

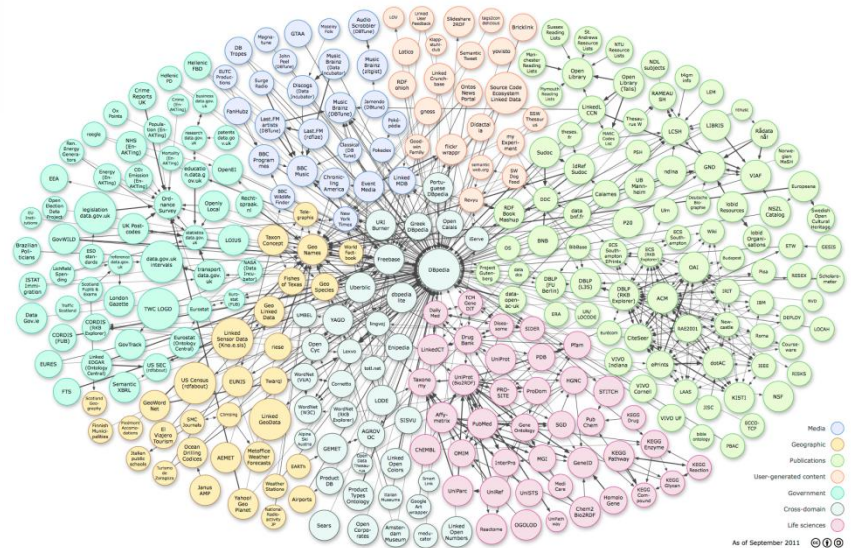
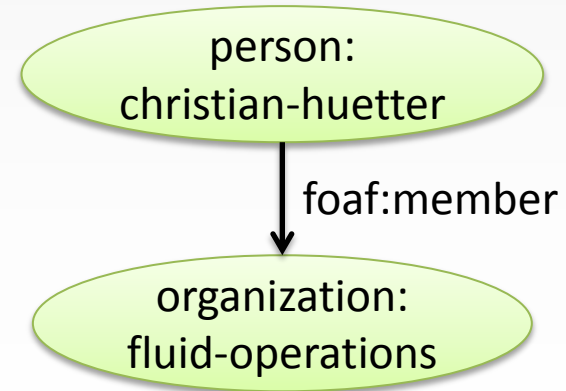


THE INFORMATION WORKBENCH AS A SELF-SERVICE PLATFORM FOR DEVELOPING LINKED DATA APPLICATIONS

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Andreas Schwarte

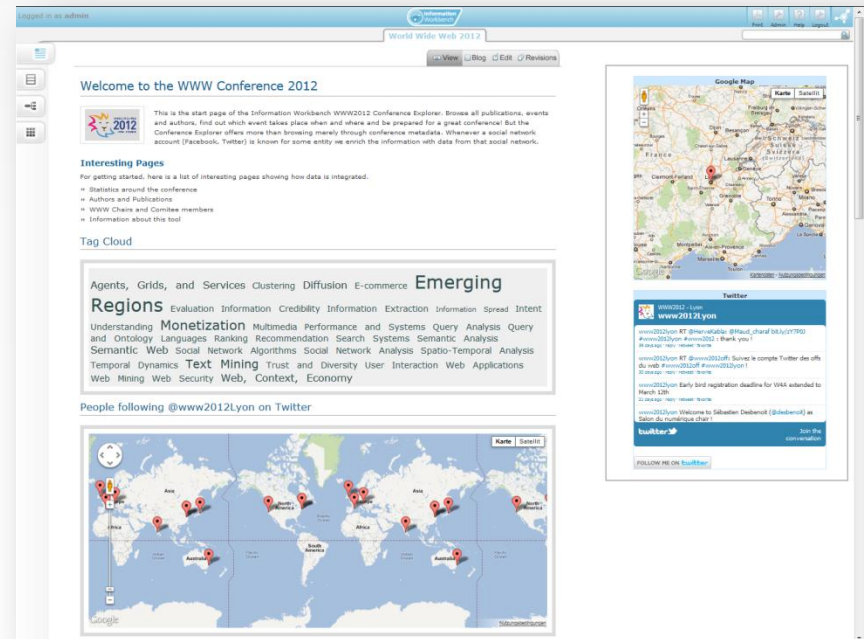
The Potential of Linked Data

- Principles for publishing, sharing and interrelating structured knowledge
- From data silos to a **Web of Data**
- Builds on **W3C standards**:
 - URIs as names for things
 - RDF as data model
 - SPARQL for querying
- Ontologies to describe semantics
- Large corpus of **Linked Open Data (LOD)** from various domains



Example: The Conference Explorer

- Aggregate conference metadata
- Explore conference events, publications, authors, etc.
- Visualize conference statistics



Features

- Conference schedule, timelines, hot topics
- Background information about authors and publications
- Analytics and reports
- Social network statistics

<http://conference-explorer.fluidops.net/>

Benefits of Linked Data Applications

Data integration

- Semantically integrate and interlink data from different sources
 - Conference metadata
 - Public bibliographic metadata
 - Social Networks



dblp .uni-trier.de
Computer Science
Bibliography



Authoring and publishing

- Augment and contextualize data through interlinking public sources

Improved user experience

- Leverage semantic technologies for better search
- Allow for expressive information needs

Papers by This Author ^{*)}

- » [Lifecycle-Support in Architectures for Ontology-Based Information Systems](#)
- » [A Kernel Revision Operator for Terminologies - Algorithms and Evaluations](#)
- » [A Conflict-based Operator for Mapping Revision--Theory and and Implementation](#)
- » [Semantic Technologies for Enterprise Cloud Management](#)
- » [The eCloudManager Intelligence Edition Semantic Technologies for Enterprise Cloud Management](#)
- » [Self-Service Development of Linked Data Applications with the Information Workbench](#)
- » [GovWILD: Integrating Open Government Data for Transparency](#)
- » [The Information Workbench as a Self-Service Platform for Developing Linked Data Applications](#)
- » [GovWILD: Integrating Open Government Data for Transparency](#)
- » [The Information Workbench as a Self-Service Platform for Developing Linked Data Applications](#)
- » [Self-Service Linked Data Applications with the Information Workbench](#)
- » [FedX: Optimization Techniques for Federated Query Processing on Linked Data](#)
- » [FedBench: A Benchmark Suite for Federated Semantic Data Query Processing](#)

author:christian-huetter



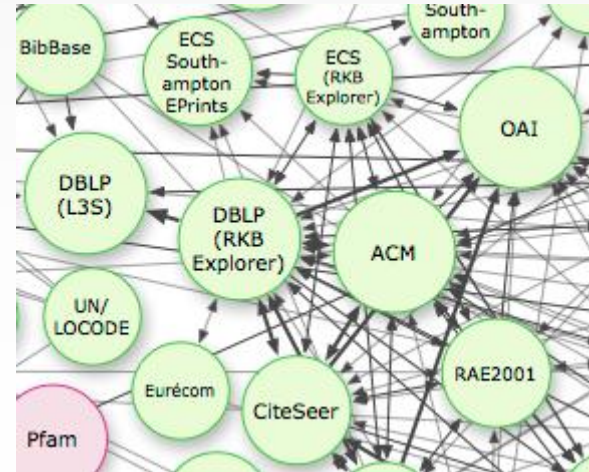
Challenges of Developing Linked Data Applications

Discovery and automated integration

- Variety of data formats (RDF, OWL, ...) and query languages (SPARQL)

Heterogeneity in various dimensions

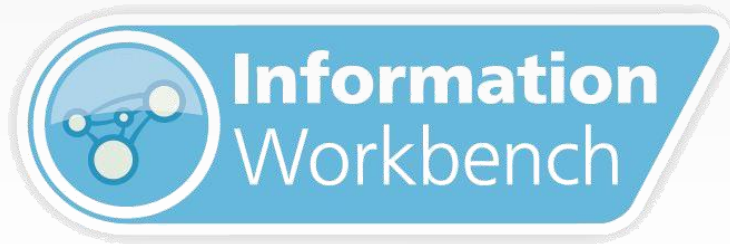
- Location and ownership of data
- Identifiers, structure, vocabularies
- Structured and unstructured data



User interfaces

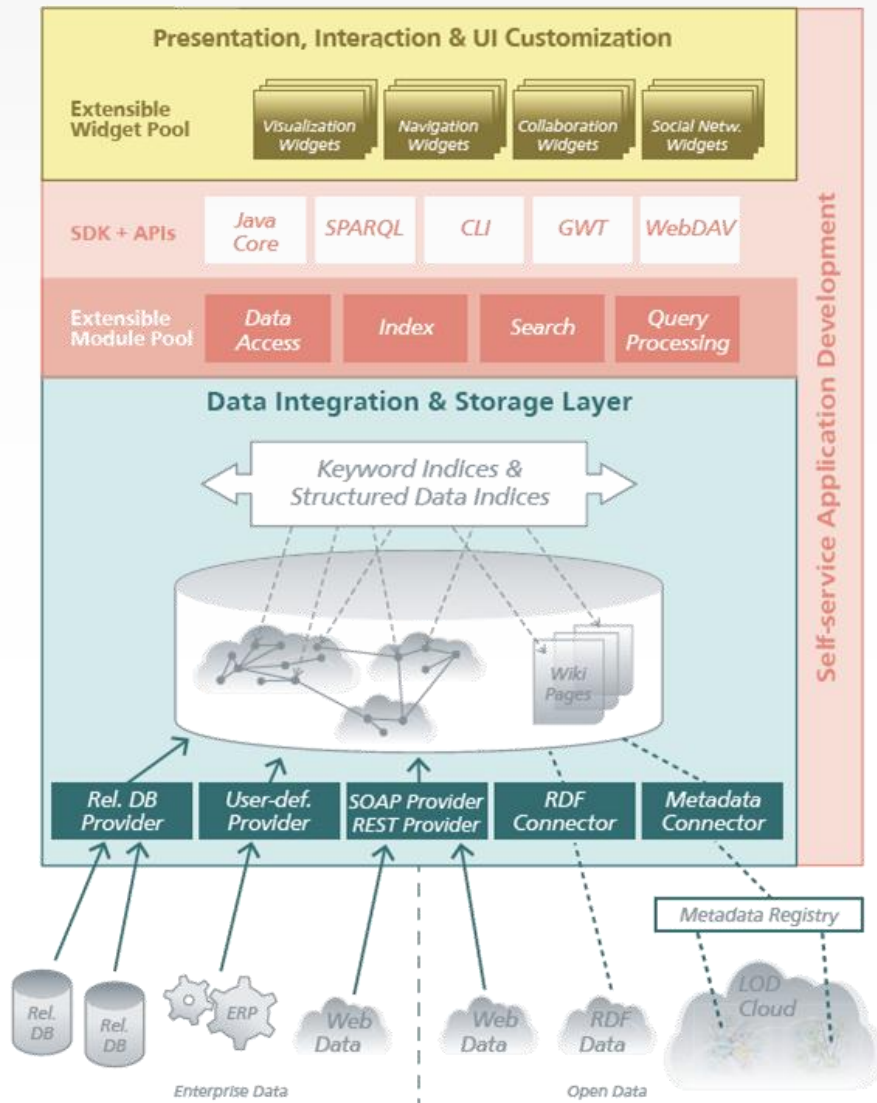
- Large amounts of data
- Flexible and dynamic schemas
- Meaningful aggregation of the data
- Support expressive information needs

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT ?name ?org
WHERE {
    ?person a foaf:Person .
    ?person foaf:name ?name .
    ?person foaf:member ?org .
}
```



OUR SOLUTION:
THE INFORMATION WORKBENCH™

Information Workbench - Linked Data Platform



Data Integration

- Semantic & Linked Data from private and public data sources

Intelligent Data Access and Analytics

- Visual Exploration
- Semantic Search
- Dashboarding and Reporting

Collaboration and Knowledge Management

- Wiki-based authoring of data
- Collaborative workflows

Self-Service Application Development Process



The Information Workbench features...

1

Data Discovery
and Integration

- Metadata from global registries
- Providers for internal and external data

2

Customizing
the Frontend

- Semantic Wiki as frontend
- Living UI composed from widgets

3

Extending
the Platform

- API and open-source SDK
- User-defined widgets, providers, etc.

Data Discovery and Integration

- **Metadata** about data sources (void, dcat) essential for dynamic discovery
- Access to metadata from **global registries** (ckan.org, data.gov, etc.)
- Visually **explore** data sets by facets (topic, license, size, etc.)
- Integrate data sets through data providers, RDF import, or federation

The screenshot shows a web interface for data discovery. On the left, there is a sidebar with filters for 'WWW', 'dchaversion', 'dcllicense', 'dctitle', 'dcatdistribution', 'dcatkeyword', 'dcatlinkedfrom', 'dcatlinksTo', 'dcatrating', 'dcattheme', and 'foafhomepage'. The main area displays a grid of dataset thumbnails, including 'Public Domain Day 2011', 'The Open University', 'Biographic Portal', 'FAST', 'Recycling', 'Prisoners', and 'beta'.

Semantic Web Dog Food Corpus

Contents

[Description](#)
[Details](#)
[Distribution](#)
[Links to other Datasets from Semantic Web Dog Food Corpus](#)
[Other Datasets linking to Semantic Web Dog Food Corpus](#)
[Keywords for Semantic Web Dog Food Corpus](#)

Description

About Data exposed: Metadata (papers, presentations, people) for several semantic web related conferences and workshops, including the most recent ISWC, ESWC and WWW events. Notes: The dump locations can be found in the site's semantic sitemap ### Openness No information found.

Details

Property	Value
Title	semantic-web-dog-food
Author	Knud Möller
Triples	191391
Theme	linkeddata
Homepage	http://data.semanticweb.org

Distribution

URL	Format	Triples		
http://data.semanticweb.org/sparql	api/sparql	191391	Add	Test
http://data.semanticweb.org/organization/freie-universitaet-berlin	example/rdf+xml	191391	Go to example	Test

Customization of the Frontend

- **Semantic Wiki** for managing and linking structured and unstructured data
- Users **collaboratively** generate, annotate, and update content
- Type-based template mechanism
- Advanced search and information access paradigms

Logged in as admin

Information Workbench

21st International World Wide Web Conference

View Edit Revisions

Need help with the wiki syntax? Have a look here.

```

<div style="width:99%;float:left;margin-top:20px;margin-bottom:20px;">
<div style="float:left;width:120px;border:2px solid #000000;padding:5px;margin-bottom:20px;margin-right:20px;">
<div style="width:100%;background-color:#000000;border:2px solid #000000;padding:5px;margin:auto;">
[[#Widget:Image
|'http://www2012.wwwconference.org/wp-content/themes/www2012/images/logo.png'
]]
</div>
</div>
<p>This is the start page of the Information Workbench WWW2012 Conference Explorer. Browse all publications, events and authors, find out which event takes place when and where and be prepared for a great conference! But the Conference Explorer offers more than browsing merely through conference metadata. Whenever a social network account (Facebook, Twitter) is known for some entity we enrich the information with data from that social network.</p>
<h3 style="clear:both;">Interesting Pages</h3>
For getting started, here is a list of interesting pages showing how data is integrated.
* <a href="http://conference-explorer.fluidops.net/resource/WWW_Statistics_2012">Statistics around the conference</a>
* <a href="http://conference-explorer.fluidops.net/resource/WWW2012:proceedings">Authors and Publications</a>
* <a href="http://conference-explorer.fluidops.net/resource/WWW2012chairs">WWW 2012 Chairs and Committee members</a>
* <a href="http://conference-explorer.fluidops.net/resource/conferenceexplorer">Information about this tool</a>
</div>
--> Tag Cloud --

```

Wiki Page in Edit Mode ...

19.04.2012

Logged in as admin

Information Workbench

21st International World Wide Web Conference

View Edit Revisions

Welcome to the 21st International World Wide Web Conference

This is the start page of the Information Workbench WWW2012 Conference Explorer. Browse all publications, events and authors, find out which event takes place when and where and be prepared for a great conference! But the Conference Explorer offers more than browsing merely through conference metadata. Whenever a social network account (Facebook, Twitter) is known for some entity we enrich the information with data from that social network.

Interesting Pages

For getting started, here is a list of interesting pages showing how data is integrated.

- Statistics around the conference
- Authors and Publications
- WWW 2012 Chairs and Committee members
- Information about this tool

Tag Cloud

Access Control Active Learning collaborative filtering Community detection Computational Advertising crowdsourcing Data mining End user development Entity linking evaluation game theory Gibbs sampling historical trends Influence Propagation Information Search and Retrieval latent factor models Latent Semantic Analysis Linked Data Linked Open Data matrix factorization microblogging mobile online communities online social networks Performance photo collections Privacy QoS Query log mining RDF

Facebook

WWW2012 - Lyon auf Facebook

WWW2012 - Lyon

WWW2012 - Lyon

636 Personen gefällt WWW2012 - Lyon.

... and Displayed Result Page

WWW 2012

10

Widgets as Living UI

Large pool of **predefined widgets** for data access

- Navigation and exploration
- Mash-ups with external data sources
- Dashboards for analytics and reporting

Declarative specification of the UI in wiki-based syntax

```
{{ #widget: TagCloud
| query = 'SELECT ?tag (COUNT(?p) AS ?count)
WHERE { ?p dc:subject ?tag . ?p
semont:isPartOf www2012:proceedings . }
GROUP BY ?tag'
| input = 'tag'
| output = 'count' }}
```



Data Discovery and Integration

Customizing the Frontend

Extending the Platform



online account

Values for foaf:onlineAccount +

- <http://twitter.com/phaase> ✕
- <http://www.linkedin.com/pub/pet> ✕

Access Control Active Learning collaborative filtering Community detection; Computational Advertising crowdsourcing Data mining End user development Entity linking evaluation game theory Gibbs sampling historical trends Influence Propagation Information Search and Retrieval latent factor models Latent Semantic Analysis Linked Data Linked Open Data matrix factorization microblogging mobile online communities online social networks Performance photo collections Privacy QoS Query log mining RDF Recommender System Recommender Systems Semantic Web social media Social Network social network social networks Social Networks SPARQL Time series time series topic models Topic Models trip planning **Twitter** user models web search Web Search Wikipedia Yahoo! Answers

Extending the Platform

Create your own components

- Develop application-specific data providers
- Implement special-purpose widgets

Extendable platform

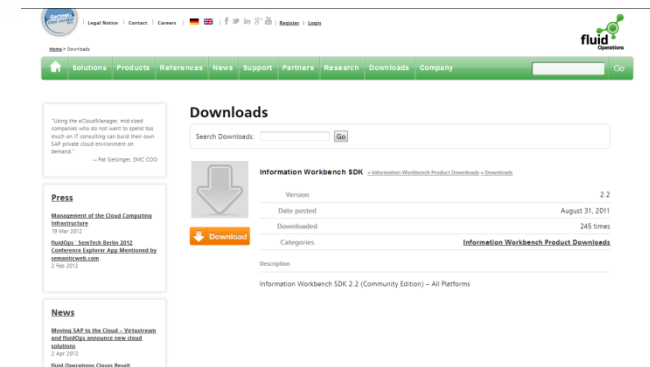
- Well-defined API
- Easy-to-use SDK

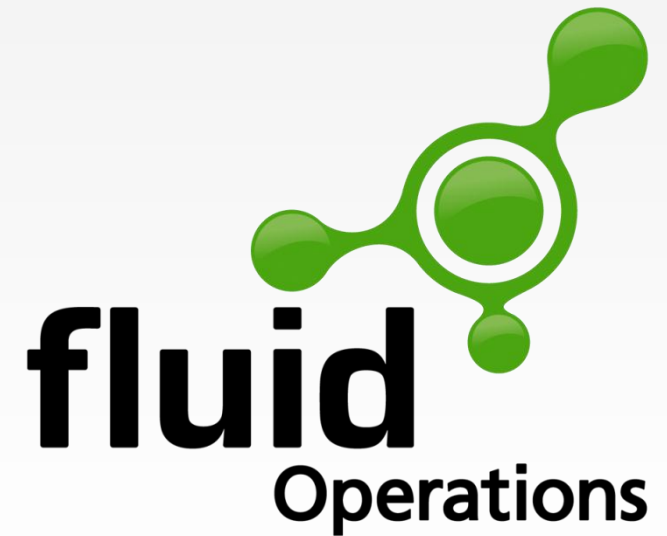
```

100  * The repository type, see @Link RepositoryFactory for documentation
101  * @return
102  */
103  @Config({ name="repositoryType",
104            desc="Type of the underlying API repository (native, memory, remote)",
105            category="Category.DBT",
106            linkCategory="LinkCategory.DATABASE",
107            type = "Type.STRING" })
108  public String getRepositoryType() {
109      return delegate().get("repositoryType", "native");
110  }
111
112
113
114  * Address of repository server for http repository
115  * @return
116  */
117  @Config({ name="repositoryServer",
118            desc="Repository server to be used for HTTPRepository",
119            category="Category.DBT",
120            linkCategory="LinkCategory.DATABASE",
121            type = "Type.STRING" })
122  public String getRepositoryServer() {
123      return delegate().get("repositoryServer", "");
124  }
125  */
  
```

Freely available as Open Source

www.fluidops.com/information-workbench/





Operations

fluid

APPLICATION DEVELOPMENT

Welcome to the WWW Conference 2012



This is the start page of the Information Workbench WWW2012 Conference Explorer. Browse all publications, events and authors, find out which event takes place when and where and be prepared for a great conference! But the Conference Explorer offers more than browsing merely through conference metadata. Whenever a social network account (Facebook, Twitter) is known for some entity we enrich the information with data from that social network.

Interesting Pages

For getting started, here is a list of interesting pages showing how data is integrated.

- » Statistics around the conference
- » Authors and Publications
- » WWW Chairs and Comitee members
- » Information about this tool

Tag Cloud

Agents, Grids, and Services Clustering Diffusion E-commerce Emerging Regions Evaluation Information Credibility Information Extraction Information Spread Intent Understanding Monetization Multimedia Performance and Systems Analysis Query and Ontology Languages Ranking Recommendation Search Systems Mining and Analysis Semantic Web Social Network Algorithms Social Network Analysis Spatio-Temporal Analysis Temporal Dynamics Text Mining Trust and Diversity User Interaction Web Applications Web Mining Web Security Web, Context, Economy

[DEMO]

People following @www2012Lyon on Twitter



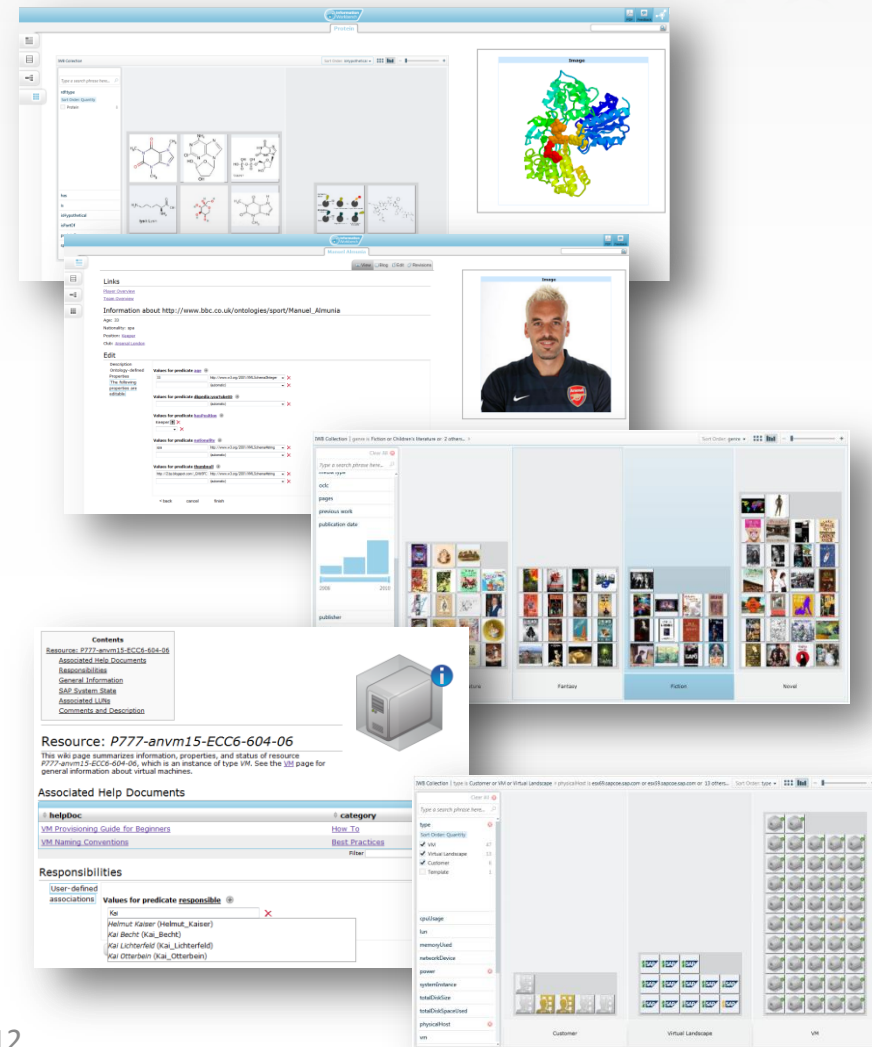
A screenshot of a Twitter feed for the account @www2012Lyon. The header shows the profile name and a 'Follow' button. The feed contains several tweets, including a thank you message and an announcement about the early bird registration deadline for W4A being extended to March 12th. A 'Join the conversation' button is visible at the bottom of the feed.

Information Workbench – *Application Areas*

Knowledge Management in the Life Sciences

Digital Libraries, Media and Content Management

Intelligent Data Center Management





CONCLUSION

Summary

Enormous potential for Linked Data applications

Information Workbench as **open platform** for implementing Linked Data applications

Addressing all aspects of **interacting with Linked Data**

- Intelligent data access, navigation, and exploration
- Dashboards for reporting and analytics
- Collaborative knowledge management, authoring, and publication

“Self-service” application development

- Linked Open Data discovery
- Automated data integration
- Customization of the frontend with rich widget pool
- Extensible via API and SDK

*Check out our app at the
Metadata Challenge!*

<http://conference-explorer.fluidops.net/>



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