



Web Linked Data

(Semantic Web, Web of Data)

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My background

Resource Description Framework (RDF):
Concepts and Abstract Syntax

W3C Recommendation 10 February 2004

Involved in RDF/semantic web/linked data for many years (and through several name-changes)

- W3C (CC/PP, RDF, PROV)
- SWAD-Europe (<http://www.w3.org/2001/sw/Europe/>)
- Oxford
 - Zoology (image bioinformatics, classical art, research data)
 - OeRC (digital music, Annalist project)

Should you be using linked data?

An idea I'd like to offer is that linked data isn't a technology to displace others so much as an approach to information modeling and exchange that facilitates combining information from independent sources.

“Connolly’s Bane”

“The bane of my existence is doing things I know the computer could do for me.”

Dan Connolly, on XML, in 1998.

<http://www.nature.com/nature/webmatters/xml/xml.html>

“The bane of my existence is doing things I know the computer could do for me ...
... and getting it wrong!”

... and on Semantic Web travel tools, in 2002.

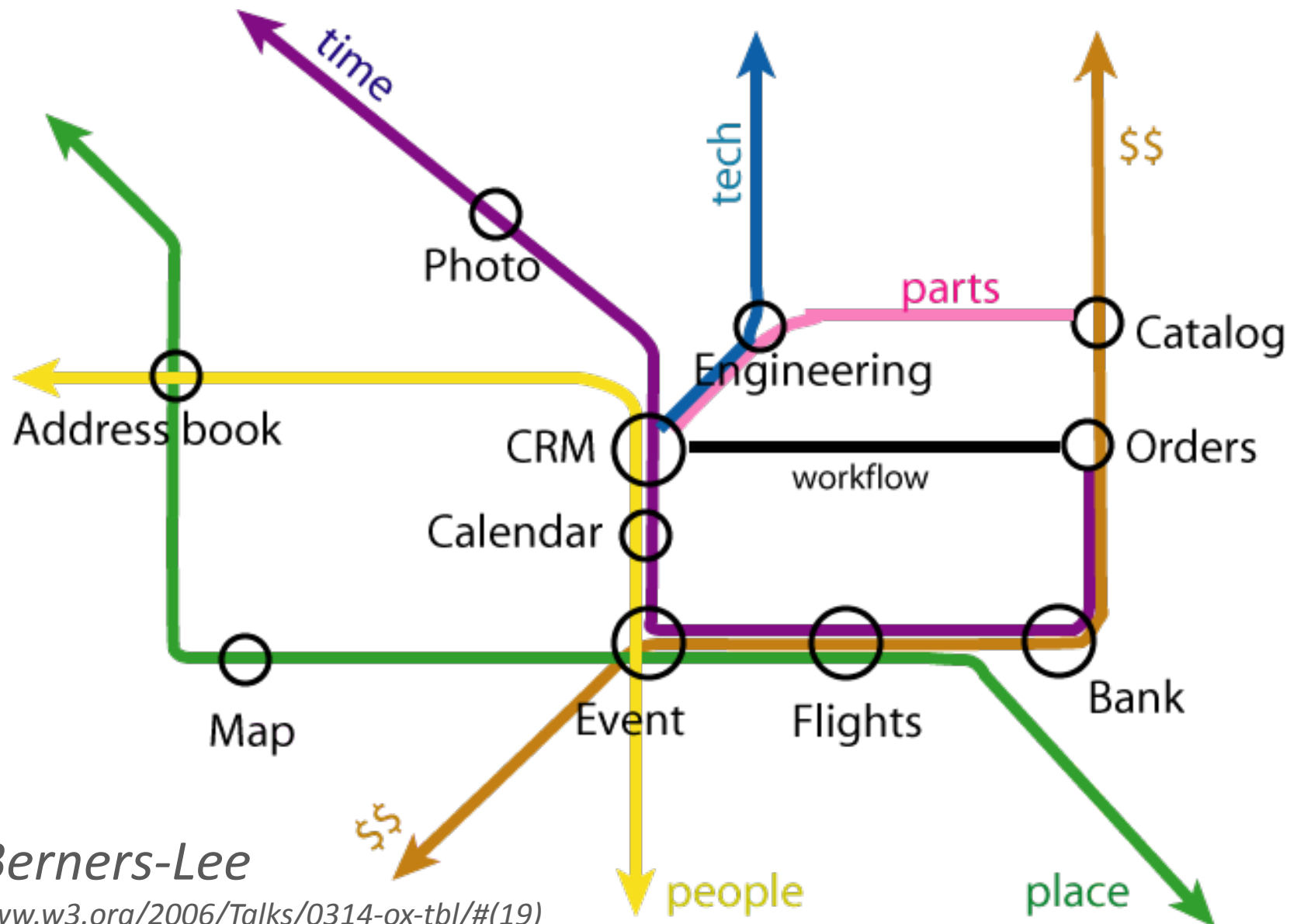
<http://www.w3.org/Talks/2002/10/09-swcal/all.htm>

Data sharing

Many of the examples in Connolly's work involved taking data from one application and using it in another.

Thus, what “the computer could do for me” often amounts to avoiding the need for re-typing or copy-and-pasting.

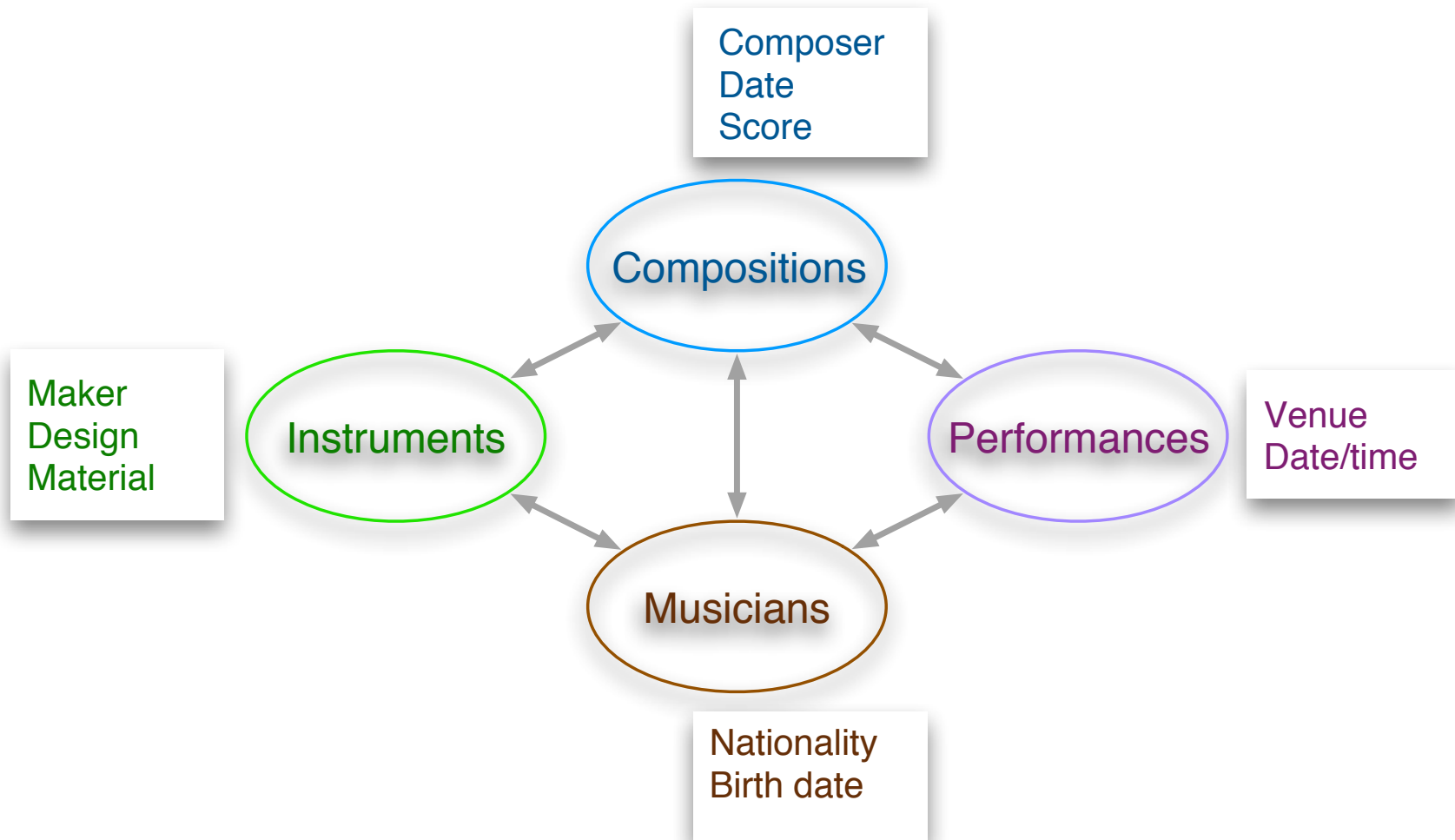
Applications at intersections of data



Tim Berners-Lee

[http://www.w3.org/2006/Talks/0314-ox-tbl/#\(19\)](http://www.w3.org/2006/Talks/0314-ox-tbl/#(19))

Example: Music performances

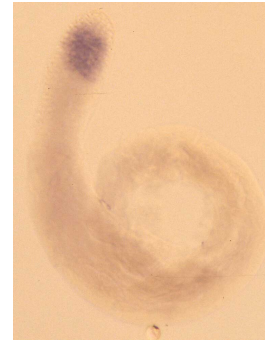


Example: Fly-TED

These *in situ* hybridization images show gene expression at different stages of spermatogenesis, created by a complex laboratory process.

Each image corresponds to a different combination of gene and a strain of *Drosophila melanogaster* (fruit fly).

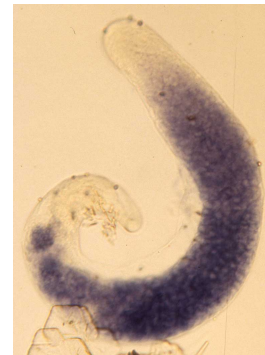
Interpretation and reproducibility require preparatory steps to be recorded along with the images and annotations.



CG2247 wt



CG2247 topi



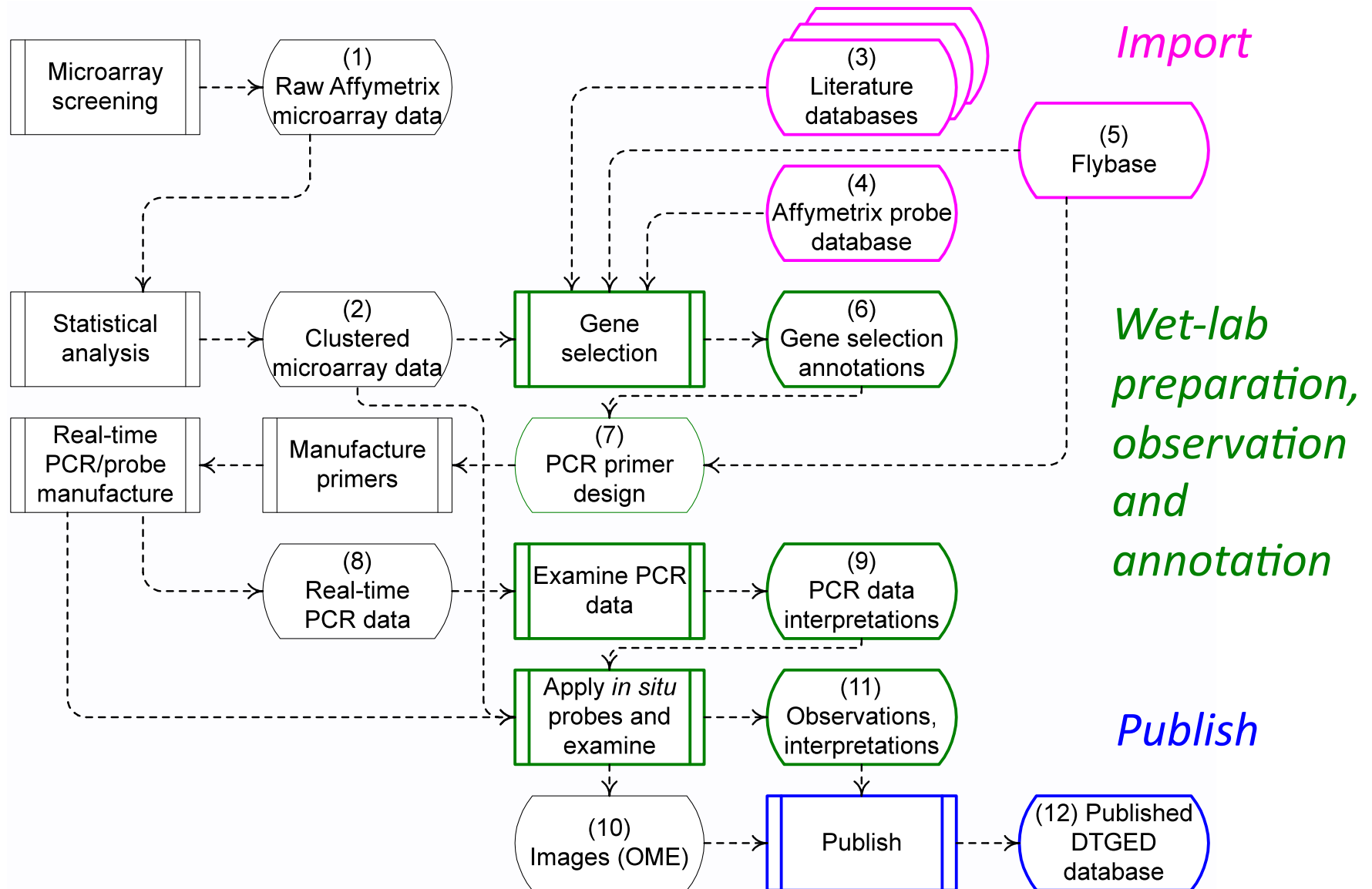
CG12907 aly



CG12907 topi

Images: Dr Helen White-Cooper

Example: Fly-TED data flows



Example: CLAROS

CLAROS
explorer:
an example
front-end to
the CLAROS
data web

You are here: [Home](#)

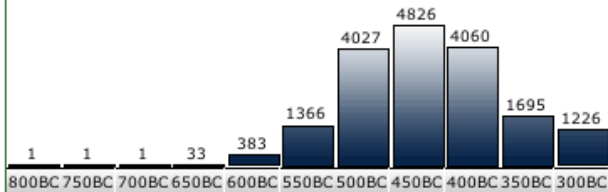
CLAROS
Classical Art Research Online Services

Search all CLAROS partners' databases

[Home](#) [CLAROS](#) [Pottery](#) [Gems](#) [Sculpture](#) [Iconography](#) [Antiquaria](#) [Dictionary](#) [Tools](#)

Timeline for calyx krater


The timeline shows the number of occurrences in each period. Click on the bar to show the distribution within the period or [click here to view the distribution for all periods](#).



Period	Occurrences
800BC	1
750BC	1
700BC	1
650BC	33
600BC	383
550BC	1366
500BC	4027
450BC	4826
400BC	4060
350BC	1695
300BC	1226

Distribution of calyx krater for period 500BC






Click on the marker ▼ on the map and a balloon will pop up with the site name and number of occurrences of the name found at that site.



Map Satellite Hybrid **Terrain**

CAPUA
Number of occurrences: 15
[Click here to view details](#)






Summary results 1 to 15 of 15 for calyx krater 500BC in CAPUA [Previous](#)

-  11936, Oxford, Ashmolean Museum, 527
-  216019, Stockholm, National Museum, G1696
-  213490, Leipzig, Antikenmuseum d. Universitat Leipzig, T646
-  200063, Berlin, Antikensammlung, F2180
-  202555, London, British Museum, E487

Web page search results 1 to 10 of about 13 for calyx krater [Next page](#)

[Calyx-krater - Shapes - Pottery](#)
The handles of the **calyx-krater** are placed low down on the body, at what is termed the cul. ... **Calyx-krater**. The handles of the **calyx** ...

Other Claros references in CAPUA

-  Pottery 326 records
-  Relief 42 records
-  Rundplastik 28 records
-  Monument/Architektur 12 records
-  Portrait 7 records

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What is the role of linked data?

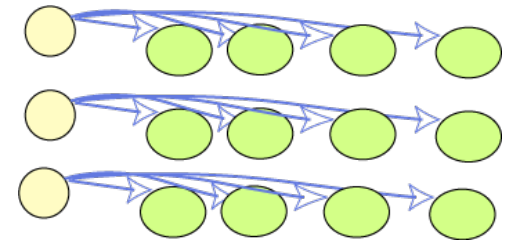
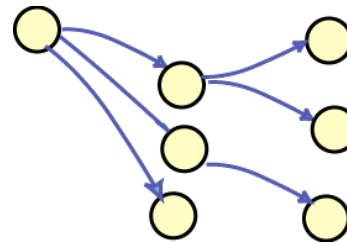
I propose:

It is to connect information across
independently developed
applications

How?

Graph data model

- Simple, flexible

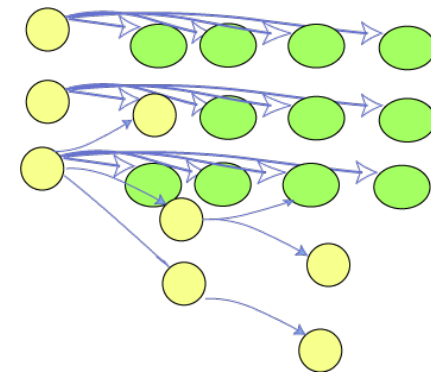


URIs (URLs) for names

- Grounds data in the web

Lightweight formal semantics

- Sound basis for data merging



Wot, no “triples”?

Use a triple store if you want to, but to realize benefits of linked data, think about:

- Use the web
 - for human ***and*** machine interactions
- Use URIs (URLs) for naming things
- Data models for exchanging information
 - Use existing designs (ontologies) where suitable
- How data evolves as requirements are exposed
- How to build the best application for your users
 - E.g., the best formats for processing are not always the best ones for data exchange

Annalist

(“keeper of records”)

Goal

To make it easy for individuals and small teams to create and share linked data on the web, and to experiment with linked information designs

View of Photograph

[Home](#)[Photo_collection](#)[Photograph](#)[User gklyne](#)[Logout](#)

Id [20150501_1644_032](#) Type [Photograph](#)

Label 20150501-1644-032.jpg Soar/Sileby/Bridge

Date taken 2015-05-01 Location taken [Sileby mill](#)

Comment Bridge over weir stream at Sileby Mill on the River Soar
2015/20150501-1644-032.jpg

Image



Keywords

Keyword

Landscape

River Soar

Sileby Mill

Leicestershire

Location notes

Id	Sileby_mill	Label	Sileby mill	Map reference	SK 592 147
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[Edit](#)[Copy](#)[Close](#)[Set default view](#)[View description](#)

Choose view

View of Photograph



[Show view](#)

JSON-LD



View of Photograph

[Home](#)[Photo_collection](#)[Photograph](#)[User gklyne](#)[Logout](#)

Id	<input type="text" value="20150501_1644_032"/>	Type	<input type="text" value="Photograph"/>										
Label	<input type="text" value="20150501-1644-032.jpg Soar/Sileby/Bridge"/>												
Date taken	<input type="text" value="2015-05-01"/>	Location taken	<input type="text" value="Sileby mill"/> 										
Comment	<div>Bridge over weir stream at Sileby Mill on the River Soar</div> <div>2015/20150501-1644-032.jpg</div>												
Image	<input type="button" value="Browse..."/> No file selected.												
Keywords	<div>Previously uploaded: 20150501-1644-032.jpg</div> <table><thead><tr><th></th><th>Keyword</th></tr></thead><tbody><tr><td><input type="checkbox"/></td><td><input type="text" value="Landscape"/></td></tr><tr><td><input type="checkbox"/></td><td><input type="text" value="River Soar"/></td></tr><tr><td><input type="checkbox"/></td><td><input type="text" value="Sileby Mill"/></td></tr><tr><td><input type="checkbox"/></td><td><input type="text" value="Leicestershire"/></td></tr></tbody></table> <div><input type="button" value="Remove Keyword"/> <input type="button" value="Add Keyword"/> <input type="button" value="Move ↑"/> <input type="button" value="Move ↓"/></div>				Keyword	<input type="checkbox"/>	<input type="text" value="Landscape"/>	<input type="checkbox"/>	<input type="text" value="River Soar"/>	<input type="checkbox"/>	<input type="text" value="Sileby Mill"/>	<input type="checkbox"/>	<input type="text" value="Leicestershire"/>
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Location notes	<input type="text" value="Sileby mill"/> 												
	<div><input type="button" value="Save"/> <input type="button" value="View"/> <input type="button" value="Cancel"/></div> <div><input type="button" value="Edit view"/></div>												

[Choose view](#)[View of Photograph](#)

Annalist: JSON-LD (“view source”)

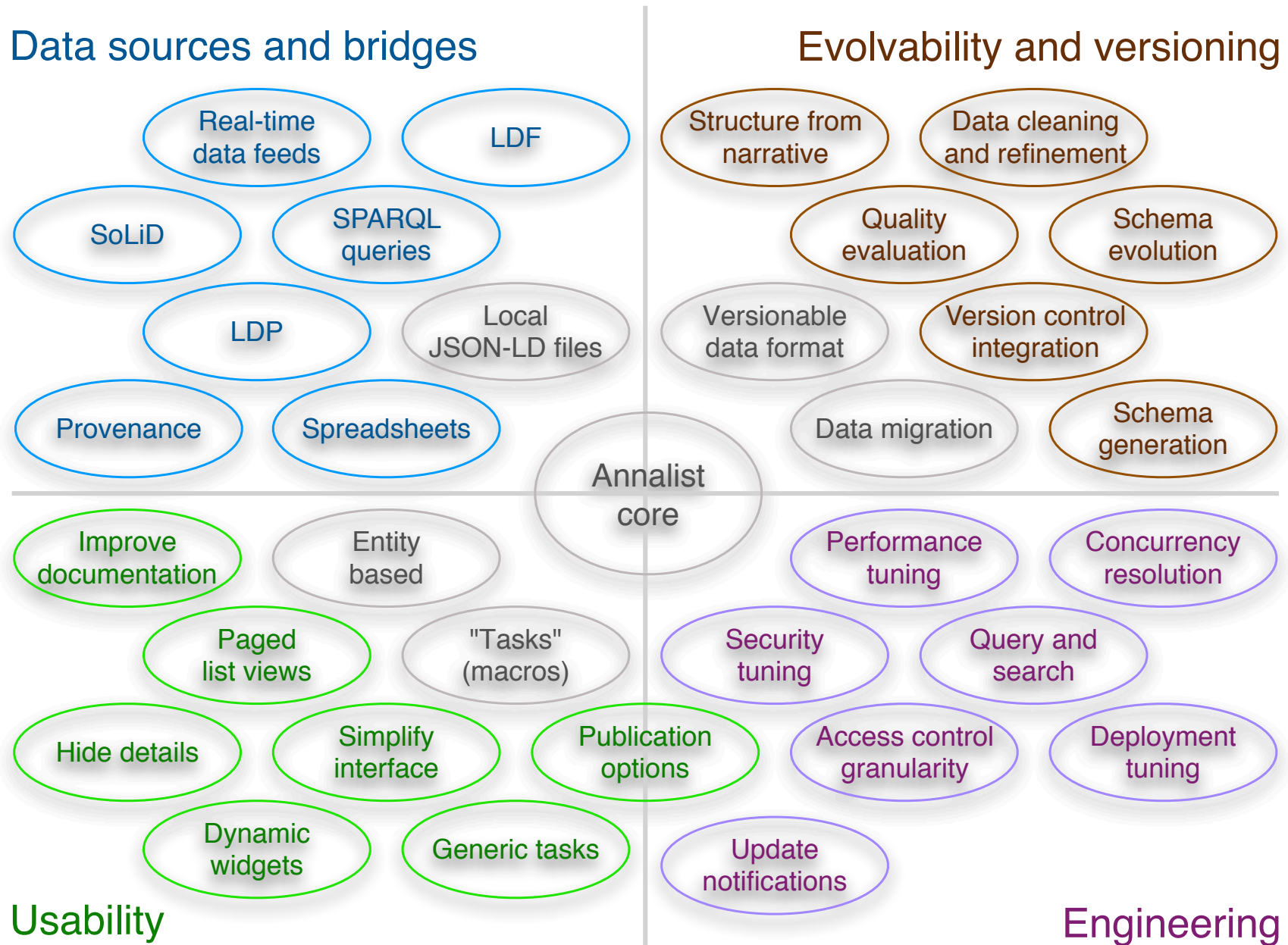
```
{ "@id": "annal:display/View_view",
  "@type": ["annal:View"],
  "@context": ["../..coll_context.jsonld"],
  "annal:id": "View_view",
  "annal:type_id": "_view",
  "annal:uri": "annal:display/View_view",
  "annal:record_type": "annal:View",
  "rdfs:label": "View definition",
  "rdfs:comment": "# View definition view\r\n\r\nForm used for viewing ...",
  "annal:open_view": false,
  "annal:view_fields": [
    { "annal:field_id": "_field/View_id",
      "annal:field_placement": "small:0,12;medium:0,6" },
    { "annal:field_id": "_field/View_label",
      "annal:field_placement": "small:0,12" },
    { "annal:field_id": "_field/View_comment",
      "annal:field_placement": "small:0,12" },
    { "annal:field_id": "_field/View_target_type",
      "annal:field_placement": "small:0,12" },
    { "annal:field_id": "_field/View_edit_view",
      "annal:field_placement": "small:0,12;medium:0,6" },
    { "annal:field_id": "_field/View_fields",
      "annal:field_placement": "small:0,12" }
  ]
}
```

Annalist: Progress to date

1. A viable tool to create and share linked data
2. Flexible to deal with diverse applications
3. Robust
 - even as a work-in-progress, I have never lost application data due to an Annalist software fault
4. At least approachable for users who are not familiar with RDF

<http://annalist.net/>

Annalist: Status and future work



Annalist

Transition to community project

A public repository is a start:

- <https://github.com/gklyne/annalist>
- MIT licence

But there remain many things to do...

- Governance
- Supporting documentation
- Engage other developers
- Integration with complementary systems
- Application data definition “libraries”