



VOEvent and IVOA standards

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ASTERICS multi-messenger symposium
Groningen, March 2019

The role of the IVOA

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

“The Virtual Observatory (VO) is the vision that astronomical datasets and other resources should work as a seamless whole.”

“The International Virtual Observatory Alliance (IVOA) is an organisation that debates and agrees the technical standards that are needed to make the VO possible.”

W3C defines the HTTP, HTML, XML and CSS standards

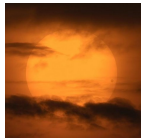


Microsoft, Apple, Google, Mozilla and Opera create web browsers.



So who does write the software ?

We do – we create the tools we need
(and hopefully share them with others)



J Swinbank - Comet

<https://github.com/jdswinbank/Comet>

<http://comet.transientskp.org/en/stable/>



4 Pi Sky research group

<https://github.com/4pisky>

<https://4pisky.org/about/>

Does anyone have SW to share ?

Do we need to publish a list ?

Where we are now

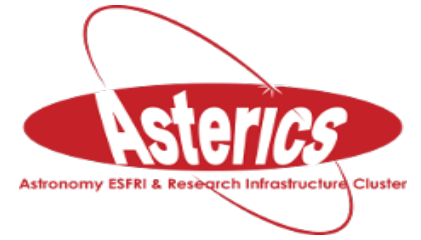
VOEvent 2.0 – accepted as recommendation*

<http://ivoa.net/documents/VOEvent>

Transport Protocol 2.0 – accepted as recommendation*

<http://ivoa.net/documents/VOEventTransport>

(*) *“accepted as recommendation” == “an IVOA standard”*



VOEvent – Current change requests

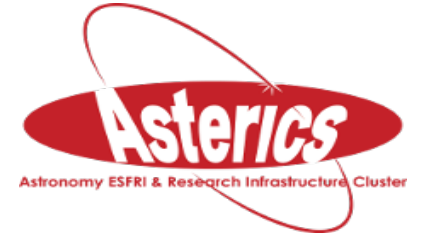
VOEvent for Fast Radio Bursts arXiv:1710.08155v1 [astro-ph.IM]

- Event type field, anyURI.
- Repository or registry for derived schema

VOEvent for planetary science Observatoire de Paris

- Small changes to WhereWhen to support solar system and planetary reference frames.
- Any changes should be backwards compatible with existing 2.x software.





VOEvent – New change requests

“Who do I contact if I want something changed ?”

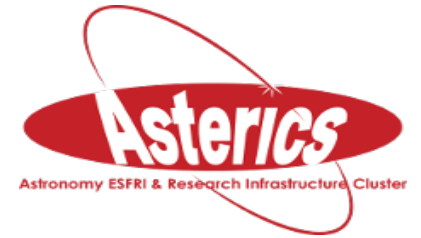
IVOA time-domain mailing list

<voevent@ivoa.net>

Mailing list history

<http://mail.ivoa.net/pipermail/voevent/>





VOEvent – New change requests

“Who do I contact if I want something changed ?”

Ada Nebot <ada.nebot@astro.unistra.fr>

IVOA time-domain - chair

Dave Morris <dmr@roe.ac.uk>

IVOA time-domain – vice chair

Roy Williams <roy@roe.ac.uk>

VOEvent - editor and author

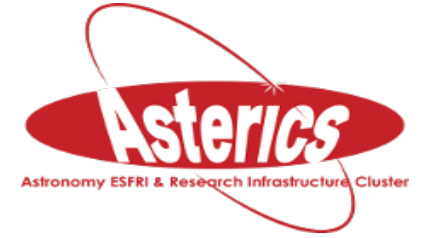
Right now !

Today only !!

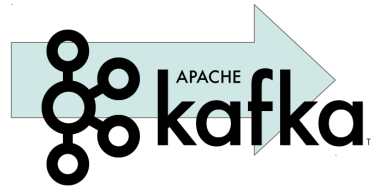
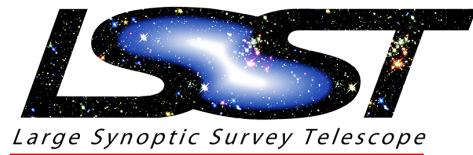
**One time
special
offer**

**Three experts
at your service**





VOEvent – The next generation ?

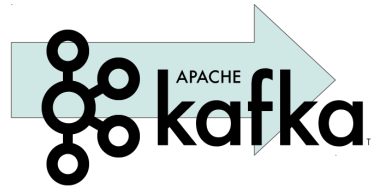
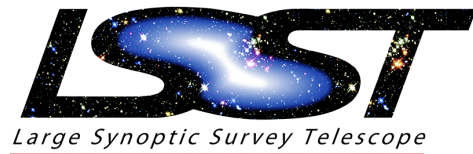


Not using VOEvent ?

High data rate ($> 10^3$ Hz)



VOEvent – The next generation ?



Not using VOEvent, because these are not events.

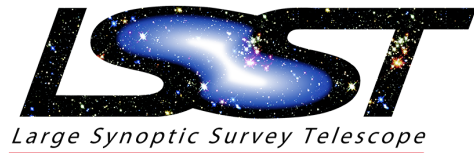
High data rate ($> 10^3$ Hz)

This is raw data.

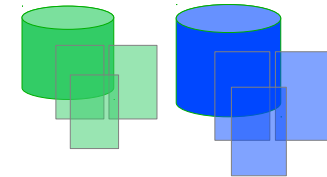
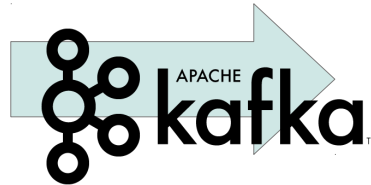
~250,000,000 detections per night

Lots of <what> no <why>

*“VOEvent defines the content and meaning of a standard information packet for representing, transmitting, publishing and archiving information about a transient celestial event, **with the implication that timely follow-up is of interest.**”*



High data rate ($> 10^3$ Hz)



crossmatch
characterization
annotation
filtering

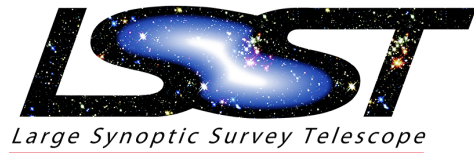


High value, well characterized events

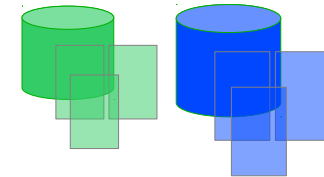
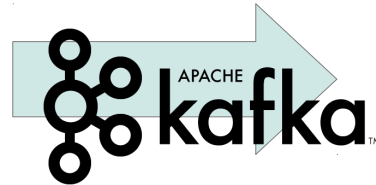
80% probability supernova candidate

Low data rate (10 per day ?)



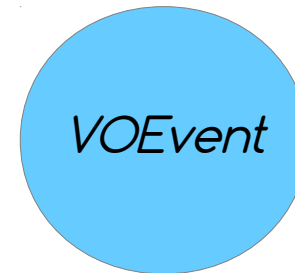


High data rate ($> 10^3$ Hz)



crossmatch
characterization
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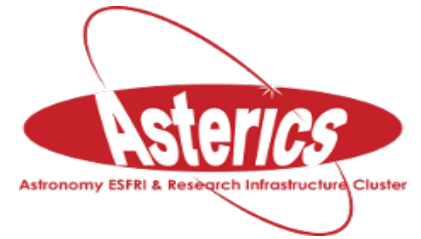
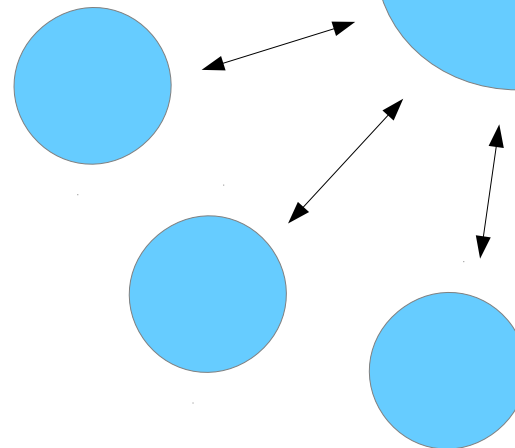
Existing VOEvent
community

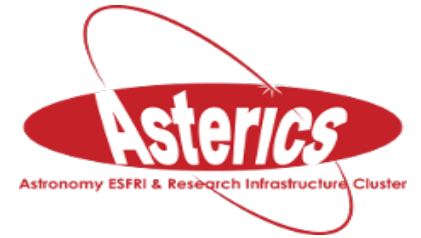


High value
well characterized events
80% probability supernova
candidate

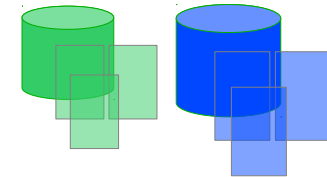
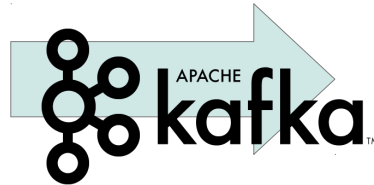
Low data rate (< 1 Hz) ?

Standard VOEvent
format





Medium data rate ~250,000/night



crossmatch
characterization
annotation
filtering

Lasair

<https://lasair.roe.ac.uk/>

Historical database

User watch lists

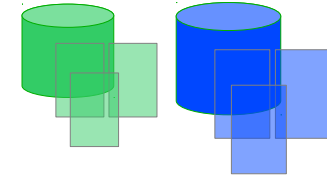
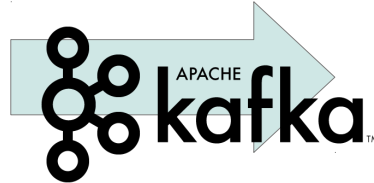
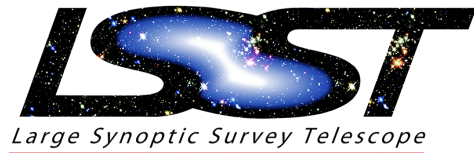
Cross match

Characterization

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crossmatch
characterization
annotation
filtering



High value, well characterized events
"80% probability supernova candidates"

FAIR data

- Findable
- Accessible
- Interoperable
- Reuseable

How well do we do ?





VOEvent
stream

“80% probability supernova candidates”

FAIR data



- Findable
- Accessible
- **Interoperable**
- Reuseable



“Metadata use a formal, accessible, shared, and broadly applicable language for knowledge representation.”

VOEvent specification



“80% probability supernova candidates”

FAIR data



- Findable
- Accessible
- Interoperable
- **Reuseable**



- Who says they are supernova ?
- Based on what criteria ?
- What algorithm was used ?

“Data and collections have a clear usage licenses and provide accurate information on provenance.”

- Can I publish this data ?
- Who should I cite ?



“80% probability supernova candidates”

FAIR data



- Findable
- Accessible
- Interoperable
- **Reuseable**



“Data and collections have a clear usage licenses and provide accurate information on provenance.”

Do we define this in the event, or use a link to refer to an external resource ?

- Who says they are supernova ?
- Based on what criteria ?
- What algorithm was used ?
- Can I publish this data ?
- Who should I cite ?

Each event has a URL for provenance and license ?

No changes to the XML schema, just two new properties.



“80% probability supernova candidates”

FAIR data



- Findable
- **Accessible**
- Interoperable
- Reuseable

“Metadata and data are understandable to humans and machines.”

<what>



<why>



What does “80% probability” mean ?

What does “supernova” mean ?



“80% probability supernova candidates”

FAIR data



- Findable
- **Accessible**
- Interoperable
- Reuseable

Each event has a URL pointing to metadata about the event type ?

No changes to the XML schema,
just a new property.

“Metadata and data are understandable to humans and machines.”

<what>



<why>



What does “80% probability” mean ?

Do we need some more terms ?

What does “supernova” mean ?

Would an “event type” identifier help ?



“80% probability supernova candidates”

FAIR data



- **Findable** 
- Accessible
- Interoperable
- Reuseable

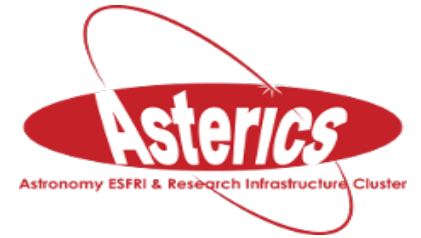
“Data and supplementary materials have sufficiently rich metadata and a unique and persistent identifier.”

We need to define the metadata for services and streams*.

(*) One event *service* may provide multiple *streams*.

- Where do I find events happening in [region] ?
- Where do I find events from [last year] ?
- Where do I find events for [wavelength] ?
- Where do I find events from [instrument] ?
- Where do I find events about [supernova] ?
- Where do I find events matching [criteria] ?
- Where do I find events filtered by [algorithm] ?





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VOEvent - editor and author

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