The WorldWide Telescope Ambassadors Program

www.cfa.harvard.edu/WWTAmbassadors/
Seamless Astronomy

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with Alberto Accomazzi, Rahul Davé,
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Tim Clark (Massachusetts General Hospital/Harvard Medical School);
Jonathan Fay & Curtis Wong (Microsoft Research)
+extended & upcoming collaboration with Chris Borgman & Alberto Pepe* (UCLA);
Doug Burke; Sarah Block, Pepi Fabbiano, et al. (CfA); E. Bressert (U. Exeter);
J. Hendler & D. McGuinness (RPI); A. Conti & C. Christian (STScI); A. Connolly et al. (U. Washington)
No time for detail in 10 minutes... please ask Pepi or Jonathan....
Realm of Seamless Astronomy
Realm of “Seamless Astronomy”

Data

Advanced Search & InfoViz tools

Get Semantic

arXiv.org

nature

Astronomy

Literature

Researcher

2010 Evermore Seamless Astronomy

Standalone Analysis Software

IDL

DataDesk’
What should we do now?

Focus on interconnections/modularity

Involve more “free agents”

Provide institutional data/code repositories

Make users aware w/o “software-speak”
This simple argument, first made at the 2009 WWT session at AAS, seems to be working:

“Astronomy research tools should work as seamlessly as travel research tools.”
Toward this...
Seamless Astronomy

Mockup based on work of Eli Bressert, excerpted from NASA AISRP proposal by Goodman, Muench, Christian, Conti, Kurtz, Burke, Accomazzi, McGuinness, Hendler & Wong, 2008
Fact
right now,
e.g.
www.cfa.harvard.edu/~COMPLETE/

~Fiction
very soon fact,
e.g. CfA & U.W. work!
Literature Handling: Diverse Apps, Common Data

- Zotero: Leveraging the long tail of scholarship.
- arXiv.org
- ADS: NASA
- Papers
- Mendeley: Research Networks Beta 0.9
- EndNote: Bibliographies Made Easy
What fraction of astronomy researchers **know about** these tools?
You know this, I hope?

interconnections/modularity
list of objects with links to WWFT browser
(thanks to ADS team & Jonathan Fay)
Now we got to NGC 7023 by using the literature as a filter.
Seamlessness through...
flickr
+ astrometry.net
+ WWT !?
Coming (Very) Soon...

**Faceted Heat Map of Articles on the Sky**

**Historical Image Layer**
Extracted from ALL ADS holdings (using astrometry.net)

[ADS+CDS+WWT are doing it!]

[ADS+WWT+who wants to help?]
Prototype of Articles on the Sky (April 2010)

Simbad bibliographical map (made by T.Boch CDS)

with thanks to CDS/Pierre Fernique

interconnections/modularity
The future is here... data IN articles

interconnections/modularity
free agents
repositories
awareness/usability

Note: This work came from the “AstroMed” project
am.iic.harvard.edu

Figure 2 | Comparison of the ‘dendrogram’ and ‘CLUMPFIND’ feature-identification algorithms as applied to CO emission from the L1448 region of Perseus. A 3D visualisation of the surfaces indicated by colours in the dendrogram shown in a. Purple illustrates the smallest scale self-gravitating structures in the region corresponding to the leaves of the dendrogram; pink shows the smallest surfaces that contain distinct self-gravitating bars within them; and green corresponds to the surfaces in the data cube containing all the significant emission. Dendrogram branches corresponding to self-gravitating objects have been highlighted in yellow over the range of $T_{mb}$ (main-beam temperature) test-level values for which the virial parameter is less than 2. The $c$-y locations of the four ‘self-gravitating’ leaves labelled with billiard balls are the same as those shown in Fig. 1. The 3D visualisations show position-velocity-velocity ($p$-$v$-$v$) space, RA, right ascension, decl., declination. For comparison with the ability of dendrogram (A) to track hierarchical structure, it shows a pseudo-dendrogram of the CLUMPFIND segmentation (B), with the same four leaves used in Fig. 1 and in a. ‘Locum’ are not allowed to belong to larger structures, each pseudo-branch in (b) simply a series of boxes connecting the maximum emission value in each clamp to the threshold value. A very large number of clumps appears in B because of the sensitivity of CLUMPFIND to noise and small-scale structure in the data. In the online PDF version, the 3D cube (a and B) can be rotated to any orientation, and surfaces can be turned on and off (interaction requires Adobe Acrobat version 7.0.8 or higher). In the printed version, the front face of each 3D cube (the ‘home’ view in the interactive online version) corresponds exactly to the patch of sky shown in Fig. 1, and velocity with respect to the Local Standard of Rest increases from front (−8 km s$^{-1}$) to back (8 km s$^{-1}$).

Figure 3 | Schematic illustration of the dendrogram process. Shown is the construction of a dendrogram from a hypothetical one-dimensional emission profile (black). The dendrogram (blue) can be constructed by ‘dropping’ a test constant emission level (purple) from above in tiny steps (exaggerated in size here), right into the local mass and maxima and minima are found, and connected as shown. The construction of a test level with the same intensity as the minimum surrounding it is repeated by moving along the dimension, a plane curve in two dimensions, and a surface in three dimensions. The construction of a test level with the same intensity as the maximum (left, white) is repeated every step in the dimension, a plane curve in two dimensions, and a surface in three dimensions. The dendrogram of 3D data file Fig. 2c in the online version is a direct analogue of the tree shown here, only constructed from ‘nonsurface’ rather than ‘point’ interactions. It has been sorted and illustrated for representation on a flat page, as fully representing dendrograms for 3D data cubes would require four dimensions.
How do we increase the fraction of astronomy researchers who know about these tools?

User Groups
(CfA now has one)

+Suggestions?!
User Groups (CfA now has one)
How do we increase the number of people who create and interlink new tools?

Kiva model proposed at MSR in semi-jest in 2009...

Should implemented through VAO “Associates,” WWT Partners, and more.
How do we organize such diverse tools, so as to make them interoperably useful?....

“SAMP” is a great technical start, but offers a very significant user interface challenge.
interconnections/modularity

SAMP
Ongoing “ADS Labs” Work: Rahul Davé, Alberto Accomazzi, Michael Kurtz, AG

Thanks to ADS (NASA)/VAO(NASA+NSF)/MSFT funding.

“Faceted Browsing”

We will be carrying out these efforts as part of ADS Labs.

Bootstrapping in ADS Labs

ADS Labs is an effort to put out more forward thinking, somewhat unstable applications will be incubated in ADS Labs before being pushed out to ADS.

1. The results of queries on a bibliographic database will be made available on a web store. We will build a user interface on the above (see first image below).
2. We will switch to a semantic backend with a SPARQL interface.
3. Development of Ontologies (which this site details) continues and
4. Finally we’ll combine the databases so as to have one large semantic store.

Examples of Applications

Here are examples of what such applications might look like:

- Data
  - Literature
  - Objects

Modular Functionality

interconnections/modularity awareness/usability
Collaborative Astronomy at University of Washington

- **Research in a Browser**
  - “iGoogle” for Astronomy
    - Collections of simple atomic applications (gadgets)
    - Users choose the view they want
    - All gadgets can communicate with each other
  - **Customizable and sharable**
    - Users can build and share “mashups”
    - Widgets are simple to create
    - Widgets call virtual observatory resources
  - **Efficient**
    - Communication is within the browser (fast)
    - Built from javascript (standard)

Show Andy Connolly’s Movie....
Select Gadgets

Rearrange based on your preference

Collaborative Astronomy (Connolly, Gibson, Krughoff, Sayers, Smith 2010)
All gadgets communicate through the data gadget

Query the SDSS based on viewport and return the source overlaid on images

Name resolver and zoom to field
Create, store and share multiple views of gadgets

Interaction allows selections to be shown on the viewport

Collaborative Astronomy (Connolly, Gibson, Krughoff, Sayers, Smith 2010)
WorldWide Telescope Ambassadors Program

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How?

Using new WWT platform to give experts and learners access to the Universe

- data, literature, media
- WWT
- Ambassadors

WWT Ambassadors Program
Recruiting, Vetting, Coordination

- Community Presentations
- WWT Tours
- In-school programs

hosted/promoted by WGBH
“I never knew programs like this could even exist. It’s just amazing.”

–Clarke Middle School 6th grade student

More quotes from Clarke 6th Graders

“Learning about our Universe by actually seeing and exploring it makes it easier to contemplate and more fun.”

“You can explore the Universe yourself and you don't always have to only learn from the teacher.”

“It gave me a better mental map of the universe.”

(And of the 72 surveys we’ve collected, 71 are positive toward WWT Ambassadors.)