Judaica Librarianship

Volume 18 88-115

6-13-2014

Judaica Europeana: An Infrastructure for Aggregating Jewish Content

Dov Winer
Judaica Europeana, EAJC, dov.winer@gmail.com

Follow this and additional works at: http://ajlpublishing.org/jl

Recommended Citation
Winer, Dov. 2014. "Judaica Europeana: An Infrastructure for Aggregating Jewish Content," *Judaica Librarianship*: 18, 88-115.
DOI: http://dx.doi.org/10.14263/2330-2976.1027

Judaica Europeana: An Infrastructure for Aggregating Jewish Content

Introduction

Envision a world in which all digitized Jewish content in a variety of databases worldwide is aggregated and accessible to users and programs anywhere, at any time. This content would be cross-linked to conceptual structures such as domain-specific vocabularies and encyclopedias, so that texts, images, maps, as well as sound, music, and video recordings would all become enriched providing them with valuable contextual significance. Imagine that a researcher studying the historian Heinrich Graetz (1817–1891) would be able to find all of Graetz's publications and all works about him in different languages with the click of a mouse button. The different ways his name is spelled (or misspelled) would not be an impediment due to the use of the Virtual International Authority File (VIAF).[1] Following the initial query, the researcher would be able to access all manuscripts and other documents related to Graetz in the archive of the Jewish Theological Seminary of Breslau aggregated by Judaica Europeana. Moreover, these would be seamlessly linked to the documents in the Center for Jewish History in New York. Related gazetteers would provide substantial information concerning every place that is referred to in any standard biography of Graetz. Named entities in such documents would be linked to the relevant entries of the *YIVO Encyclopedia of Jews in Eastern Europe*.

The Judaica Europeana project, available at http://www.judaica-europeana.eu, is seeking to serve as a catalyst in a process leading to this kind of world. The project brings together European and North American providers of Jewish content, European Commission initiatives for aggregation of cultural content, and the new Web technologies of Linked Data that are being deployed at such flagship projects as Europeana in Europe and the Digital Public Library of America (DPLA) in North America.

Judaica Europeana is part of a cluster of projects that constitute Europeana, an initiative of the European Commission to digitize and aggregate expressions of European culture. Following a proposal submitted in mid-2008, Judaica Europeana's first phase was co-funded by the European Commission in 2010–2011, under the eContentplus programme.[2] Led by the European Association for Jewish Culture, the Judaica Sammlung der Universitätsbibliothek der Goethe Universität, and the National Library of Israel, the project's partners (see Table 1) then established a consortium under a Memorandum of Understanding to continue and co-fund the project

1 Virtual International Authority File (VIAF): http://www.oclc.org/viaf.en.html.

2 The mission of the eContentplus programme (2005–2008) was to "make digital content in Europe more accessible, usable and exploitable". It sought to reduce fragmentation of the European digital content market and to improve access to and ease of use of geographical information, educational material and cultural content. Ceased to exist after 2008, the program funded projects approved by the end of that year. http://europa.eu/legislation_summaries/information_society/strategies/l24226g_en.htm.

together with the European Commission. Currently, the Judaica Europeana constituent members oversee two projects sponsored by the Competitiveness and Innovation Framework Programme: Information and Communication Technologies-Policy Support Programme (CIP ICT/PSP),[3] a European Commission program that superseded eContentplus:

- Digital Manuscripts to Europeana (DM2E) project, designed for developing new tools and services for Digital Humanities applications of Europeana content.[4]

- AthenaPlus, a network that develops both best practices for aggregating additional content for Europeana and tools for digital storytelling.[5]

The consortium members have provided a portion of the funding for Judaica Europeana (fifty percent in the first phase, 2010–2011; twenty percent in the second phase, from 2012 on), while the Rotschild Foundation (Hanadiv) Europe and the National Library of Israel have provided complementary support.

This article will survey the establishment and operation of Judaica Europeana as part of the Europeana initiative. The Europeana Data Model (EDM) will be introduced, as well as some of the innovations made possible through its grounding in a Linked Data Semantic Web approach. The article will present the crucial role of vocabularies/ontologies in enabling enrichment of the metadata of the aggregated digital cultural objects, the objects' intelligent contextualization, and a conceptually consistent access to content. Lastly, the article will describe Judaica Europeana's action plan that allows Jewish-related vocabularies to be available as Linked Data and will report some of the network's latest achievements.

Europeana

Europeana, available at http://europeana.eu, is self-defined as an ecosystem shared by different actors, among them an array of influences and institutions in the cultural heritage domain: libraries, museums, and archives; multimedia archives of sound, film, video, games, and 3D reproductions; professional associations; standardization bodies; government ministries; institutions of the European Commission and the European Union; funding programs; commercial publishers; a variety of user groups; as well as tools, standards, and guidelines. Europeana Professional[6] is the focus of the Europeana ecosystem, "where librarians, curators and archivists [and other professionals and stakeholders] share digital expertise."

3 The ICT Policy Support Programme (ICT PSP) is one of the three specific programs of the Competitiveness and Innovation framework Programme (CIP), http://ec.europa.eu/cip/ict-psp/index_en.htm.

4 Digital Manuscripts to Europeana (DM2E): http://dm2e.eu.

5 AthenaPlus: http://www.athenaplus.eu.

6 Europeana Professional: http://pro.europeana.eu.

As described by Irene Hyna (2010), Europeana was established following a number of phases: the eEurope 2002 Action Plan and ensuing Lund Principles and Lund Action Plan for coordinating the digitization of cultural heritage in Europe; the National Representatives Group (representatives of qualified culture ministries or equivalents from national governments) that monitored the progress of the implementation plan; the different digitization projects of the European-wide Ministerial Network for Valorising Activities (MINERVA); and the i2010 initiative on digital libraries. This progression culminated in the establishment of Europeana within the Digital Agenda for Europe, one of the initiatives of Europe 2020, the European Union's growth strategy for the coming decade. Bjarki Valtysson (2012) updates this timeline and offers a critical review of the political decision-making process that led to the establishment of Europeana, in pointing to some disparity between the discourse that legitimized the service and the level of user-generated content available through it. Susan Reilly and her colleagues (Reilly et al. 2012) provide a detailed survey of the connection between content provided by libraries and the researchers who use it in the framework of the Europeana Library, one of the Europeana projects targeted specifically to aggregate contents from libraries.

The Europeana Foundation is the governing body of Europeana. The Foundation promotes collaboration among museums, archives, audiovisual collections, and libraries so that users can have integrated access to the organizations' varied materials content through Europeana and other services. Its objectives are

> [T]o make Europe's cultural and scientific heritage available through a cross-domain portal; to work with museums, archives, audiovisual archives and libraries to deliver the portal and make it sustainable; to bring items that have already been digitised into the portal; to encourage and support the digitisation of more of Europe's cultural and scientific heritage.[7]

The Europeana Network[8] is an open forum for those engaged with promoting access to Europe's digital heritage, from content providers and aggregators to those in the technical, legal, and strategic fields. This forum reflects the diversity of Europeana and gives its members an opportunity to voice their views. Europeana also oversees task forces, among them Public–Private Partnerships; the role of User-Generated Content (UGC) in Europeana; European Cultural Commons Advisory Board; Europeana Data Model–Functional Requirements for Bibliographic Records Object Oriented (FRBRoo) Application Profile; and Hierarchical Objects.[9]

Financial support for building Europeana has been channeled by the European Commission, mainly through its Competitiveness and Innovation framework Programme: Information and

7 Europeana Foundation: http://pro.europeana.eu/web/guest/foundation.

8 Europeana Network: http://pro.Europeana.eu/web/guest/network.

9 For an overview of the Europeana task forces, see http://pro.Europeana.eu/network/task-forces/overview.

Communication Technologies-Policy Support Programme (CIP ICT-PSP). As of 2013, forty-six projects are listed in the Europeana group. These projects[10] cover a wide variety of content areas and technological issues while supporting Europeana's many stakeholders.

The Europeana Strategic Plan 2011–2015 defined four tracks by which Europeana will continue to deliver value—aggregate, facilitate, distribute and engage, defined as:

- **"Aggregate**: Build the open trusted source for European cultural heritage content": so as to source content that represents European cultural diversity; extend the network of aggregators and improve the quality of metadata.
- "**Facilitate**: Support the cultural heritage sector through knowledge transfer, innovation, and advocacy": share knowledge among cultural heritage professionals; foster research and development of Digital Humanities applications; strengthen Europeana's advocacy role.
- "**Distribute**: Make heritage available to users wherever, whenever".
- "**Engage**: Cultivate new ways for users to participate in their cultural heritage": enhance users' experience; extend social media programs and use of Web 2.0 tools; build new relationships among curators, content and users.[11]

The Europeana Business Plan for 2014[12] marks a transitional period for Europeana, as it moves from the current strategic plan (2011–2015) to a new one, covering the period from 2015–2020. The new strategic plan provides a long-term vision for Europeana as a Digital Service Infrastructure (DSI), primarily funded under the Connecting Europe Facility (CEF)[13], the new financial instrument used by the European Commission. The main undergoing change is the transition from Portal to Platform. This means less focus on inviting individuals to explore their heritage in a pre-defined way on the main portal, http://europeana.eua, and much more focus on developing communities who reuse the data, content, knowledge and technology on the platform that Europeana and its partners make available for them. This shift is essential for enabling a "read-write" future, where users will be able to take and give back to their community. In 2014, Europeana will expand the offerings of Europeana Labs, a new service designed for the creative industries: developers and creators will find data, content, technology and documentation they can use to build new apps, games, and services.

10 For a complete list of the Europeana projects, see http://pro.Europeana.eu/web/guest/projects.

11 Europeana Strategic Plan 2011–2015: http://pro.Europeana.eu/documents/_858566/c0c6e31f-5174-4898-9771-f9b9a8d1d4d7.

12 Europeana Business Plan 2014: http://pro.europeana.eu/documents/900548/f19cc4ff-56a3-422c-83d9-f156ec-c9b4ca.

13 Connecting Europe Facility: http://ec.europa.eu/digital-agenda/en/connecting-europe-facility.

Judaica Europeana seeks to play a similar role vis-à-vis Jewish content stakeholders. The presentations given at the EVA/Minerva 2013 Jerusalem International Conference on the Digitization of Culture[14] demonstrated the many projects that benefit from developing and reusing of Europeana content, in particular the aggregation of Jewish and Israeli contents.

Judaica Europeana

Judaica Europeana began operating in 2010, following the approval of a proposal submitted to the European Commission. Several organizational efforts and meetings, beginning in the 2000s, had laid the groundwork for Judaica Europeana's existence:

- The Jewish Agency for Israel's (JAFI) initiative for Jewish networking infrastructures (2001–2006) and its close ties with the Ministerial Network for Valorising Activities in Digitization (MINERVA).[15] Since 2002, Israel and Russia participated as observers in MINERVA, a network of Ministries of Culture (or equivalents) from European Union countries. This collaboration and the projects established in this framework precipitated an European project focused on Jewish heritage;

- The Prague international conference on the Future of Jewish Heritage in Europe (2004);[16]

- The Consultation on the Digitisation of Jewish Heritage in Europe (2004).[17] The meeting took place in Brussels with the participation of representatives from leading European projects, the Ministry of Culture of Italy, and the UK's Museums, Libraries and Archives Council;

- The MOSAICA project (2006–2008),[18] aimed at creating "Semantically enhanced multifaceted collaborative access to cultural heritage."

Judaica Europeana was conceived by the author of this article. The proposal was developed and the project managed in close cooperation with Pier Giacomo Sola of Amitié, an Italian-based consultancy that supports the digitization programs of the Italian Ministry of Culture;[19] Lena Stanley-Clamp, director of the European Association for Jewish Culture; and Rachel Heuberger, the Judaica Librarian of the Goethe University of Frankfurt. The project is carried out by professionals from all the partner and associated partner institutions.

14 Presentations at the 2013 EVA/Minerva Jerusalem International Conference on Digitisation of Culture: http://2013.minervaisrael.org.il.

15 Ministerial Network for Valorising Activities in Digitization (MINERVA): http://www.minervaeurope.org.

16 Prague international conference on the Future of Jewish Heritage in Europe: http://tinyurl.com/prague04.

17 Consultation on the Digitisation of Jewish Heritage in Europe: http://filelibrary.unitedapps.com/0/file763.pdf.

18 MOSAICA project: http://tinyurl.com/mosaicaproject.

19 Amitié: http://www.amitie.it/en/index.htm.

Since its inception, Judaica Europeana sought to achieve four main goals: provide substantial digitized resources for Europeana; increase the reuse of such resources; promote the use of standards that assure the compatibility of digital content with Europeana requirements and demonstrate semantic interoperability; and involve the relevant community of knowledge in adding value to this content for scholarship and curatorial purposes.

Originally, Judaica Europeana focused on cities, one of the themes suggested in the European Commission's call for proposals for content to enrich Europeana's holdings, based on the historical relationship between Jews and cities.[20] Jews have played a central role in the evolution of the modern city. Their presence and stake in urban culture have been so great as to make them the symbolic equivalent of the city itself (Kieval 1999). According to Yuri Slezkine (2004),

> Modernization is about everyone becoming urban, mobile, literate, articulate, intellectually intricate, physically fastidious, and occupationally flexible. It is about learning how to cultivate people and symbols, not fields and herds. It is about pursuing wealth for the sake of learning, learning for the sake of wealth, and both wealth and learning for their own sake. It is about transforming peasants and princes into merchants and priests, replacing inherited privilege with acquired prestige, and dismantling social estates for the benefit of individuals, nuclear families, and book-reading tribes (nations). Modernization, in other words, is about everyone becoming Jewish.

Ever since they settled in Europe, Jews have been predominantly urban. Urbanization and occupational specialization has led to the identification of Jews with specific places, streets, neighborhoods, buildings and characteristic urban phenomena in certain cities. Jewish musicians transformed Vienna into a capital of music; Jews were identified as owners of small stores or pioneers in the development of department stores; they were the main Social Democratic faction at the end of the nineteenth century in Eastern Europe; exponents in the main liberal political parties in Germany and other countries; medical doctors everywhere; operators of outreach low cost psychoanalytic clinics in the 1920s in Germany and Austria; prominent as intellectuals, journalists, and writers serving as opinion makers; owners of newspapers chains and publishing houses.

In the Polish-Lithuanian Commonwealth, by the middle of the eighteenth century Jews constituted nearly half of the urban population. In the nineteenth century, new industrial or commercial centers, like Warsaw, Odessa, and Lodz, began to develop and soon had mass Jewish populations. For example, in 1914 Warsaw, Jews constituted 38.1 percent of a total population of 885,000 (Polonsky 2013).

20 The eContentPlus programme issued the call for proposals on March 20, 2008, with an overall budget of 42.5 million Euros; the deadline was June 12, 2008. See http://tinyurl.com/call2008 and http://tinyurl.com/2008ppt.

Jewish urban self-expression has ranged from communal to individual manifestations: the ways that Jewish communities have organized their internal operations (mutual aid societies, education, politics, theatre, music, newspapers), through the existence of Jewish occupations and enterprises understood by their neighbors as "Jewish", and, finally, in fully individual expression as celebrities. In his seminal article, "Jewish Historiography and the Modern City: Recent Writing on European Jewry", Steven Zipperstein (1987) identified a significant transition from a tendentious anti-urban historiography to a more balanced one. The result of this shift was a rich body of research that Zipperstein surveyed and which has been much enlarged upon since then.

The manifold expressions of European Jewish urban culture are well documented in thousands of photographs, films, books, pictures, documents, texts, works of art, monuments, archaeological excavations, buildings, and cemeteries; nevertheless, there are many obstacles in trying to locate them and still more difficulties in placing them in the original contexts of their creation. A broad review of such instances is available in the book *Le guide culturel des juifs d'Europe* (Camus and Lévy-Willard 2002; "The Cultural Guide to the Jews of Europe") or on the web page celebrating the European Day of Jewish Culture,[21] maintained by the European Association for the Preservation and Promotion of Jewish Culture and Heritage (AEPJ).

In 2008, a search via the European Library interface, which integrated access to the catalogs of leading national and research libraries in Europe,[22] demonstrated how problematic access to the documentation of Jewish urban expression in European cultures was. A keyword search for "Jews" and "Jewish" produced meager results in this precursor of Europeana. However, large troves of relevant content were available in a dispersed and fragmentary form through hundreds of museums, libraries, archives, and other institutions' databases.

The Judaica Europeana website serves as a central point for the activities of its partners and other stakeholders. It is not intended to serve as a search portal but instead provides access to resources related to both the project and the member institutions; to regular announcements of developments in Judaica Europeana and Europeana; and to related events, newsletters, and virtual exhibitions that employ the digitized Judaica content. These items and their metadata are intended to support the stakeholders in developing their own services for the benefit of their respective audiences, in their own respective sites and portals. Resources aggregated by Europeana employing the new Europeana Data Model (see below) were made public only in 2013. However, two examples that still draw on resources within the previous Europeana Semantic Elements (ESE) mode show how this can be accomplished for an institution own purposes:

- A widget based on the Europeana's Application Programming Interface (API)—a web service that enables users to build software applications, websites and mash-ups—pro-

21 European Day of Jewish Culture: http://www.jewisheritage.org/.

22 European Library: http://www.theeuropeanlibrary.org/.

vides a list of links to cultural heritage materials according to the websites' topics or subject.[23] Potential use scenarios include the enrichment of a library or museum catalog or website or heritage-related blog posts.[24]

- An experimental Judaica Europeana widget (see Figure 1) enables browsing Europeana content with thesaurus terms developed by the Israel Museum, Jerusalem, covering the following categories: the Jewish Life Cycle, the Jewish Year, the Jewish Community, and the Jewish Home.

Figure 1. A screen capture from Judaica Europeana website, demonstrating searches with terms from the thesaurus of Israel Museum, Jerusalem. Source: http://www.judaica-europeana.eu/Search_Europeana_Collections_with_Judaic_categories.html

Judaica Europeana's main challenge is to integrate its European Jewish heritage objects, with the concomitant contexts (of creation and use) made possible by Linked Data, into Europeana, the web of materials representing the wider European heritage.

Judaica Europeana has so far aggregated more than five million cultural heritage objects from institutions in Europe, North America, and Israel, including many Jewish libraries (see Table 1). Currently, the project partners are in the process of developing the means to enrich the metadata of the digitized objects.

23 Europeana's Application Programming Interface: http://pro.europeana.eu/api

24 The widget was developed by the Poznan Supercomputing and Networking Center: https://github.com/psnc-dl/chcontext.

Table 1. Judaica Europeana content providers and partners; coordinating institutions highlighted. Source: http://www.judaica-europeana.eu/partners.html

Judaica Europeana content providers and partners	URL
1. European Association for Jewish Culture, London	http://www.jewishcultureineurope.org/
2. Judaica Sammlung der Universitätsbibliothek der Goethe Universität, Frankfurt/Main	http://www.ub.uni-frankfurt.de/ssg/judaica.html
3. National Library of Israel, Jerusalem	http://nli.org.il
4. Alliance Israélite Universelle, Paris	http://www.aiu.org/bibli
5. Amitié, Bologna	http://www.amitie.it
6. Ben Uri Gallery: The London Jewish Museum of Art	http://www.benuri.org.uk/
7. Bibliotheca Rosenthaliana, Amsterdam	http://cf.uba.uva.nl/en/collections/rosenthaliana/
8. Brandeis University Library	http://lts.brandeis.edu/research/archives-speccoll/
9. British Library, London	http://www.bl.uk/
10. Center for Jewish History, New York	http://www.cjh.org
11. YIVO Institute for Jewish Research, New York	http://www.yivoinstitute.org
12. Leo Baeck Institute, New York	http://www.lbi.org
13. Central Zionist Archives, Jerusalem	http://www.zionistarchives.org.il/
14. Columbia University Libraries, New York	http://library.columbia.edu/
15. Hungarian Jewish Archives, Budapest	http://www.milev.hu/
16. Israel Museum Jerusalem	http://www.imj.org.il/
17. Institut Européen des Musiques Juives	http://www.cfmj.fr/
18. Institute for Jewish Policy Research, London	http://www.jpr.org.uk
19. JDC Archives, New York	http://archives.jdc.org/
20. Jewish Historical Institute, Warsaw	http://www.jhi.pl/en
21. Jewish Historical Museum, Amsterdam	http://www.jhm.nl/
22. Jewish Museum Berlin	http://www.jmberlin.de/
23. Jewish Museum, Frankfurt/Main	http://www.juedischesmuseum.de/
24. Jewish Museum in Prague	http://www.jewishmuseum.cz
25. Jewish Museum London	http://www.jewishmuseum.org.uk/
26. Jewish Museum of Greece, Athens	http://www.jewishmuseum.gr/
27. Jewish Theological Seminary, New York	http://www.jtsa.edu
28. Leopold Zunz Zentrum, Halle-Wittenberg	http://www.lzz.uni-halle.de
29. Makash: ICT Applications in Education and Culture, Jerusalem	http://www.makash.org.il
30. Medem Library of the Yiddish Cultural Center, Paris	http://www.yiddishweb.com/
31. Ministerio de Cultura, Madrid	http://www.mcu.es/
32. Ministero per i Beni e le Attività Culturali, Rome	http://www.beniculturali.it
33. Royal Library: The National Library of Denmark and Copenhagen University Library	http://www.kb.dk/en/nb/materialer/judaica/
34. Salomon Ludwig Steinheim Institut, Essen	http://www.steinheim-institut.de
35. Sephardi Museum, Toledo	http://museosefardi.mcu.es/

Europeana Data Model (EDM)

Europeana is pioneering the application of a new Web concept. Under this vision, diverse databases are seamlessly integrated into one searchable network of Linked Data. In a nutshell, Linked Data is "about using the Web to connect related data that wasn't previously linked, or using the Web to lower the barriers to linking data currently linked using other methods."[25] Eric T. Mitchell (2013) provides a good, detailed introduction of Linked Data in libraries. This American Libraries Association book, published in the Library Technology Reports series, describes Linked Data concepts in context of Resource Description and Access (RDA) specifications and explains how they may improve the interoperability of cataloging and content standards in general.

The Linked Data technology, aimed at extending a web of documents to a web of data, applies web-based standards for encoding datasets and linking them to other published datasets, so that applications can exploit data from many different sources. Linked Data also provides standards for encoding general knowledge in ontologies, to allow for enhancements based on automatic reasoning (improved querying, for example).[26] Introductory tutorials are provided in the Open Access books of Heath and Bizer (2011) and Simperl et al. (2013).

The Europeana Data Model (EDM)[27] is a new system for structuring the data that Europeana is ingesting, managing, and publishing. It is an improved version of the basic data model with which Europeana began its life, the Europeana Semantic Elements (ESE). That older model reduced to the lowest common denominator the different data standards used by heritage sectors contributing to Europeana. The EDM reverses this reductive approach, attempting to both transcend the respective information perspectives of the sectors that are represented in Europeana and to support more complex objects. The EDM not only supports the full richness of the content providers' metadata, but also enables data enrichment from a range of third party sources. For example, a digital object from Provider A may be contextually enriched by metadata from Provider B. It may also be enriched by the addition of data from authority files (Winer 2011A) held by Provider C, as well as a web-based thesaurus offered by Publisher D. If the digital object is a book, for example, each of the chapters, illustrations, and index can be understood individually as well as collectively. If the digital object is an archival finding aid or fonds (documents originating from the same source), the constituent letters, deeds, manuscripts or other items can be similarly understood. Through 2014, Europeana will still be in a transition period as part of its holdings are still described with older metadata model (ESE) while other holdings have completed the transition to the new EDM model.

25 For a detailed explanation on how Linked Data can connect distributed data across the Web, see http://linkeddata.org/.

26 For a detailed explanation, see Simperl et al. 2013, chapter 1: "Introduction and Application Scenarios", http://www.euclid-project.eu/modules/chapter1.

27 Europeana Data Model (EDM): http://pro.europeana.eu/edm-documentation.

Similar Linked Data models are implemented in other digital libraries. Mitchell (2013) provides three case studies in Linked Open Data in which he compares the EDM with the Digital Public Library of America (DPLA) model and the Library of Congress Bibliographic Framework Initiative (BIBFRAME).[28] The EDM model developed by Europeana and later adopted by the DPLA has been inspired by Functional Requirements for Bibliographic Records (FRBR), developed by the International Federation of Library Associations and Institutions (IFLA Study Group on the Functional Requirements for Bibliographic Records 2009), in particular by its Object Oriented version (FRBRoo). Unlike RDA, FRBR do not provide cataloging rules, but conceptualize how those rules might support enhanced online catalog displays (for detailed comparison between RDA and FRBR see Powers and Coan 2013). The main concepts in this conceptual model are that "the entities defined as work (a distinct intellectual or artistic creation) and expression (the intellectual or artistic realization of a work) reflects intellectual or artistic content. The entities defined as manifestation (the physical embodiment of an expression of a work) and item (a single exemplar of a manifestation), on the other hand, reflect physical form" (*ibid*.).

The EDM will let users browse Europeana in new ways. It will make connections between the networks of stories animating Europeana's content by answering the "Who?", "What?", "When?", and "Where?" questions. Users searching Europeana can either select "Search Creators" from the dropdown search menu, or enter the search term "Who:" followed by a name); select "Search Subjects" or "Search Titles" from the dropdown menu, or enter the search term "What:" followed by a type of item; select "Search Places" from the dropdown search menu, or enter the search term "Where:" followed by the name of a town, city or country; or select the "Search Dates/Periods" from the dropdown search menu, or enter the search term "When:" followed by a date.

In particular, the EDM makes a distinction between the intellectual and technical creation that is submitted by a provider (a bundle of resources about an object curated by a provider), the object this structure is about, and the digital representations of this object, which can be accessed on the Web.

The EDM also adheres to the modeling principles that underpin the approach of the Web of Data ("Semantic Web"). Content modeling is about metadata, the various alternative schemata that can be used to describe books, manuscripts, pictures, maps, etc. In that approach, there is no such thing as a fixed schema that dictates only one way to represent data. A more general model like the EDM can be seen instead as an anchor to which various more finely-grained models can be attached, making them at least partly interoperable at the semantic level, while the data retain their original expressivity and richness. The EDM does not require changes in local approaches, although any changes in local practice that increase the cross-domain usefulness of the data is encouraged, such as the use of publicly accessible vocabularies (for persons, places, subjects, etc.). In this sense, the EDM is an attempt to transcend the respective information perspectives

28 Bibliographic Framework Initiative (BIBFRAME): http://www.loc.gov/bibframe/.

of the various communities constituting Europeana, such as museums, archives, audio-visual collections, and libraries.

Vocabularies

According to the World Wide Web Consortium (W3C),

> On the Semantic Web, vocabularies define the concepts and relationships used to describe and represent an area of concern. Vocabularies are used to classify the terms that can be used in a particular application, characterize possible relationships, and define possible constraints on using those terms.[29]

The role of vocabularies in the ocean of structured Big Data provided by Linked Data is to provide structure and conceptual consistency in navigating such information resources. Vocabularies support data integration by avoiding ambiguities that may exist among terms used in different data sets; therefore, vocabularies are used to organize knowledge.

Knowledge Organization Systems (KOS) employ a variety of disparate terminologies in the form of term lists (e.g., authority files, glossaries, gazetteers, dictionaries); classification and categorization schemes (e.g., bibliographic classifications, taxonomies); and relational vocabularies (e.g., thesauri, subject heading lists, semantic networks, ontologies). Terminology mappings (or vocabulary mappings) are essential to facilitate access and interoperability. Mapping involves imposing equivalence and conceptual and hierarchical relationships among concepts in different schemes. The assumption underpinning mapping is that equivalence can exist between disparate KOS and their respective terminologies (McCulloch and Macgregor 2008).

The SKOS Datasets page[30] of the W3C lists many vocabularies and their mappings. For example, the *New York Times* subject headings are available and connected to the newspaper articles. They are also mapped to Freebase,[31] Geonames,[32] DBPedia.[33]

29 For detailed explanation and examples, see the "Vocabularies" page on the W3C website: http://www.w3.org/standards/semanticweb/ontology.

30 W3C SKOS Datasets page: http://www.w3.org/2001/sw/wiki/SKOS/Datasets.

31 Freebase: http://www.freebase.com/.

32 Geonames: http://geonames.org.

33 DBpedia: http://dbpedia.org.

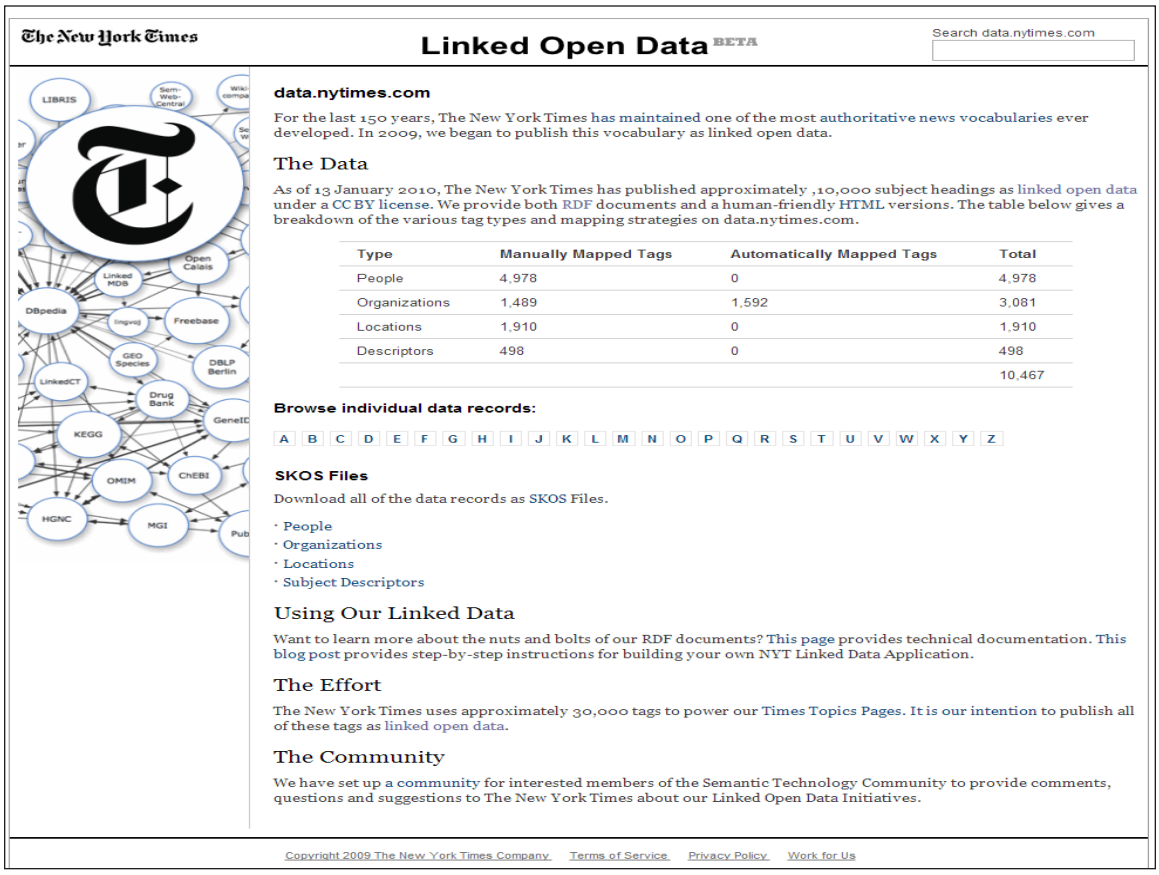

Figure 2. A screen capture from the *New York Times* Linked Open Data webpage, demonstrating vocabularies mapped to additional sources of information. Source: http://data.nytimes.com

Resource Description Framework (RDF)[34] can be used to represent information about things that can be identified on the Web, even when they cannot be directly retrieved on the Web. RDF is intended for situations in which this information needs to be processed by applications rather than being only displayed to people.

RDF is based on the idea of identifying things using Web identifiers called Uniform Resource Identifiers (URIs). URI is a string of characters used to identify a name of a Web resource. Such identification enables interaction with representations of the Web resource over a network, typically the World Wide Web, using specific protocols.[35] This enables RDF to represent simple statements about resources as a graph of nodes and arcs representing the resources and their properties and values. This is represented in the form of subject-predicate-object expressions and is known as *triples* in RDF terminology (see Figure 3).

34 The EdUcational Curriculum for the Usage of LInked Data (Euclid) project offers a good introduction to RDF and Linked Data. Accessed February 11, 2014: http://euclid-project.eu/. See also the "RDF Primer: W3C Recommendation" page on the W3C website: http://www.w3.org/TR/rdf-primer/.

35 Uniform Resource Identifier (URI) Generic Syntax: http://tools.ietf.org/html/rfc3986.

Figure 3. “The Thirty Minute Guide to RDF and Linked Data” (Davis and Heath 2009), Slides 4–9. Source: http://www.slideshare.net/iandavis/30-minute-guide-to-rdf-and-linked-data

RDF provides a way of expressing simple statements about resources, using named properties and values. However, user communities also need the ability to define the vocabularies (terms) they intend to use in those statements, especially to indicate that they are describing specific kinds or classes of resources, and employ specific properties in describing those resources. User communities interested in describing bibliographic resources, for example, would want to describe classes such as "ex2:Book" ("ex" stands for "example") for a book or "ex2:MagazineArticle" for a magazine article, and employ properties such as "ex2:author" or "ex2:title" and "ex2:subject" to describe them. The RDF schema provides a medium to describe such classes and properties, and indicate which classes and properties are expected to be used together.

Developed by the Semantic Web Deployment Working Group of the W3C, Simple Knowledge Organization System (SKOS)[36] provides a model for expressing the basic structure and content of concept schemes such as thesauri and other, similar types of controlled vocabulary. It provides a simple way to express existing vocabularies in syntax adequate for their use in a Semantic Web, Linked Data context. As an application of RDF, SKOS allows concepts to be composed and published on the Web, linked with data on the Web, and integrated into other concept schemes.

When concepts from different concept schemes are connected together, they begin to form a distributed, heterogeneous global concept scheme. Such a web can allow meaningful navigation among KOS. A crucial feature of mapping is the possibility to state that two concepts from different schemes have comparable meanings and to specify how these meanings compare, even though they come from different contexts and possibly follow different modeling principles. One example of the possibilities of mapping of concepts across schemes is to establish connections between well-maintained and established terminologies with those developed locally by small and medium-sized institutions. Such mapping enables the establishment of a catching net for information based in well-established knowledge bases.

For example, the town of Przemysl in Poland is referenced in both the Bezalel Narkiss Index of Jewish Art (Torah Ark doors from one of its synagogues)[37] and the *YIVO Encyclopedia of Jews of Eastern Europe*.[38] Once connected, these two sources will provide in-depth information about the town and enrich each other. When published as Linked Data, these sources could be also linked to the Przemysl Yizkor Book[39] and the Yad Vashem digital collections.[40] Further more,

36 Simple Knowledge Organization System (SKOS): http://www.w3.org/2004/02/skos/.

37 Torah Ark doors from a Przemysl synagogue, Bezalel Narkiss Index of Jewish Art: http://tinyurl.com/cja-przemysl.

38 Entry for Przemysl, *YIVO Encyclopedia of Jews of Eastern Europe*: http://www.yivoencyclopedia.org/article.aspx/Przemysl.

39 Przemysl Yizkor book, digitized by New York Public Library: http://yizkor.nypl.org/index.php?id=2529; and translated by JewishGen: http://www.jewishgen.org/Yizkor/Przemysl/Przemysl.html.

40 Yad Vashem Digital Collections: http://www.yadvashem.org/yv/en/resources/index.asp.

once the *YIVO Encyclopedia of Jews of Eastern Europe* is published as Linked Data, the results of a Google search for Przemysl will include the encyclopedia entry (see Figure 4), thanks to the Knowledge Graph[41] service of Google that already provides Linked Data.

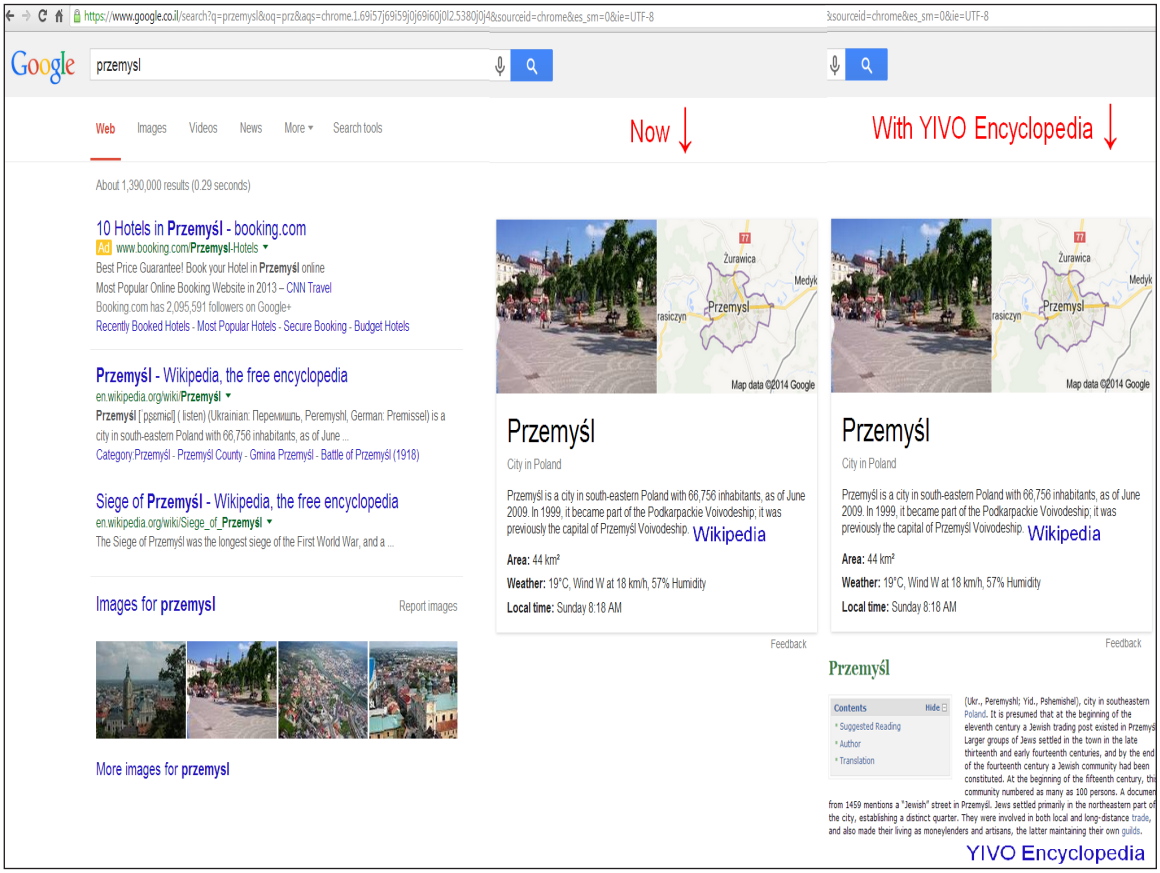

Figure 4. A screen capture of a current Google search for the city of Przemysl (left); and a projected view of the same search once the *YIVO Encyclopedia of Jews of Eastern Europe* is published as Linked Data (right)

41 Google Knowledge Graph: http://www.google.com/insidesearch/features/search/knowledge.html.

Judaica Europeana metadata has begun to be enriched with some of the general interest vocabularies presently applied by Europeana. Figures 5 and 6 below demonstrate how an item held by the Judaica Sammlung der Universitätsbibliothek der Goethe Universität, Frankfurt/Main (the Judaica library of Goethe University Frankfurt am Main) is featured on the home library webpage, and how it is featured once uploaded to Europeana and enriched with additional Linked Data vocabularies concerning "What?" (concepts), "Where?" (geographical coverage), and "Who?" (information from the VIAF of the German National Library).

Figure 5. Hoerning, Reinhard. *British Museum Karaite MSS descriptions and collations of 6 Karaite manuscripts of portions of the Hebrew Bible in Arabic characters; with a compl. reprod. by the autotype process of one, Exod. 1,1-8,5, in 42 faces*. London: Williams and Norgate, 1889. Judaica Sammlung der Universitätsbibliothek der Goethe Universität, Frankfurt/Main. Source: http://sammlungen.ub.uni-frankfurt.de/freimann/urn/urn:nbn:de:hebis:30:1-138410

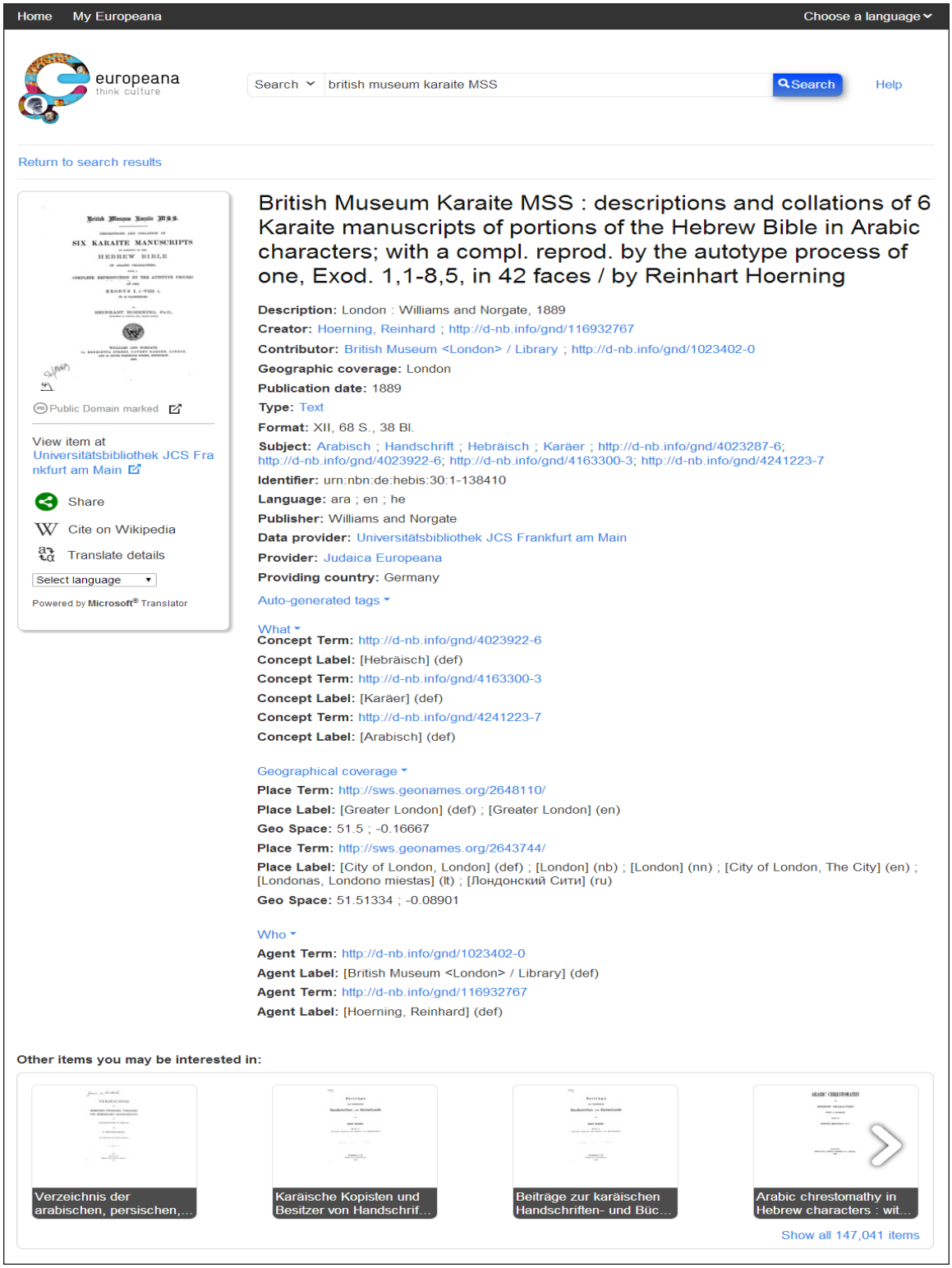

Figure 6. Hoerning, Reinhard. *British Museum Karaite MSS descriptions and collations of 6 Karaite manuscripts of portions of the Hebrew Bible in Arabic characters; witha compl. reprod. by the autotype process of one, Exod. 1,1-8,5, in 42 faces*. London: Williams and Norgate, 1889. Judaica Sammlung der Universitätsbibliothek der Goethe Universität, Frankfurt/Main. Source: http://europeana.eu/portal/record/09302/_ub_ffm__item_sammlungen_urn_nbn_de_hebis_30_1_138410.html

Jewish Vocabularies: An Action Plan

Judaica Europeana carried out a comprehensive survey of known Jewish-related vocabularies, categorized by names, places, periods, general interest, and regional interest vocabularies, with forty-nine vocabularies identified (Winer 2011). Judaica Europeana also developed a detailed action plan, as described below (Winer 2011a), for expressing relevant vocabularies in the required format and employing them in the Europeana context. These vocabularies have the potential to enrich metadata descriptions of digitized resources by providing contextual meaning for objects that might otherwise be less significant for the user. The action plan provides detailed descriptions of the vocabularies and contact information with their developers. It also reviews ongoing work on vocabularies for each of these categories and suggests specific short-term and medium-term tasks concerning Jewish vocabularies.

Names

The Virtual International Authority File (VIAF) is a joint project of several national libraries, implemented and hosted by OCLC. The VIAF's goal is "to lower the cost and increase the utility of library authority files by matching and linking [the] . . . authority files [of national libraries] and making that information available on the Web".[42] Users see names displayed in the language most appropriate for them and view name records as established in other languages, thus the authorities are truly international and facilitate research across languages worldwide.[43] For example, a search on "Ba'al Shem Ṭov" retrieves all works related to not only this spelling of the name but also those in other languages, such as Russian and Hebrew, as well as works related to other variations that refer to the same author— in this case Israel ben Eliezer.[44]

The VIAF authorities include the Library of Congress and the National Library of Israel, whose contributions guarantee a substantial representation of names of both authors and other relevant persons related to Jewish content; additionally, these files are already available as Linked Data. The immediate task is to disseminate the use of these available VIAF URIs. Any institution maintaining Jewish-related information resources that substitutes name strings with the VIAF URIs will *ipso facto* extraordinarily extend the reach of information that can be accessed. At a minimum, this includes different spellings for the same name, links provided by VIAF to the works related to these names, and information about publishers.

Places

Locations related to Jewish life need to be identified in all their variety of names, spellings, languages, and historical contexts. A summary of current initiatives was recently reviewed (Winer

42 Virtual International Authority File (VIAF): http://viaf.org.

43 OCLC webpage for VIAF: http://www.oclc.org/research/activities/viaf.html.

44 VIAF's record for Ba'al Shem Ṭov: http://www.viaf.org/viaf/64812822/#Ba'al_Shem_Tov,_approximately_1700-1760.

2011) and the following short-term task proposed: JewishGen and Yad Vashem would be encouraged to publish their gazetteers as Linked Data. Appropriate tasks for the medium-term included:

1. Establishing a systematic registry of Jewish places' relevant gazetteers;
2. Seeking to express these gazetteers in RDF;
3. Seeking to establish a community-based Jewish places' gazetteer service.

The last task could be based on successful prototype projects, such as those developed by the Freebase, GeoNames,[45] and LinkedGeoData projects.[46]

Periods and Time

The categorization of time into discrete, named blocks is called periodization. It plays an essential role in documentation and data retrieval in the visual arts, music, history, archeology, and other disciplines. There are several initiatives in Jewish-related contexts to cope with issues of periodization of Jewish history and cultural production. Such periodization is deeply embedded in the catalogs and indexing systems of institutions such as the Israel Museum, Jerusalem, the Israel Antiquities Authority, the YIVO Institute for Jewish Research, the Center for Jewish History, and many others. A directory of historical timelines is maintained by the Jewish History Resource Center of the Dinur Center for Research in Jewish History at the Hebrew University of Jerusalem.[47] Some of these timelines could be further studied to consider their potential as period-indexing tools. An excellent example of guidelines for scholarly classification that includes periodization elements is the *Comparative Development of the Classes for Religious Law: The Abrahmic Tradition* prepared by Jolanda Goldberg of the Library of Congress (Goldberg 2006).

The author proposes the following tasks in this area:

1. Survey available vocabularies for periodization of Jewish history and culture;
2. Express some of such vocabularies as RDF Schema/SKOS and publish them as Linked Data;
3. Promote linking such vocabularies with Jewish content resources;
4. Establish institutional tools enabling in-depth probing of present practices for Jewish history and culture periodization.

45 See footnotes 31 and 32 above.

46 The LinkedGeoData project: http://linkedgeodata.org/About.

47 A directory of historical timelines, maintained by the Jewish History Resource Center of the Dinur Center for Research in Jewish History, the Hebrew University of Jerusalem: http://tinyurl.com/dinur-time.

Hubs of Jewish Knowledge

Several well-structured Jewish knowledge bases are encyclopedias. The publication of such databases as Linked Data in the RDF Semantic Web can lead to an increased application of such knowledge assets, enriching their value both for users as well as for the institutions that developed them. In this format, they can serve to provide contextual information concerning the digitized objects; such objects can be linked back to these knowledge bases as primary sources validating their assertions. A partial list includes:

- *Ėlektronnaia Evreiskaia Ėntsiklopediia* [The Jewish Encyclopedia in Russian on the Web][48]
- *Encyclopedia of Jews in the Islamic World Online*[49]
- *Encyclopaedia Judaica* Online (2007)[50]
- *Ėlektronnaia fersuia Rossyyskoy Efreyskoy (Ėntsiklopedyy)* [Encyclopedia of Russian Jewry][51]
- *Holocaust Encyclopedia*[52]
- *Jewish Encyclopedia* (1906)[53]
- *YIVO Encyclopedia of Jews in Eastern Europe*[54]

48 *Ėlektronnaja evrejskaja ėnciklopedija sozdana na baze Kratkoj evrejskoj ėnciklopedii, izdannoj v Ierusalime v 1976 - 2005 godach* = Atar ha-Entsiḳlopedyah ha-yehudit ba-śafah ha-rusit: ʻal basis shel Entsiḳlopedyah yehudit ḳatsrah ba-lashon ha-rusit = The @Jewish encyclopaedia in Russian on the web: based on The Shorter Jewish Encyclopedia published in Jerusalem in the years 1976-2005. 2003: http://www.eleven.co.il/.

49 Stillman, Norman A. *Encyclopedia of Jews in the Islamic World* [Leiden, the Netherlands]: Brill, 2010. http://referenceworks.brillonline.com/browse/encyclopedia-of-jews-in-the-islamic-world.

50 *Encyclopaedia Judaica*, 2nd ed. Detroit: Macmillan Reference USA in association with Keter Publishing House (Jerusalem), 2007. Electronic version published by Gale Cengage Learning.

51 *Ėlektronnaia fersuia Rossyyskoy Efreyskoy (Ėntsiklopedyy)* [Encyclopedia of Russian Jewry]: http://www.rujen.ru.

52 *Holocaust Encyclopedia*, the United States Holocaust Memorial Museum: http://www.ushmm.org/wlc/en/.

53 Singer, Isidore, and Cyrus Adler. *Jewish Encyclopedia* [Wynnewood, Pa.]: Kopelman Foundation, [1906] 2002: http://www.jewishencyclopedia.com/.

54 Yivo Institute for Jewish Research. *The YIVO Encyclopedia of Jews in Eastern Europe* [New York, N.Y.]: YIVO Institute for Jewish Research, 2010: http://www.yivoencyclopedia.org/.

In collaboration with Dr. Kai Eckert of the University of Mannheim, Judaica Europeana is engaged in a dialogue with the publishers of these encyclopedias in order to publish them as Linked Data (RDF). This project, called JudaicaLink, is available at http://judaicalink.org. Making these monumental reference works available in such a format will enable their application to the enrichment of metadata and textual corpora through the technology of Named Entity Recognition (NER).[55] NER is a "subtask of information extraction that seeks to locate and classify atomic elements in text into predefined categories such as the names of persons, organizations, locations, expressions of times, quantities, monetary values, percentages, etc."[56] Applied to a given text of Jewish interest, people and place names identified by NER can be expanded thanks to VIAF to include different spellings (and misspellings), as well as representations in different languages.

A major breakthrough in this process occurred in September 2013, when YIVO Executive Director Jonathan Brent and YIVO Director of Digital Initiatives Roberta Newman decided to publish the *YIVO Encyclopedia of Jews in Eastern Europe* as Linked Data. In the coming months we will see a very rich concrete expression of the vision described here, when this knowledge base serves to enrich the content of Judaica Europeana. Rabbi Zeev Vagner, editor of *The Encyclopedia of Russian Jewry*, made the same decision early in 2013. Judaica Europeana expects that following the proof of concept, additional knowledge base holders will decide to follow suit.

European Network of Judaica Digital Humanities

Judaica Europeana has promoted the use of its digitized content in scholarly applications and now participates in the project Digital Manuscripts to Europeana (DM2E) that pursues this agenda. This effort has been effected through several seminars and workshops as well as deployment of a pilot project entitled "The Judaica Europeana Semantic Knowledge Management experiment: The Modern Jewish Republic of Letters in the 18th and 19th Century" (2011).

Judaica Europeana now seeks to establish a European Network of Judaica Digital Humanities to bring together three elements: massive digitized content, Digital Humanities methodologies, and the community of Jewish Studies scholars. Researchers of Digital Humanities are engaged in data visualization, information retrieval, data mining, statistics, text mining, and digital publishing. Humanities scholarship may now be substantially advanced due to the maturation of the technology of Linked Data, which facilitates the aggregation of available digitized corpora to support basic scholarship tasks, as well as discovering, annotating, comparing, referring, sampling, illustrating, and representing (Unsworth 2000; Blanke and Hedges 2013).

55 Named Entity Recognition (NER): http://nlp.stanford.edu/software/CRF-NER.shtml.

56 This definition is cited in Stackoverflow, the "question and answer site for professional and enthusiast programmers": http://stackoverflow.com/tags/named-entity-recognition/info.

The proposed European Network of Judaica Digital Humanities would

1. Establish a Virtual Research Environment (VRE), integrating documents and other research objects, tools/infrastructures, and scholarly resources as a complete package serving a dynamic scholarly community;

2. Reach a critical mass of active scholars, young scholars and post-graduate students trained and able to advance their research interests while using the VRE;

3. Test the adequacy of existing Digital Humanities tools in their application in Jewish Studies and identify research challenges that may demand the development of further tools/infrastructures.

Expected Applications

The Linked Data infrastructure that Judaica Europeana is putting in place is able to support a wide variety of applications. The following examples are an indication of the potential that inheres:

- E-books: the core of EDM is the Object Reuse and Exchange (OAI-ORE) model for aggregation of web resources;[57]

- Mobile: Jewish-related mobile applications can enhance tourists' experience by providing historical information drawn from aggregated content to contextualize buildings, monuments, and other cultural sites;[58]

- Jewish-related Massive Open Online Courses (MOOCs): Developers have an opportunity to enrich the experience of their students. Such semantically-enhanced content is ideally suited to the new learning environments supporting K–12 education;[59]

- Narratives and storytelling: Narratives are ubiquitous in human experience. We use them to educate, communicate, convince, explain, and entertain. A draft for Judaica Europeana applications is available in the core of the AthenaPlus comprehensive review of Linked Data storytelling devices (Winer 2011A), based on AthenaPlus's MOVIO storytelling package developed according to such requirements;[60]

57 Object Reuse and Exchange (OAI-ORE): http://www.alatechsource.org/library-technology-reports/object-reuse-and-exchange-oai-ore.

58 As an example that could be emulated, see the Streetmuseum: http://www.museumoflondon.org.uk/Resources/app/you-are-here-app/home.html.

59 Examples include the Learning Spaces of the Future Classroom Lab: http://fcl.eun.org/learning-spaces; and the use cases at the LinkedUp project: http://linkedup-challenge.org/usecases.html.

60 MOVIO is a tool for creating virtual exhibitions: http://www.athenaplus.eu/getFile.php?id=156.

- Jewish textual canon: the Open Siddur (http://opensiddur.org/) and Sefaria (Open Source Jewish Texts; http://www.sefaria.org/) are some of the initiatives that enrich the Jewish experience.

Judaica Europeana has aggregated more than five million digital cultural objects and more work is still underway. Some of the most important Jewish content holders that are involved in long-term digitization programs are now engaged, via Judaica Europeana, around a common data model, the EDM. This data model was adopted by the two leading world initiatives, Europeana and the DPLA. Aggregated content should become conceptually integrated and easily accessible across the variety of databases in which they are hosted. This is to be implemented through a program that focuses on the use of vocabularies (thesauri, taxonomies, encyclopedias, etc.) expressed in a way that enables them to enrich the digitized content, link its diverse manifestations, and provide context and meaning. The first substantial achievement of this program is the publication of the *YIVO Encyclopedia of Jews in Eastern Europe* as Linked Data.

Two main challenges still remain in regard to Jewish cultural content: reaching a critical mass of Jewish-related vocabularies expressed in the Linked Data format and thus suitable to enrich Jewish digitized content; and providing sophisticated services to patrons of websites/portals of its content providers, Digital Humanities scholarship, virtual research environments, integration of Information and Communication Technologies (ICT) in K–12 education, mobile cultural tourism applications, e-books, and much more.

Abbreviations and Organizations

AEPJ	European Association for the Preservation and Promotion of Jewish Culture and Heritage
API	Application Programming Interface
AthenaPlus	Access to cultural heritage networks for Europeana
BIBFRAME	Bibliographic Framework Initiative
CEF	Connecting Europe Facility
CIP ICT/PSP	Competitiveness and Innovation Program, Information and Communication Technologies, Policy Support Programme
DM2E	Digitised Manuscripts to Europeana
DPLA	Digital Public Library of America
DSI	Digital Service Infrastructure
EAJC	European Association for Jewish Culture
EDM	Europeana Data Model

ESE	Europeana Semantic Elements
EUCLID	Educational Curriculum for the Usage of Linked Data
EVA	Electronic Visualization and the Arts
FRBR	Functional Requirements for Bibliographic Records
FRBRoo	Functional Requirements for Bibliographic Records Object Oriented
ICT	Information and Communication Technologies
IFLA	International Federation of Library Associations
JAFI	Jewish Agency for Israel
KOS	Knowledge Organization Systems
MINERVA	Ministerial Network for Valorising Activities in Digitization
MOOC	Massive Open Online Courses
MOSAICA	Semantically enhanced, multifaceted, collaborative access to cultural heritage
MOVIO	Mostre Virtuali Online
NER	Named Entity Recognition
OAI-ORE	Open Archives Initiative – Object Reuse and Exchange
OCLC	Online Computer Library Center
RDA	Resource Description and Access
RDF	Resource Description Framework
SKOS	Simple Knowledge Organization System
UGC	User-Generated Content
URI	Uniform Resource Identifier
VIAF	Virtual Authority File
VRE	Virtual Research Environment
W3C	World Wide Web Consortium
Yad Vashem	Holocaust Remembrance Authority
YIVO	Institute for Jewish Research

Sources

Blanke, Tobias and Hedges, Mark. 2013. "Scholarly primitives: Building institutional infrastructure for humanities e-Science." *Future Generation Computer Systems* 29: 654–661. http://dx.doi.org/10.1016/j.future.2011.06.006

Camus, Jean-Yves, and Denis Lévy-Willard. 2002. *Le guide culturel des juifs d'Europe*. Paris: Seuil.

Clough, Wayne G. 2013. *Best of both worlds: Museums, Libraries and Archives in a Digital Age.* Washington: Smithsonian Institution. http://dx.doi.org/10.5479/si.9780981950013.

Davis, Ian and Tom Heath. 2009. "The Thirty Minute Guide to RDF and Linked Data." A presentation given at the code4lib 2009 Linked Data Preconference. Accessed May 13, 2014. http://www.slideshare.net/iandavis/30-minute-guide-to-rdf-and-linked-data.

Goldberg, Jolande. 2006. *Comparative Development of the Classes for Religious Law: The Abrahamic Tradition.* Washington: Library of Congress. http://www.loc.gov/catdir/cpso/KBIntro2.pdf.

Heath, Tom and Christian Bizer. 2011. *Linked Data: Evolving the Web into a Global Data Space (1st edition)*. Synthesis Lectures on the Semantic Web: Theory and Technology, 1:1, 1–136. Morgan & Claypool. http://linkeddatabook.com/editions/1.0/.

Hyna, Irene. 2010. *Coordinating digitisation of Europe's scientific and cultural heritage in Europe since the year 2001*. Vienna: Ministry of Education, Arts and Culture. http://www.judaica-Europeana.eu/docs/Coordinating_digitisation_in_Europe_Irene_Hyna.pdf.

IFLA Study Group on the Functional Requirements for Bibliographic Records. [1998] 2009. *Functional Requirements for Bibliographic Records*. International Federation of Library Associations and Institutions (IFLA). http://www.ifla.org/publications/functional-requirements-for-bibliographic-records

Kieval, Hillel, J. 1999. "Antisemitism and the City: A Beginner's Guide." In *People of the City: Jews and the Urban Challenge*, edited by Ezra Mendelsohn, 3–18. New York: Oxford University Press.

McCulloch, Emma, and Macgregor, George. 2008. "Analysis of equivalence mapping for terminology services." *Journal of Information Science* 34, 1: 70–92. http://dx.doi.org/10.1177/0165551507079130.

Mitchell, Eric T. 2013. *Library Linked Data: Research and Adoption*. Chicago, IL: ALA TechSource.

Polonsky, Antony. 2013. *The Jews in Poland and Russia: A Short History*. Oxford: The Littman Library of Jewish Civilization.

Powers, Heather and Dianne Coan. 2013. "RDA and FRBR... Tell me again why I care?" Catalogers Reference Shelf, posted March 19, 2013. Accessed April 30, 2014. http://www.its-marc.com/crs/mergedProjects/RDAplus/rdaplus/rda_and_frbr_tell_me_again_why_i_care.htm.

Reilly, Susan K., Marian Lefferts, and Martin Moyle. 2012. "Collaboration to build a meaningful connection between library content and the researcher." *New Review of Information Networking* 17(1): 34–42. http://dx.doi.org/10.1080/13614576.2012.678139.

Simperl, Elena et al. 2013. *Using Linked Data Effectively.* Educational Curriculum for the usage of Linked Data (EUCLID). http://euclid-project.eu/resources/learning-materials.

Slezkine, Yuri. 2004. *The Jewish Century*. Princeton: Princeton University Press.

Unsworth, John. 2000. *Scholarly Primitives: what methods do humanities researchers have in common, and how might our tools reflect this*? Symposium on "Humanities Computing: formal methods, experimental practice." London: King's College. http://people.lis.illinois.edu/~unsworth/Kings.5-00/primitives.html.

Valtysson, Bjarki. 2012. *EUROPEANA The digital construction of Europe's collective memory*. Information, Communication & Society, 15(2): 151–170. http://dx.doi.org/10.1080/1369118X.2011.586433.

Winer, Dov. 2011. *D2.4: Survey of controlled vocabularies relevant to the thematic domain*. ECP-2008-DILI-538025 JUDAICA Europeana. http://www.judaica-Europeana.eu/docs/D2-4_Survey_of_controlled_vocabularies.pdf.

———. 2011A. "*Judaica Europeana D2.5: Semantic Interoperability Report with representation of selected controlled vocabularies in RDF/SKOS*." Semantic interoperability report with representation of selected controlled vocabularies in RDF/SKOS. 39 pp. http://www.judaica-Europeana.eu/docs/D2-5_Semantic_interoperability_report.pdf.

Winer, Dov, and Heuberger, Rachel. 2011. The Judaica Europeana Semantic Knowledge Management experiment: the modern Jewish Republic of Letters in the 18th and 19th Century. A paper presented at the Interedition Huygens Symposium: Scholarly Digital Editions, Tools and Infrastructure, March 19–20, 2011. Accessed September 30, 2013, http://tinyurl.

com/interedition and http://www.interedition.eu/wp-content/bestanden/2012/03/1_1.pdf.

Zipperstein, Steven. 1987. "Jewish Historiography and the Modern City." *Jewish History* 2: 77–88. http://dx.doi.org/10.1007/BF01651514.

Dov Winer is a psychologist formed at the Hebrew University of Jerusalem. Born in Brazil he has been a Kibbutz member (Bror Chail). He is among the pioneers in the application of ICT in education in Israel (MAKASH NGO, 1989). Founded the Israel Internet Society (1993) and promoted its W3C office; trained the development team of the Internet based MACAM Teacher's Colleges Network (1994). He included Israel (1998) in the EUN/European Schoolnet consortium of the European Ministries of Education association for ICT and is member of its Steering Committee.

.

He proposed the establishment of an Internet Global Jewish Network on the eve of the opening of the Internet (1989), had it approved by the Knesset and planned it for the Ministry of Communications (1991-2). The Jewish Agency of Israel invited him to define and manage the eJewish.info program for Jewish Networking Infrastructures (2001-2006). He introduced Israel to the MINERVA European cultural heritage cluster of projects (Ministerial network for valorizing activities in digitisation). Some of the ensuing projects coped with the challenges of Jewish content: MOSAICA Semantically enhanced, multifaceted, collaborative access to cultural heritage; Athena; Linked Heritage; Judaica Europeana that ran in 2010-11 and Judaica Europeana as a consortium that now participates in DM2E (Digital Manuscripts to Europeana) and Athena Plus. He co-Chairs the EVA/Minerva Jerusalem International Conference on Digitisation of Culture since 2004 and teaches a post-graduate seminar on Digital Humanities at the Hebrew University since 2013.