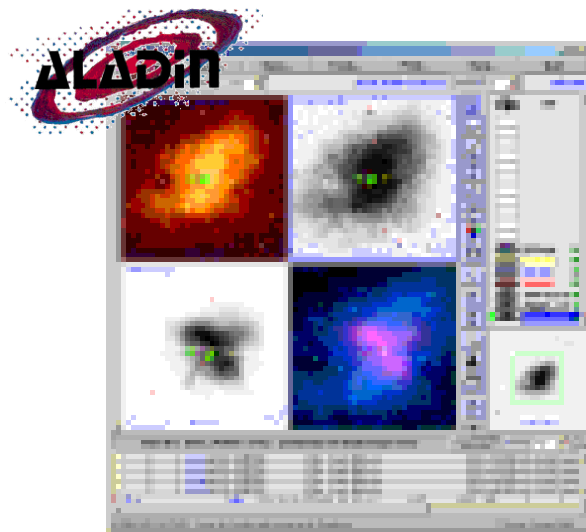


The VO tools everyone uses :

TOPCAT



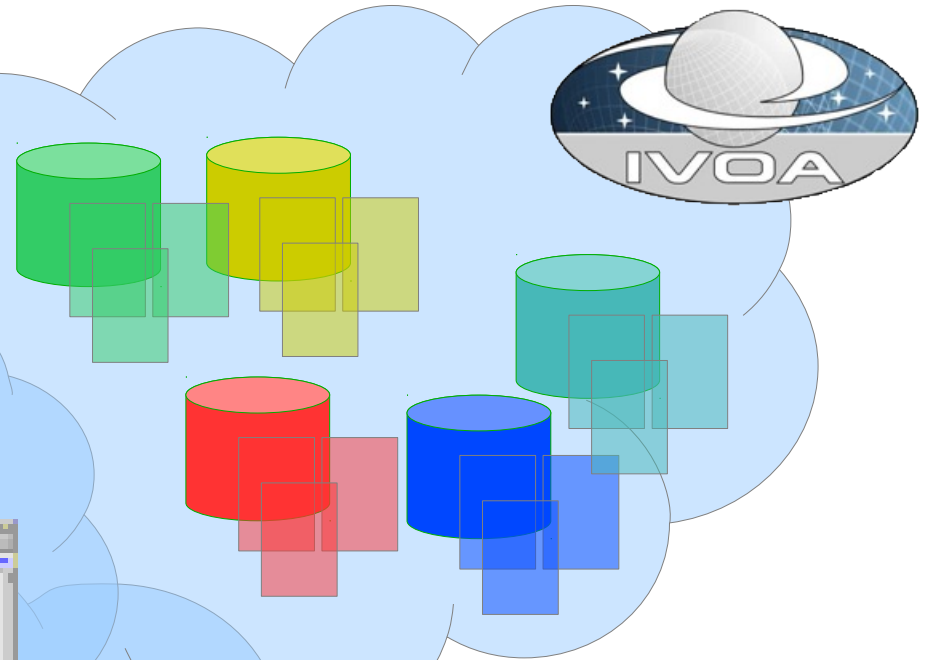
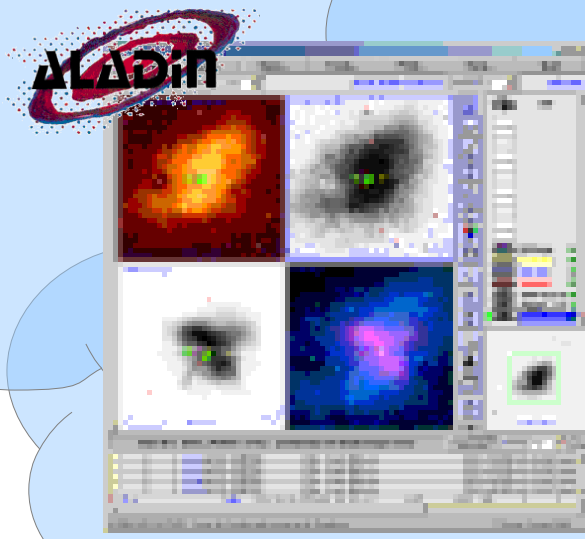
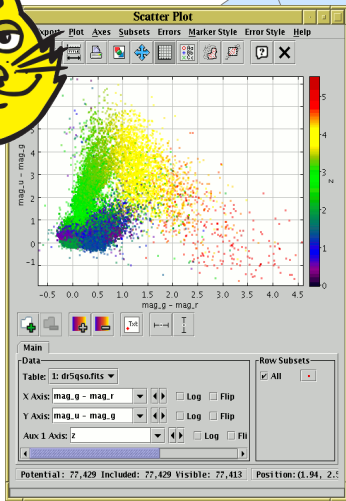
Aladin Vizier



Were not invented by the VO.

They were all well established before the VO was created.

The VO provides access to other people's data.





The VO is equivalent to the W3C



Providing a forum for members to collaborate on developing common standards for data interchange.



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The VO is equivalent to the W3C

Providing a forum for members to collaborate on developing common standards for data interchange.

VOTable Format Definition (VOTable)

Multi-Order Coverage map (MOC)

Sky Event Reporting Metadata (VOEvent)

Hypertext Markup Language (HTML)

Extensible Markup Language (XML)

Simple Image Access (SIA)



```
<!DOCTYPE html>
<html>
<!-- created 2010-01-01 -->
<head>
<title>sample</title>
</head>
<body>
<p>Voluptatem accusantium
totam rem aperiam.</p>
</body>
</html>
```

HTML

Table Access Protocol (TAP)

Astronomy Data Query Language (ADQL)

Hypertext Transfer Protocol (HTTP)

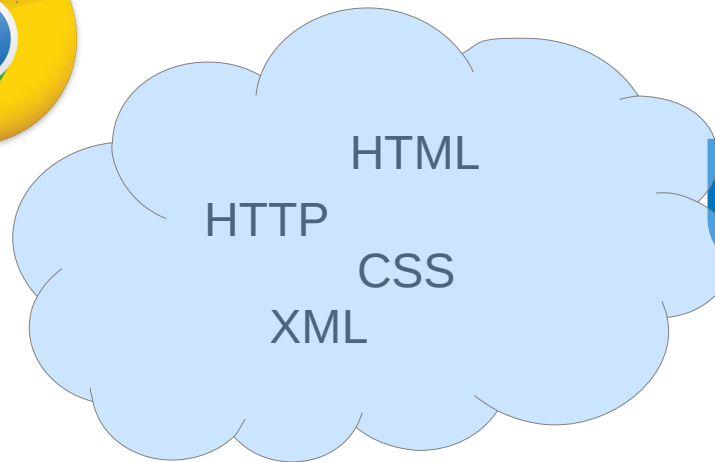
Cascading Style Sheets (CSS)





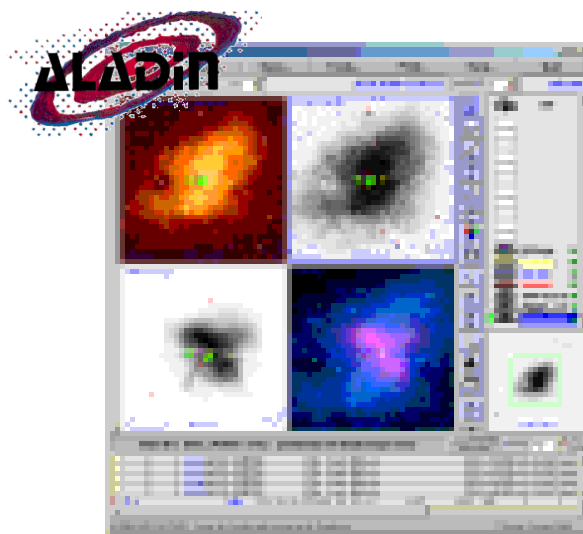
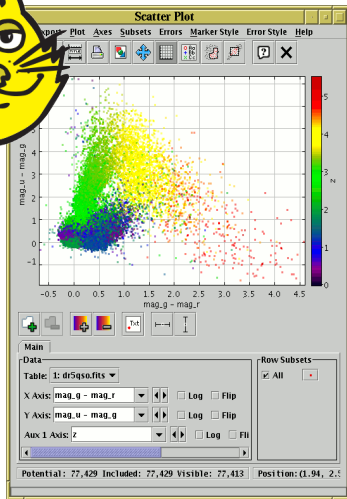
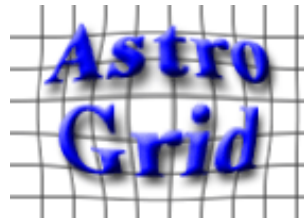
The W3C didn't develop any software

Individual W3C members use the standards to develop interoperable websites and browsers.





The VO didn't develop any software



Individual projects or institutes, for example AstroGrid and CDS, contributed the resources to add VO capabilities to existing tools.

TopCat receives funding from a variety of sources including several European and UK projects.

<http://www.star.bristol.ac.uk/~mbt/topcat/faq.html#Q1.20>

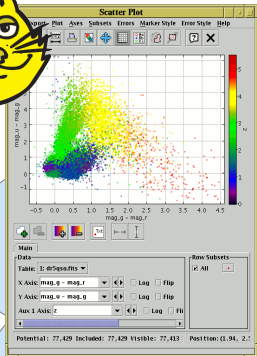
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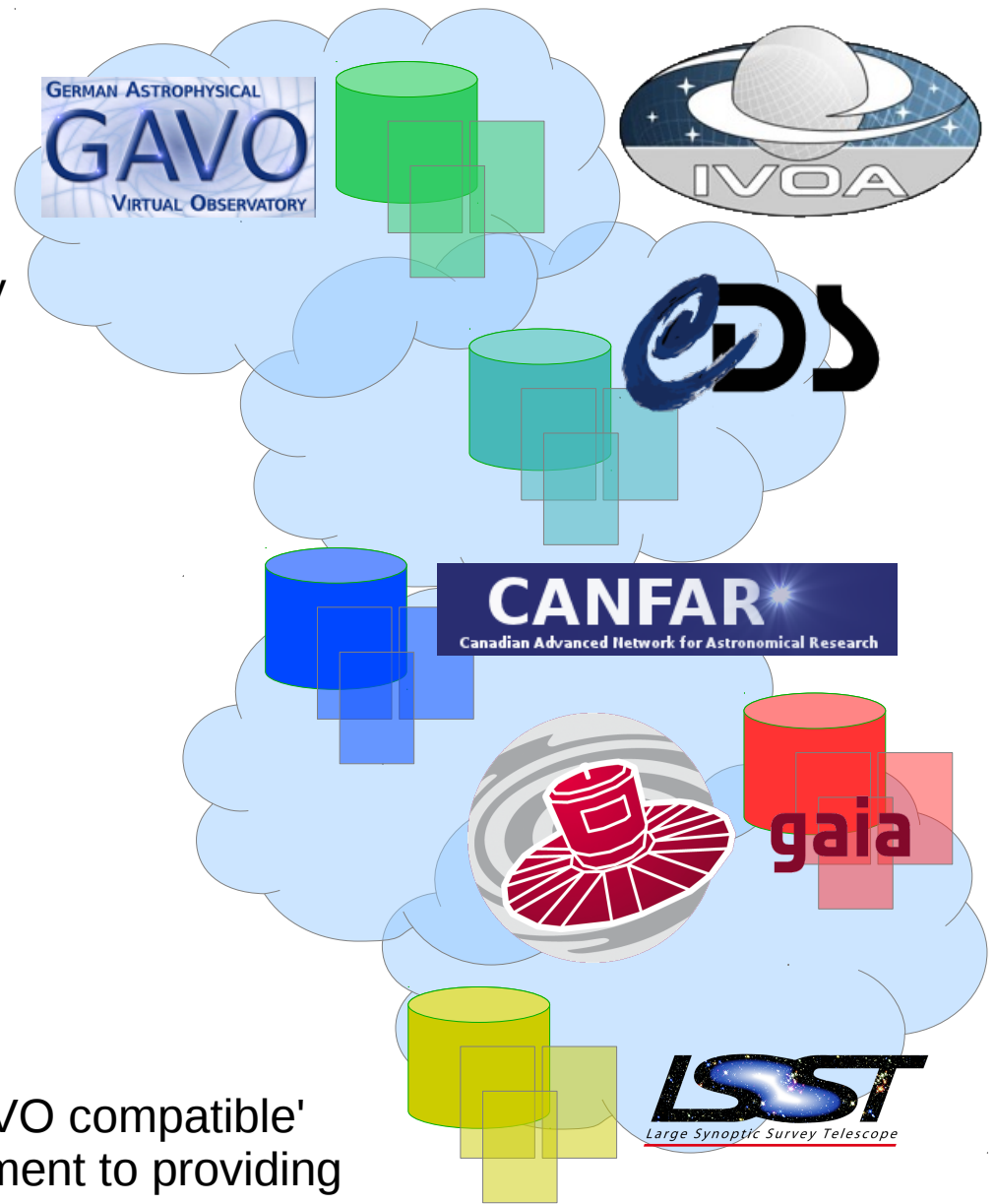
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The VO provides a way to make your data available to others.



Funding bodies see 'VO compatible' as a positive commitment to providing data access.





Key standards for transient alerts :

VTP



VOEvent Transport Protocol
Version 2.0
IVOA Recommendation 2017-03-20

VOEvent



International
Virtual
Observatory
Alliance

Sky Event Reporting Metadata (*VOEvent*)
Version 2.0
IVOA Recommendation 27 June 2011

Linked standards :

VOTable Registry
DALI VOResource

D.Morris <dmr@roe.ac.uk>
Institute for Astronomy,
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VOEvent Transport Protocol

Point to point protocol based on direct TCP connections

Delivery confirmed for every message.

Connection keep alive messages.

Server can drop connections to slow clients.

Duplicate delivery detection and prevention.



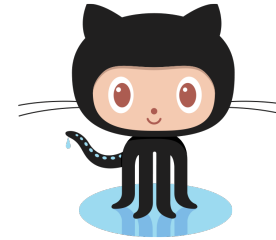


VOEvent Transport Protocol

Primary implementation

Comet – client / server VOEvent broker

Use by multiple projects



Source code available in GitHub
<https://github.com/jdswinbank/Comet>

Not the only protocol, alternatives are good
(specification text need clarifying).

XMPP – open source protocol

Report on lessons learned,
advantages and disadvantages
and examples – in progress.

ZeroMQ – open source protocol

Prototype ZeroMQ – VOEvent
gateway available on GitHub





VOEvent XML based message format

XML schema defines the structure and content of event messages

In use by multiple projects,
collecting feedback for next
version(s).

Change request from
ASTRON

Schema extensions to
represent FRB events

```
<VOEvent>
  <Who>
    ....
  </Who>
  <What>
    ....
  </What>
  <WhereWhen>
    ....
  </WhereWhen>
  <How>
    ....
  </How>
  <Why>
    ....
  </Why>
</VOEvent>
```

Change request from
Paris Astronomical Data Centre

Changes to the <WhereWhen>
coordinate system to
represent planetary events.





VOEvent and VTP

Key software to implement a VOEvent network

Comet

Client / server VOEvent broker

Four π sky

Tools for creating
and filtering events

voeventdb archive of
past events

Some groups are using it and it just works.

Feedback from others is that it is
difficult to get started.

Standards are difficult to read

XML is nasty

Comments noted

We will work to improve all of these





Next steps

Customizing the VOEvent schema to meet the needs of specific communities

- FRB events
- Planetary events
-

Updating the VOEvent schema to bring it into line with changes to other specifications.

- VOUnits
- VOTable
- Data types
- etc

What else needs changing ?





Next steps

Alternative data formats

JSON ?

Key value ?

Should it be a 1:1 mapping ?

Should it be a simpler structure ?

Write a proposal and I will promote it at the IVOA meeting at the end of October.

- Why is it better ?
- Why do we need it ?
- Examples of how it would represent historical events from voeventdb.

Caveat – it may take a while to introduce.
We will need to take care to avoid breaking existing services.





LSST

Large Synoptic Survey Telescope

High data rate, large complex event structure.





LSST *internal* alert processing

Not using VOEvent or VTP – primary reason is data rate

10^3 events per 39 sec visit

Apache Kafka as the transport protocol



Apache Avro as the data format



LSST are actively working within the IVOA

IVOA time domain group are working with LSST

Experience from LSST will influence future development of VOEvent

Kafka and/or Avro may be part of a future version of VOEvent

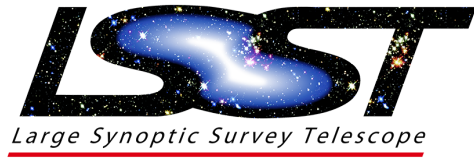
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What if
we subscribed to the full stream

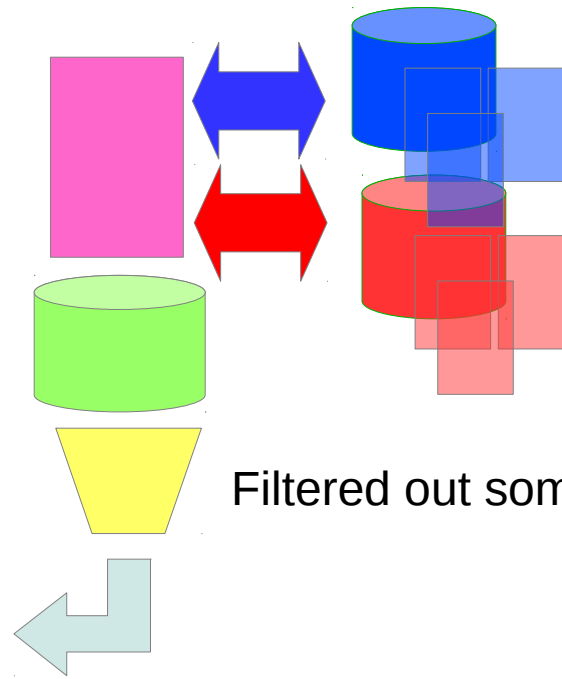
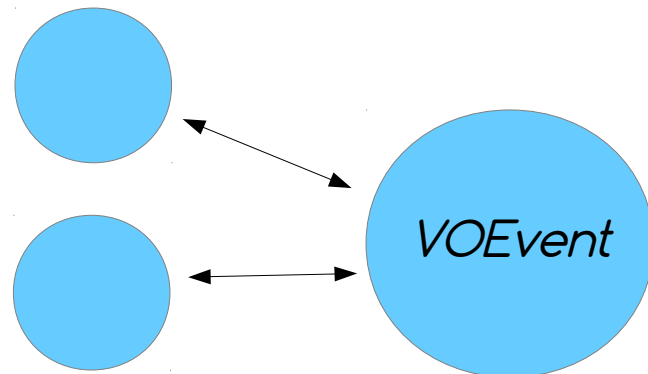


Cross matched
with other things

Kept an archive

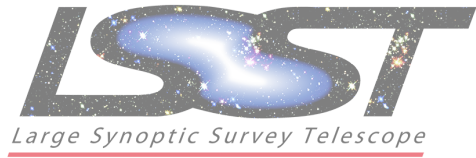
Filtered out some things

What VOEvents
would you want to
see at this end ?

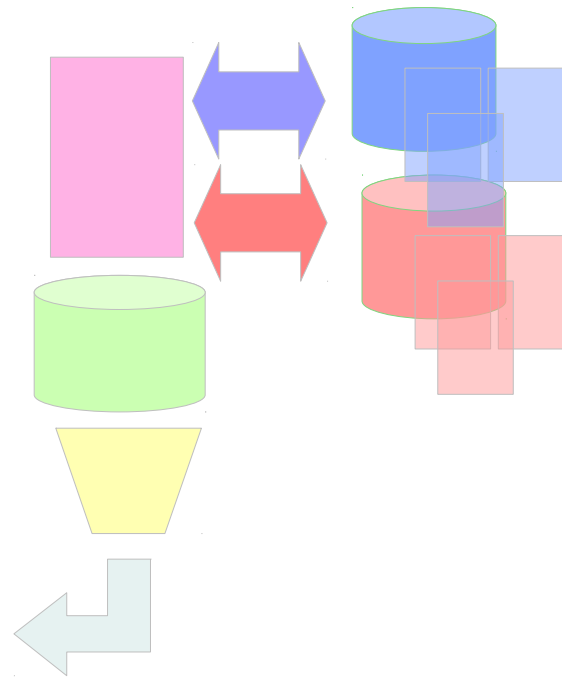
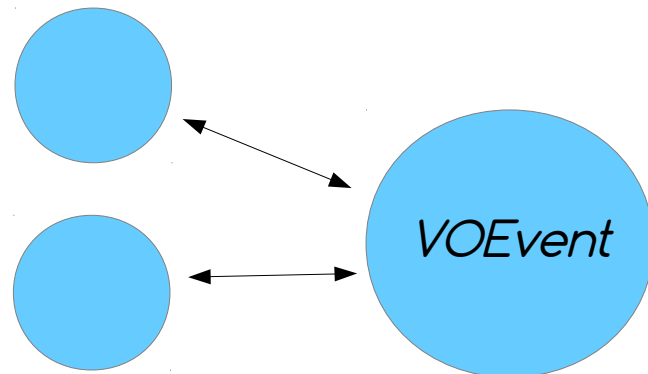


Broadcast as VOEvent





How do we describe this stream?





Please join the discussion

voevent@ivoa.net

VOEvent should be designed by the people using it.

Registration form

<http://mail.ivoa.net/mailman/listinfo/voevent>

Dave Morris

dmr@roe.ac.uk

D.Morris <dmr@roe.ac.uk>
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