

# Social Networks and Data Portability using Semantic Web technologies

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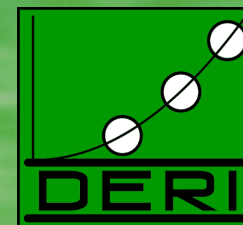
Social Aspects of the Web (SAW2008)

Innsbruck, Austria, 2008-05-06

www.deri.ie

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What's the problem and how to solve it ?

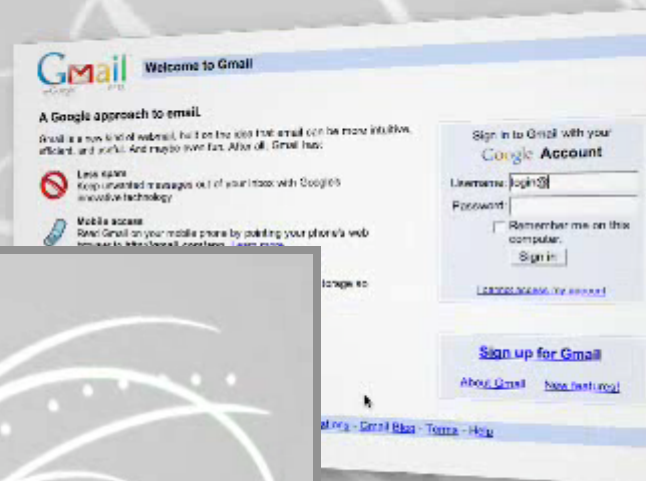
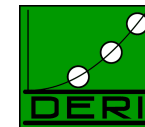


# What if I use multiple services and I want to...

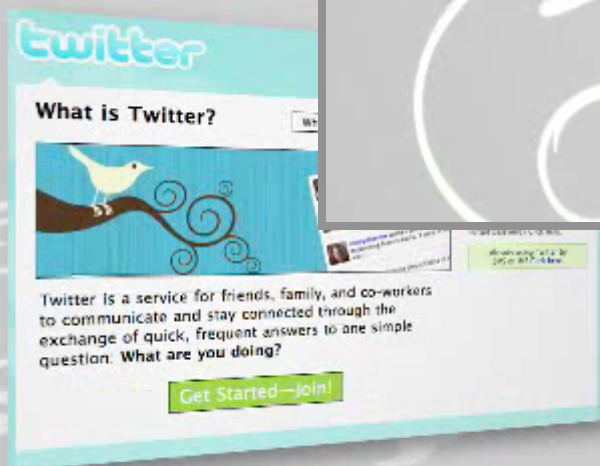


- Merge my social networks between various websites
- Invite my friends from a social media website to a new service I've just registered
- Move the stuff I have on one service to another (e.g. move all my blog posts, comments, etc. from WordPress.com to "Acme Blogs")
- Move all my stuff from multiple services to one third-party service or centralise on my own service, e.g. my blog
- See my stuff on a third-party service providing an aggregate view, like FriendFeed, but in an open way

# So many social media sites...

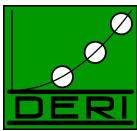


**YOU LOGIN TO**



\* Source: Smashcut Media, [www.smashcut-media.com](http://www.smashcut-media.com)

# Even more services...



A screenshot of the LinkedIn homepage. It features the LinkedIn logo, navigation buttons for 'Home' and 'Join Today', and a 'What's new at LinkedIn:' section with several bullet points. A 'Sign in' form is visible on the right side of the page.

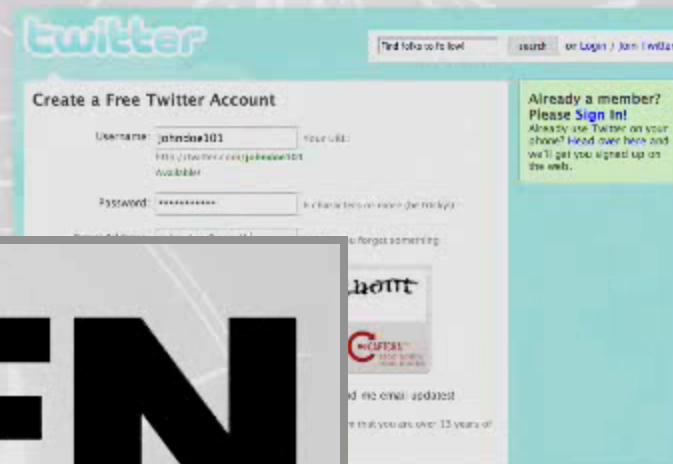
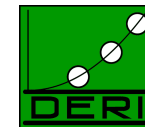
A screenshot of the WordPress login form. It has a blue header with the WordPress logo, followed by input fields for 'User name' (containing 'login d') and 'Password'. A 'Login' button is at the bottom right.



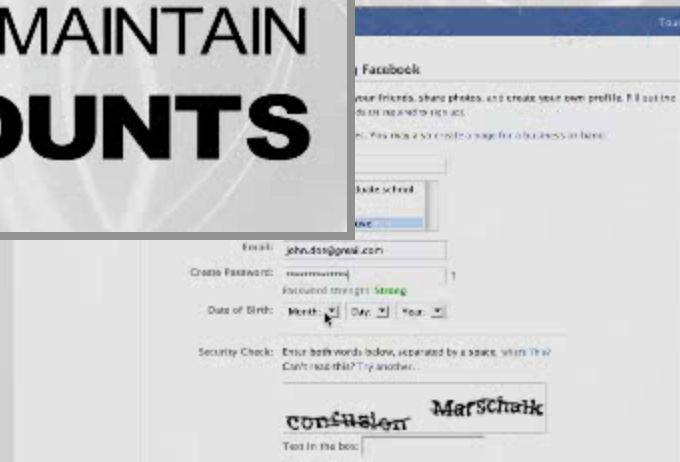
A screenshot of a Ustream live stream. The top shows the Ustream logo and navigation options. The main content is a video player showing a pool table. Below the video, there are social media sharing options and a 'Go to Show Room and Chat!' button.

A screenshot of a social media mashup page. It features a grid of social media icons including Twitter, Facebook, and WordPress. Below the icons, there is a 'Mobile post voice, video, picture, and text mashups right to your page. Evolve. Be Herd.' text and a 'GET STARTED' button.

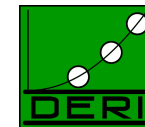
It takes a lot of time...



**THEN**  
YOU HAVE TO MAINTAIN  
**YOUR ACCOUNTS**



# Filling out your profiles, re-adding your friends...



email

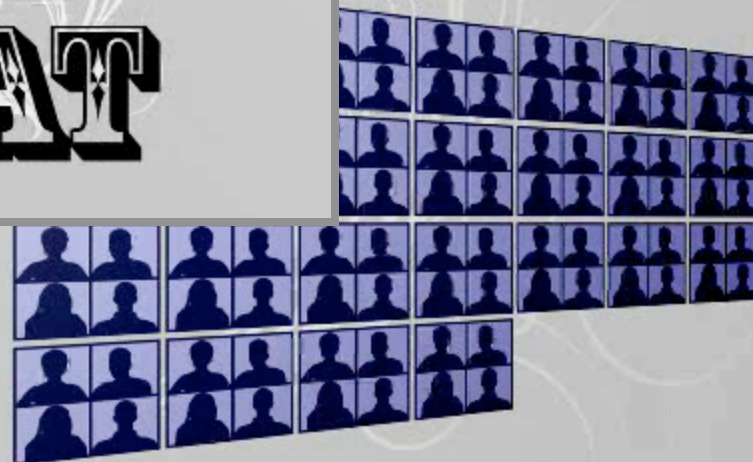
me@dataportability.org

phone

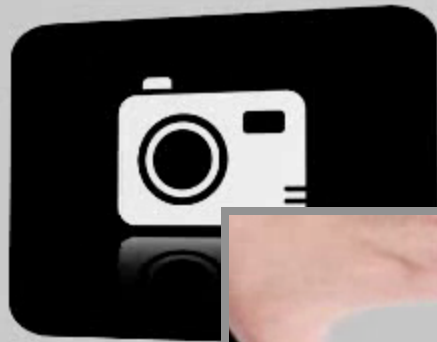
212-345-767

portabledata

**RINSE  
&  
REPEAT**



# Uploading posts and content items to “stovepipes”!



AGAIN  
AGAIN  
& AGAIN  
& AGAIN

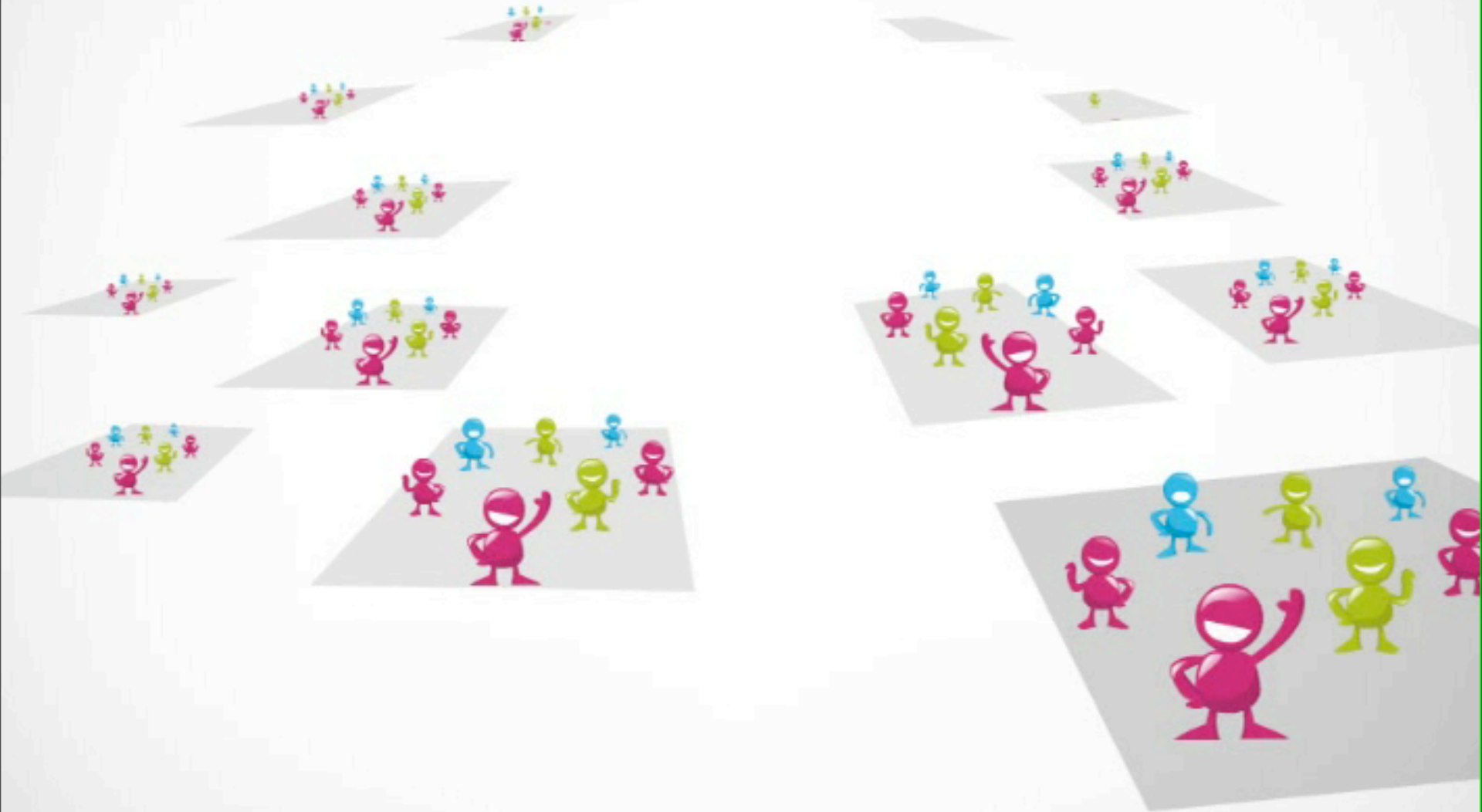


# Social media sites are like data silos



\* Source: Pidgin Technologies, [www.pidgintech.com](http://www.pidgintech.com)

# Many isolated communities of users and their data



\* Source: Pidgin Technologies, [www.pidgintech.com](http://www.pidgintech.com)

Need ways to connect these islands



\* Source: Pidgin Technologies, [www.pidgintech.com](http://www.pidgintech.com)

Allowing users to easily move from one to another



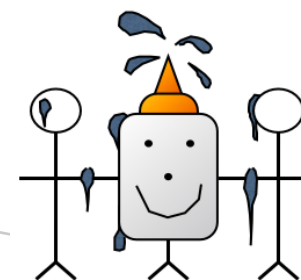
\* Source: Pidgin Technologies, [www.pidgintech.com](http://www.pidgintech.com)

# Enabling users to easily bring their data with them



\* Source: Pidgin Technologies, [www.pidgintech.com](http://www.pidgintech.com)

- How many general or niche SNSs are you willing to register and / or interact with?
- *“People are getting sick of registering and re-declaring their friends on every site”* [Brad Fitzpatrick](#) (Aug. 2007)
- Need for a “social graph” with distributed social networks and reusable profiles
- [A Bill of Rights for Users of the Social Web](#) (Sept. 07)
  - Ownership
  - Control
  - Freedom
- The Semantic Web can help !



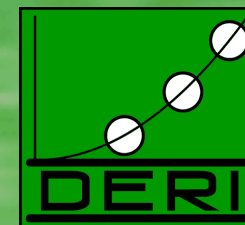
- *“The Semantic Web is an **extension** of the current web in which information is given **well-defined meaning**, better enabling computers and people to **work in cooperation**”* - Tim Berners-Lee, James Hendler, Ora Lassila, [Scientific American, May 2001](#)
- A common model to describe data in a machine-readable way:
  - RDF (Resource Description Framework)
  - RDF statements are triples (subject predicate object):  

```
SAW08 isA Workshop .  
SAW08 colocatedWith 11thBIS .
```
- Common semantics for this data, using ontologies:
  - *“An ontology is a specification of a conceptualisation”* - Tom Gruber
  - RDFS (RDF Schema)
  - OWL (Web Ontology Language)
- The Semantic Web FAQ:
  - <http://www.w3.org/2001/sw/SW-FAQ>



- Semantic Web and Web 2.0 could benefit from each other to lead to a better Web, with social and machine-understandable data.
- Many examples:
  - Vocabularies: FOAF to describe people, SIOC to describe their data
  - Semantic Wikis: Semantic MediaWiki, OntoWiki ...
  - Revyu.com: A review website based on SW technologies
  - Tagging: The Tag Ontology, SCOT, MOAT
  - Journal Of Web Semantics - Special Issue on Web 2.0
- *“I think we could have both **Semantic Web technology supporting online communities**, but at the same time also **online communities can support Semantic Web data** by being the **sources of people voluntarily connecting things together.**” Tim Berners-Lee (ISWC2005 podcast)*

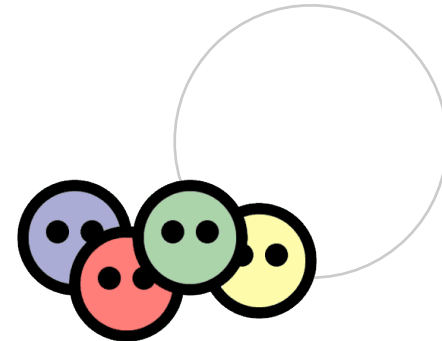




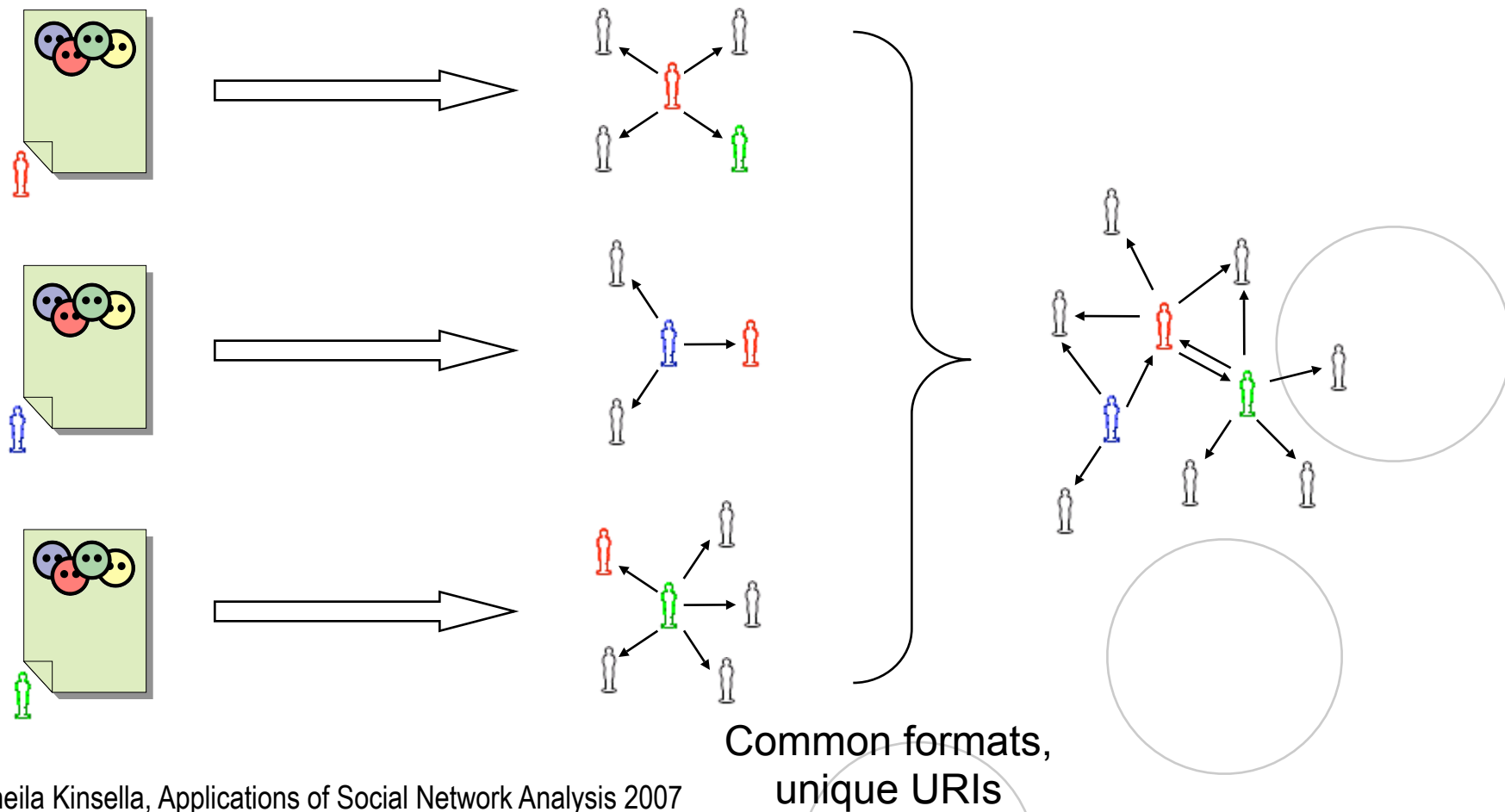
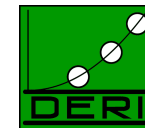
# Social Networks and the Semantic Web



- FOAF is the main vocabulary used to represent people:
  - Friend Of A Friend - <http://foaf-project.org>
  - foaf:Person class:
    - “The foaf:Person class represents people. Something is a foaf:Person if it is a person.”
  - Give yourself a URI:
    - <http://apassant.net/alex>
  - Relationships using the foaf:knows property:
    - `:John foaf:knows :Alex`
- Extensions using the RELATIONSHIP vocabulary:
  - <http://vocab.org/relationship/>
  - All rel:\* properties are subproperties of foaf:knows
  - `:John rel:worksWith :Uldis`
  - RDFS inferencing allows tools to answer queries using foaf:knows when people use rel:\* alternatives

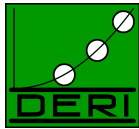


# Integrating social networks with FOAF



Source: Sheila Kinsella, Applications of Social Network Analysis 2007

# A common semantics for existing services



- Existing FOAF exporters for Facebook, Flickr, Twitter...
- Run unified queries using SPARQL

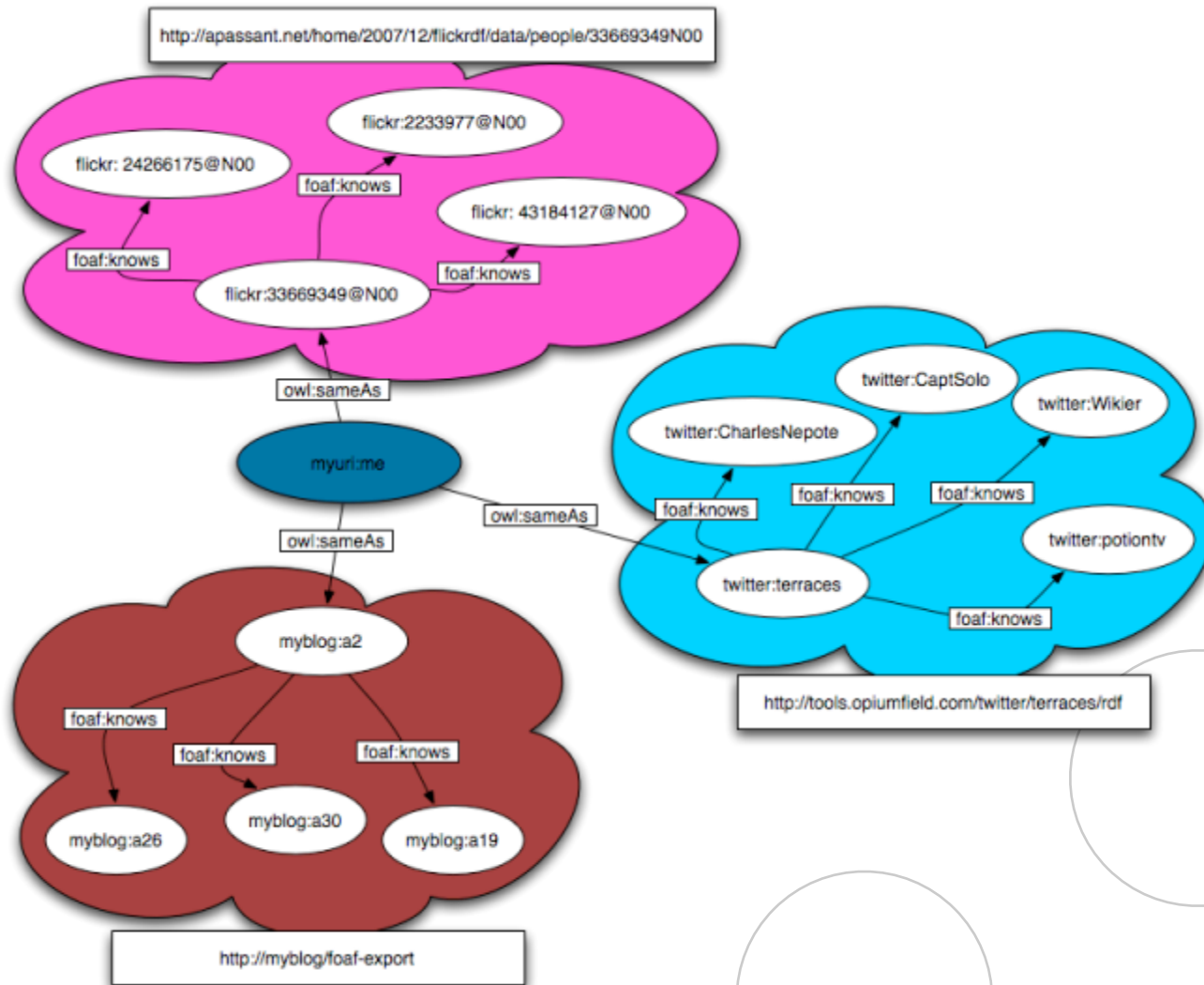
```
<foaf:Person rdf:ID="me">
  <foaf:name>Alexandre Passant</foaf:name>
  <foaf:givenname>Alexandre</foaf:givenname>
  <foaf:family_name>Passant</foaf:family_name>
  <foaf:gender/>
  <foaf:img rdf:resource="http://profile.ak.facebook.com/profile5/1755/89/s607513040_9867.jpg"/>
  - <foaf:holdsAccount>
    - <foaf:OnlineAccount>
      <foaf:accountServiceHomepage rdf:resource="http://www.facebook.com"/>
      <foaf:accountName>607513040</foaf:accountName>
    </foaf:OnlineAccount>
  </foaf:holdsAccount>
```

```
<foaf:Person rdf:about="http://apassant.net/home/2007/12/flickrdf/people/33669349@N00">
  <foaf:name>Alexandre Passant</foaf:name>
  <foaf:mbox_shalsum>80248cbb1109104d97aae884138a6afcd688bd2</foaf:mbox_shalsum>
  <geonames:locatedIn rdf:resource="http://sws.geonames.org/3038213/" />
  <foaf:holdsAccount rdf:resource="http://apassant.net/home/2007/12/flickrdf/user/33669349@N00" />
  <foaf:knows rdf:resource="http://apassant.net/home/2007/12/flickrdf/people/86846122@N00" />
  <foaf:knows rdf:resource="http://apassant.net/home/2007/12/flickrdf/people/32233977@N00" />
  <foaf:knows rdf:resource="http://apassant.net/home/2007/12/flickrdf/people/43184127@N00" />
  <foaf:knows rdf:resource="http://apassant.net/home/2007/12/flickrdf/people/24266175@N00" />
  <foaf:knows rdf:resource="http://apassant.net/home/2007/12/flickrdf/people/7787294@N06" />
  <sioc:member_of rdf:resource="http://apassant.net/home/2007/12/flickrdf/groups/49656594@N00" />
  <sioc:member_of rdf:resource="http://apassant.net/home/2007/12/flickrdf/groups/23989049@N00" />
</foaf:Person>
```

```
<foaf:Agent rdf:about="http://twitter.com/terraces">
  <foaf:knows rdf:resource="http://twitter.com/factoryjoe" />
  <foaf:knows rdf:resource="http://twitter.com/danja" />
  <foaf:knows rdf:resource="http://twitter.com/edd" />
  <foaf:knows rdf:resource="http://twitter.com/dajobe" />
  <foaf:knows rdf:resource="http://twitter.com/iand" />
  <foaf:knows rdf:resource="http://twitter.com/ldodds" />
  <foaf:knows rdf:resource="http://twitter.com/tomorris" />
```

- A need to unify URIs from different services so as to represent one's unified identity
- Linked-data principles are to use owl:sameAs and rdfs:seeAlso:
  - See: <http://www4.wiwiss.fu-berlin.de/bizer/pub/LinkedDataTutorial/>
  - owl:sameAs: Used to identify two resources with different URIs as being the same resource
    - `:alex owl:sameAs flickr:33669349@N00 .`
  - rdfs:seeAlso: “More information about this resource can be found here”, can be used by Semantic Web tools such as Tabulator
- Inference using owl:InverseFunctionalProperty:
  - foaf:mbox, foaf:openid, etc. can be used to identify uniqueness for a foaf:Person
- Unifying aspects of a foaf:Person across networks:
  - All relevant relationships are related to one foaf:Person
  - Social Network unification

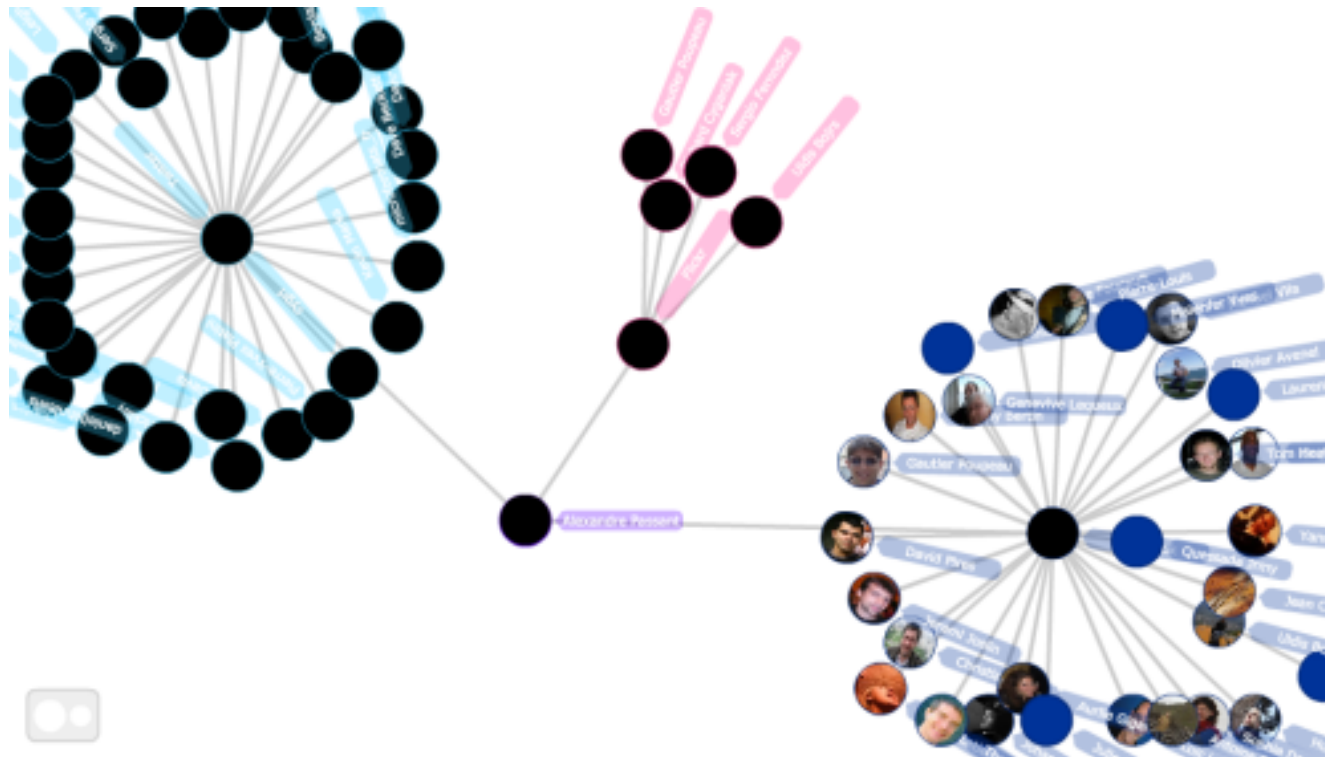
# Distributed social networking with FOAF



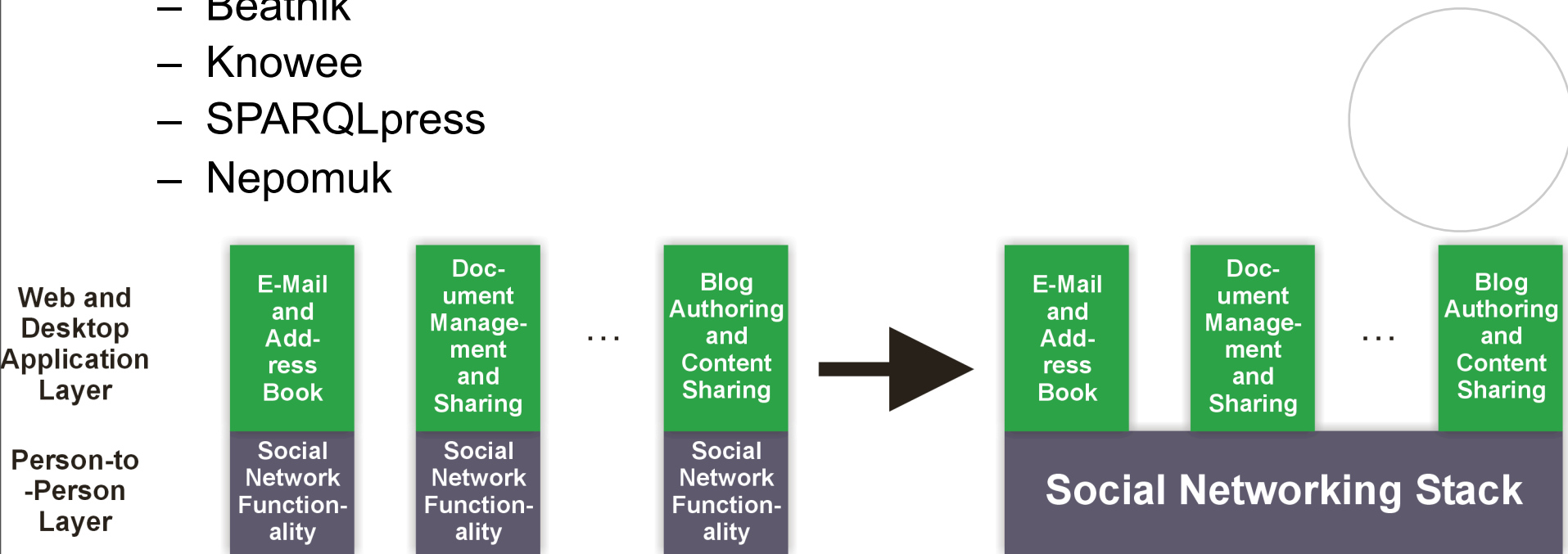
# Applications for browsing the social (semantic) graph



- FOAFnaut, FOAF Explorer, etc.
- FOAFGear: thanks to common semantics, only 100 lines of code: <http://apassant.net/home/2008/01/foafgear/>



- Browse / re-use your social graph in personal applications
- Merge identities with pre-defined rules
- Tools:
  - Beatnik
  - Knowee
  - SPARQLpress
  - Nepomuk



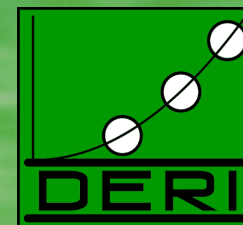


- Link to your FOAF profile from your OpenID URL, so that services can get your machine-readable profile when you log-in:

```
<head><link rel="meta" type="application/rdf+xml"
  title="FOAF" href="foaf.rdf" /></head>
```

- FOAF + OpenID Scenario

- Bob creates an account on Networkr, a new social networking website, using OpenID
- Networkr retrieves the FOAF URI thanks to an auto-discovery link
- From the FOAF file, it identifies if there are any people already subscribed to Networkr who are listed in Bob's defined relationships
- If that is the case, Bob can add them as "local connections", share data with them, etc. without having to once again search for / add his friends
- Specific rules:
  - If I know X from Flickr, he / she can see my pictures on Networkr

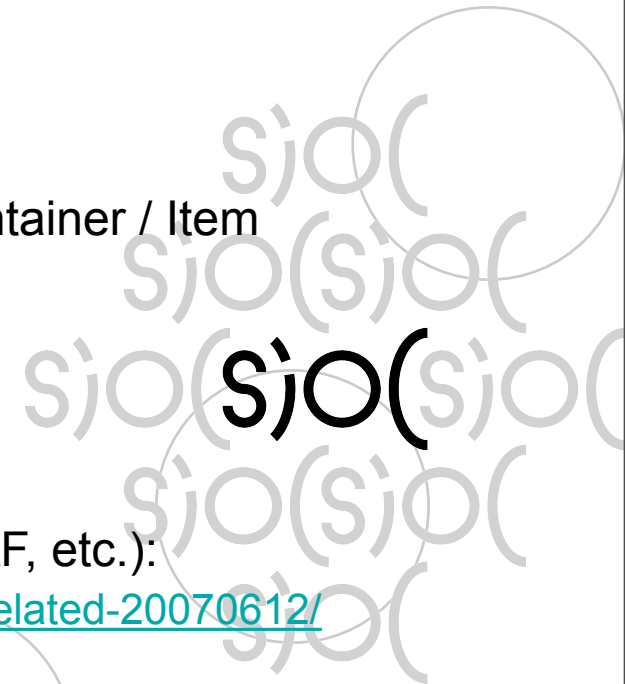


# Social Media Contributions and the Semantic Web

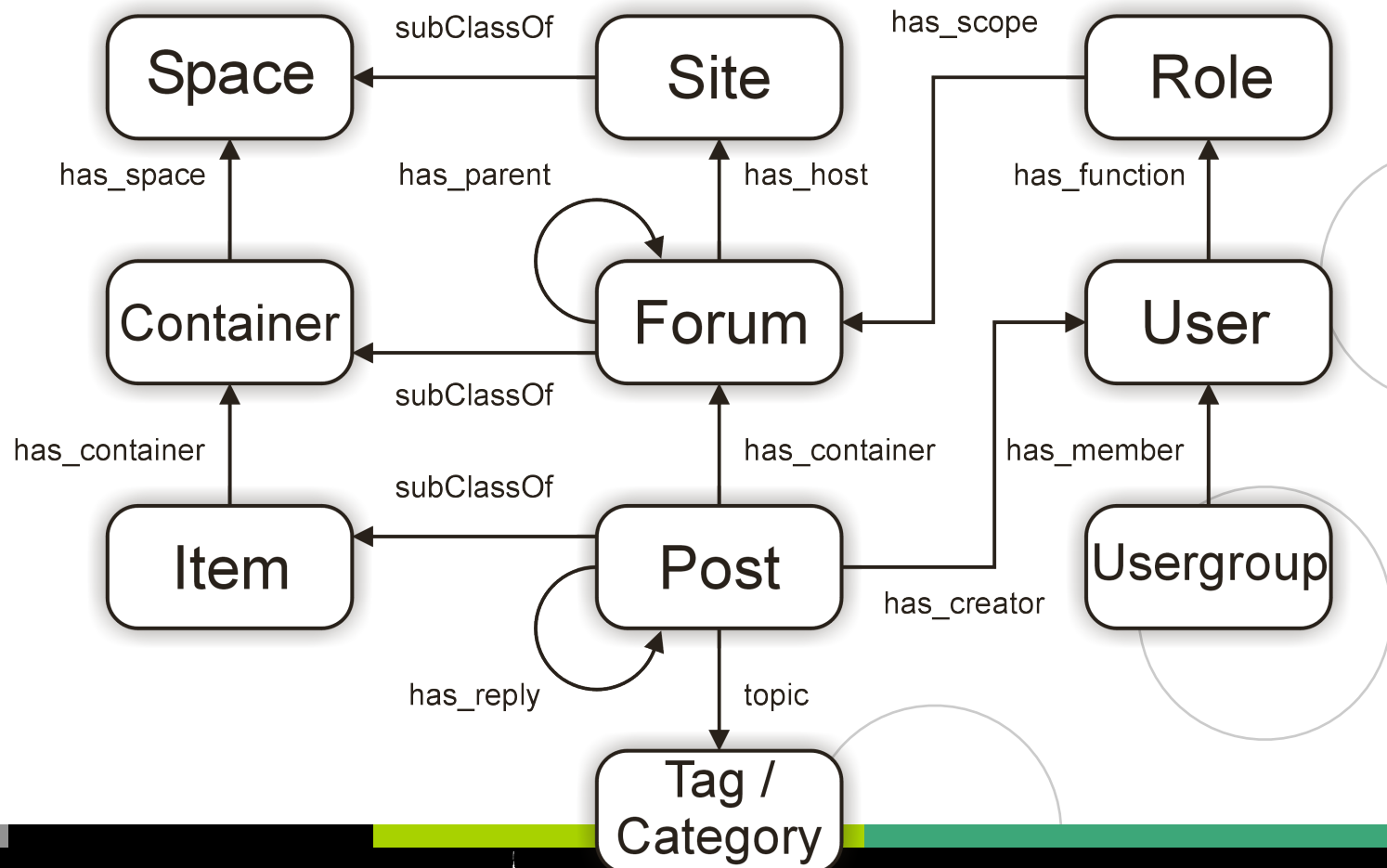


- Lots of user-created content posted on the Web:
  - Blog posts, wiki pages, bulletin board threads
  - Called « Social Media Contributions » or SMC
- Distributed content
  - Blogging platform, photos-sharing website, social bookmarking service .....
- A need for common semantics to
  - Provide a single model for any SMC, wherever it comes from
  - Enables the use of SPARQL queries instead of proprietary APIs
  - Interlink data and find relationships between content
  - From documents to resources, from WWW to GGG

- SIOC - Semantically-Interlinked Social Communities
  - <http://sioc-project.org>
  - A ontology to represent the activities of online communities on the Web
  - More than 40 applications, mainly open-source
  - W3C Member Submission, June 2007
    - <http://www.w3.org/Submission/2007/02/>
- Namespace: <http://rdfs.org/sioc/ns>
  - Five top-level classes: User / Role / Space / Container / Item
  - A “SIOC Types” module for Social Web content
  - Action: A user posts an item in a container
- A Semantic Web citizen:
  - Reusing and interlinking existing ontologies
  - Not reinventing the wheel (connects to DC, FOAF, etc.):
    - <http://www.w3.org/Submission/2007/SUBM-sioc-related-20070612/>



- The main classes and properties are:



# Sample export of SIOC data from vBulletin

quake.ie - WWWBoard

Welcome, Cloud.  
You last visited: 19-02-2008 at 10:05

User CP    FAQ    Members List    Calendar    New Posts    Search    Quick Links    Log Out

```
<foaf:Document rdf:about="">
  <dc:title>SIOC profile for "boards.ie"</dc:title>
  <dc:description>A SIOC profile describes the structure and contents of a community site (e.g., weblog) in a machine
processable form. For more information refer to the &lt;a href="http://rdfs.org/sioc">SIOC project
page&lt;/a></dc:description>
  <foaf:primaryTopic rdf:resource="http://vbulletin.sioc-project.org/showthread.php?t=1"/>
  <admin:generatorAgent rdf:resource="http://wiki.sioc-project.org/index.php/PHPEXportAPI?version=1.01"/>
  <admin:generatorAgent rdf:resource="http://sw.deri.org/svn/sw/2005/08/sioc/vbulletin/">
</foaf:Document>

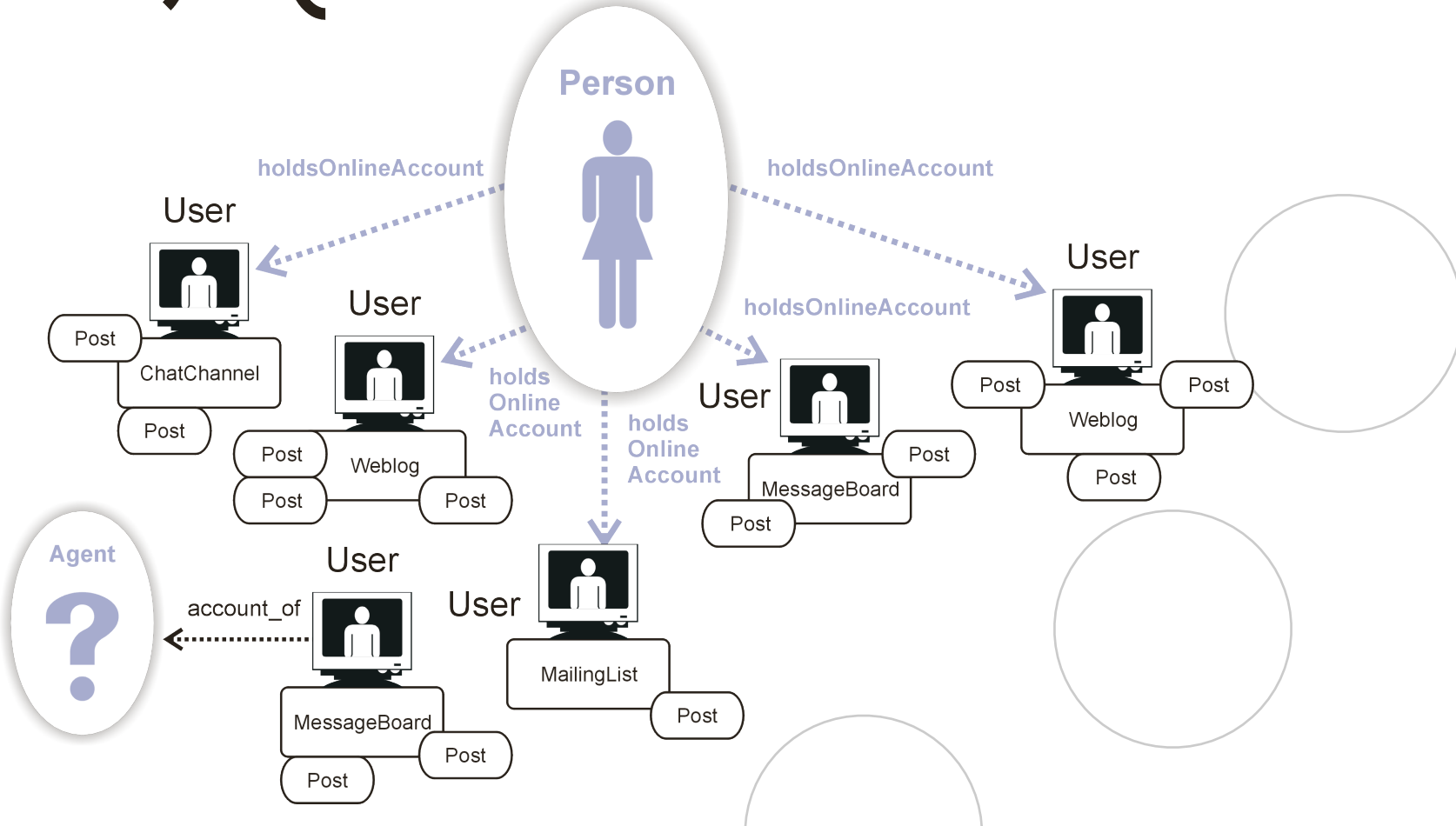
<sioc:Thread rdf:about="http://vbulletin.sioc-project.org/showthread.php?t=1">
  <sioc:link rdf:resource="http://vbulletin.sioc-project.org/showthread.php?t=1"/>
  <sioc:num_views>1166</sioc:num_views>
  <dc:title>quake.ie - WWWBoard</dc:title>
  <dcterms:created>1998-02-12T15:36:23</dcterms:created>
  <sioc:has_parent>
    <sioc:Forum rdf:about="http://vbulletin.sioc-project.org/forumdisplay.php?f=13">
      <rdfs:seeAlso
rdf:resource="http://vbulletin.sioc-project.org/sioc.php?sioc_type=forum&sioc_id=13"/>
    </sioc:Forum>
  </sioc:has_parent>
  <sioc:container_of>
    <sioc:Post rdf:about="http://vbulletin.sioc-project.org/showpost.php?p=1">
      <rdfs:seeAlso
rdf:resource="http://vbulletin.sioc-project.org/sioc.php?sioc_type=post&sioc_id=1"/>
      <sioc:next_by_date rdf:resource="http://vbulletin.sioc-project.org/showpost.php?p=2"/>
    </sioc:Post>
  </sioc:container_of>
  <sioc:container_of>
    <sioc:Post rdf:about="http://vbulletin.sioc-project.org/showpost.php?p=2">
      <rdfs:seeAlso
rdf:resource="http://vbulletin.sioc-project.org/sioc.php?sioc_type=post&sioc_id=2"/>
      <sioc:previous_by_date rdf:resource="http://vbulletin.sioc-project.org/showpost.php?p=1"/>
      <sioc:next_by_date rdf:resource="http://vbulletin.sioc-project.org/showpost.php?p=3"/>
    </sioc:Post>
  </sioc:container_of>
  <sioc:container_of>
    <sioc:Post rdf:about="http://vbulletin.sioc-project.org/showpost.php?p=3">
      <rdfs:seeAlso
rdf:resource="http://vbulletin.sioc-project.org/sioc.php?sioc_type=post&sioc_id=3"/>
      <sioc:previous_by_date rdf:resource="http://vbulletin.sioc-project.org/showpost.php?p=2"/>
    </sioc:Post>
  </sioc:container_of>
</sioc:Thread>
```

- The `sioc:User` class:
  - Can be thought of as a virtual representation of any person online, within the context of a given social media website or community
  - A subclass of `foaf:OnlineAccount`
- `foaf:holdsAccount` property:
  - “The `foaf:holdsAccount` property relates a `foaf:Agent` to a `foaf:OnlineAccount` for which they are the sole account holder.”
  - Links a `foaf:Person` to various `sioc:User(s)`
  - As many `sioc:User(s)` as required can be linked to a single person
  - One people, various identities
- Users create and manage content:
  - `has_creator` and `has_modifier` properties
  - `:blogpost123 sioc:has_creator :john`

# A person and their user accounts

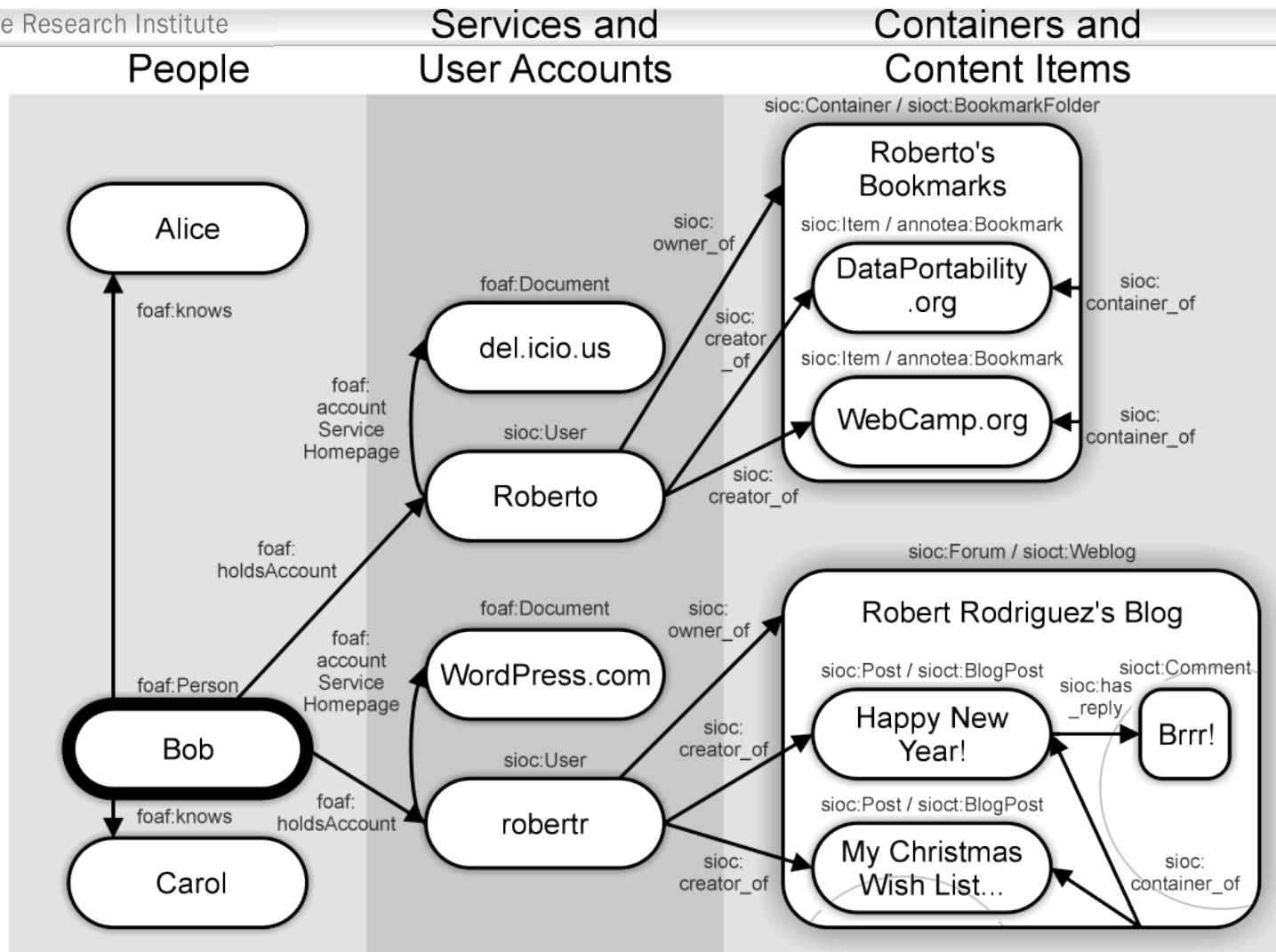
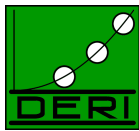


# SIOC + FOAF





# Using SIOC and FOAF to represent portable data



- Find all content created by someone with a given OpenID URL:
  - Browse someone's social media contributions posted on various websites using different account names, but for the same person
  - A single SPARQL query, no need to play with different APIs

```
SELECT ?item
WHERE {
    ?person foaf:openid <$openid> ;
    foaf:holdsAccount ?user .
    ?user sioc:creator_of ?item .
}
```

- Exporting data from the original container
  - Use one of the SIOC exporter (or write yours)
- Importing SIOC data is easy:
  - Parse SIOC RDF data (e.g. using ARC2 or RAP for PHP)
  - Convert SIOC data to the content model of the target system:
    - e.g. content and other properties of blog posts and comments
    - Can use SIOC APIs to hold the data model
  - Store data in the target application:
    - The most difficult part ☺
    - Wordpress plugin

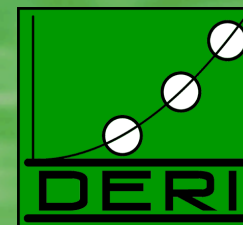
## Just a Weblog [\(View site »\)](#)

Dashboard Write Manage Links Presentation Plugins Users **Options**

General Writing Reading Discussion Permalinks Miscellaneous Tags **SIOC Import**

### SIOC Import Plugin - Control Panel

URL of SIOC data to import



# Summary



- Data portability is needed to avoid social network fatigue for end-users
  - Many networks, many friends, many contributions
  - Distributed in proprietary data silos
- The Semantic Web provides common models for such needs:
  - Common semantics to represent data wherever it comes from
  - FOAF to represent people and social networks
  - SIOC to represent Social Media Contributions
  - Use standards API and languages (SPARQL) to get **your** data

# Be part of the Social Semantic Web !



- Vocabularies and tools (APIs, producers...) already exist
  - <http://esw.w3.org/topic/SemanticWebTools>
  - <http://sioc-project.org/applications>
  - Needs a wider adoption
- Join us and contribute !
  - <http://sioc-project.org>
  - #sioc on irc.freenode.net
  - sioc-dev on google-groups
- Social Data on the Web
  - Workshop @ ISWC2008
  - <http://sdow2008.semanticweb.org/>

- Uldis Bojars
  - [uldis.bojars@deri.org](mailto:uldis.bojars@deri.org) // <http://captsolo.net>
- Alexandre Passant
  - [alex@passant.org](mailto:alex@passant.org) // <http://apassant.net>
- John Breslin
  - [john.breslin@deri.org](mailto:john.breslin@deri.org) // <http://johnbreslin.com>
- Stefan Decker
  - [stefan.decker@deri.org](mailto:stefan.decker@deri.org) // <http://stefandecker.com>
- Thanks to Dan Brickley (FOAF) for his valuable comments about this work
  - <http://danbri.org> // <http://foaf-project.org>