

Digital Science

Reproducibility and Visibility in Astronomy

José Enrique Ruiz on behalf of the Wf4Ever Team



ESAC FACULTY SEMINAR
MADRID, JANUARY 18th 2013



Digital Science - Reproducibility and Visibility in Astronomy

Astronomy Research Lifecycle

Astronomy research lifecycle is **entirely digital**

- » Observation proposals 
- » Data reduction pipelines
- » Analysis of science ready data
- » Catalogs of objects and data
- » Publish process
 - › Final data results 
 - › Experiment in DL
ADS/arXiv

Reproducible research is still not possible in a digital world

A rich infrastructure of data (VO) is not efficiently used



A normalized preservation of methodology is needed

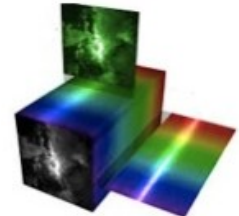
Tools

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The next generation of archives

Much wider FoV and spectral coverage

- » Large volumes for an observed datacube
- » Subproducts are **Virtual Data** generated on-the-fly



	Low Res		High Res		Extreme Res	
Number	4 Bytes	4B	4 Bytes	4B	4 Bytes	4B
Resolution	2,048 x 2,048	16MB	8,192 x 8,192	268MB	12,288 x 12,288	603MB
Channels	16,384	0.27TB	16,384	4.39TB	16,384	9.8TB
Stokes & Weighting	1	0.27TB	1	4.39TB	4 + 1	49.5TB

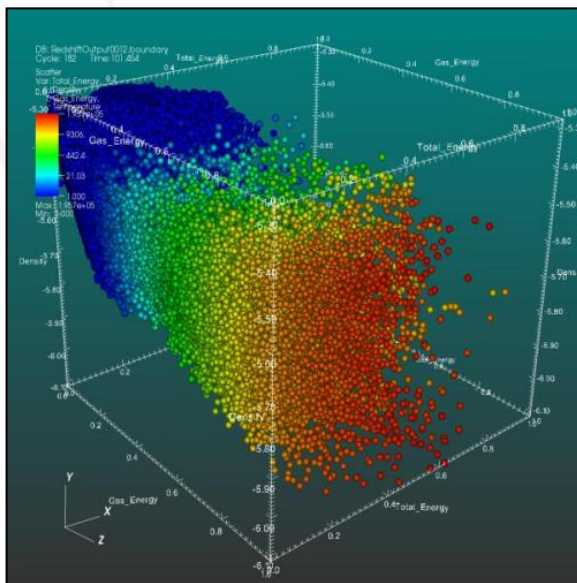
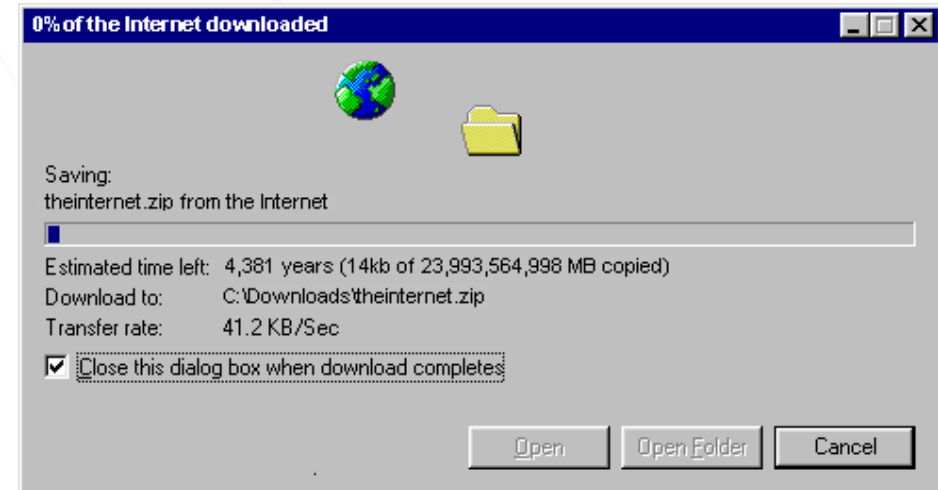
ASKAP Cubes
Prof. Kevin Vinsen

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The next generation of archives

Automated surveys

- » Huge amounts of tabular data
- » Services for KDD



Extraction of scientifically relevant information from a multidimensional parameter space

- » Exploration services
- » Anomaly detection
- » Cross-matching data
- » Dimensionality reduction

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The next generation of archives

» A cloud of Web Services

Archives should evolve from data providers into

- » Virtual data providers
- » Software tasks providers

» Archives speaking Web Services

Astronomy of multi archives/facilities/wavelength

Interconnected and interoperable archives

- » Data -> Virtual Observatory
- » Software Tasks



Preservation

Process should benefit of the same privileges acquired by data

Preserving the method ensures replication of final results at any moment

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Efficiency and Reuse

Optimize return on investments made on big facilities

- » Avoid duplication of efforts and reinvention
- » How to discover and not duplicate ?
- » How to re-use and not duplicate ?
- » How to make use of best practices ?
- » How to use the rich infrastructure of data ?
- » **Intellectual contributions are encoded in softw**

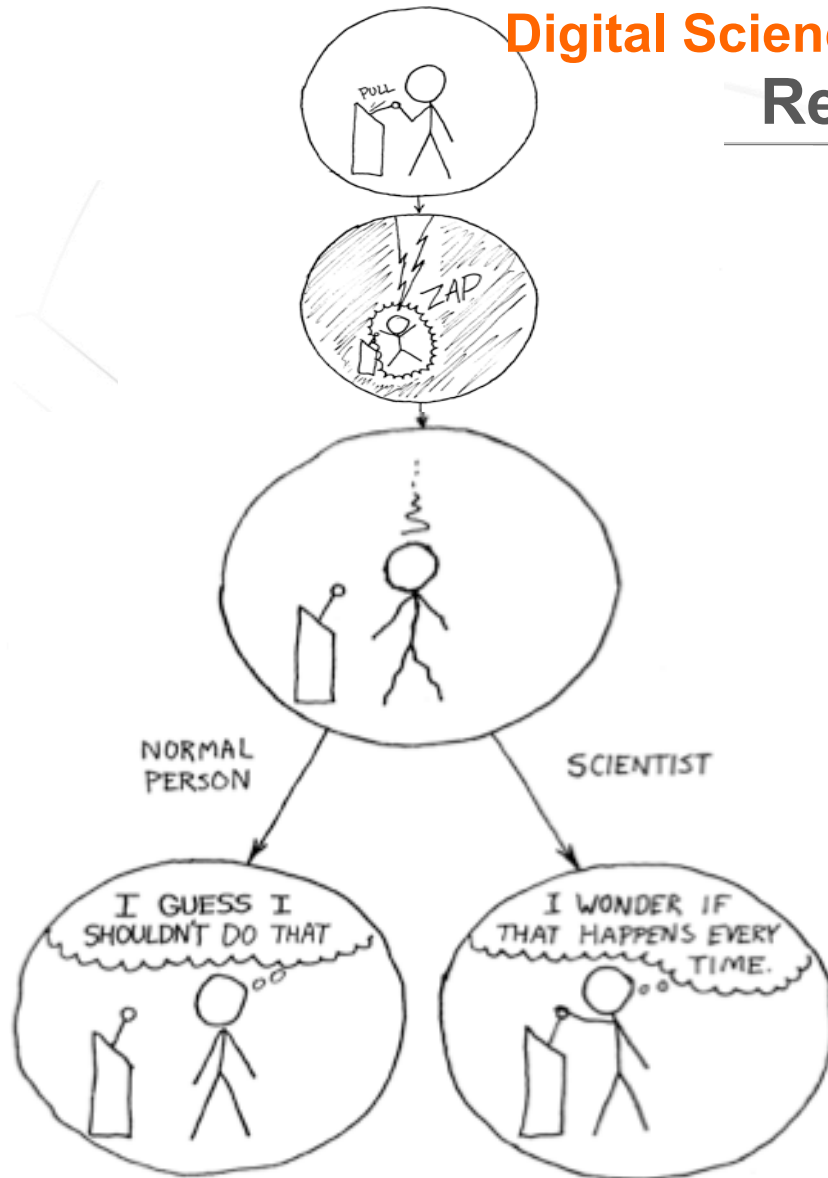
More data in archives does not imply more knowledge

- » Time has come to go beyond the PDF
- » Expose complete scientific record, not the story
- » Allow easy **discovery** of methods and tools



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Reproducibility and The Scientific Method



<http://xkcd.com/242/>

Benefits

- » Publishing knowledge, **not advertising**
- » The author, the referee and the re-user
- » Reputation, prestige and respect
- » **Higher quality of publications**
 - › Authors will be more careful
 - › Many eyes to check results

Challenges

- » Hard and time consuming
- » Need incentives – not rewarded now

Initiatives

- » **Elsevier Executable Papers Challenge**
- » **Open Data / Open Science - EU H2020**

Barriers to Data and Code Sharing in Computational Science

Survey of Machine Learning Researchers (Ginsburg & Iden, 2010):

I don't know how

Code		Data
77%	Time to document and clean up	54%
52%	Dealing with questions from users	34%
44%	Not receiving attribution	42%
40%	Possibility of patents	-
34%	Legal Barriers (ie. copyright)	41%
-	Time to verify release with admin	38%
30%	Potential loss of future publications	35%
30%	Competitors may get an advantage	33%
20%	Web/disk space limitations	29%

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Discovery, Visibility and Credit

nature International weekly journal of science

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How to improve the use of metrics

Nature 465 870–872 (17 June 2010) | doi:10.1038/465870a

... “Science is being killed by numerical ranking,” [...] Ranking systems lures scientists into pursuing high rankings first and good science second.

SCIENCE METRICS

The value of scientific output is often measured, to rank one nation against another, allocate funds between universities, or even grant or deny tenure. Scientometricians have devised a multitude of 'metrics' to help in these rankings. Do they work? Are they fair? Are they over-used? *Nature* investigates.

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How to improve the use of metrics

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Research reverts to a kind of 'academic prostitution', in which work is done to please editors and referees rather than to further knowledge.

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How to improve the use of metrics

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... an author's h-index can reflect longevity as much as quality — and can never go down with age, even if a researcher drops out of science altogether.

SCIENCE METRICS


The value of scientific output is often measured, to rank one nation against another, allocate funds between universities, or even grant or deny tenure. Scientometricians have devised a multitude of 'metrics' to help in these rankings. Do they work? Are they fair? Are they over-used? *Nature* investigates.

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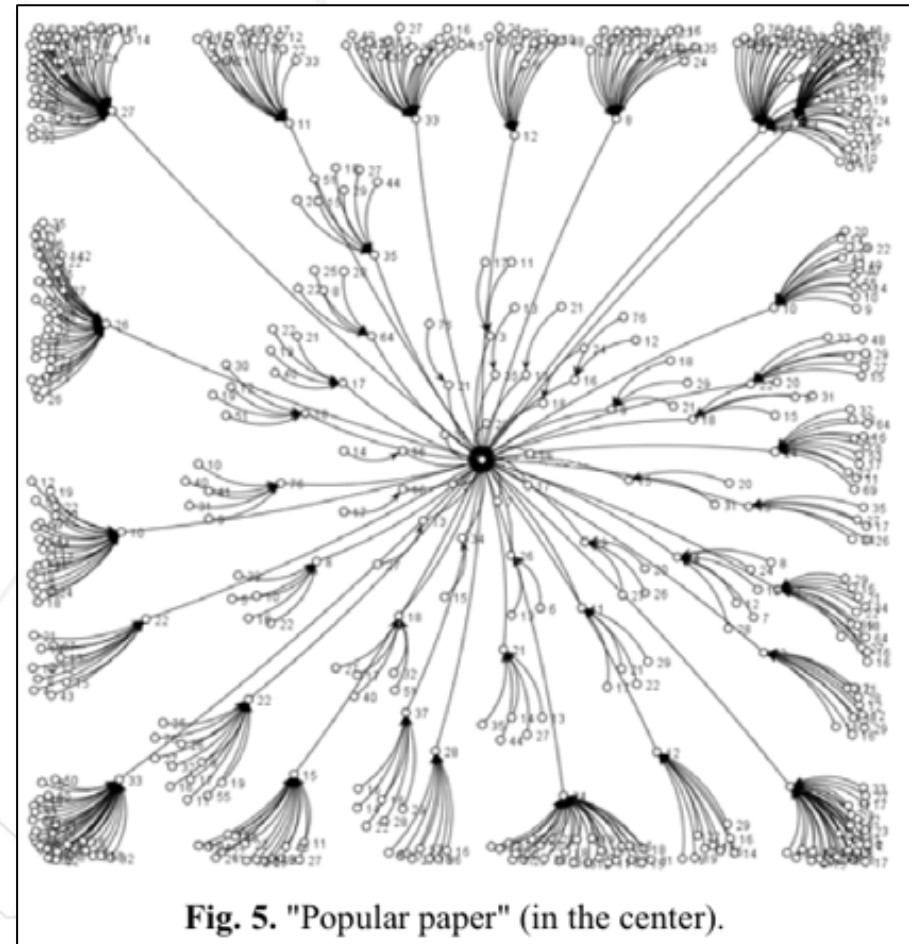
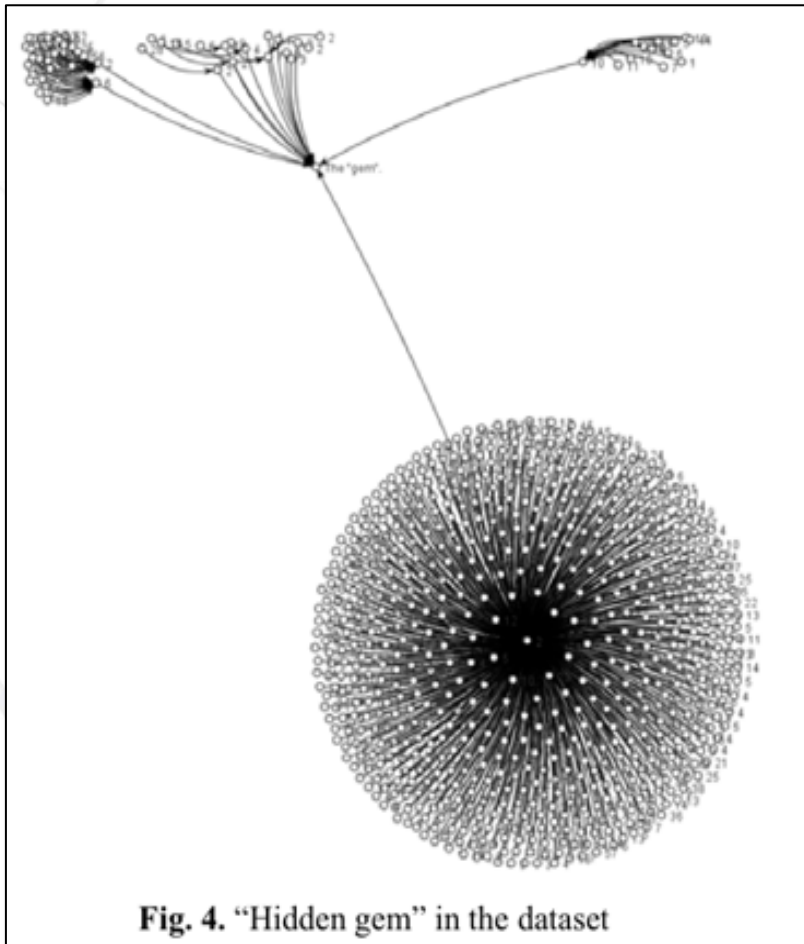
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Exploring and understanding scientific metrics in citation



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Discovery, Visibility and Credit

Paper discovery: the social dimension

The image is a collage of various digital science and social media platforms. At the top left is the Peeref logo with the tagline 'empowering scholars'. Next to it is the Mendeley logo with the text 'Welcome back Lourdes Verdes-Montenegro'. To the right is the YouTube logo. Below these are the Citeulike logo and a search bar for 'Search citeulike'. Further down is the BibSonomy logo. To the right of BibSonomy is a screenshot of a Mendeley profile page with a 'Papers' dropdown and a search bar. Below BibSonomy is the ResearchGate logo with a search bar. To the right is a Twitter logo. Below ResearchGate is the Klonk logo with the tagline 'Spread your research results'. To the right is a large green text 'Collabgraph!' with a subtext 'Collaborating in your field of research. Just [green]ary or upload a bibtex file, containing your graph will create a fancy graph showing'. Below Klonk is the Delicious logo with the tagline 'social bookmarking'. To the right is a screenshot of the AstroBetter website with a search bar and navigation links. Below Delicious is the Slideshare logo with 'BETA' text. To the right is the Zotero logo.

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The Wf4Ever Project

EU funded FP7 STREP Project

December 2010 – December 2013



1. Intelligent Software Components (**ISOCO**, Spain)
2. University of Manchester (**UNIMAN**, UK)
3. Universidad Politécnica de Madrid (**UPM**, Spain)
4. Poznan Supercomputing and Networking Centre (**PSNC**, Poland)
5. University of Oxford (**OXF**, UK)
6. Instituto de Astrofísica de Andalucía (**IAA**, Spain)
7. Leiden University Medical Centre (**LUMC**, NL)

iSOOCO
enabling the networked economy



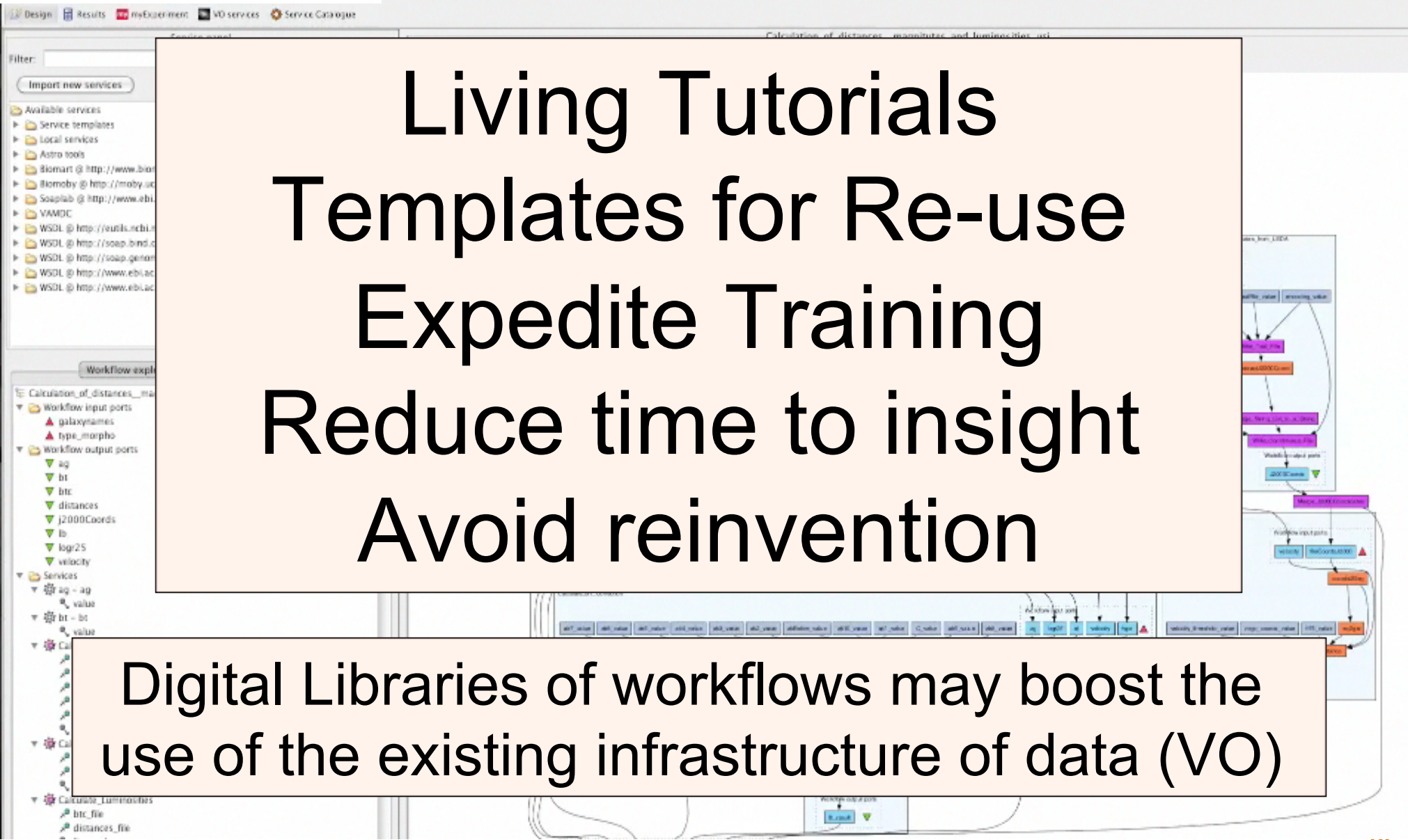
The University
of Manchester

MANCHESTER
1824



UPM





Living Tutorials
Templates for Re-use
Expedite Training
Reduce time to insight
Avoid reinvention

Digital Libraries of workflows may boost the use of the existing infrastructure of data (VO)

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Scientific Workflows

Survey in the domain of astrophysical workflows

- › Personal script-based recipes
 - Python, IDL, Software..
- › Multi-archive VO recipes
 - Euro-VO, IVOA..
- › Internal group developments
 - GRID, Clusters, Specific knowledge
- › Processing pipelines
 - Facilities provide data, compute infrastructure, tools..

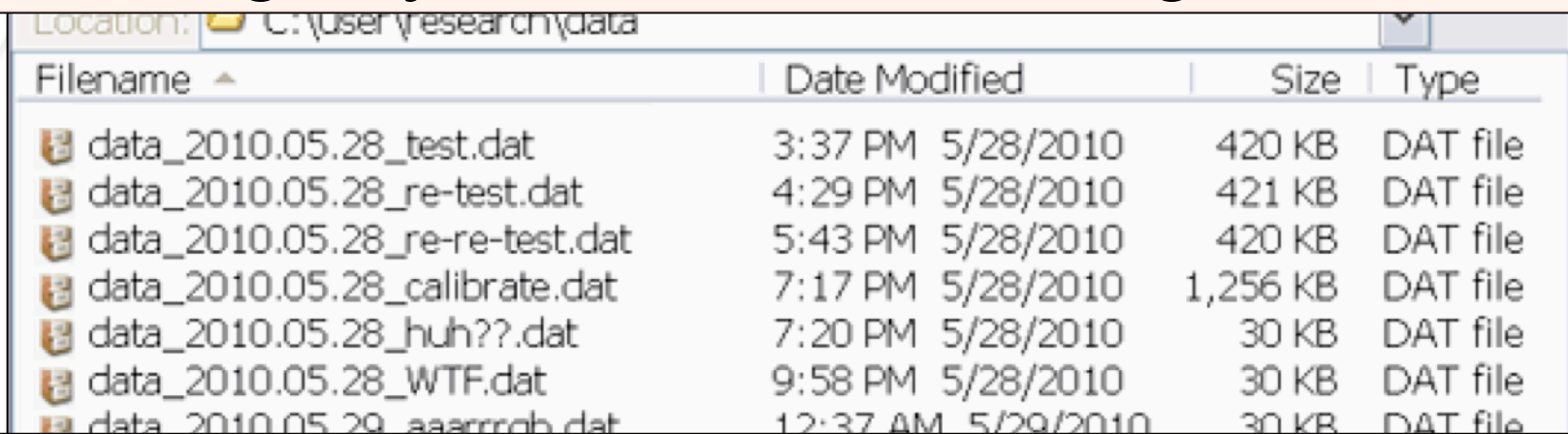
Hand-crafted workflows



Accessible
Shareable
Reusable
Adaptable
Understandable

- » **Clarity** (workflows) for re-use and re-purpose **vs. automation** (pipelines)
- » A black box is not **re-usable**, cannot be broken into parts
- » **Reproducibility vs. industrial** paper publishing

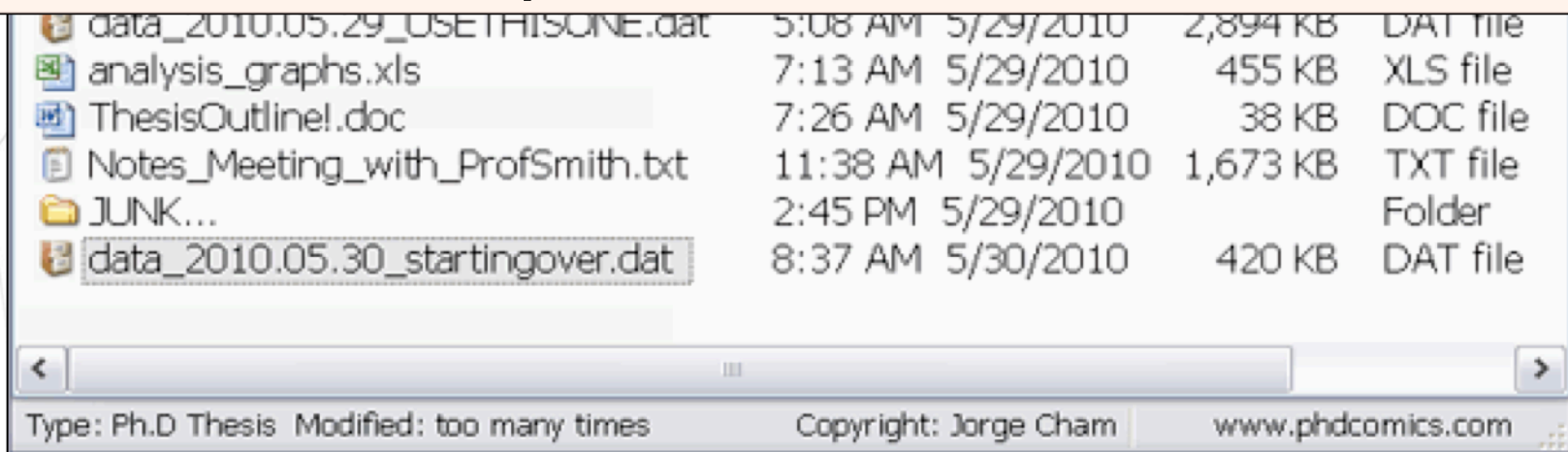
Going beyond automation: Organization



Location: C:\user\research\data

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data_2010.05.28_re-re-test.dat	5:43 PM 5/28/2010	420 KB	DAT file
data_2010.05.28_calibrate.dat	7:17 PM 5/28/2010	1,256 KB	DAT file
data_2010.05.28_huh??.dat	7:20 PM 5/28/2010	30 KB	DAT file
data_2010.05.28_WTF.dat	9:58 PM 5/28/2010	30 KB	DAT file
data_2010.05.29_aaarrrob.dat	12:37 AM 5/29/2010	30 KB	DAT file

Assistive building Completeness evaluation

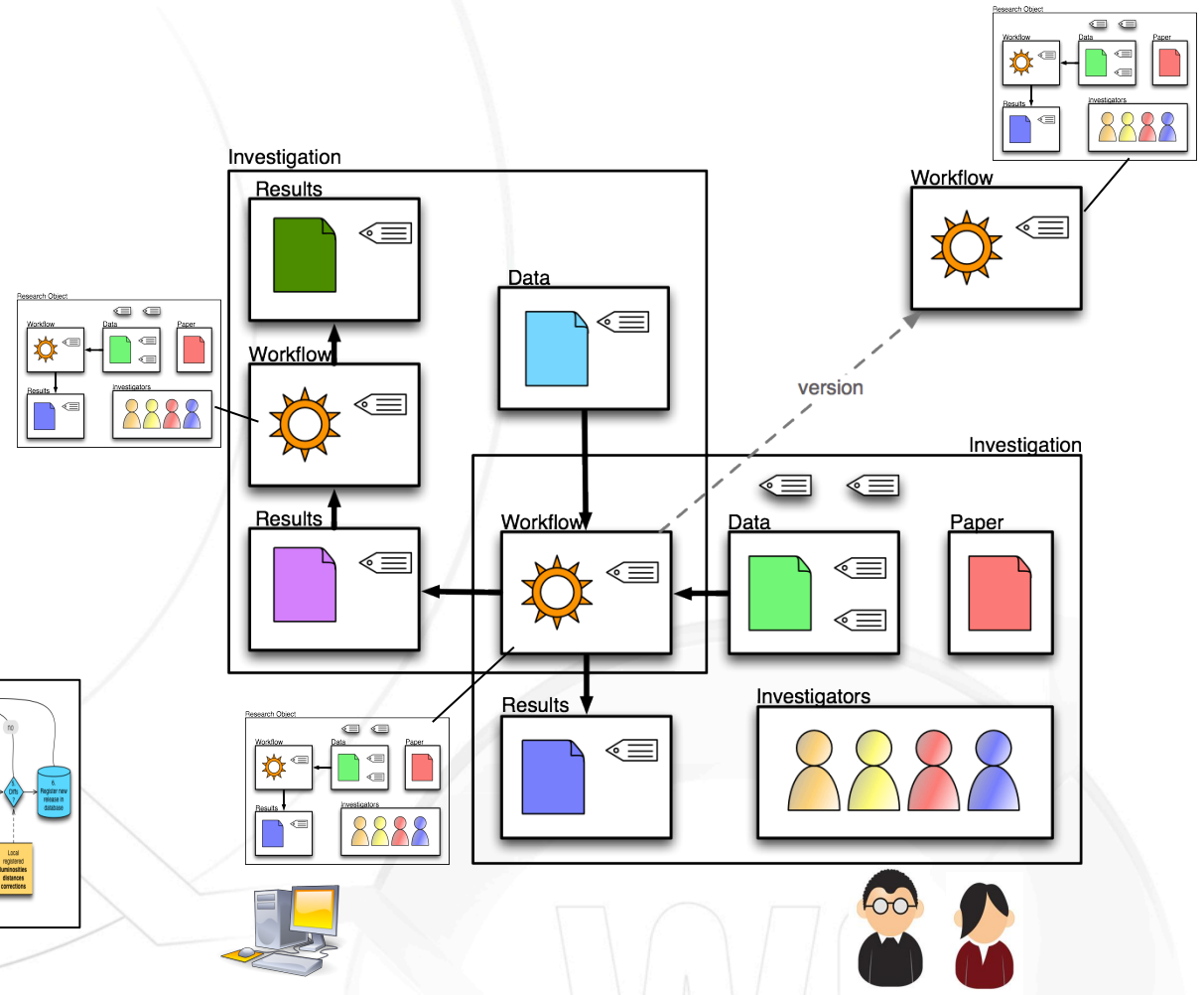
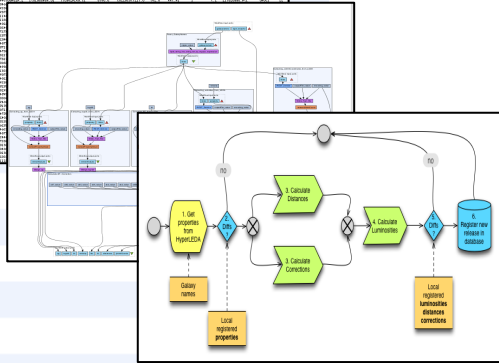
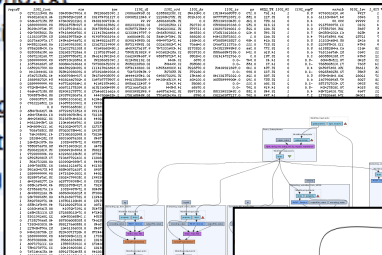
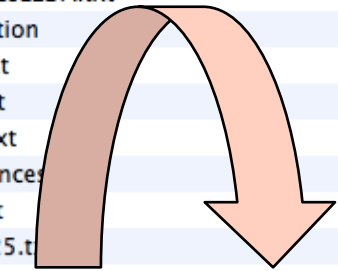
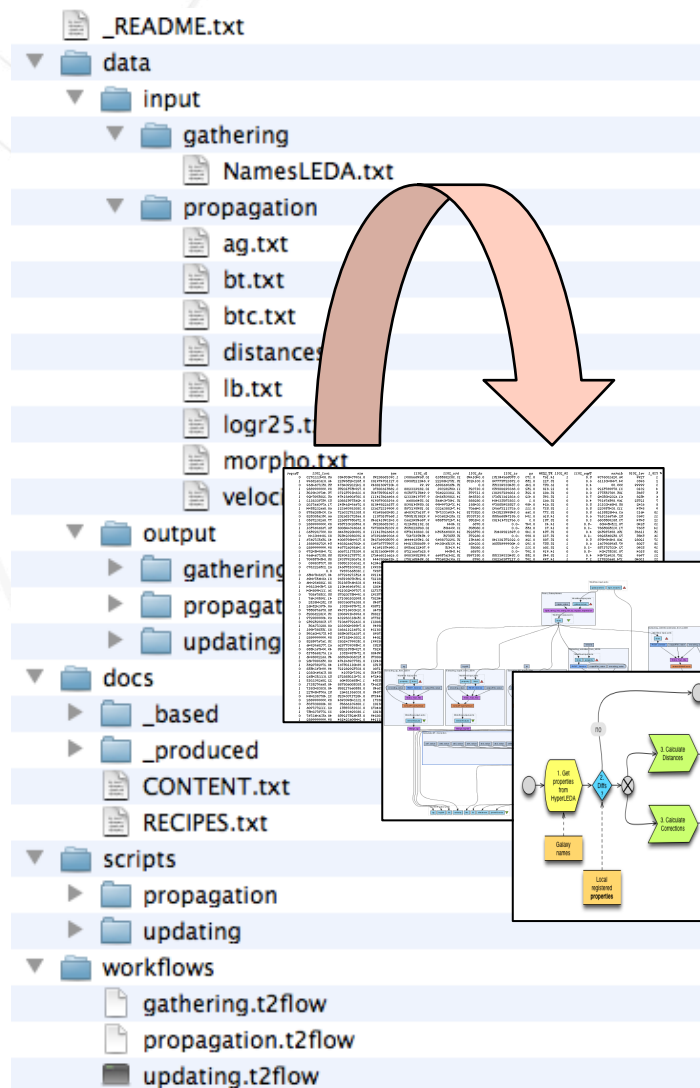


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analysis_graphs.xls	7:13 AM 5/29/2010	455 KB	XLS file
ThesisOutline!.doc	7:26 AM 5/29/2010	38 KB	DOC file
Notes_Meeting_with_ProfSmith.txt	11:38 AM 5/29/2010	1,673 KB	TXT file
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Type: Ph.D Thesis Modified: too many times Copyright: Jorge Cham www.phdcomics.com

Digital Science - Reproducibility and Visibility in Astronomy Research Objects

Expose **experimental context** in a structured way in order to be **understood**



Technical Objects
Distributed

Social Objects

Similar initiatives in Astronomy

- » **Semantic curation** of digital objects
 - › CDS Centre Données Strasbourg
 - › US Virtual Astronomical Observatory
 - › SAO/NASA ADS Labs
- » **Workflow users platforms**
 - › Cyber-SKA
 - › IceCore
 - › Montage
 - › Astro-WISE
 - › Helio-VO
- » **Auto descriptive Web Services**
 - › Workflows VO-France
 - › IVOA: S3, SimDAL, PDL

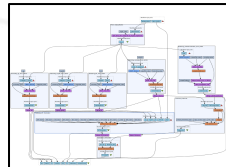
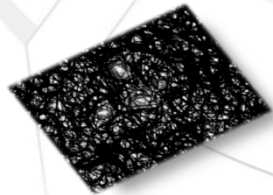


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ADSLabs Initiative

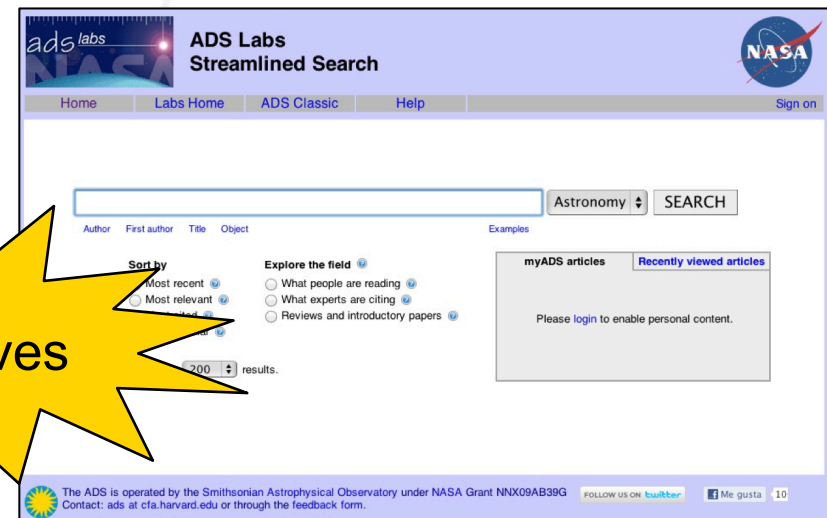
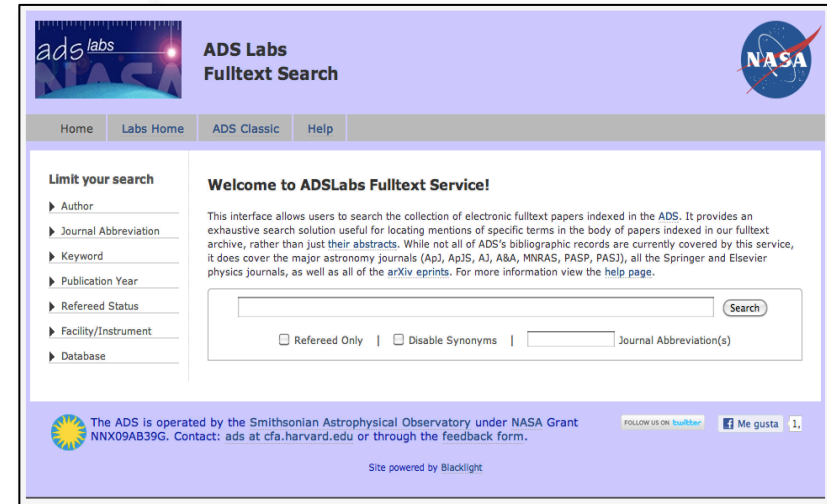
ADO Linked Components

- » Authors
- » Publications
- » Journals
- » Objects SIMBAD
- » Tabular data behind the plots CDS
- » ASCL reference of used software
- » Observing time Proposals
- » Used facilities, surveys or missions



Incentives

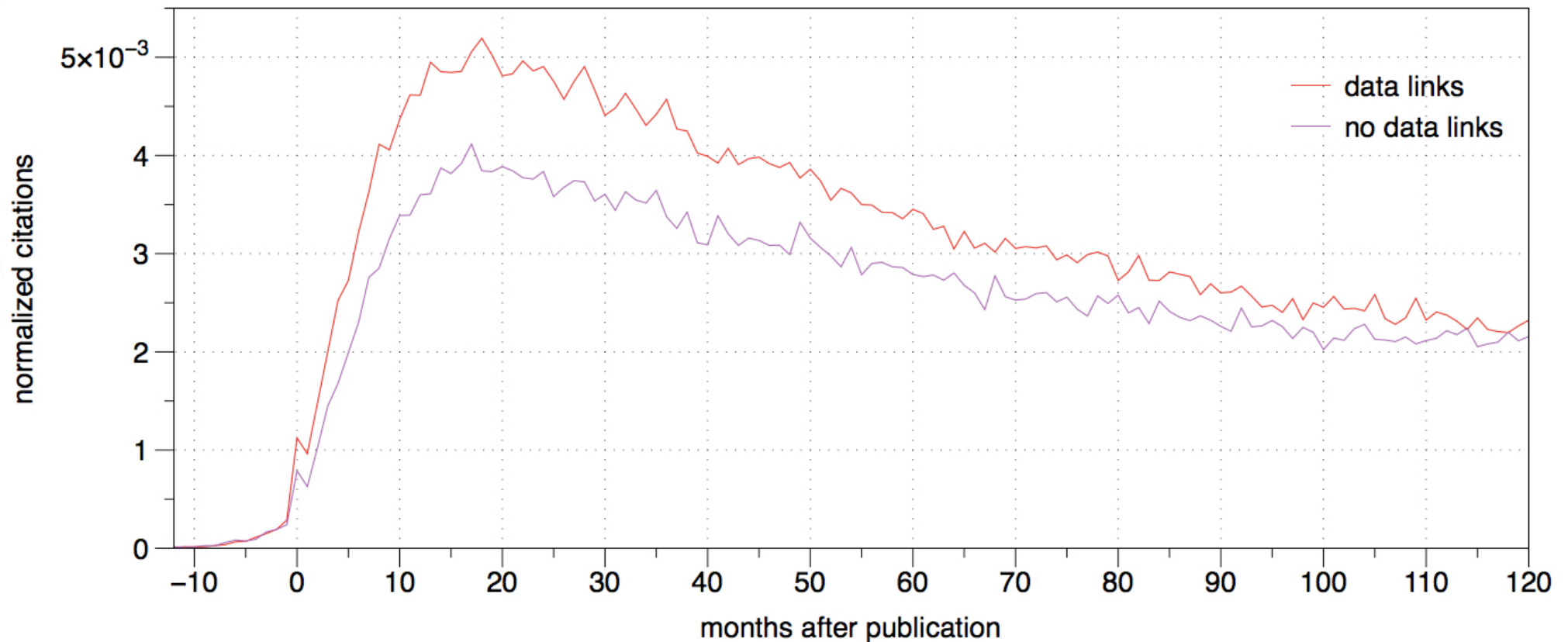
 <http://labs.adsabs.harvard.edu/>



The Incentive

Papers with data links are cited more than those without

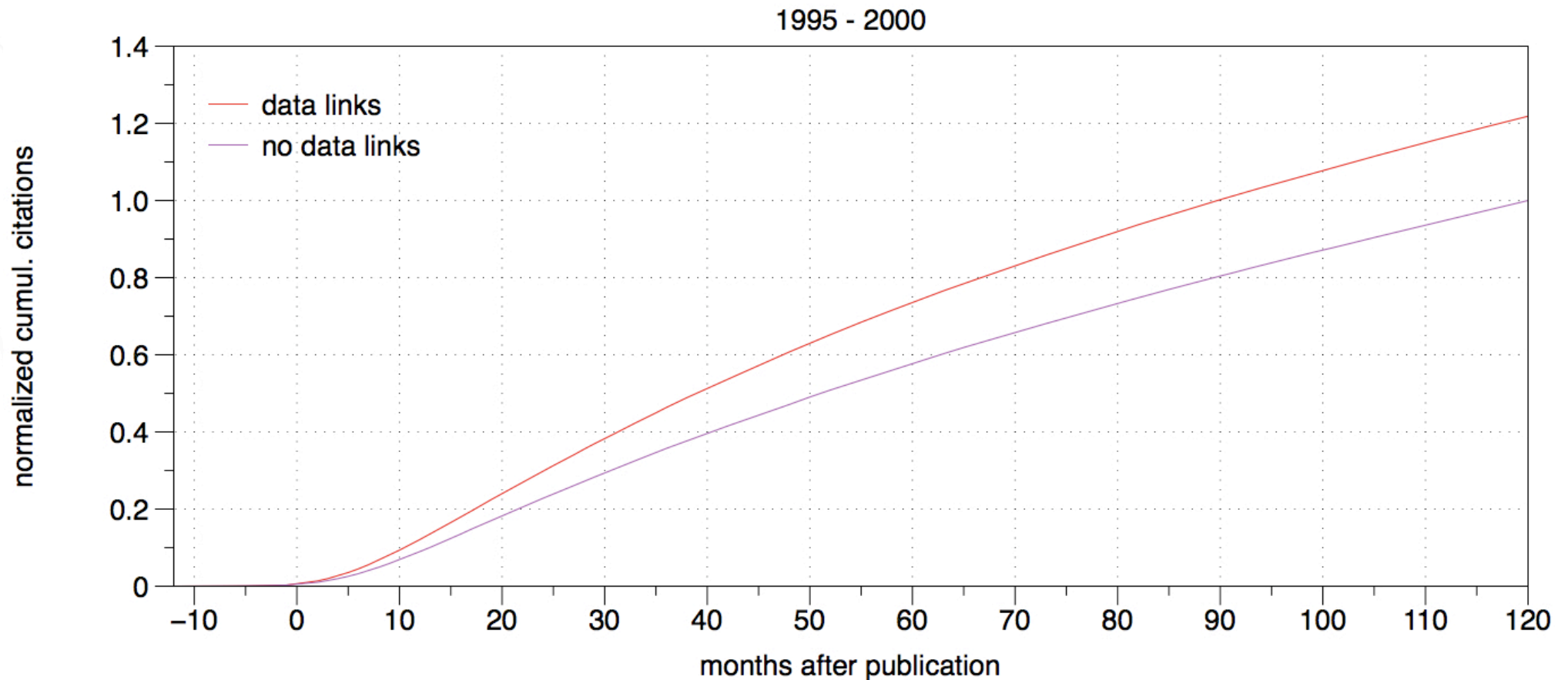
1995 - 2000



Effect of E-printing on Citation Rates in Astronomy and Physics
2006. Edwin A. Henneken et al.



The Incentive

Papers with data links are cited more than those without



Effect of E-printing on Citation Rates in Astronomy and Physics
2006. Edwin A. Henneken et al.

Community engagement

- » **ADASS XXI** BoF Scientific Workflows in Astronomy
- » Early contacts in **IVOA** for the creation of a community of users
- » Interest **mailing list** in IVOA  workflow@ivoa.net 
- » Draft of IVOA **Note** on Workflows
- » Collaboration with **ADSLabs**

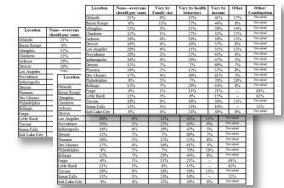
- » Interested potential collaborators
 - › Workflows VO France
 - › VAMDC EU FP7 Project
 - › Helio VO
 - › Spanish VO

- » AstroTaverna Starter Pack
- » Seminars, Webinars, Workshops and Schools

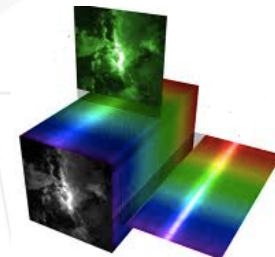
Digital Science - Reproducibility and Visibility in Astronomy

The Wf4Ever Project

- » Development of **AstroTaverna plugins** to access and manage VO data
- » Development **Golden Exemplars** of astrophysical Workflows and Research Objects that use the Wf4Ever technological support
 - › **Curation** of physical quantities in 1D catalogues
 - Data retrieved from external repositories and stored locally
 - Only local processes for calculations
 - › **Environment and Modelling** from 1D catalogues and 2D images
 - Data retrieved from external repositories (SDSS DR7)
 - Local software and external web services as processes
 - › **Modelling and Analysis** of 3D formatted data
 - Only external data and processes



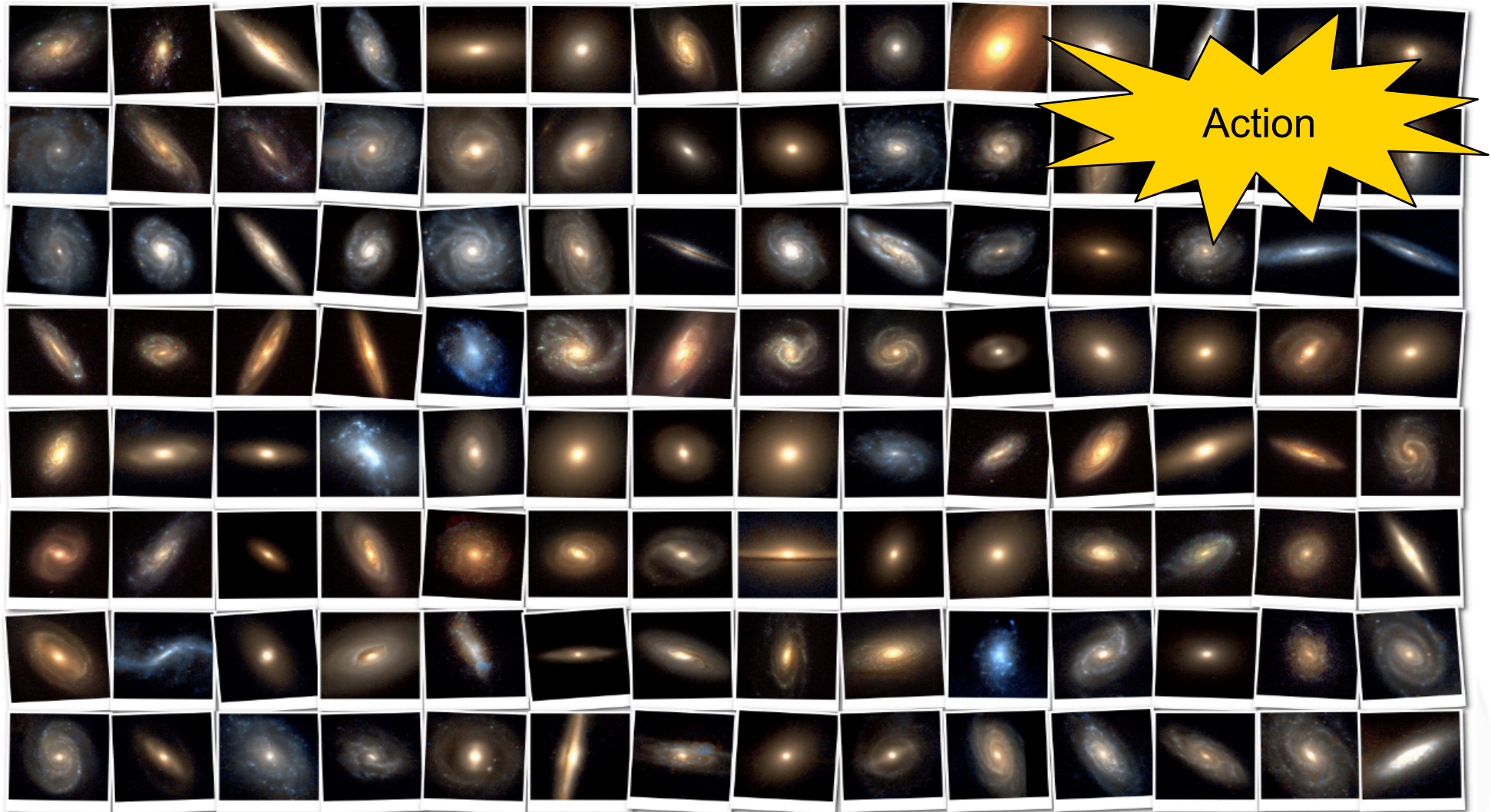
Object	RA	Dec	Distance	Mass	Age	Velocity	Temperature	Color	Parallax	Proper Motion	Radial Velocity	Transverse Velocity	Space Velocity	Galactic Coordinates	Galactic Distance	Galactic Velocity	Galactic Acceleration	Galactic Position	Galactic Velocity	Galactic Acceleration	
...



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Astronomical Research Objects in Action

Curation by inspecting propagation of changes in quantities



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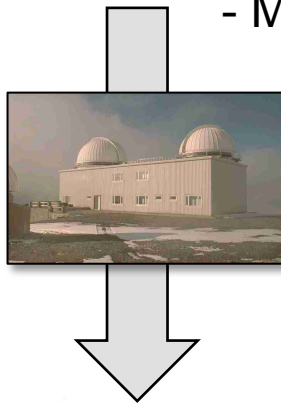
Astronomical Research Objects in Action

AMIGA Catalog

Panchromatic properties for a sample of the most isolated nearby galaxies

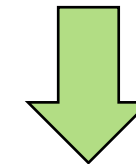
How is the User DB affected ?

- Changes in External DB
- Modifications in Calculations

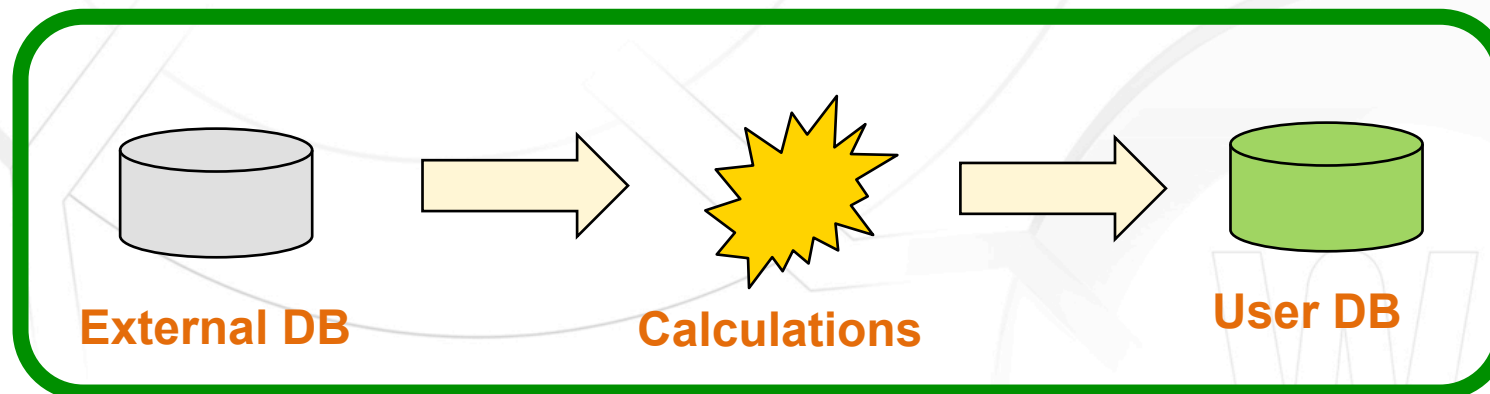


Evaluate variations with time

- Modified External Quantities
- Affected User DB Quantities



Update

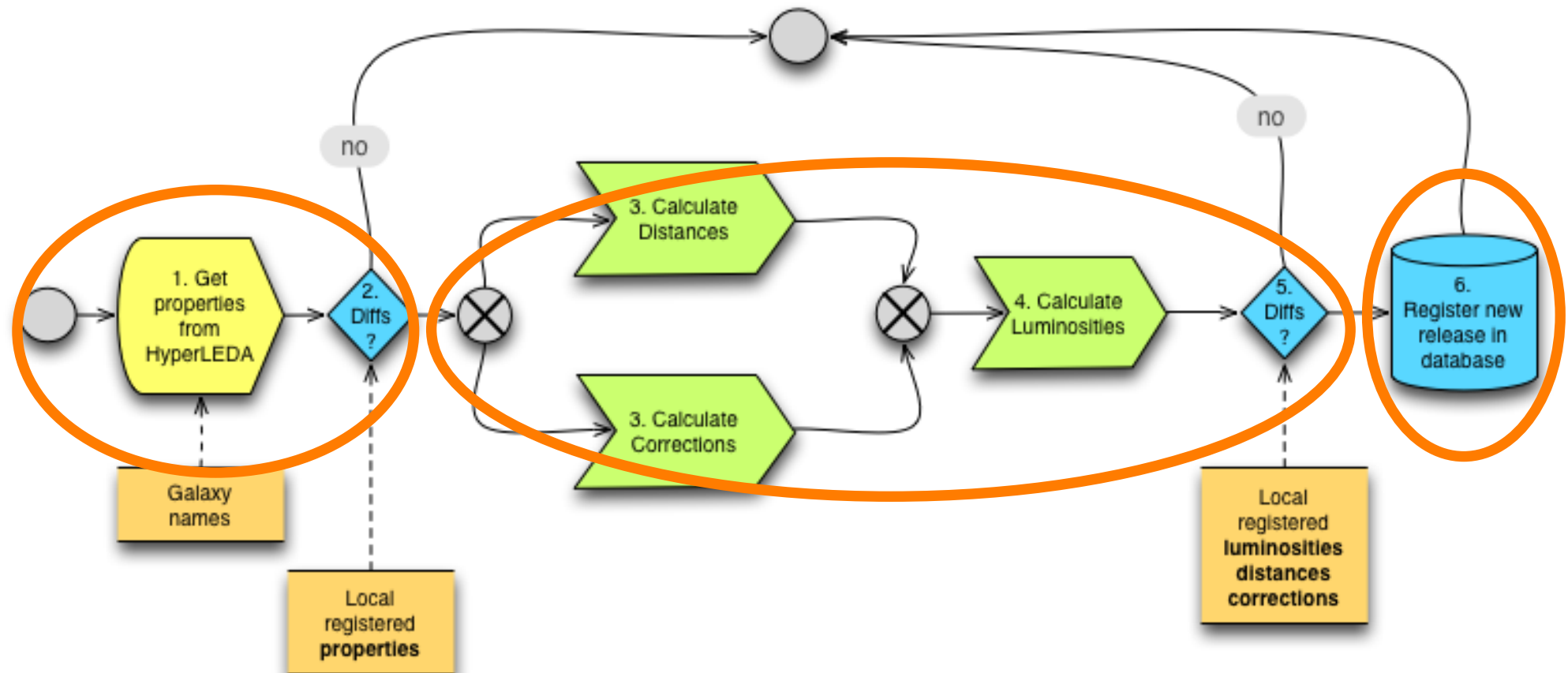


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Astronomical Research Objects in Action

Curation by inspecting propagation of changes in quantities

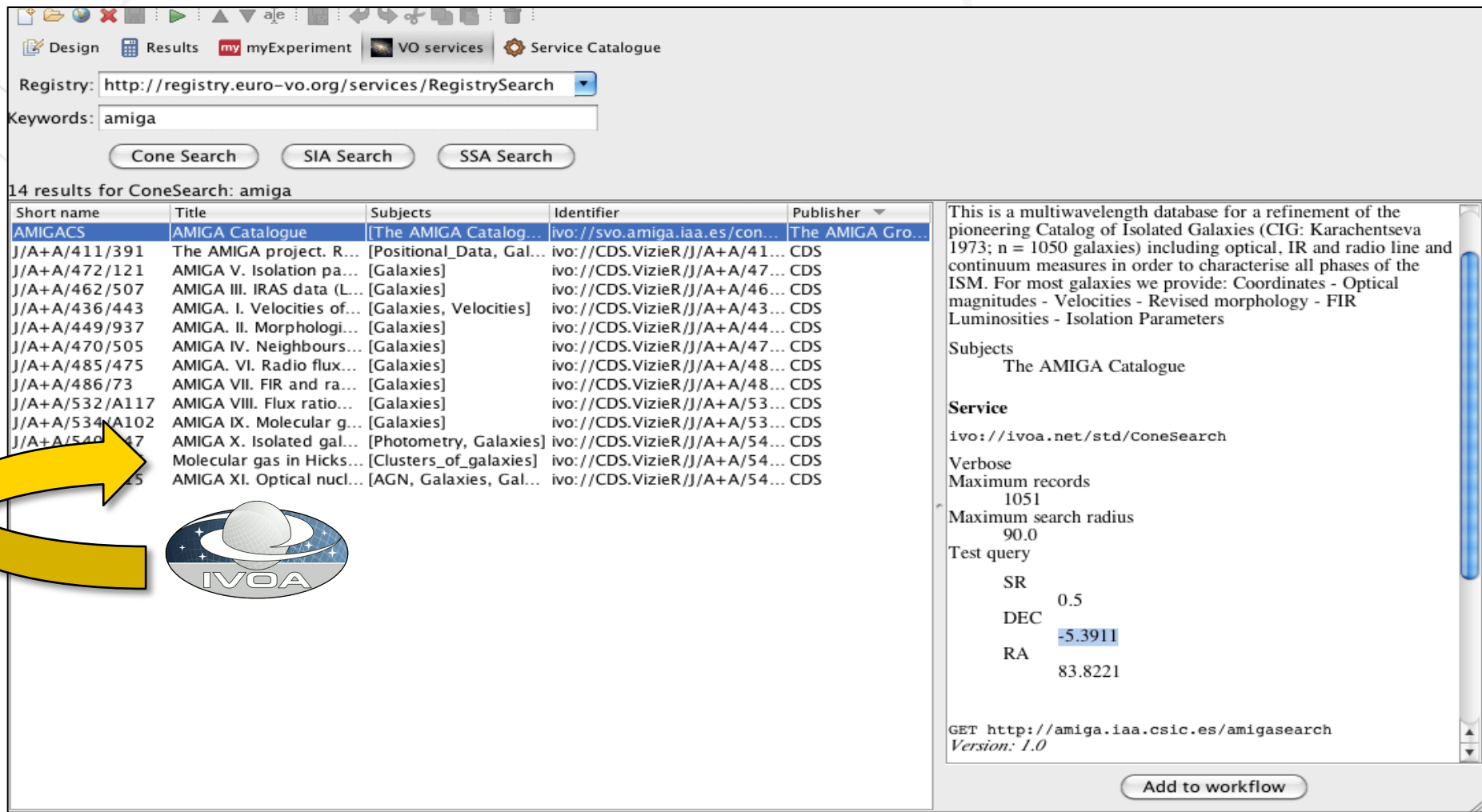
Multi-workflow Research Object



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Astronomical Research Objects in Action

AstroTaverna: Create, annotate and run a workflow



Registry: <http://registry.euro-vo.org/services/RegistrySearch>

Keywords:

14 results for ConeSearch: amiga

Short name	Title	Subjects	Identifier	Publisher
AMIGACS	AMIGA Catalogue	[The AMIGA Catalog...	ivo://svo.amiga.iaa.es/con...	The AMIGA Gro...
J/A+A/411/391	The AMIGA project. R...	[Positional_Data, Gal...	ivo://CDS.VizieR/J/A+A/41...	CDS
J/A+A/472/121	AMIGA V. Isolation pa...	[Galaxies]	ivo://CDS.VizieR/J/A+A/47...	CDS
J/A+A/462/507	AMIGA III. IRAS data (L...	[Galaxies]	ivo://CDS.VizieR/J/A+A/46...	CDS
J/A+A/436/443	AMIGA. I. Velocities of...	[Galaxies, Velocities]	ivo://CDS.VizieR/J/A+A/43...	CDS
J/A+A/449/937	AMIGA. II. Morphologi...	[Galaxies]	ivo://CDS.VizieR/J/A+A/44...	CDS
J/A+A/470/505	AMIGA IV. Neighbours...	[Galaxies]	ivo://CDS.VizieR/J/A+A/47...	CDS
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J/A+A/532/A117	AMIGA VIII. Flux ratio...	[Galaxies]	ivo://CDS.VizieR/J/A+A/53...	CDS
J/A+A/534/A102	AMIGA IX. Molecular g...	[Galaxies]	ivo://CDS.VizieR/J/A+A/53...	CDS
J/A+A/540/47	AMIGA X. Isolated gal...	[Photometry, Galaxies]	ivo://CDS.VizieR/J/A+A/54...	CDS
J/A+A/540/47	Molecular gas in Hicks...	[Clusters_of_galaxies]	ivo://CDS.VizieR/J/A+A/54...	CDS
J/A+A/540/47	AMIGA XI. Optical nucl...	[AGN, Galaxies, Gal...	ivo://CDS.VizieR/J/A+A/54...	CDS

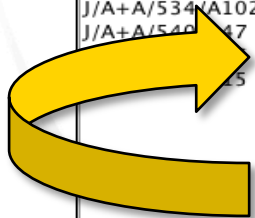
This is a multiwavelength database for a refinement of the pioneering Catalog of Isolated Galaxies (CIG: Karachentseva 1973; n = 1050 galaxies) including optical, IR and radio line and continuum measures in order to characterise all phases of the ISM. For most galaxies we provide: Coordinates - Optical magnitudes - Velocities - Revised morphology - FIR Luminosities - Isolation Parameters


Subjects
The AMIGA Catalogue

Service
ivo://ivoa.net/std/ConeSearch

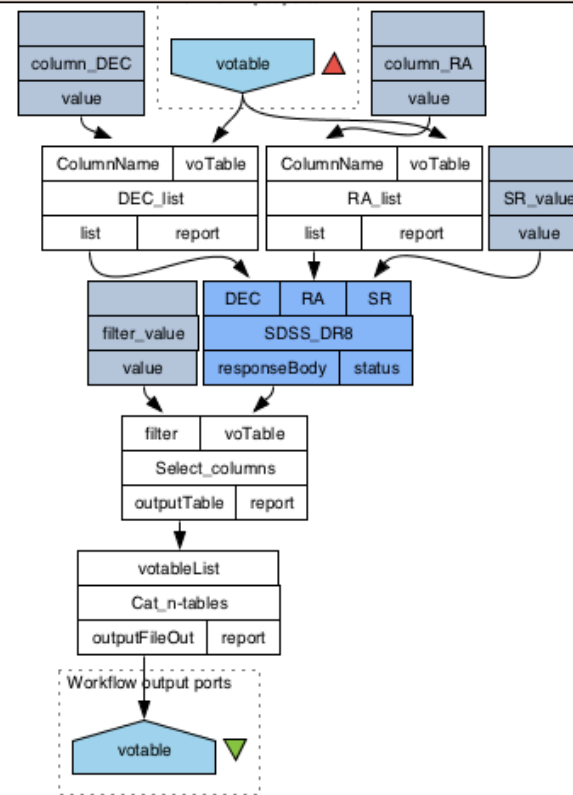
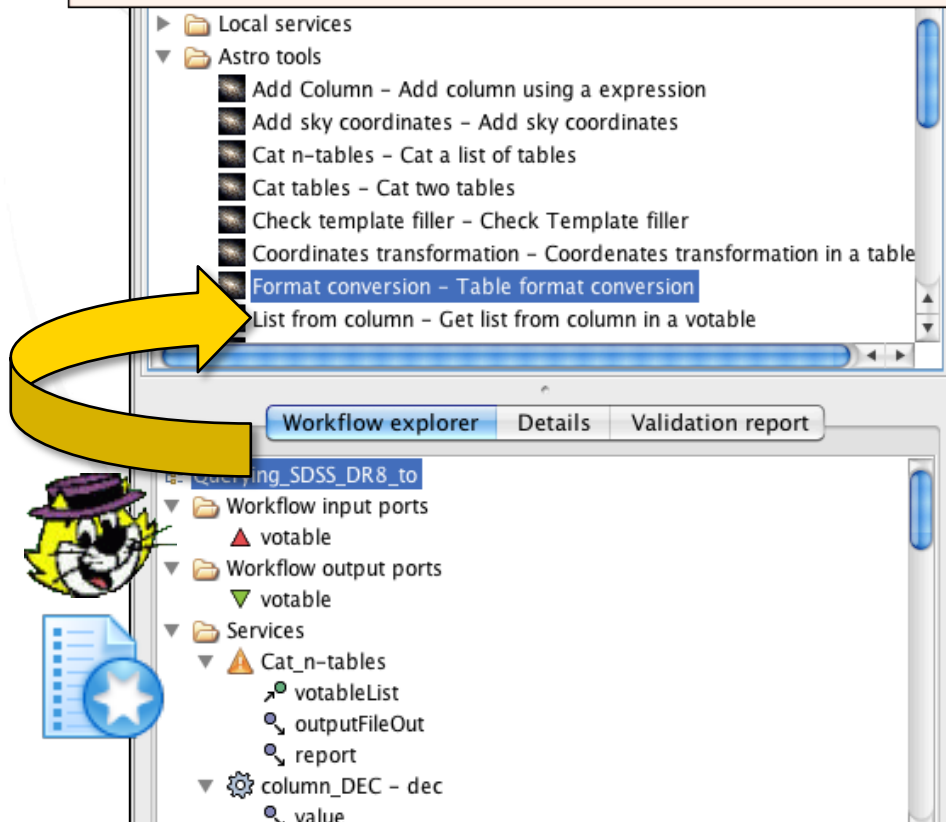
Verbose
Maximum records
1051
Maximum search radius
90.0
Test query
SR
DEC 0.5
RA -5.3911
83.8221

GET <http://amiga.iaa.csic.es/amigasearch>
Version: 1.0



 <http://amiga.iaa.es/p/290-astrotaverna.htm>

Registers Provenance Orchestration of Tasks and Dependencies Improves Clarity and Reproducibility



Digital Science - Reproducibility and Visibility in Astronomy

Astronomical Research Objects in Action

Populate the Research Object and annotate

Wf4Ever - RO Annotator MOCKUP

Research Object: Distance Estimation

- Datasets
 - Galaxy_Names.csv
 - Apparent_Magnitudes.csv
- Scripts
- Web Services
- Workflows

Annotating "Galaxy_Names.csv"

Type: Comma-separated-value
Keywords: src; meta.name, galaxies, ...
Description: Names of galaxies whose
Role: Input file
Created At: 2011-09-06 16:32:18

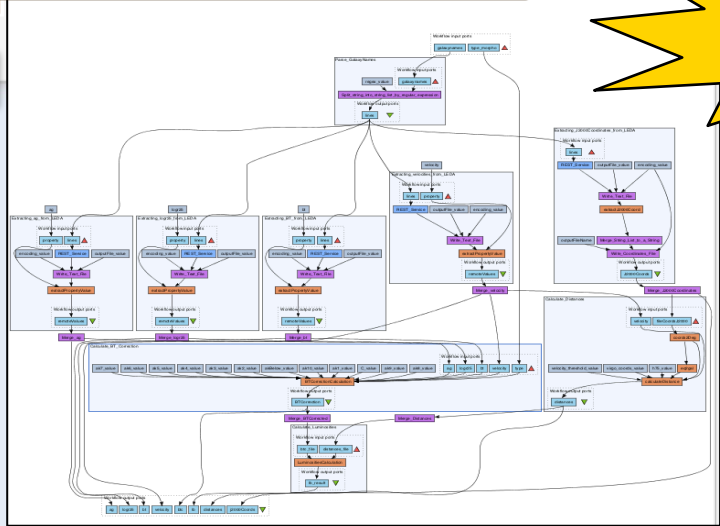


What kind of annotation is this?
Description:

Value for the annotation

Names of galaxies whose distance is to be estimated. Each line represents a different galaxy. Optional information on the galaxy is added as comma-separated values, in this format:

- Galaxy name
- Morphology type (NED)
- NED distance

Save Changes Cancel



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Astronomical Research Objects in Action

Add documents and references

Wf4Ever - RO Annotator MOCKUP

Research Object: Distance Estimation

- Datasets
 - Galaxy_Names.csv
 - Apparent_Magnitudes.csv
- Scripts
- Web Services
- Workflows
- Docs
 - 2012A&A...536A.108V.AMIGA XIII: Workflow-based distance assessment...

Annotating "Galaxy_Names.csv"

Type: Comma-separated-value

Keywords: src; meta.name, galaxies, ...

Description: Names of galaxies whose

Role: Input file

Created At: 2011-09-06 16:32:18

Modified At: 2012-02-07 08:44:32

What kind of annotation is this?

Description:

Value for the annotation

Names of galaxies whose distance is to be estimated. Each line represents a different galaxy. Optional information on the galaxy is added as comma-separated values, in this order:

- Galaxy name
- Morphology type (NED)
- NED distance
- Estimation Method

Save Changes Cancel

User-agent: *
Allow: /

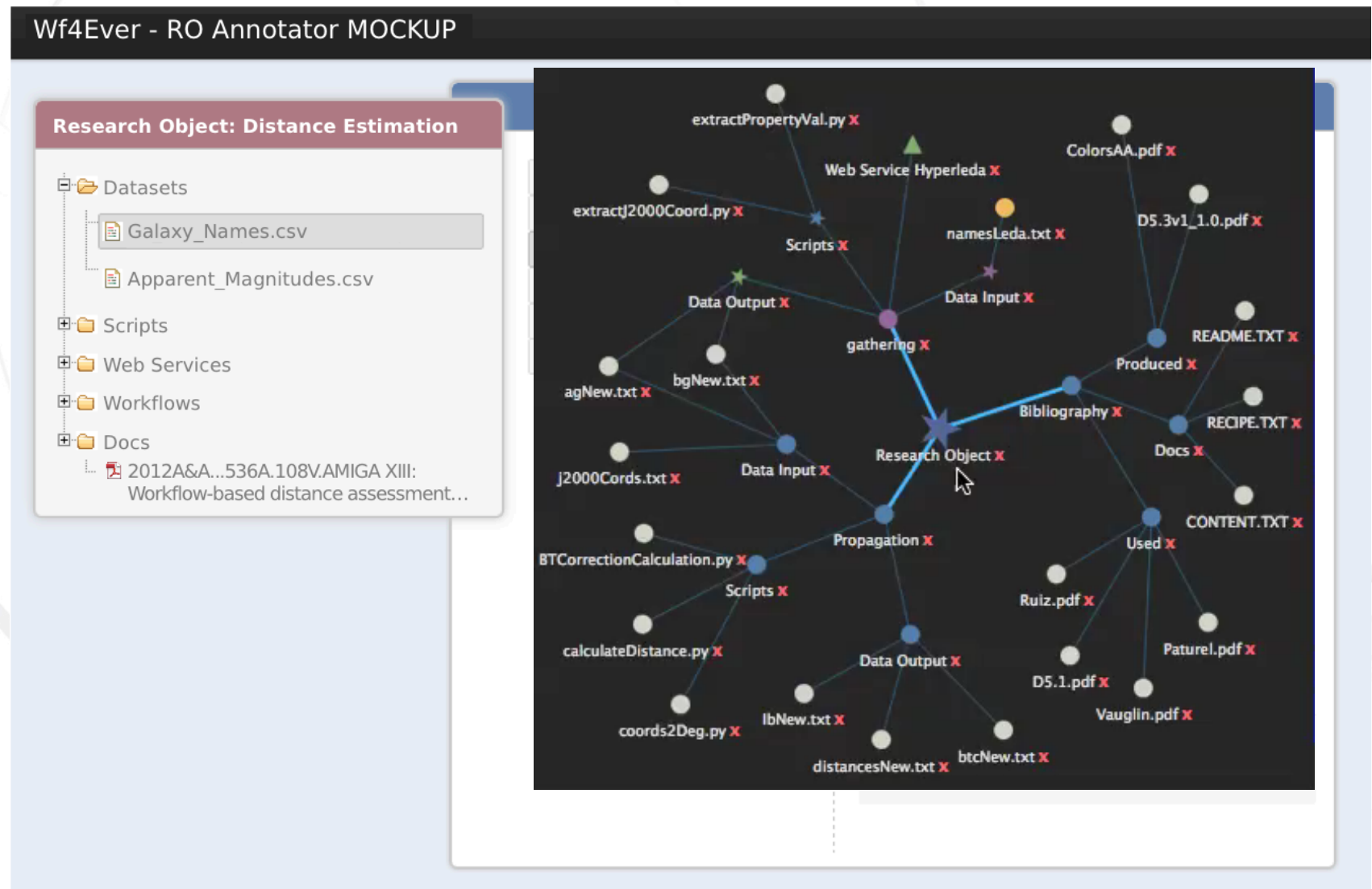
```
# October 11 2010 Whyte & Mackay whisky are running a promotion where 250 bottles of 30 year old whisky, each worth £150, are hidden in bottles of Whyte & Mackay Special whisky (learn more at http://bit.ly/whiskyhuntvideo )  
  
# The bottles are hidden in stores across the UK but we wanted to hide one in our new-look website as well - so if you're reading this congratulations on being a winner  
  
# Drop an email to richard at themasterblender dot com with the subject I Read Robots.txt Files and if you're one of the first to reply, are of a legal drinking age and your local licensing laws allow it we'll send you a bottle of 30 year old Whyte & Mackay. If we can't send you that, we'll send you something else.  
  
# And of course make sure you are following us on Twitter and Facebook - @the_nose @whyteandmackay facebook.com/whyteandmackay see what we do next. We do like our stunts!  
  
# If you weren't first, there's still 200 bottles hidden in stores across the UK  
October 11 2010
```

PDF

Digital Science - Reproducibility and Visibility in Astronomy

Astronomical Research Objects in Action

Create and explore relations among components



Digital Science - Reproducibility and Visibility in Astronomy

Astronomical Research Objects in Action

Add schema of the experiment

Wf4Ever - RO Annotator MOCKUP

Research Object: Distance Estimation

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Annotating "Galaxy_Names.csv"

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Description: Names of galaxies whose

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Value for the annotation

Names of galaxies whose distance is to be estimated. Each line represents a different galaxy. Optional information on the galaxy is added as comma-separated values, in this order:

- Galaxy name
- Morphology type (NED)
- NED distance
- Estimation Method

```
graph TD; Start(( )) --> T1{{1. Get properties from HyperLEDA}}; T1 --> D1{2. Diff?}; D1 -- no --> T1; D1 --> T2(( )); T2 --> T3[3. Calculate Distances]; T2 --> T4[3. Calculate Corrections]; T3 --> T5(( )); T4 --> T5; T5 --> T6[4. Calculate Luminosities]; T6 --> D2{5. Diff?}; D2 -- no --> T1; D2 --> T7[(6. Register new release in database)]; T7 --> End(( ))
```

The workflow diagram illustrates the process of distance estimation. It begins with a start node leading to a task '1. Get properties from HyperLEDA', which takes 'Galaxy names' as input. This leads to a decision diamond '2. Diff?'. If 'no', it loops back to '1. Get properties from HyperLEDA'. If 'yes', it proceeds to a merge node, then splits into two parallel tasks: '3. Calculate Distances' and '3. Calculate Corrections'. Both lead to another merge node, followed by '4. Calculate Luminosities'. This leads to a second decision diamond '5. Diff?'. If 'no', it loops back to '2. Diff?'. If 'yes', it leads to a task '6. Register new release in database', which takes 'Local registered luminosities distances corrections' as input. The process ends at a final node.

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Astronomical Research Objects in Action

Publication for later discovery

Home / Research Object: <http://sandbox.wf4ever-project.org/rosrs5/ROs/HyperLEDA%20Luminosities/>

Interactive Conceptual Physical

HyperLEDA Luminosities/

- Web Services
- Datasets
 - agNew.txt
 - lbOld.txt
 - j2000Coords.txt
 - lbNew.txt
 - diff_lb.txt
 - lb.sql
 - NamesLEDA.txt
 - logr25New.txt
 - velocitiesNew.txt
 - distancesNew.txt
 - morphoNew.txt
 - btcNew.txt
 - btNew.txt
- Scripts
- Workflows
 - comparison_and_update_values_475535.
 - calculating_the_total_luminosity_of_a_galaxy_using_properties_from_text_1
 - gathering_galaxy_properties_using_hyperleda_129473.
- Workflow Runs
- Documents
 - GoldenTrace.txt

Item info


Created by: Jose Enrique Ruiz


Created on: 2012.01.08 17:09:14 CET

File size: --

Number of annotations: 1

Keywords [galaxies][catalogs]

Integrity  50%

Rating 



Downloads 36

Citations 1

Re-used 4

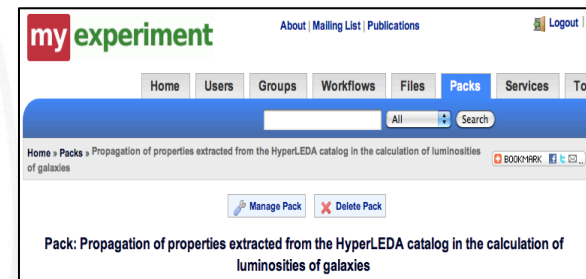
Comments 2

<< Previous version | Next version >>



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- » Taverna 2.4 
- » MyExperiment Pack
 - > <http://www.myexperiment.org/packs/231>



Related Publication

The AMIGA sample of isolated galaxies X. A First Look at Isolated Galaxy Colors 2012 A&A 540, A.47

A&A 540, A47 (2012)
DOI: 10.1051/0004-6361/201118660
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Astronomy Astrophysics

The AMIGA sample of isolated galaxies

X. A first look at isolated galaxy colors*

M. Fernández-Lorenzo¹, J. Sulentic¹, L. Verdes-Montenegro¹, J. E. Ruiz¹, J. Sabater², and S. Sánchez²

¹Instituto de Astrofísica de Andalucía, Granada, IAA-CSIC Apdo. 3004, 18080 Granada, Spain
e-mail: mrl@iaa.es
²Institute for Astronomy, University of Edinburgh, Edinburgh EH9 3HJ, UK
Received 16 December 2011 / Accepted 25 January 2012

ABSTRACT

Context. The basic properties of galaxies can be affected by both nature (internal processes) or nurture (interactions and effects of environment). Deconvolving the two effects is an important current effort in astrophysics. Observed properties of a sample of isolated galaxies should be mainly the result of internal (nature) evolution. It follows that nature-isolated galaxy evolution can only be understood through a comparative study of galaxies in different environments.

Aims. We take a first look at SDSS ($g-r$) colors of galaxies in the AMIGA sample, which consists of many of the most isolated galaxies in the local Universe. This alerted us at the same time to the pitfalls of using automated SDSS colors.

Methods. We focused on median values for the principal morphological subtypes found in the AMIGA sample (E/S0 and Sb-Sc) and compared them with equivalent measures obtained for galaxies in denser environments.

Results. We find a weak tendency for AMIGA spiral galaxies to be redder than objects in close pairs. We find no clear difference when we compared this with galaxies in other (e.g. group) environments. However, the ($g-r$) color of isolated galaxies shows a Gaussian distribution, as might be expected assuming nurture-free evolution. We find a smaller median absolute deviation in colors for isolated galaxies compared to both wide and close pairs. The majority of the deviation on median colors for spiral subtypes is caused by a color-luminosity correlation. Surprisingly, isolated and non-isolated early-type galaxies show similar ($g-r$). We see little evidence for a green valley in our sample because most spirals redder than ($g-r$) = 0.7 have spurious colors.

Conclusions. The redder colors of AMIGA spirals and lower color dispersions for AMIGA subtypes – compared with close pairs – are likely caused by a more passive star formation in very isolated galaxies.

Key words. galaxies: evolution – galaxies: interactions – galaxies: fundamental parameters – galaxies: general

1. Introduction

In some ways our study of galaxy properties is still in its infancy. We have a plethora of theoretical ideas but we are still trying to understand what the basic measures such as size, luminosity, and color are telling us. This is partly because galaxies are composite structures and also because we cannot easily separate effects of nature (internal processes) from nurture (interactions and effects of environment).

The optical colors of galaxies reflect their stellar populations and these colors correlate with morphology and environment. The distribution of galaxy colors in the ($g-r$) vs. ($r-g$) plane (Strateva et al. 2001) shows a strong bimodality with clear separation into red and blue sequences. The study of morphology and spectral classification (Strateva et al. 2001) for subsamples of 287 red and 500 blue galaxies shows that the two color peaks correspond roughly to early- (E, S0, and Sa) and late-type (Sb, Sc, and Irr) galaxies, as expected from the respective dominance of old and young stellar populations. Colors of galaxies also strongly depend on luminosity in the sense that more luminous galaxies of the same morphological type are redder (Baldry et al. 2004). The color-magnitude relation is most obvious in the rest-frame ($g-r$) (corrected to $z = 0.1$), where the separation between the red and blue populations is evident (Blanton et al. 2003).

Environment is also thought to play a role in the mix of morphological types for a sample of galaxies, which is reflected by the morphology-density relation (Dressler 1980; van der Wel et al. 2010, and references therein). In dense environments luminous red early-type galaxies predominate while in the lowest density environment blue late-type spirals are the defining population (Dressler 1980; Capak et al. 2007). While it is easy to recognize a rich cluster, definitions of low-density environments can be confusing. In recent years there has been an increased emphasis on identifying low density or isolated galaxy populations. One of the most useful samples remains the visually selected Catalog of Isolated Galaxies (CIG) compiled by Karachewa (1973), more recently vetted as the AMIGA sample (Analysis of the Interstellar Medium of Isolated Galaxies, Sulentic 2010, and references therein).

Star formation is strongly dependent on the environment and shows an increased activity toward low-density environments (Lewis et al. 2002; Hogg et al. 2003, 2004; Baldry et al. 2006). In this sense, Balogh et al. (1999) found that the mean star formation rate in galaxies with similar bulge-to-total (B/T) luminosity ratios is always lower in clusters than in the field. However, Patton et al. (2011) found that the opposite is happening in galaxy pairs with clear signs of star formation induced by interaction within the blue galaxies. This result agrees with the bluer ($U-B$ and $B-V$) colors found previously by Larson & Tinsley (1978) for peculiar galaxies.

* Full Tables 1 and 2 are only available at the CDS via anonymous ftp to cdsarc.u-strasbg.fr (130.79.128.5) or via <http://cdsarc.u-strasbg.fr/viz-bin/qcat?J/A+A/540/A47>

Article published by EDP Sciences

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How NOT to be a good Astronomer

1. Write a **obscure paper**, do not say clearly how to reproduce the results
2. Do things **quickly** and forget about them once you've submitted the paper
3. Be untidy, **spread your code and data** in a variety of formats, folders and disks
4. Do not provide data results, **including the plots is just fine**
5. Practise the "**data mine-ing**" – input data are mine
6. Practise the "**data flirting**" – I want you to call me, if you want more
7. Always **cite the same** authors and papers or those that cite you
8. Do not reference other resources than published papers, **never provide URL links**
9. Do not search info on **Internet** with other tools than ADS or arXiv
10. Do not contact others, just **duplicate and reinvent for your own** what you may find

 <http://amiga.iaa.es/p/212-workflows.htm>

 <http://www.wf4ever-project.org>

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