Software Lessons from LOFAR

VOEvent Considerations

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Interfaces are Essential

I don’t want to talk to you: I want to talk to your software
Interfaces are Bidirectional

I don’t want to talk to you: I want to run your telescope
Interfaces are Everywhere

Even in your data products. Especially in your data products.
Interfaces are Useless

Unless they’re documented. And the documentation is right.
Keep your data moving

Perhaps better: moveable.
Keep your data accessible

Getting data to the end user is the easy part. Right?
Keep your schedule dynamic

...and push, don’t poll.
Start simple and
Start simple and iterate
Start simple and iterate iterate iterate
Start simple and
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Start simple and

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iterate

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Start simple and
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Start simple and iterate iterate iterate iterate iterate iterate iterate iterate iterate iterate iterate
Who is writing your software?

And who’s going to support it when they’re done?
VOEvent Considerations
“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.”

Sky Event Reporting Metadata, Version 2.0
IVOA Recommendation 11 July 2011
Seaman et al
http://www.ivoa.net/documents/VOEvent/
<?xml version='1.0' encoding='UTF-8'?>
<voe:VOEvent
  ior='ivo://nasa.gsfc.nasa/Fermi#GBM_Alert_2012-11-28T05:05:50.96_375771953_1-351'
  role="observation" version="1.1"/>

<Who>
  <Author>
    <shortName>Fermi (via VO-GCN)</shortName>
  </Author>
  <Date>2012-11-28T05:05:57</Date>
  <Description>This VOEvent message was created with GCN VOE version: 1.11 02aug12</Description>
</Who>

<What>
  <Param name="TrigID" value="375771953" ucd="meta.id"/>
  <Param name="Trig_Signif" value="5.5" unit="sigma" ucd="stat.snr"/>
  <Param name="Trig_Dur" value="0.512" unit="sec" ucd="time.interval"/>
  <Description>A heads-up alert that the Fermi-GBM instrument found a transient.</Description>
</What>

<WhereWhen>
  <Time unit="s">
    <TimeInstant>
      <ISOTime>2012-11-28T05:05:50.96</ISOTime>
    </TimeInstant>
  </Time>
  <Description>The RA,Dec coordinates are of the type: unavailable/inappropriate.</Description>
</WhereWhen>

<How>
  <Description>Fermi Satellite, GBM Instrument</Description>
</How>

<Why importance="0.5">
  <Inference probability="0.5">
    <Concept>process.variation.burst;em.gamma</Concept>
  </Inference>
</Why>

<Description/>
</Description>
</voe:VOEvent>
<voe:VOEvent
  xmlns="ivo://nasa.gsfc.nasa/Fermi#GBM_ALERT_2012-11-28T05:05:50.96_375771953_1-351"
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    </WhereWhen>
    <How>
      <Description>Fermi Satellite, GBM Instrument</Description>
    </How>
    <Why>
      <Inference probability="0.5">
        <Concept>process.variation.burst;em.gamma</Concept>
      </Inference>
    </Why>
  </Who>
</voe:VOEvent>
Who?
What?
When?
How?
So what?
http://comet.transientskp.org/
(for e.g.)
VOEvent Backbone

- LSST
- PanSTARRS
- Swift
- Fermi
- ...

Request for specific observation

Description of transient events
VOEvent Backbone

- LSST
- PanSTARRS
- Swift
- Fermi
- ...

Description of transient events

Science Project

→ Request for specific observation

↓ Description of transient events
Description of transient events

Request for specific observation

Description of transient events