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PROPOSAL COVER SHEET

Project Information

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Grantee Organization: University of Oklahoma

Amount Requested: \$351,844

Requested Start Date: April 2014

Requested End Date: March 2016

Project URL (if any):

Project Goal

The goal is to build an open access, digital research platform for the global history of science community centered on data from the Isis Bibliography of History of Science, a resource begun in 1913 and currently edited by the PI on this grant.

Objectives

The platform will be modeled on successful bibliographical projects such as PhilPapers and PubMed, which serve their communities by providing finding aids and documentary resources for researchers worldwide.

Proposed Activities

The focus of this two-year grant will be to develop a stable infrastructure for the Isis Bibliographical data that conforms to rigorous library and archival standards. A small staff at the University of Oklahoma will collaborate with several other institutions internationally to mount approximately 300,000 existing bibliographical records and several ontology files (composed of an estimated 100,000 terms and names) into a university/government repository.

Expected Products

The carefully curated data will be made accessible in several ways: via APIs for computational research and development, through a sophisticated user-account-based research platform, in annual publications produced in page-based print and ePub formats, through popular social media forums, and with citation management software. The systems will be designed to maximize sharing of resources in open access forums.

Expected Outcomes

The Isis Bibliography originated in 1913 to help establish an academic field of study in history of science. This project is meant to carry on that mission by opening up a valuable and previously hard-to-get dataset to scholars worldwide. We believe that this platform will invigorate research and collaborative work in the academic field of history of science as similar tools have done in related fields. This is a community-building effort that will serve scholars as well as the general public by disseminating information and research in history of science in ways proven to be effective in other fields with such services as PhilPapers and PubMed.

**Funding Proposal for Isis Document Indexing Platform:
A Curated and Community-Based Resource for History of Science,
Stage I (April 2014-March 2016)**

1. What is the main issue, problem, or subject and why is it important?

In 1913 the Belgian historian of science, George Sarton, published his first bibliography of history of science in his new journal *Isis*; it was a centerpiece of his effort to form an academic community around this relatively specialized field. He understood that bibliography could be an effective way of bringing together a community of scholars. As the current editor of the bibliography that Sarton began one century ago, I intend to reinvigorate his vision of bibliography as a community-building endeavor, a vision that sees bibliography as a stimulus to research and innovation in the profession.

The proposal here seeks funding to create an open access scholarly research platform based on the Isis Bibliography of the History of Science. This bibliographical search platform will be built using models derived from other successful academic research tools, especially the widely used PhilPapers and PubMed platforms. The Isis platform will be able to index a full-text document repository; it will serve as a discovery tool not only for traditional peer-reviewed text-based works but also for online academic resources; and the entire dataset will be accessible as open linked data for multiple uses, including other research tools as well as new forms of computational historical analysis. The service will be designed to anticipate expansion.

The Isis Platform will have the following characteristics:

- It will have a **user-account-based interface** that will enable social bookmarking and provide ways in which users will be able to tag and comment on existing entries and add new ones.
- It will provide **intelligent search capabilities** based, not simply on keywords, but on the ontological relationships among existing as well as new tags.
- It will be a **fully open access resource**, and the entire dataset will be available as open linked data, accessible via APIs.
- It will allow users to **share citations and full bibliographies**, either through the native Isis platform or through popular social media tools and citation reference managers.
- It will be fully integrated with an **open access publication platform** (both print and electronic) for current and past Isis Bibliographies.
- It will be **linked to by other online resources**, beginning with the Stanford Encyclopedia of Philosophy.
- It will be supported by a **stable institutional repository** at the University of Oklahoma and partner institutions so that users can upload full-text documents and link them to Isis database records.
- It will follow **rigorous data management protocols for archiving and structuring bibliographical data**, using common digital standards for international library resources.

There are several challenges that this project is intended to meet:

First of all, any service of this sort needs a stable foundation. The 100-year-old Isis Bibliography, which is supported by the History of Science Society, the University of Oklahoma,

and the University of Chicago Press, provides that foundation. The close collaboration among the PIs on this project brings further institutional strengths and adds more areas of expertise that include academic library operation and electronic scholarship research platform development. (See Appendix A for a schematic of institutional support and Appendix B for a schematic of the publication outlets for the Isis dataset.)

Second, the variety of research agendas in history of science makes it important to provide user-based tagging and classification systems, user comments, and user contributions. With the new system, it will be possible to appoint subject specialists who can work with the bibliographer as well as work independently to manage subfields and special topics. Multiple tagging schemes and bibliographic development will be possible, greatly adding to the utility of the platform.

Third, open access is critical. There are no major open access bibliographical resources for the discipline of history of science at this time, and the extremely limited North American access of the EBSCO HSTM database (of which Isis is a part) cuts off a huge segment of the global community. The discipline desperately needs wider access to a scholarly curated tool.

Fourth, the development of social media and a vast new digital information environment has transformed the way that scholars work, and it is essential that any scholarly tools be able to incorporate them.¹ This platform will include social media elements itself, through such things as sharing and user-tagging and commenting features, but it will also be readily accessible to a diverse array of current applications being used by scholars, ranging from Twitter to Academia.edu to Zotero.

Finally, with the advent of computational history of science that uses “big data” analysis to uncover new historical patterns, it is crucial that the bibliography be made available as open

linked data.² The ability to harvest both the data and metadata in this bibliography will revolutionize the way that people can work with bibliography. For the first time, this curated bibliography can be integrated with other datasets, including such things as citation indexes. All of this will make it possible to build a better understanding of both the scholarship and the historiography of the discipline. Eventually, when enough full-text resources populate the database, even more complex computational research projects will be possible.

Since the Isis Bibliography is the most comprehensive, the most long-running, and the most complete bibliographical dataset in the discipline, it is well positioned to serve as a backbone for this service. The bibliography makes it possible to rapidly build a useable tool that is currently unavailable to people with limited library services.

The Isis Platform will be unique in the following ways:

- It will be the only open access resource of this breadth and depth for the discipline of History of Science. Because of this, the development of this tool is expected to have a major impact on the discipline internationally.
- The platform will allow users to interact with the data at all levels, ranging from simple discovery to storing personal bibliographies to accessing the metadata for computational research.
- The platform will promote social interaction through social communication tools and methods for user feedback and project development.
- The platform is the only such service that will be linked to an open access publishing venture.

A recent survey of the current and potential users of the Isis Bibliography shows that a service such as what we propose here would be widely used. It also indicated that unless a tool of

this sort is built, the discipline stands to lose one of its most valuable research tools. Limited access and outdated technology have eroded support for the bibliography in a period in which bibliographical databases in other fields remain indispensable to researchers. Curated and discipline-specific resources such as the Isis Bibliography will continue to be a mainstay of academic research, but only if they keep up with researchers' expectations for document indexing services and can make new kinds of scholarship possible. (See Appendix E on the results of the survey.)

Achievability and Sustainability

This grant is designed to fund only the first stage of this project. The goal is to set up a system that can be sustained at a basic level with relatively small extra costs. Even that basic level of activity will significantly advance the state of the field worldwide. We expect to accomplish all of the goals in this proposal, but the most important focus is on developing a stable and scalable infrastructure with a clean and useable basic interface.

The cost investment for this project is extremely low given what we intend to accomplish. This is the case because we are able to use existing data standards and open source tools and we can rely on stable institutionally supported expert staff and equipment. Most of the tools and algorithms for preparing the dataset have already been developed by others and can be tweaked to fit the specific uses we need. The dataset itself, while rich and sizable, is not too big for a small staff to work with, and the data (both print and digital) is very clean. In other words, what makes this grant possible within the current cost is the existence of this well-developed infrastructure alongside a sophisticated online computational environment. This environment did not exist ten years ago. We are taking advantage of the current moment and the confluence of institutional links to build something that would have been prohibitive in other circumstances.

The Isis Platform's governing board will meet in person twice and communicate regularly via Skype and email to ensure that the project will be able to grow beyond the first two years. We will study funding strategies that have been successfully used by similar academic projects like the Stanford Encyclopedia of Philosophy and PhilPapers.

The second stage of this project will require further funding at a later date to expand the platform in several areas. These include making the public interface more robust, developing new search algorithms, finding ways to encourage and sustain a large editorial board, expanding the repository of full-text resources, finding ways to integrate full-text search, managing a large user base, learning how to integrate user input to the database, and encouraging participation by non-Western scholars. The governing board will develop funding proposals for these activities.

2. What is the major related work in this field?

The only competing tool is the HSTM database, a proprietary database hosted by EBSCO and available only by library subscription. Current access to this database is almost exclusively limited to North America, England, and a few places in Western Europe and Australia. Broadening the reach of the Isis data is one of the most pressing aspects of this project.

Two successful models for a similar type of service are PhilPapers and PubMed, both are widely used open access scholarly tools. PubMed is a government funded resource serving an enormous community of medical professionals and research scientists. The centerpiece of the service includes a vast repository of full-text papers, abstracted and indexed citations, and a highly developed classification system. PhilPapers is a collaborative scholarly endeavor for the academic philosophy community. It uses crowdsourcing and volunteer editing along with algorithm-based tools.

The Isis Platform seeks to play a similar role in the history of science research community as the above mentioned resources in philosophy and medicine do for their disciplines. The size of the history of science community is smaller than either of these communities, so it must contend with a different set of problems in establishing a discipline-wide resource.

3. Why is the proposer(s) qualified to address the issue or subject for which funds are being sought?

The principle investigator, Stephen Weldon, has edited the Isis Bibliography since 2002, and is also head of the World History of Science Online (WHSO), an international project involving the collection and classification of web-based resources in the history of science. The Isis Bibliography is produced by the History of Science Society. The WHSO is a project of the International Union for the History and Philosophy of Science and Technology/Division of History of Science and Technology (IUHPST/DHST), having been started by the Secretary General of that organization about ten years ago. Weldon has a doctorate in history of science, has worked on bibliographical issues for over a decade, and has been writing scripts for data entry and analysis, developing methods of data conversion of legacy data, and working out print publication formats for the annual Isis bibliography during his tenure as the Isis Bibliography editor.

The co-PI Gavan McCarthy is director of the eScholarship Research Centre (eSRC) at the University of Melbourne. He has worked with Weldon on the WHSO project and has extensive experience developing and hosting historical databases for both academic and public/governmental institutions. His most recent work on the Australian government's Find & Connect project has enabled his team to build quite sophisticated web interface systems based on a Solr Lucene search platform that will be the foundation of the Isis Platform.³

The other co-PI Kerry Magruder is curator of the History of Science Collections at the University of Oklahoma and is providing library resources to help with this project. Magruder has been a member of the digital HPS consortium for several years and understands the scope and future of digital history of science as well as anyone. He is a strong proponent of open access scholarly tools and has spearheaded the development of open access digital galleries of hundreds of rare books in the University of Oklahoma History of Science Collections. He is an editor of the Editions Open Access collaboration between the University of Oklahoma and the Max Planck Institute for the History of Science in Berlin.

In addition to these three persons, the project has strong institutional support. The History of Science Society has firmly endorsed this project. The University of Oklahoma Libraries and the University of Melbourne Library are currently drafting a memorandum of understanding to collaborate and foster work on the Indexing Platform. Weldon at OU and McCarthy at eSRC have already set up two databases utilising the eSRC Social and Cultural Informatics platform that hosts several public knowledge web resources in Australia: the World History of Science Online (WHSO) project and the Isis Open Access Bibliography prototype. In addition, OU has just signed an MOU with the Max Planck Institute for the History of Science in Berlin (MPI) to work on a scholarly open access publishing platform. Weldon and the faculty of MPI have begun investigating what it would take to get the annual printed Isis Current Bibliographies published on this platform.

Other individuals who are involved informally in collaboration with this project are Jane Maienschein and Manfred Laubichler based at Arizona State University with the Digital HPS Consortium, Colin Allen head of the InPhO Project at Indiana State University,⁴ Sean Takats

with the Center for History and New Media at George Mason University, and Urs Scheopflin and Dirk Wintergrün of the Max Planck Institute for the History of Science in Berlin.

4. What is the approach being taken?

The outline below explains how the project will unfold over the next two years (See Appendix C for a schematic of the major activities and Appendix D for a timeline view.)

I. Governance and staffing of the project

- (1) *Establish a governing board (by March 2014).* Four directors will oversee the development of this project. This board will consist of the three PIs on this project and one other member chosen by the PIs. The board will meet in person once each year to develop and assess the project, and conduct ongoing business using email and Skype.
- (2) *Assemble Isis staff (by March 2014).* Local staff will include Weldon (PI), a technical assistant, and a data processing and proofing assistant. The technical assistant position will be filled by Sylwester Ratowt (PhD, History of Science; MLIS focusing on classification of the sciences using citation analysis). Ratowt and Weldon built the current Filemaker-Perl script software system. They have worked together to clean up tens of thousands of records in the existing dataset and helped produce export files for prototype testing, and converted nearly 100 thousand records of pre-2000 citations to the current system. The second staff position, data processor/proofreader, will be hired to work primarily on labor intensive data work, especially concerning the legacy print data. This position will be filled by a graduate student in History of Science at OU because it will require someone with a clear understanding of history of science resources.

II. Working on bibliographic citations

- (1) *Select standards (by January 2014)*. We have selected MODS 3.5, a widely used XML schema for encoding library bibliographic records and selected EAC-CPF, a common XML schema for encoding certain kinds of archival authority records. Will likely use BibTeX standard to share records with the open access publishing platform.
- (2) *Convert digital records to standards; establish URIs for each record (by March 2014)*. This work is currently in process. Scripts conversion is being done by Ratowt. There is currently a trial version in testing and proofing stage, done in collaboration between Isis and eSRC. Records will be given a stable URI at the OU state archive managed by the OU Libraries.
- (3) *Ingest non-text-based web resources from WHSO database (by July 2014)*. We will incorporate records from the World History of Science Online database hosted at the eSRC that contains references to web-based resources in the history of science. It is a small dataset. It will give us a chance to understand how to mark and tag web-based resources in the MODS 3.5 format. To be accomplished by Isis staff.
- (4) *Prepare and ingest legacy print data (1913-1973) (by January 2015)*. This task will be time consuming; it will require scripting and algorithmic preparation as well as human checking and error correction. Estimated number of text pages in bibliographies published from 1913 to 1973 is about 4,500, containing an estimated 90,000 citations.

- a. *Photograph and digitize legacy print data (by July 2014).* We will first digitize the print copies of the annual bibliographies into flat full-text files. This will be done either through scanning and OCR (done by the Oklahoma University Libraries Digitization Laboratory) and human error correction, or by using a foreign retyping service.
- b. *Parse and extract data from the legacy print files (by January 2015).* We will then parse the flat files into individual citation records. Then we will use scripts to automate the initial separation of the data into field-delimited records and matching records to preexisting citation records in Hathi Trust, OCLC WorldCat, Google Books, and other accessible bibliographic datasets. (Scripting and extraction algorithms will be produced by Isis staff, eSRC, and InPhO.) These will then be proofread and corrected by data proofreading assistant.

III. Ontology development (thesaurus terms, authority records, classification schemas)

- (1) *Extract information from citation data (by September 2014).* Many records will have information not previously encoded. These include precise dates, subjects, personal names, and institutions, all of which can be found in citation titles, descriptive notes, and abstracts. We will data-mine the bibliographic records using clustering and matching algorithms to extract this semantic information. (This will be done collaboratively between eSRC and Isis staff. The eSRC staff is currently heavily engaged in a very similar project, the Humanities Networked Infrastructure (HuNI), and tools and analytic methods will be easily applied to Isis records.)

- (2) *Enhance thesaurus content (by September 2014)*. The controlled vocabulary currently exists as a list of terms with very little other information. The EAC-CPF authority format (that we will expand to include subject, time, and place entities) gives us the ability to include machine-readable information about entries, including such things as birth and death dates, time period delimiters for eras and dynasties, relationships among persons and between persons and institutions, GIS information for geographical terms. Done by Isis staff.
- (3) *Determine relationships among different schemas (March 2015)*. Understanding and building relationships among different ontologies will be essential to developing algorithms for intelligent searching across bibliographies with the different schemas that have been used over the past century. This will be done by Isis staff and eSRC staff, both of which have expertise in this area.
- (4) *Harvest information from external authority records (by July 2015)*. We will select a subset of authority records from our thesaurus file and find ways to match these records with VIAF records from OCLC, MADS records from the Library of Congress, and EAC-CPF records from independent archives. (The project Social Networks and Archive Context (SNAC) has done work of this sort using EAC-CPF records, which we will draw upon. InPhO is also developing machine-aided matching algorithms that we will use.)
- (5) *Test algorithms that use linked authorities (by July 2015)*. In order to make this file more usable for intelligent semantic searching, the thesaurus needs to be updated. Using a series of tools that are now being employed at Indiana University for machine-guided classification, Isis staff will turn the thesaurus list

into a semantically rich thesaurus using relational information from external authority records.

IV. User interface development

- (1) *Build open-access print and e-print platform (by March 2014).* This will be done in conjunction with the OU-MPIWG partnership on Edition Open Access. It will be a simple and straightforward project for the current Isis data. The History of Science Society, The University of Chicago Press, and MPIWG are currently working out the arrangements for this service which is to start next year. This service will require a specific API to extract the data from the repository in the proper format.
- (2) *Build API for storage and transfer of data (by September 2014).* This will be the pipeline process for transfer of data between project partners and will be accomplished at eSRC.
- (3) *Build input interface for bibliography staff (by January 2015).* The Isis Bibliography workflow will be altered at this time so that it works entirely through the Isis Platform. The eSRC staff has the ability to build a scripting with a NOSQL database like Couch or Mongo (a JSON-based relational database).
- (4) *Build APIs for user access (beginning January 2015).* These APIs will allow any user to get access to both data and metadata of all open data on the site.
- (5) *Build first generation user interface (by January 2015).* This interface will include a search and discovery tool, personal accounts, and a personal workbench for manipulating data. This will be done at eSRC under the guidance of Isis staff which has both the data-infrastructure expertise and the content expertise to host

an open access bibliography site. They already have a prototype of a basic search platform for another project that uses code developed by eSRC for Isis.⁵

- (6) *Build Zotero interface (by July 2015)*. We will build a second public interface with the bibliographical management software Zotero.⁶ Zotero is a fully functional, widely used bibliographical system. It has multi-lingual features, along with sharing and social networking capabilities. An online searchable version of the Isis bibliography can be set up with some basic Java and HTML scripting. The Zotero interface will allow users to find and use the citation data, import it into their own bibliographies, and interact directly with the database. The eSRC staff has already done an initial proof-of-concept by up-loading MODS3.5 records into Zotero with largely successful results.
- (7) *Mirror the platform at OU (by July 2015)*. We will mirror the eSRC site on the OU server and train people to operate it.

V. Promoting the platform

- (1) *Maintain blog on activities (ongoing since fall 2013)*. In the fall of 2013, Weldon began a blog discussing developments in the Isis Bibliography. This blog will become a forum for discussion of the new tool and encouraging participation in the project.
- (2) *Encourage users to do research and build tools (November 2014-December 2015)*. In either November of 2014 or 2015, depending on progress, we will hold a hackathon in conjunction with the HSS annual meeting to encourage users to find innovative uses of the platform and the linked open data associated with it. We will also promote the project using a standard RFP announcement in newsletters,

forums, and email lists. This RFP will be for several small sub-awards for development and research using the platform and datasets. Winners of these grants will be asked to present papers over their work at the 2015 HSS meeting.

(3) *Create a board of editors for specialized fields (by March 2015).* This board will be a group of scholars, librarians, and archivists would will take charge of special subject areas within the field, building bibliographies and finding other resources to help researchers in the discipline.

(4) *Establish cross-product links with other online resources (by December 2015).* We will work with the Stanford Encyclopedia of Philosophy and Wikipedia to encourage users to use the Isis interface for electronic bibliographical resources on relevant research topics.

5. What will be the output from the project?

The main output of this project will be a bibliographically based open access research platform for the history of science, similar to such successful projects as the PhilPapers and PubMed. It will enable users to sign in with individual accounts; find, save, and share their research with others; add new citations and comment on existing ones; access 100 years of bibliographical data in the field of history of science through APIs, allowing for computational research and widespread interaction and collaboration. It will expand the editorial work to include outside field editors.

6. What is the justification for the amount of money requested?

We are seeking \$351,844 to implement this project. The funds will be spent in the following ways:

Personnel costs: \$189,166

Weldon is asking for funding support in two areas: course release for one year and summer funding for two years. This will give him time to direct, test, and organize this project. During the first year, especially, he will be working closely with the data handling and interface development in addition to conceptual and organizational activities. He will also be supervising two regular staff.

There will be a half-time technical assistant who will help with administration, data analysis, testing, and research. Sylwester Ratowt, a PhD in History of Science, helped build the current Filemaker-Perl script software system that currently manages the Isis Bibliographic data. Ratowt has worked with the dataset closely for years and knows it very well, having converted over 100,000 records from a legacy data format to the current one. He also has an academic interest in classification of the sciences and citation analysis.

We will also need a data proofreader and processor to work with several aspects of the database conversions and testing. This will be a one-year graduate student position in the History of Science Department. Most of this person's time and effort will go into processing the legacy print data (from 1913 to 1974), estimated at about 90,000 records. Using machine aided methods, we estimate twelve months of half-time work for this assistant.

Programming and infrastructure development: \$87,250

The work at eSRC at the University of Melbourne is crucial to the success of this project. The staff at this center will host the platform and build its basic features. The programmers there will incorporate the Isis data into their Solr Lucene-based platform, as they have done with numerous very large academic and governmental datasets. They will develop the data infrastructure as well as the public and Isis staff interfaces for the database. Once completed, the

project will be mirrored at the University of Oklahoma. The entire virtual machine will be transferred and staff will be trained to operate it.

We are also partnering with Indiana University's InPhO team to help out with several data manipulation tasks that need to be done. They have scripts that will help automate the legacy data conversion; they have a system that will enable us to link our ontologies to outside authority records in order to enrich our thesaurus and provide broader connections to other linked open data sources; and they have scripts that will allow us to experiment with machine guided classification of records, which will help in organizing the multiple internal classification schemas that we have.

We have also budgeted for other programming and data processing costs. Of this, we have budgeted for the first step in digitizing the legacy data: producing a digitized flat text file. We estimate that there are 90,000 citations in about 4,500 pages of text will need to be extracted and turned into a field-delimited database. This step requires minimal competency and might be accomplished using a foreign retyping service.

Another cost will be needed for the building of a Zotero-based website that will interface with the Zotero group library. The cost includes a Java script programmer to work with the Zotero API and an HTML programmer to set up the website interface.

Finally, we have budgeted an extra amount for unforeseen programming and data manipulation tasks. All of the tasks listed above will require competence in scripts of different sorts; we need the ability to hire a programmer or do data analytics that the existing staff is not able to accomplish.

Travel: \$25,000

Travel will include several trips by Weldon to visit partner institutions at Indiana University at Bloomington and the Max Planck Institute for the History of Science in Berlin in order to work on specific aspects of this project in person. There will be a need to bring the technical assistant Ratowt who now lives in Georgia to OU a few times during the two year term. His presence will also be necessary at the History of Science Society meeting when we are holding the hackathon. The close collaboration between the Isis Bibliography and the eScholarship Research Centre will require at least two trans-Pacific trips between the US and Australia, in which either Weldon or McCarthy visits the other location. The budget also includes travel costs to cover two meetings of the four-member planning board: at the end of the first year, and at the end of the project.

Hardware and software: \$5,250

Two computers with software will be purchased for the two assistants. Three large-screen monitors for the PI and two project assistants will be purchased for analyzing and proofreading large datasets.

Follow-up and promotion: \$20,000

As part of the effort to encourage use of the product, we are asking for funds to hold a hackfest in conjunction with an annual HSS meeting to encourage people to develop new digital tools. In addition, we are going to offer up to five mini-grants for extended development of research using the Isis dataset or for tool development using the dataset or platform.

8. What is the status and output of current and/or previous Sloan grants?

A previous Alfred P. Sloan Foundation grant was used to bring together experts for a conference that led to this proposal. The theme of the conference was to discuss how the Isis

bibliography could be developed in new ways with current digital and networking technologies. Weldon convened the international conference at the University of Oklahoma.⁷ The conference participants discussed ways of making the bibliography more globally accessible and more fully integrated with newly developing scholarly practices. The agenda covered a broad range of issues in the digital humanities—technical, scholarly, ethical, and legal. Invited to the conference were professional historians, independent scholars, librarians, archivists, and computer scientists. The was supplemented by the University of Oklahoma, and the History of Science Society.

The participants came from a wide range of institutions, many of which have already reshaped the academic research landscape: the Wikimedia Foundation, the Center for History and New Media, the Indiana Philosophy Ontology Project, the Stanford Encyclopedia of Philosophy, the Digital HPS Consortium, the eScholarship Research Centre at the University of Melbourne, and the CESIMA Institute at the Pontifical Catholic University of São Paulo. The international representation included the full board of the Commission on Bibliography and Documentation of the International Union for the History and Philosophy of Science/Division of History of Science and Technology.

The conference affirmed two important ideals: (1) Open access at all levels should be promoted. It was recommended that, not only should the History of Science Society continue to make Isis data freely available, it should make the data much more accessible than it currently is. (2) Collaboration and sharing are central to emerging patterns of scholarship. Several collaborations were established at the meeting, and the results of these partnerships have already proven effective in creating very fast and effective prototypes of research tools using the Isis bibliographical data. Several projects were proposed at the conference: digitize the legacy data, build a more robust search platform, enable social networking, develop APIs for direct

interaction with the data, and create a digital repository. The current proposal seeks to accomplish these tasks.

Appendix - Endnotes

¹ A recent study of historians shows how digital practices have been incorporated into scholarly research, see Jennifer Rutner and Roger C. Schonfeld, *Supporting the Changing Research Practices of Historians* (Ithaca S+R, December 10, 2012), <http://www.sr.ithaka.org/research-publications/supporting-changing-research-practices-historians>.

A recent paper co-authored by Weldon discusses the effectiveness of social media for many historians of science: Stephen Weldon and Amy Rodgers, “How Are Historians Using the Isis Bibliography Today? Current Trends and Historical Research Practices,” History of Science Society Meeting, Boston, Massachusetts, November 21, 2013.

² Manfred D. Laubichler, Maienschein, and Jürgen Renn, “Computational Perspectives in the History of Science: To the Memory of Peter Damerow,” *Isis* 104, no. 1 (March 1, 2013): 119–130, doi:10.1086/669891.

³ Gavan McCarthy was instrumental in the development of the Australian Science Archives Project, which pioneered the development of national information services and infrastructure to support the history of Australian science, technology, medicine and engineering through the utilization of emerging digital technologies. The commercial success of the archiving software developed by his team, led to the creation of a research center, the Australian Science and Technology Heritage Centre.

The system that currently hosts the Isis database prototype as well as the World History of Science Online is the Online Heritage Resource Manager (OHRM). The eSRC uses the OHRM technology to run many of its signature projects, such as the Encyclopedia of Australian Science and The Australian Dictionary of Biography Online. This work includes projects for the

national government, which uses the OHRM work to document human resources and index archival material.

⁴ Colin Allen is professor of cognitive science at Indiana University. He works on philosophy of biology and cognitive science. He has received funding from the National Science Foundation and several grants from the National Endowment for the Humanities for his work in digital humanities. He directs the NEH-funded Indiana Philosophy Ontology (InPhO) project and is Associate Editor of the Stanford Encyclopedia of Philosophy.

⁵ The University of Melbourne Library will also host a stable digital archive of the Isis bibliography project going back to 2000.

⁶ This will be done using a dynamic citation display software such as Zotpress (<http://wordpress.org/plugins/zotpress>). Zotpress dynamically displays the current contents directly from an online Zotero library, including live links to items with a URL source field. Given the size and complexity of the bibliography, it is clear that we will need some programming to develop the interface for it.

⁷ The conference agenda, readings, and other information can be found at <https://ou-lib-hos.atlassian.net/wiki/display/IsisConference/Isis+CB+2.0+Conference>.

Participants from out of town included: Jennifer Alexander (University of Minnesota); Colin Allen (Indiana Philosophy Ontology Project, Indiana University); Emanuela Appetiti (National Museum of Natural History, Smithsonian Institution); Marcia H. M. Ferraz (Center Simão Mathias of History of Science, Pontifical Catholic University); Daniel Goldstein (University Library, University of California, Davis); Manfred Laubichler (Arizona State University); Henry Lowood (Stanford University Libraries); Jane Maienschein (Arizona State University); Gavan McCarthy (eScholarship Research Centre, University of Melbourne); Birute

Railiene (Wroblewski Library of the Lithuanian Academy of Sciences); Sylwester Ratowt (Independent Scholar); Sage Ross (Wikimedia Foundation); Sean Takats (Roy Rosenzweig Center for History and the New Media, George Mason University); Alex Wellerstein (Center for History of Physics, American Institute of Physics). Participants from the University of Oklahoma Libraries included David Corbly; Janet Brennan Croft; Carl Grant; Rick Luce; Kerry Magruder; JoAnn Palmeri; Karen Rupp-Serrano; and Brian Schults. Participants from the Department of History of Science at the University of Oklahoma included Margaret Gaida; Hunter Heyck; Suzanne Moon; Jared Neumann; Katherine Pandora; Amy Rodgers; Carolyn Scarse; John Stewart; Stephen Weldon; and Royline Williams-Fontenelle. Participants from the Department of Computer Science at the University of Oklahoma included Sayantani Satpathi and Chris Weaver.

STEPHEN P. WELDON

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Editor, *Isis Bibliography of the History of Science*

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Norman, Oklahoma 73072
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TEACHING AND RESEARCH POSITIONS:

Assistant Professor, History of Science Department, and affiliated faculty in Religious Studies, University of Oklahoma (2002-present). Faculty responsibilities of teaching, service, and research account for half of my contractual obligations, the rest is devoted to editing the *Isis Current Bibliography* (see below)
Affiliated Scholar, Kanazawa Institute of Technology (Fall 2008).
Visiting Scholar, Department of Science and Technology Studies, Cornell University (2000-2002)

EDITORIAL POSITIONS:

Editor, *Isis Current Bibliography*, (2002-present). Am fully responsible for the collection, classification, and indexing of around 4000 bibliographical citations in history of science annually, covering publications worldwide in over 20 languages.
Managing Editor, *Osiris* (vols. 15 and 16) and *Isis* (1999 and 2001)

PROFESSIONAL SERVICE COMMITTEE POSITIONS:

World History of Science Online (a project of the International Union of History and Philosophy of Science/Division of History of Science and Technology), Chair of Governing Board (2007-present)
Commission on Bibliography and Documentation (International Union of History and Philosophy of Science/Division of History of Science and Technology), Vice President of Bibliography (2012-present)

EDUCATION:

Ph.D., History of Science and History, University of Wisconsin-Madison, 1997
M.A., History of Science, University of Wisconsin-Madison, 1990
B.A., Science, Technology, and Society, Cornell University, 1985
Special Student, Science, Technology, and Society, Massachusetts Institute of Technology, 1984

PEER-REVIEWED PUBLICATIONS:

- “Ordering the Discipline: Classification in the History of Science,” introduction to a Focus Section, *Isis* (September 2013): 537-539.
- “Bibliography Is Social: Organizing Knowledge in the *Isis* Bibliography from Sarton to the Early Twenty-First Century,” part of a Focus Section, *Isis* (September 2013), pp. 540-550.
- “History of the World History of Science Online Project,” *Acta Baltica Historiae et Philosophiae Scientiarum* (in press, 2013).
- “La classification des sciences n’a jamais cessé d’évoluer’: A Century of Effort at Putting Science in Its Place,” pp. 307-328, in Ana M. Alfonso-Goldfarb et al., eds. *Centenário Simão Mathias: Documentos, Métodos e Identidade da História da Ciência* (São Paulo: PUC-SP; Imprensa Oficial, 2009).
- “The *Isis* Bibliography from Its Origins to the Present Day: One Hundred Years of Evolution of a Classification System” *Circumscribere* 6 (2009): 26-46.
- “Totalitarianism, Democracy, and the Science-Religion Dialog during the Second World War,” in Philip Kevin Goff, ed., *God and the Good War* (submitted August 2007; under review)
- “American Jews and the Ideology of Modern Science,” 745-747, in Stephen H. Norwood and Eunice G. Pollack, eds., *Encyclopedia of American Jewish History*, vol. 2 (ABC-CLIO, 2007)
- “Humanism, Secular, U.S.” *Dictionary of the History of Ideas* (2004)
- “Postmodernism” and “Social Construction.” *Science and Religion: A Historical Introduction*. Ed. Gary B. Ferngren. Baltimore: Johns Hopkins, 2002. (Republication of two articles that appeared in 2000. Both contain new introductions.)
- “Deism,” “Postmodernism,” “Secular Humanism,” and “Social Construction of Science.” In *The History of Science and Religion in the Western Tradition: An Encyclopedia*. Ed. Gary B. Ferngren, Edward J. Larson, and

Darrel W. Amundsen. New York: Garland, 2000

EDITED PUBLICATIONS:

Isis Current Bibliography, vol. 93 (2002) – vol. 103 (2012)

DOCTORAL DISSERTATION:

“The Humanist Enterprise from John Dewey to Carl Sagan: A Study of Science and Religion in American Culture,”
University of Wisconsin, Madison, 1997

PROFESSIONAL BLOGS:

Citations: A View from the Bibliographer’s Desk (2013-present)
World History of Science Online (2012-present)

CONFERENCE AND SYMPOSIUM ORGANIZING:

Session co-organizer for “The Isis Bibliography and the Profession: Past, Present, and Future” symposium at History of Science Society Meeting, Boston, Massachusetts, November 21, 2013.
Conference planner for “Isis CB 2.0,” an international research conference with 15 invited guests and over 20 local participants, held in the History of Science Collections of the University of Oklahoma, Norman, Oklahoma, supported primarily with funds from the Alfred P. Sloan Foundation.
Session co-organizer for “The Tools of Research and the Craft of History” symposium at 5ESHS, Athens, November 1-3, 2012.
Session organizer for “Science and the New Media” symposium at ICHST, Budapest, Summer 2009.
Session organizer for “Classification in the History of Science,” a 2-session symposium at the History of Science Society meeting, Phoenix, November 20-21, 2009.

OTHER PUBLICATIONS:

“Searching Smartly in the HistSciTechMed Database,” with Sam Spence and Kim Rudolph, *History of Science Society Newsletter* (39:2, April 2010): 26-40.
“Humanism and Eugenics: A Case Study of Herman J. Muller,” 139-149, in *Humanism Today*, ed. Howard B. Radest (Prometheus, 2007)
“The Academy and the Pulpit: 1930s-Style Humanism at Columbia University.” *Religious Humanism* 32, nos. 1 & 2 (Winter/Spring 1998): 29-50
“In Defense of Science: Secular Intellectuals and the Failure of Nerve Thesis.” *Religious Humanism* 30, nos. 1 & 2 (Winter/Spring 1996): 30-39

SELECTED PAPERS AND PRESENTATIONS:

“How Are Historians Using the Isis Bibliography Today? Current Trends and Historical Research Practices,” co-written with Amy Rodgers, History of Science Society Meeting, Boston, Massachusetts, November 21, 2013.
“Digital Classification and Tagging of Bibliographical Objects in the Isis History of Science Data,” co-presented with Sylwester Ratowt, Digital HPS Meeting 2013, Bloomington, Indiana, September 7, 2013.
“Digital Perturbations in the Ecology of Knowledge: Analysis of a Survey of Historians’ Use of the *Isis Current Bibliography of History of Science* in Both Print and Digital Forms,” co-written with Amy Rodgers, 24th International Congress of History of Science, Technology and Medicine, Manchester, UK, July 26, 2013.
“The Culture of Research in History of Science: The Social and Ethical Aspects of Research Tools at the Dawn of the Digital Age,” 5th European Society for the History of Science conference, Athens, Greece, November 3, 2012.
“The World History of Science Online: Organizing Scholarly Resources on the Web,” co-author of paper presented by Biruté Railienė, International Baltic Conference on the History of Science 2012, Vilnius, Lithuania, October 4-6, 2012.
“Digitizing Bibliography: On the Impact of Electronic Media on Classification in the History of Science,” Three Society Conference, Philadelphia, Pennsylvania, July 13, 2012.
“Humanism, the ‘Sacraments of Science,’ and the Secularizing of American Culture after 1945,” History of Science Department Colloquium, April 15, 2011
“Secular Humanism,” Unitarian Universality Fellowship, Norman, Oklahoma, December 5, 2010
“Hypatia and the Library of Alexandria in the motion picture *Agora*.” The Naturalist Society of Norman, November 21, 2010; and History of Science Club, February 2011
“World History of Science Online: Preparing for the Future of Information Discovery,” delivered at the History of

- Science Society Meeting, Montreal, November 6, 2010
- “Hopes, Fears, and Discontent in America: Four Decades of Anti-Evolutionism and Anti-Creationism” Darwin 2009, Sam Noble Oklahoma Museum of Natural History, August 27, 2009.
- “The Cost of Free Access: Making the Isis Bibliography Available on the Open Internet.” History of Science and the New Media: Resources for Connecting the Global Community of Scholars, 23rd International Congress of History of Science and Technology (ICHST), Budapest, Hungary, July 29, 2009.
- “貴重本が語る天文学の革命” [Translated title: The Story of the Scientific Revolution in Astronomy as Told through Rare Books] Ishikawa Kousen, Tsubata, Japan. Tuesday, January 9, 2008.
- “La classification des sciences n’a jamais cessé d’évoluer”: A Century of Effort at Putting Science in Its Place.” Centenário Simão Mathias: Documentos, Métodos e Identidade da História da Ciência, CESIMA, Pontifícia Universidade Católica de São Paulo, August 29, 2008
- “International Collaboration through WHSO (World History of Science Online): Technical and Social Issues.” Future Proof IV: International Scientific Archives Conference, Royal Swedish Academy of Sciences, Stockholm, Sweden, Friday, April 25, 2008
- “Francis Schaeffer and the Understanding of Modern Science in an Evangelical Context.” History of Science Society Annual Meeting, Arlington, Virginia, November 2, 2007
- “Scientific Talk as a Medium for Negotiating Human Values: A Study of Fundamentalist-Humanist Interaction in Late 20th-Century America.” History of Science Colloquium, University of Oklahoma, March 9, 2007
- “Evolution, Religion, and Science in 20th Century America.” Renaissance Project Symposium on Science, Religion, and the Law in U.S. Politics and Society, University of Oklahoma, February 2, 2006
- “The *Isis Bibliography of the History of Science: Attempting a Global Survey.*” XXII International Congress of History of Science, Beijing, July 24-30, 2005
- “Humanistic Psychology and Liberal Religion in America, 1950-1980.” History of Science Society Annual Meeting, Austin, Texas, November 19, 2004
- “Forum Discussion on Classification.” Moderator and Presenter. History of Science Society Annual Meeting, Cambridge, Massachusetts, November 22, 2003

GRANTS AND AWARDS:

- University of Oklahoma, Supplemental Grant for Conference on Proposal Development for Isis CB 2.0 (\$2,500)
- Sloan Foundation, Conference on Proposal Development for Isis CB 2.0 (\$13,000)
- Editing subvention for *The Scientific Spirit of American Humanism* (working title), University of Oklahoma, 2011 (\$2000)
- Junior Faculty Summer Fellowship, University of Oklahoma, 2005. (\$6,000)
- Travel funding for XXII International Congress of History of Science in Beijing, University of Oklahoma, 2005
- National Science Foundation, travel grant, “Disseminating Darwin” Conference in Dunedin, New Zealand, 1994
- National Science Foundation, Dissertation Improvement Grant, 1993-1994. (\$5,000)

PROFESSIONAL SERVICE COMMITTEES

- OU Undergraduate Scholarship Committee (2013)
- World History of Science Online, Chair, Governing Board (International Union for the History and Philosophy of Science/Division of History of Science and Technology) (2007-present)
- Darwin@OU2009 Steering Committee, Chair (2008), Member (2009)
- Graduate Studies Committee, History of Science Department, Chair and Graduate Advisor (2007-2012), Graduate Liaison (2012-present)

CV: Gavan McCarthy

Date of Birth: 17 September 1956

Address: 5 Camden Road, Hawthorn Victoria

Academic Qualifications and employment history

Masters of Arts (Archives and Records), Monash University, 1995

Bachelor of Arts (Hons), LaTrobe University, 1980

Academic Career 2007 to present

2013 January 1 to present: **Associate Professor and Director, eScholarship Research Centre.** University Library, Academic Research (Continuing) Level D [Position 0022060]

2009 September 7 to 2012 December 31: **Director, eScholarship Research Centre and Senior Research Fellow.** University Library, Academic Research (Continuing) Level C [Position 0022060]

2007 January 1 to 2009 September 6: **Director, eScholarship Research Centre and Senior Research Fellow.** Vice Principal Information and Planning Office, Academic Research (Continuing) Level C [Position 0017915]

Research

Grants (from 2007)

Since 2005 I have been a Chief Investigator on 8 Australian Research Council funded projects (2 Discovery; 4 Linkage and 4 LIEF):

Australian Research Council Linkage Grant 2012-2014: LP120200367. *The Trailblazing Women and the Law Project.* Chief Investigators: Prof Kim Rubenstein, Mr **Gavan McCarthy**, Ms Helen Morgan

Australian Research Council Linkage Grant 2012-2014: LP120100220. *Building Futures for Young Australians at risk: a coordinated measurement framework and data archive.* Lead Institution: The University of Melbourne. Chief Investigators: Professor Johanna Wyn; Mr **Gavan McCarthy**. Budget: : ARC contribution \$218,000, Total budget \$293,000 3 year. ESRC allocation \$100,000

Australian Research Council LIEF Grant 2011: LE110100049. *Establishment of the Australian data archive: an integrated research facility for the social sciences and humanities.* Chief Investigators: Mitchell, Prof Deborah; Dr Benjamin Evans; Dr Steven McEachern; Mr **Gavan McCarthy**; Dr John Byrne; A/Prof Michele Haynes; Dr Toby Burrows; Dr Lynda Cheshire; Prof David Denmark; Prof Mark Western; Prof Lorraine Mazerolle; Prof Paul Ashton; Prof Nicholas Nakata; Prof Paul Memmott; Prof Ian McAllister; Dr Edith Gray; Prof Alastair Pennycook; Prof John Cordery; A/Prof Julie McLeod; Prof John Wiseman; Prof Sharon Parker; Dr Andrea Gaynor. Budget: ARC contribution \$600,000, Total budget \$1,100,000 1 year. ESRC allocation \$130,000.

Australian Research Council LIEF Grant 2011: LE110100136 *Saulwick Age poll archive: a national facility of authoritative records mapping a generation of social change at the end of the 20th Century.* Lead Institution: The University of Melbourne. Chief Investigators: Considine, Prof Mark; Dr Denis Muller; Mr **Gavan McCarthy**; Prof Toni Makkai; Prof Murray Goot. Budget: ARC contribution \$140,000, Total budget \$240,000 1 year allocated to the ESRC.

Australian Research Council LIEF Grant 2009: LE0989083 *Australian Social Science Data Archive: Provision of Advanced Research Infrastructure and Collaborative Environment.* Chief Investigators: Dr DA Mitchell; Dr BJ Evans; Prof MC Western; A/Prof DN Denmark; Mr **GJ McCarthy**; Prof NM Nakata; Prof L Mazerolle; Dr JA Byrne; Prof JR Wiseman; Dr MP Crozier; A/Prof AT Kenyon; A/Prof JE McLeod; Prof CB Ferguson; Prof PR Boreham; Dr LA Cheshire; Dr TN Burrows; Dr RJ Denning; Prof Dr LY Behrendt; Prof A Jakubowicz; Prof PF McDonald; Prof I McAllister; Dr EE Gray; Dr LR Smith; Mr SC Hungerford; Ms SK Holloway. Budget: ARC contribution \$550,000, Total budget \$1,000,000 1 year. ESRC allocation \$120,000

Australian Research Council Linkage Grant 2008-2011: LP0883232. *Who am I? The archive as central to quality practice for current and past care leavers.* Lead Institution: The University of Melbourne. Chief Investigators: Humphreys, Prof Cathy; Prof Shurlee Swain; Mr **Gavan McCarthy**; A/Prof Andy Brown-May; Ms Coleen Clare; Ms Muriel Bamblett; Ms Chris Asquini. Budget: ARC contribution \$496,325, total budget ~\$900,000, 4 years, ESRC allocation \$300,000

Australian Research Council Discovery Grant 2007-2011: DP0771033. *Founders and Survivors: Australian Lifecourses in Historical Context.* Lead Institution: The University of Melbourne. Chief Investigators: Dr Hamish John Maxwell-Stewart, Dr Rebecca Kippen, Prof Janet Susan McCalman, Mr **Gavan John McCarthy**, Dr Ralph Shlomowitz, A/Prof Alison Jane Venn, A/Prof David George Meredith, Dr Shyamali Chandrika Dharmage. Budget: ARC contribution \$600,000 5 years, ESRC allocation \$500,000

Publications – Peer reviewed only

Books

McCarthy, Gavan, *Guide to the Archives of Science in Australia: Records of Individuals*, D.W.Thorpe, Melbourne, **1991**, 302 pp.

Book Sections (2007 onwards)

Smith, Len; McCalman, Janet; Anderson, Ian; Smith, Sandra; Evans, Joanne; **McCarthy, Gavan** and Beer, Jane. 'Chapter 1. Fractional Identities: the Political Arithmetic of Aboriginal Victorians', In Per Axelsson, and Peter Sköld, eds. *Indigenous Peoples and Demography: The Complex Relation between Identity and Statistics*. Berghahn Books, Oxford, **2011** [354 pages, 1 map, 26 figures, 36 tables, ISBN 978-0-85745-000-5 Hb]

Vines, Richard; Hall, William and **McCarthy, Gavan**, 'Textual representations and knowledge system support systems in Research Intensive Networks'. In Cope, W. Kalantzis, M., and Magee, L., *Towards a Semantic Web: Connecting Knowledge in Academic Research*. Chandos Publishing Ltd, Oxford, **2011**, pp. 145-195

McCarthy, Gavan and Evans, Joanne. "Archival Documentation" in *Encyclopedia of Library and Information Science*. Marcia Bates and Mary Maack, eds. The Encyclopedia Group, Taylor and Francis Group LLC, New York. Final draft accepted for publication January **2009**.

Evans, Joanne and **McCarthy, Gavan**. "Mapping the Socio-technical Complexity of Australian Science: From archival authorities to networks of contextual information", in Jean Dryden (ed), *Respect for Authority: Archival Control, Context Control and Archival Description*, The Haworth Information Press, **2007**, New York, pages 149-175 [Doi:10.1300/J201v05n01_08]

McCarthy, Gavan, 'Finding a future for digital cultural heritage resources using contextual information frameworks', in Kenderdine, S; Cameron, F. (ed.), *Digital Cultural Heritage: a critical discourse*, Refereed work, MIT Publishing, Boston, USA [in print], **2007**.

Journal Articles (1999 onwards)

Vines, Richard; Jones, Michael; and **McCarthy, Gavan** "Collaborating across institutional and jurisdictional boundaries: enabling the emergence of a national innovation system through public knowledge management" *Knowledge Management Research & Practice*, 19 August **2013**, pp. 1-11 [DOI: 10.1057/kmrp.2013.41]. Online at: <http://www.palgrave-journals.com/kmrp/journal/vaop/ncurrent/full/kmrp201341a.html>

Downing, Melissa; Jones, Michael; Humphreys, Cathy; **McCarthy, Gavan**; O'Neill, Cate; and Tropea, Rachel "An educative intervention: assisting in the self-assessment of archival practice in 12 community service organisations", *Archives and Manuscripts*, vol. 41 no. 2 July **2013**, pp. 116-128 [DOI: 10.1080/01576895.2013.810552]

McCarthy, Gavan; Swain, Shurlee and O'Neill, Cate "Archives, identity and survivors of out-of-home care" [Editorial] ", *Archives and Manuscripts*, vol. 40 no. 1 March **2012**, pp. 1-3 (ISSN 0157-6895) [DOI:10.1080/01576895.2012.680247]

McCarthy, Gavan and Evans, Joanne “Principles for archival information services in the public domain”, *Archives and Manuscripts*, vol. 40 no. 1 March **2012**, pp. 54-67 (ISSN 0157-6895) [DOI:10.1080/01576895.2012.670872]

McCarthy, Gavan; Smith, Ailie and Zinn, Jens “Knowledge for the ‘Risk Society’ – Developing and International Social Science Risk Database (ISSRD)”, *Archives and Manuscripts*, vol. 39, no. 2, November **2011** pp. 23-47 (ISSN 0157-6895)

McCarthy, Gavan, ‘Mapping the past: Building public knowledge places to meet community needs’, *Circumscribere*, vol. 10, **2011** pages 1-9

Smith, Len; McCalman, Janet; Anderson, Ian; Smith, Sandra; Evans, Joanne; **McCarthy, Gavan** and Beer, Jane. “Fractional identities: the political arithmetic of Aboriginal Victorians”, *Journal of Interdisciplinary History*, vol. 38, **2008** no. 4, pp. 533-551

Evans, Joanne and **McCarthy, Gavan**. “Mapping the Socio-technical Complexity of Australian Science: From archival authorities to networks of contextual information”, *Journal of Archival Organisation*, Volume 5, Issue 1/2, Spring **2007**, (ISSN: 1533-2748) [DOI: 10.1300/J201v05n01_08] Note: Authors are listed in alphabetical order.

McCarthy, Gavan, ‘The role of context in sustaining knowledge of radioactive waste’, *Archives and Manuscripts*, vol. 34, no. 1, May **2006**, pp. 144-161.

Hagan, James; **McCarthy, Gavan**; Smith, Bruce; Wells, Andrew, 'Unlocking Global Memory', *Southern Review*, vol. 38, no. 1, **2005**. Note: Authors are listed in alphabetical order.

McCarthy, Gavan, 'The Overland Telegraph and Undersea Cable: Australia's First Electronic Information Network', *Australasian Science*, vol. 22, no. 10, **2001**, p. 46.

McCarthy, Gavan, 'Australian Science and Technology Heritage Centre: Networking Australia's Cultural Heritage', *Lasie*, vol. 31, no. 2, June **2000**, pp. 33-38.

McCarthy, Gavan, 'The Structuring of Context: New possibilities in an XML enabled World Wide Web', *Journal of the Association for History and Computing*, Refereed article, vol. III, no. 1, April **2000**. Also available at <http://mcel.pacificu.edu/JAHC/JAHCIII1/ARTICLES/McCarthy/index.html>.

McCarthy, Gavan, 'Utilizing the web to build a network of archival authority records', *Janus*, Refereed article, vol. 1, International Council on Archives, **1999**, pp. 96-107.

Conference Papers (1999 onwards)

McCarthy, Gavan; Jones, Michael; Vines, Richard and Lewis, Antonina, ‘Context Entity Analysis: Using public domain knowledge to build information infrastructure’, refereed paper accepted for the *Knowledge Cities World Summit*, Italy, June **2012**, 21 pages

Vines, Richard; **McCarthy, Gavan**; Kirk, Chris, and Jones, Michael. ‘Cities, human well-being and the environment: conceiving national regulatory knowledge systems to facilitate resilient knowledge, knowledge based development and inter-generational knowing’, in *Knowledge Cities World Summit*, Melbourne Exhibition and Convention Centre, Victoria, Australia, **2010**. <http://repository.unimelb.edu.au/10187/9036>

McCarthy, Gavan and Upshall, Ian, 'Using contextual information frameworks to maintain knowledge of radioactive waste', in *Proceedings of the International Conference on Politics and Information Systems: Technologies and Applications (PISTA'05)*, 14-17 July 2005, Refereed article, International Institute of Informatics and Systematics, Orlando, Florida, USA, **2005**, pp. 31-36. Also available at <http://www.austehc.unimelb.edu.au/~gavan/pubs/COFL-2005-04-26-McCarthy-PISTA05.pdf>.

McCarthy, Gavan, 'Engineering Utility: a visionary role for encoded archival authority information in managing virtual and physical resources', in *AusWeb99 - The Fifth Australian World Wide Web Conference*, 17-20 April 1999, Refereed article, Ballina, NSW, **1999**. Also available at <http://ausweb.scu.edu.au/aw99/papers/mccarthy/paper.html>. Details

Kerry V. Magruder

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 The John H. and Drusa B. Cable Chair
 University of Oklahoma Libraries
 401 W. Brooks, Rm 521
 Norman, OK 73019-0528 USA
 405/325-2741, kmagruder@ou.edu; ouhos.org



Education

- 2003 MLIS., School of Library and Information Science, University of Oklahoma
 Thesis: "A Bibliography and Reference Analysis of Thomas Burnet, *The Theory of the Earth* (1684)"; <http://kvmagruder.net/pdf/Magruder-2003.pdf>
- 2000 Ph.D., History of Science, University of Oklahoma.
 Dissertation: "Theories of the Earth from Descartes to Cuvier: Natural Order and Historical Contingency in a Contested Textual Tradition"
<http://kvmagruder.net/pdf/Magruder-2000.pdf>
- 1985 M.A., Science Education, Truman State University
- 1983 B.A., Biology, Truman State University

Academic Positions

Curator, History of Science Collections, University of Oklahoma Libraries, 2009-present
 Librarian, History of Science Collections, University of Oklahoma Libraries, 2004-2008
 Acting Librarian, History of Science Collections, University of Oklahoma Libraries, 2000-2003
 History of Science Department, University of Oklahoma, 2000-present
 Assistant Professor of Natural Sciences and Planetarium Director, Oklahoma Baptist University, 1994-1998

Select Professional Presentations

- "Islamic Science," invited presentation, University of Oklahoma - Tulsa, 11/21/2013.
- "Boldly Exploring: The History of Science and Science Education," invited keynote presentation, Oklahoma Science Teachers Association annual conference, 11/2/2013.
- "Johann Kepler: Life and Works," invited presentation, Okie-Tex Star Party, 10/3/2013.
- "Early Microscopy and Galileo's World," invited keynote, Oklahoma Microscopy Society annual meeting, Oklahoma Academy of Sciences, University of Central Oklahoma, 11/2012.
- "Global Visions: Depictions of Spaceship Earth before Apollo," invited colloquium presentation, Departments of Meteorology and Earth Sciences, Texas Tech University, April 27, 2012.
- "Progress report: The OU History of Science Collections Online Galleries," NSF Digitization Workshop, Einstein Papers Project, Cal Tech, Pasadena, CA, 4/14-17/2011 (invited).
- "The University of Oklahoma Libraries' Galileo and Darwin Collections," OU College of Dentistry, honor banquet speaker, 4/9/2011.
- "The OU History of Science Online Galleries," NSF Digitization Workshop, Marine Biological Laboratory, Woods Hole, MA, 2/25-28/2010 (invited).
- "Online Images and Learning: Going Beyond Visual Aids"; invited presentation, History of Science Society annual conference, Phoenix, AZ, 11/20/2009.
- "The Works of Charles Darwin: A Guided Tour," banquet presentation for the Bizzell Society, Oklahoma City, 4/30/2009.
- "Geology and Ancient Wisdom: The Enigma of John Whitehurst," paper presented at the annual meeting of the Geological Society of America, Houston, Texas, 10/8/2008.
- "The Works of Galileo: A Guided Tour"



- Many venues, including: University of Arkansas, Fort Smith, 1/21/2010; Okie-Tex national star party, 9/18/2009; International Year of Astronomy lecture series, Sam Noble Oklahoma Museum of Natural History, 1/21/2009; NASA Research Center, Langley, VA, 7/8/2008; Virginia Air & Space Center, Hampton, VA, 7/8/2008; Michigan State University, 4/12/07; New Mexico State University, February 24th, 2006; Truman State University, April 1, 2005; Fermilab National Accelerator colloquium, Chicago, February 4, 2004; and Florida State University, October 23, 2003.

“Copernicus and his *Revolutions*: A Guided Tour”

- University of Arkansas, Fort Smith, 1/21/2010; Okie-Tex national star party, 9/17/2009; Florida State University, 1/24/08; Michigan State University, 4/11/07.

“Biblical Idiom and Global Depictions in Theories of the Earth,” annual Symposium of INHIGEO in Eichstätt, Germany, July 27 - Aug 5 2007.

“Global Depictions in Theories of the Earth,” annual Symposium of INHIGEO in Prague, Czech Republic, July 2005.

Publications

Kerry V. Magruder, “Global Visions and the Establishment of Theories of the Earth,” *Centaurus* 2006, 48: 234-257.

Kerry V. Magruder, “Understanding a Contested Print Tradition: Bourguet’s Mosaic, Platonic and Aristotelian Theories of the Earth,” *The Compass: The Earth-Science Journal of Sigma Gamma Epsilon* 2008, 81: 9-25; part of a special issue on the history of geology edited by Daniel F. Merriam.

Kerry V. Magruder, “Thomas Burnet, Biblical Idiom, and 17th-Century Theories of the Earth,” in Jitse M. van der Meer and Scott Mandelbrote, eds., *Nature and Scripture in the Abrahamic Religions: Up to 1700*, Brill’s Series in Church History, no. 36 (Leiden: Brill, 2008), 2 vols., vol. 2, pp. 451-490.

Kerry V. Magruder, “The Idiom of a Six Day Creation and Global Depictions in Theories of the Earth,” in Martina Kölb-Ebert, ed., *Geology and Religion: Historical Views of an Intense Relationship between Harmony and Hostility*, Geological Society of London Special Publications, no. 310 (London: The Geological Society of London, 2009), 49-66.

Kerry V. Magruder, “Jesuit Science after Galileo: The Cosmology of Gabriele Beati,” *Centaurus* 2009, 51: 189-212.

Kerry V. Magruder, *A Living Library: The Growth of the History of Science Collections after “Roller-Goodman,” 1976-2012* (Summer/Fall 2012). See exhibits, below.

Exhibits, History of Science Collections

2008: Content consultant for Huntington Library exhibition “Beautiful Science: Ideas that Changed the World”; opening ceremony and banquet (10/31/08).

2009-2010: “Darwin at the Museum”: A joint exhibition by the Collections & the Sam Noble Oklahoma Museum of Natural History; Oct 10, 2009 through January 18, 2010.

2012-2013: “The Living Library: The Growth of the History of Science Collections after ‘Roller-Goodman,’ 1976-2012.” With interactive iPad exhibit guide available from the Collections blog (<http://ouhos.org/2012/08/15/new-exhibit-a-living-library/>), iTunes U (<https://itunes.apple.com/us/course/living-library-exhibition/id656745239>), and from the iBookstore (<https://itunes.apple.com/us/book/a-living-library/id684342640?mt=11>).

Honors, Grants, Awards

- The John H. and Drusa B. Cable Chair of the History of Science Collections, 9/26/2011.
- Election to membership in INHIGEO, the International Commission for the History of the Geosciences, Fall 2004 (one of 11 American members at time of election).

Appendixes

Appendix – Endnotes

Appendix A: Institutional support of the Isis Bibliography and Isis Document Indexing Platform

Appendix B: Data flow, dissemination, and publication of the Isis Bibliography dataset

Appendix C: Activities and products of the two-year development project for the Isis Document Indexing Platform

Appendix D: Timeline of Development of the Isis Document Indexing Platform

Appendix E: User Survey Results

Appendix F: HSS Letter of Support

Appendix - Endnotes

¹ A recent study of historians shows how digital practices have been incorporated into scholarly research, see Jennifer Rutner and Roger C. Schonfeld, *Supporting the Changing Research Practices of Historians* (Ithaca S+R, December 10, 2012), <http://www.sr.ithaka.org/research-publications/supporting-changing-research-practices-historians>.

A recent paper co-authored by Weldon discusses the effectiveness of social media for many historians of science: Stephen Weldon and Amy Rodgers, “How Are Historians Using the Isis Bibliography Today? Current Trends and Historical Research Practices,” History of Science Society Meeting, Boston, Massachusetts, November 21, 2013.

² Manfred D. Laubichler, Maienschein, and Jürgen Renn, “Computational Perspectives in the History of Science: To the Memory of Peter Damerow,” *Isis* 104, no. 1 (March 1, 2013): 119–130, doi:10.1086/669891.

³ Gavan McCarthy was instrumental in the development of the Australian Science Archives Project, which pioneered the development of national information services and infrastructure to support the history of Australian science, technology, medicine and engineering through the utilization of emerging digital technologies. The commercial success of the archiving software developed by his team, led to the creation of a research center, the Australian Science and Technology Heritage Centre.

The system that currently hosts the Isis database prototype as well as the World History of Science Online is the Online Heritage Resource Manager (OHRM). The eSRC uses the OHRM technology to run many of its signature projects, such as the Encyclopedia of Australian Science and The Australian Dictionary of Biography Online. This work includes projects for the

national government, which uses the OHRM work to document human resources and index archival material.

⁴ Colin Allen is professor of cognitive science at Indiana University. He works on philosophy of biology and cognitive science. He has received funding from the National Science Foundation and several grants from the National Endowment for the Humanities for his work in digital humanities. He directs the NEH-funded Indiana Philosophy Ontology (InPhO) project and is Associate Editor of the Stanford Encyclopedia of Philosophy.

⁵ The University of Melbourne Library will also host a stable digital archive of the Isis bibliography project going back to 2000.

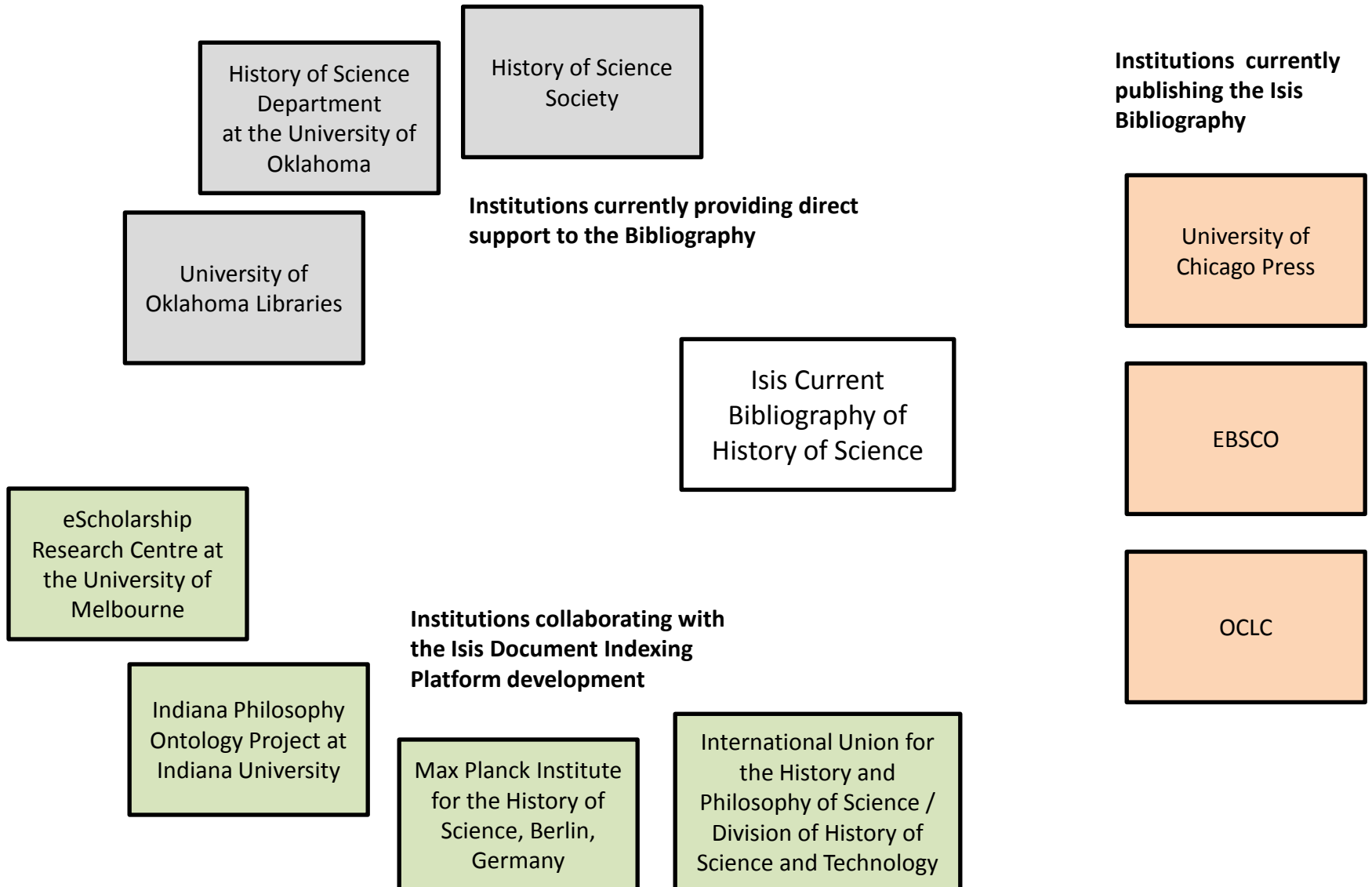
⁶ This will be done using a dynamic citation display software such as Zotpress (<http://wordpress.org/plugins/zotpress>). Zotpress dynamically displays the current contents directly from an online Zotero library, including live links to items with a URL source field. Given the size and complexity of the bibliography, it is clear that we will need some programming to develop the interface for it.

⁷ The conference agenda, readings, and other information can be found at <https://ou-lib-hos.atlassian.net/wiki/display/IsisConference/Isis+CB+2.0+Conference>.

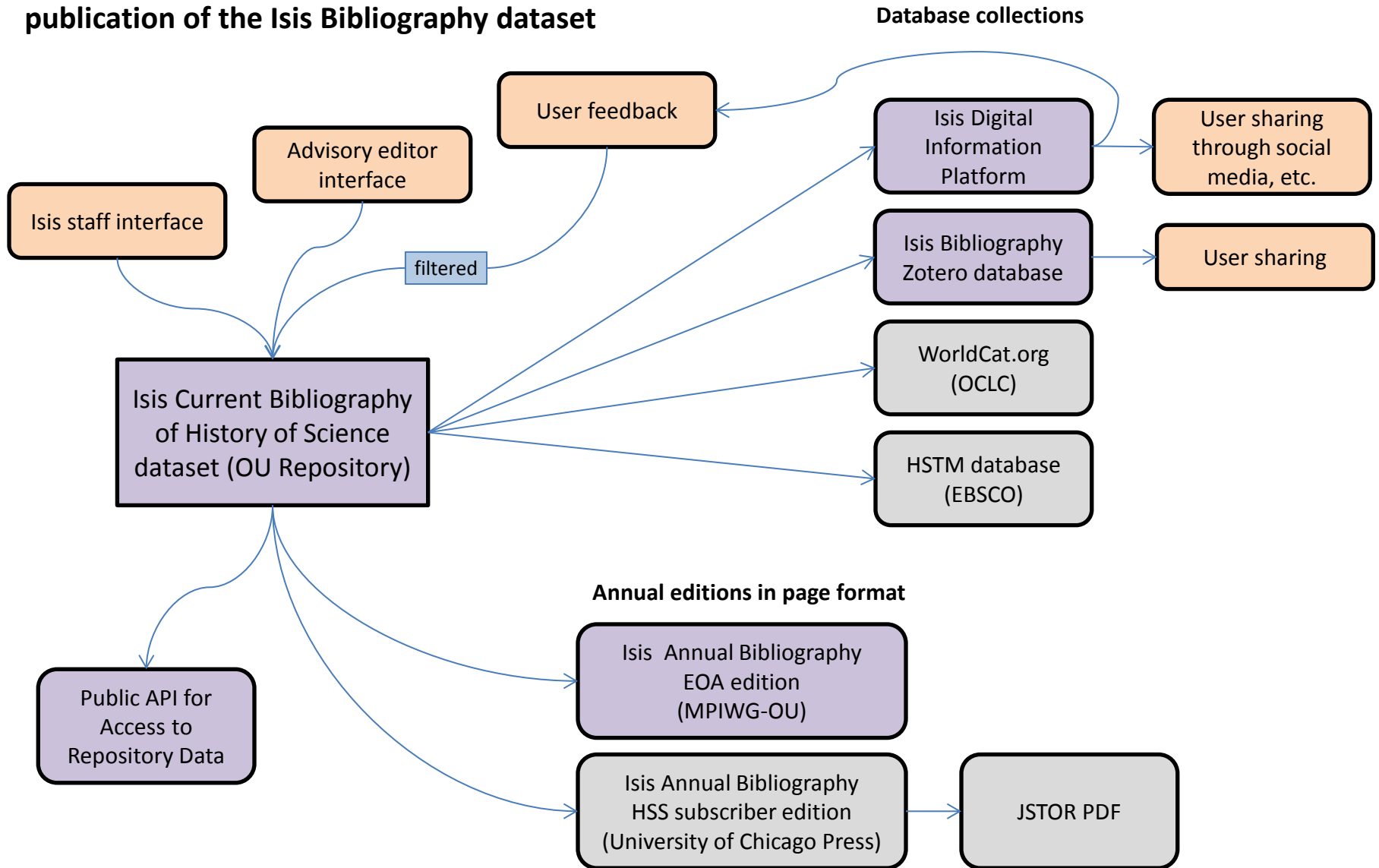
Participants from out of town included: Jennifer Alexander (University of Minnesota); Colin Allen (Indiana Philosophy Ontology Project, Indiana University); Emanuela Appetiti (National Museum of Natural History, Smithsonian Institution); Marcia H. M. Ferraz (Center Simão Mathias of History of Science, Pontifical Catholic University); Daniel Goldstein (University Library, University of California, Davis); Manfred Laubichler (Arizona State University); Henry Lowood (Stanford University Libraries); Jane Maienschein (Arizona State University); Gavan McCarthy (eScholarship Research Centre, University of Melbourne); Birute

Railiene (Wroblewski Library of the Lithuanian Academy of Sciences); Sylwester Ratowt (Independent Scholar); Sage Ross (Wikimedia Foundation); Sean Takats (Roy Rosenzweig Center for History and the New Media, George Mason University); Alex Wellerstein (Center for History of Physics, American Institute of Physics). Participants from the University of Oklahoma Libraries included David Corbly; Janet Brennan Croft; Carl Grant; Rick Luce; Kerry Magruder; JoAnn Palmeri; Karen Rupp-Serrano; and Brian Schults. Participants from the Department of History of Science at the University of Oklahoma included Margaret Gaida; Hunter Heyck; Suzanne Moon; Jared Neumann; Katherine Pandora; Amy Rodgers; Carolyn Scarse; John Stewart; Stephen Weldon; and Royline Williams-Fontenelle. Participants from the Department of Computer Science at the University of Oklahoma included Sayantani Satpathi and Chris Weaver.

Appendix A: Institutional support of the Isis Bibliography and Isis Document Indexing Platform



Appendix B: Data flow, dissemination, and publication of the Isis Bibliography dataset



Note: Items in color are to be part of the new platform. Items in grey are existing publications.

Management and
promotion

Public
Promotion

Management:
Editorial and
Organizational

Establishing
the Repository

Building the
Staff Interface

Infrastructure
development

Building the
Database
Backend

Ontology
Development

**Appendix C: Activities and products of
the two-year development project for
the Isis Document Indexing Platform**

Publishing
Edition Open
Access (print
and ePubs)

Legacy Data
Conversion
(print to Linked
Open Data)

Public Web
Interface with
User Accounts

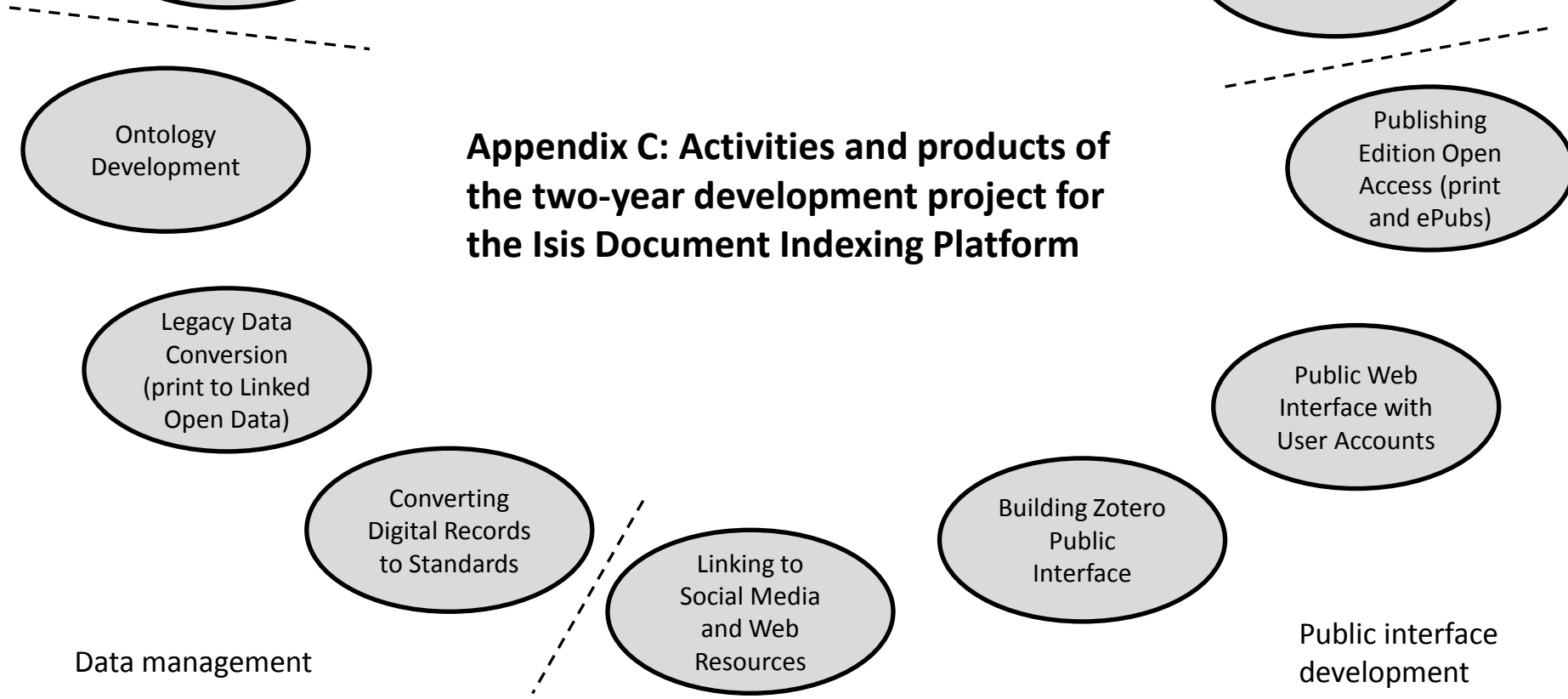
Converting
Digital Records
to Standards

Linking to
Social Media
and Web
Resources

Building Zotero
Public
Interface

Data management

Public interface
development



Appendix D: Timeline of Development of the Isis Document Indexing Platform

(outline numbers in red refer to sect. 4 of the proposal document)

September 2013	Establishing public communication (ongoing) V. (1)
December 2013	Select standards II. (1)
March 2014	Establish a governing board I. (1) Assemble Isis staff I. (2) Convert digital records to standards; establish URIs for each record II. (2)
June 2014	Build open-access print and e-print platform IV. (1) Ingest non-text-based web resources from WHSO database II. (3)
September 2014	Extract more information from citation data III. (1) Enhance thesaurus content III. (2) Build API for storage and transfer of data IV. (2)
December 2014	Build input interface for bibliography staff IV. (3)
March 2015	Prepare and ingest legacy print data (1913-1973) II. (4) Build APIs for user access IV. (4) Build first generation user interface IV. (5) Grants for big data research and tool building V. (2) Create a board of editors for special fields V. (3)
June 2015	Determine relationships among different schemas III. (3) Harvest information from external authority records III. (4)
September 2015	Test algorithms that use linked authorities III. (5) Build Zotero interface IV. (6)
December 2015	Mirror the platform site at OU IV. (7) Establish cross-project links with other online resources V. (4)

Appendix E: User Survey Results

In February and March of 2013, Weldon conducted a survey of scholars who work in the discipline of history of science.¹ Just over two thirds of the 675 respondents were members of the History of Science Society,² which means that about two hundred respondents were not members of the Society, which gave me broader coverage, especially internationally.³ Respondents' ages ranged from 22 to 95. A majority of them were residents of North America (62%), but a large number live in Western Europe (28%), and some were from other countries (10%).

The survey indicated that the Isis Bibliography remains a valuable tool for historians of science. Only about 10 percent of respondents stated that the bibliography did not fit their needs. The restricted-access database hosted by EBSCO was considered by most people to be the most

¹ Weldon posted a questionnaire online through Survey Monkey, an online survey service. Weldon advertised the survey in emails using the History of Science Society membership list, in targeted emails to specific departments of history of science in the United States, to the H-Net history of science user forum and the Mersenne history of science listserv, and in a couple of other locations in order to contact scholars from around the globe. Of 675 people who answered the questionnaire, 69% stated that they were members of the History of Science Society and about the same number of people said that they used the bibliography for their research.

² The number of HSS members who took the survey was 468, which is 24% of the Society membership.

³ The non-members were much more international and somewhat younger overall than the members who took the survey.

valuable format, with 82% of the respondents finding it either essential or useful to their research.⁴ The hardcopy was valued somewhat less, but a very large majority of 76% found it either useful or essential. The PDF was considered useful or essential by 60% of respondents.

To understand what people thought ought to be changed in the bibliography, the survey asked respondents to choose from a list of possible features ones that they might use, and then it asked them to explain the bibliography's current deficiencies.

When asked about features that they might use, several digital tools were indicated. Personal accounts where users could upload documents, save searches, and share work, found broad appeal across all age groups. Over half of the respondents thought the possibility of sharing unpublished research through the bibliography would be useful. Citation reference software is now seen to be an important tool for about half of the survey population.⁵ Most answers showed a clear age correlation, with young and middle-aged scholars in their 30s, 40s, and 50s favoring digital and network-communication tools more than older scholars. Younger scholars were more excited about using social media tools for their research. And many of them now share bibliographical references online.

⁴ Of those surveyed, 46% found it essential, and 36% found it useful. The database is available only through library subscription or through individual HSS-member login. The regional distribution of this database is quite limited with nearly 79% of all institutional subscriptions coming from North America, 13% from the United Kingdom, and the remaining 8% scattered among 9 subscriptions in France, Australia, Germany, and Lebanon.

⁵ A total of 51% of respondents found these tools "Not important at all."

When asked about deficiencies in the current bibliography, the answers ranged widely, and Weldon identified over twenty categories. The most frequent comments concerned access, communication, content, interface, and timeliness.

(1) *Access.* In terms of access, many people believed that an open access version of the

bibliography was necessary and that it needed to be publicized much more widely (some of the respondents had never even heard of the Isis Bibliography before they took this survey, and even many HSS members were unaware that they had access to it).

(2) *Communication.* Many respondents believed that there needed to be much more

communication between historians who produce and use the bibliography and the bibliographer. This is especially true when it comes to difficult-to-find works and works that fall outside of the Anglo-American and Western European context.

(3) *Content.* Lack of content in those same areas mentioned in point (3) above proved to be a

common criticism of the bibliography, and many people suggested that the bibliographer build more collaborations with scholars outside of America in order to help remedy this problem.

(4) *Interface.* Several different problems were noted with the current digital interface. These

included difficulty in performing searches, an inability to save search results for future use, and lack of support for common bibliographical software. Some complained that the Isis Bibliography did not have search features common in other databases.

(5) *Timeliness*. Finally, many people complained of timeliness. It takes too long according to some users for material to make its way into the database, and in an environment in which scholars are looking to find new work rapidly, this situation can be a serious liability.

Overall, the survey revealed that while people highly valued the bibliography, they wanted it made better. People wanted the bibliography's features expanded, making it more interactive and compatible with existing citation reference tools. Age was a key factor in the way that they approached digital media. Although scholars into their 90s support new digital tools, early career scholars have clearly adopted new practices that make digital access to the bibliographical data especially important. Building for the future of the discipline, means building digitally.



Established in 1924

Sponsor of *Isis* and
Osiris

July 23, 2013

Dr. Stephen Weldon
Department of History
University of Oklahoma
Norman OK

Dear Stephen,

The Executive Committee of the History of Science Society has reviewed your proposal to the Sloan Foundation. We endorse this project and congratulate you on your efforts to provide a more powerful bibliographic tool for scholars. The officers of the Society will be eager to learn more as you project unfolds.

Yours truly,

A handwritten signature in black ink that reads 'Lynn K. Nyhart'. The signature is written in a cursive style with a large initial 'L'.

Lynn K. Nyhart
HSS President