
This version is available at https://strathprints.strath.ac.uk/65040/

Strathprints is designed to allow users to access the research output of the University of Strathclyde. Unless otherwise explicitly stated on the manuscript, Copyright © and Moral Rights for the papers on this site are retained by the individual authors and/or other copyright owners. Please check the manuscript for details of any other licences that may have been applied. You may not engage in further distribution of the material for any profitmaking activities or any commercial gain. You may freely distribute both the url (https://strathprints.strath.ac.uk/) and the content of this paper for research or private study, educational, or not-for-profit purposes without prior permission or charge.

Any correspondence concerning this service should be sent to the Strathprints administrator: strathprints@strath.ac.uk
Linked data: Opening Scotland’s library content to the world

Dr Diane Rasmussen Pennington MS PhD PgDip FHEA FRSA
Lecturer in Information Science, University of Strathclyde
Editor-in-Chief, Library and Information Research
@infogamerist
diane.pennington@strath.ac.uk
The evolution of the Web (1989-now)

- **Web 1.0**: hand-coded HTML pages; accessible and readable, but not interactive
- **Web 2.0**: Facebook and Twitter; everyone can post, share, and respond without extensive technical knowledge
- **Web 3.0**: the Semantic Web
  - “Semantic” is “meaning in language”
  - “Semantic Web” communicates “the meaning of the content on web pages in a way that computers can understand. If they can process these meanings, they can then make and convey relationships between related web pages. This leads to improved – and more meaningful – information retrieval.” (p. 34)

Linked open data principles

1. Use URIs as names for things
2. Use HTTP URIs so that people can look up those names
3. When someone looks up a name, provide useful Resource Description Framework [RDF] information, using the standards (RDF*, SPARQL)
4. Include links to other URIs so that they can discover more things

Source: [http://www.w3.org/DesignIssues/LinkedData.html](http://www.w3.org/DesignIssues/LinkedData.html)
1. Use URIs as names for things
2. Use HTTP URIs so that people can look up names

- The Hypertext Transfer Protocol (HTTP) is a networking protocol for distributed, collaborative, hypermedia information systems.
- HTTP is the foundation of data communication for the World Wide Web.
- Use URIs to name people, for institutions, concepts, topics, and geographical places.

Examples:

- http://www.strath.ac.uk (a university)
- https://www.facebook.com/CILIPinfo (a professional association)
- https://personal.cis.strath.ac.uk/diane.pennington (a lecturer)
- https://www.flickr.com/photos/chandlerinok/6168389622 (a Chihuahua)
3. When someone looks up a name, provide useful [RDF] information

RDF, or Resource Description Framework, is the language of the Semantic Web

- Use RDF subject-predicate-object ‘triples’ to describe a thing
- Reciprocate triples to show relationships between things

Emma Watson → StarredInMovie → Harry Potter and the Half-Blood Prince
Emma Watson is the subject, StarredInMovie is the predicate, and Harry Potter and the Half-Blood Prince is the object.
This relationship also needs to be reciprocated:
Harry Potter and the Half-Blood Prince → Has Movie Star → Emma Watson
4. Include links to other URIs so that users can discover more things.

An example using DBpedia; shows relationships between philosophers.

Google's Knowledge Graph uses linked data to connect related resources.
Scottish Government’s Open Data Strategy (2015)

“This strategy seeks to create a Scotland where non-personal and non-commercially sensitive data from public services is recognised as a resource for wider societal use and as such is made open in an intelligent manner and available for re-use by others.”

Source: [http://www.gov.scot/Publications/2015/02/6614](http://www.gov.scot/Publications/2015/02/6614)

“DATA CHANGES EVERYTHING, OPENING UP NEW CHOICES AND POSSIBILITIES FOR OUR PUBLIC SERVICES, OUR BUSINESSES, OUR WELLBEING.”
GILLIAN DOCHERTY, CHIEF EXECUTIVE, DATA LAB

Data holds the key to unlocking innovation in public services. Better data sharing can generate new insights, stimulate new ideas and deliver potential savings to the public sector of more than £1 billion. Such benefits will, however, only be realised if people in Scotland trust us to hold their data securely and use it in appropriate ways.

“SCOTLAND HAS THE POTENTIAL TO BECOME THE DATA CAPITAL OF EUROPE.”
CHARLIE JEFFREY, SENIOR VICE PRINCIPAL, UNIVERSITY OF EDINBURGH


A range of official statistics about Scotland for information and re-use. Explore the data by theme, organisation, or geography. Search for datasets, places or postcodes.

<table>
<thead>
<tr>
<th>Latest updates</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>House Prices</td>
<td>31/05/2017</td>
</tr>
<tr>
<td>House Sales</td>
<td>31/05/2017</td>
</tr>
</tbody>
</table>
Libraries implementing linked data: Why should we do it?

- People can more easily find library resources on the web
- More creative applications based on library metadata
- Opportunities for cataloguing efficiency and innovation

Source: Rasmussen Pennington, 2016, pp. 35-36
National Library of Scotland’s Open Data Publication Plan

“We will publish our non-personal and non-commercially sensitive data as 3-star open data”

Source: https://www.nls.uk/about-us/open-data
Survey of Scotland’s library staff: Design and recruitment

- Short online Qualtrics survey
- Departmental ethics approval
- Recruitment through Twitter, SLIC, CILIPS
- Open from 03/05/17 to 18/05/2017
- n=113 completed responses
Library types of participants

- Public
- School
- Academic
- National
- Other
- Did not specify
Do you know what the term 'linked data' means?

- Definitely yes
- Probably yes
- Might or might not
- Probably not
- Definitely not

Do you know what the term ‘Semantic Web' means?

- Definitely yes
- Probably yes
- Might or might not
- Probably not
- Definitely not
In your own words, describe what the term ‘linked data’ means to you.

- Range of answers and levels of knowledge
- General themes: data/resource sharing, linking, availability, connectedness

“I understand that this is a current term referring to an approach to publishing and sharing data on the Web, although I don't know much about it. As it suggests improved understanding and accessibility, I'm all for it!”
In your own words, describe what the term ‘Semantic Web’ means to you.

- Decidedly less certainty here
- General themes: improved web searching; more structured online data for better organisation

“A spider with a love of words and their roots???”
Has your library implemented, or is it planning to implement, any linked data applications on its online resources?

- **Have implemented**
  - MARC records, digitised resources, social media, research outputs using RDF, Dublin Core, SPARQL

- **Have plans to implement**
  - MARC catalogue records, digitised resources, social media using RDF; also OWL, SKOS, SPARQL, Europeana Data Model

- **Have no current plans to implement**
  - Lack of knowledge about it, lack of staff, lack of technical resources, no strategy

Implemented or plans to implement linked data?

- Have implemented
- Have plans to implement
- Have no current plans to implement
- No response
Suggestions and concerns…

• Licencing constraints (permission needed from database providers to link)
• Teach practitioners what linked data can concretely achieve
• Lack of knowledge; decisions made further up the chain?
• Potential loss of control of data
• Digitisation means monetisation?
• How should collections be linked?
Preliminary thoughts from survey

• Despite government directives for open data and NLS actions, barriers exist to implementation
  – Lack of awareness
  – Lack of staff/time/resources
  – Licencing
  – Beliefs of the profession at stake? (Commercialisation, loss of control…)

• Interest in learning more, for some
Ongoing research and other actions

- Finish survey data analysis
- Evaluate online content of Scottish libraries for linked/open data existence
- Conduct interviews in libraries and other information centres at different stages of linked data planning/implementation
- Increase awareness among the ILS community about linked data/Semantic Web in order to (potentially) increase interest in uptake
- Determine how to overcome barriers to help open and share Scottish library content to the world
References/further resources

- What is linked data? [https://www.youtube.com/watch?v=4x_xzT5eF5Q](https://www.youtube.com/watch?v=4x_xzT5eF5Q)
- Linked data for libraries (by OCLC): [https://www.youtube.com/watch?v=fWfEYcnk8Z8](https://www.youtube.com/watch?v=fWfEYcnk8Z8)
- The Linking Open Data cloud diagram: [http://lod-cloud.net/](http://lod-cloud.net/)
- Linked Data – Connect Distributed Data across the Web: [http://linkeddata.org/](http://linkeddata.org/)
- Tim Berners-Lee, Linked Data: [http://www.w3.org/DesignIssues/LinkedData.html](http://www.w3.org/DesignIssues/LinkedData.html)
- About the linked data movement
  - [http://www.youtube.com/watch?v=3YcZ3Zqk0a8](http://www.youtube.com/watch?v=3YcZ3Zqk0a8)