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Column Editor's Note. *This JLA column posits that academic libraries and their services are dominated by information technologies, and that the success of librarians and professional staff is contingent on their ability to thrive in this technology-rich environment. The column will appear in odd-numbered issues of the journal, and will delve into all aspects of library-related information technologies and knowledge management used to connect users to information resources, including data preparation, discovery, delivery and preservation. Prospective authors are invited to submit articles for this column to the editor at kenning.arlitsch@montana.edu*

MAKING SENSE OF RESEARCHER SERVICES

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ABSTRACT. *Researcher services have proliferated in recent years and numerous free or fee-based sites now promise increased visibility and impact for authors or contributors of publications and other research products. Not all services have the same goals, however, and it can be difficult to know with which services researchers should engage. In this article we establish three categories (au-*

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thor/researcher identification, academic/professional networking, and reference/citation management) and examine nineteen services that fit into those categories.

KEYWORDS *researchers services, citation management, academic networks, researcher networks, researcher identification, author identification*

INTRODUCTION

Researchers struggle to gain recognition for their work in the increasingly crowded publication environment. No longer is it sufficient to publish an article in a commercial or Open Access journal and then wait for it to be read and cited by colleagues. Active promotion of scholarship has become another aspect of the publication cycle. Moreover, the current dearth of assistance and expertise in this area forces most authors to struggle alone. In such an environment, there exist opportunities for libraries to develop services that help increase the visibility and recognition of an author's work.

Increased visibility can lead to more citations, which remain the proven currency of the academic promotion and tenure system. Although growing emphasis on altmetrics may be slowly changing the definition of scholarly impact, current promotion and tenure requirements continue to focus on research funding and citations as measurable evidence of research impact. Researcher funding and author citations also drive reputation and ranking of research universities, in turn positively affecting enrollment and financial health of the institution.

In recognition of the importance of such measures and in support of the Open Access movement, academic libraries have developed various scholarly communication services. Institutional repositories, data management, and copyright services are points along the spectrum of library-based researcher services that are growing to include identifiers, professional networking, and citation management. Recent years have seen a proliferation of both commercial and non-profit services that help researchers increase visibility and recognition of their work.

A plethora of digital researcher services exist to effort to enhance discoverability, shareability, and citability of researchers and their scholarship. Aims of these services vary and may include: creating unique identifiers for researchers, increasing the visibility of individuals, and enhancing the discoverability of scholarly products. Given the growing importance of researcher services, this article has two-pronged purpose:

1. Define terminology related to researcher services;
2. Categorize and provide a systematic overview of selected researcher services.

A NOTE ON TERMINOLOGY

As with any new field, terminology in the area of researcher services is fluid. Therefore, before diving deeper into specific features, allow us to first define the categories we use in this article. Our method divides the overarching term “researcher services” into three categories:

1. *Author/Researcher Identification*—these services provide some necessary infrastructure that may be used in the other two categories, such as unique identifiers and name disambiguation
2. *Academic and Professional Networking*—most succinctly described as “social networking for academics,” these services focus on connecting users based on research interest, affiliation, geography, or other variables.
3. *Reference and Citation Management*—while these tools and services include some of the functionality and features of other categories, they are distinct given their primary focus on management of citations that a researcher compiles for use within a publication or for sharing with other researchers.

Given overlapping functionality of services, these are not three discrete categories. Nevertheless, this method of categorization identifies substantive differences and broad commonalities among the various researcher services. Moreover, this method of categorization helps provide some much needed clarity to a diverse and robust landscape. Short descriptions will allow us to dive deeper into the particularities of each service, and we offer an overview of selected characteristics to help compare each service (see Table 1).

REVIEW OF LITERATURE

Increased recognition from networking and collaboration can lead to material gains, such as increased funding from granting agencies (Ebadi & Schiffauerova, 2015). Funding agencies may also favor established researchers with proven track records, thereby avoiding perceived risks associated with lesser-known scholars (Daniels, 2015). Increased visibility leading to more citations may help researchers establish credibility and reputation.

It is not uncommon for researchers to create their own websites or social media profiles to promote their scholarship. However, content presented on personal websites, institutional websites, or social media is not likely to provide the visibility or carry the recognition of internationally-recognized services dedicated to the needs of researchers. Indeed, research demonstrates an increase in publication downloads as a result of “increased SEO [search engine optimization] rankings through inbound links from highly ranked websites” such as LinkedIn or Academia.edu (Kelly & Delasalle, 2012). There-

TABLE 1. Overview of researcher services.

Name	Functionality					Free or Fee	Affiliation	Comments
	Persistent and Public Digital Identifier ^a	Networking	Reference and Citation Management	Free or Fee	Affiliation			
Academia.edu	No	Yes	Yes	Free	Private company	Limited to individuals affiliated with Dutch universities and/or research institutions		
Digital Author Identifier (DAI)	Yes	No	No	Free	NARCIS			
EndNote Flow	No	Yes	Yes	Free and Fee ^b	Thomson Reuters	Integrates with ResearcherID Flow is scheduled to merge with RefWorks on January 18, 2016		
	No	Yes	Yes	Free and Fee	ProQuest			
figshare	No	Yes	Yes	Free	Digital Science	Provides bi-directional synchronization with ORCID		
Google Scholar	No	No	Yes	Free	Google	Highly automated publication matching open-source		
ImpactStory	No	Yes	Yes	Fee	Non-profit	Allows listing of publications		
ISNI	Yes	No	No	Free	OCLC			
LinkedIn	No	Yes	No	Free and Fee	Publicly traded company			
Mendeley	No	Yes	Yes	Free and Fee	Elsevier	Slated for integration into Microsoft's existing Bing search service		
Microsoft Academic Search	No	No	Yes	Free	Microsoft			

ORCID	Yes	No	Yes	Free	Non-profit	Able to exchange data with figshare, ResearcherID, and Scopus Author ID upon request
RefWorks	No	No	Yes	Free	ProQuest	RefWorks is scheduled to merge with Flow on January 18, 2016
ResearchGate Researcher ID	No Yes	Yes Yes	Yes Yes	Free Free	Private company Thomson Reuters	
Scopus Author ID	Yes	Yes	Yes	Free	Elsevier	Bi-directional exchange of citations with ORCID
VIAF	Yes	No	No	Free	OCLC	Unidirectional transfer of citations to ORCID
VIVO	No	Yes	Yes	Free	Cornell University and University of Florida	Built from library name authority files open-source
Zotero	No	Yes	Yes	Free and Fee	George Mason University	open-source

^aWhile many researcher services (e.g., Google Scholar) utilize persistent digital identifiers behind the scenes, these differ in function and scope from publicly visible persistent digital identifiers. Persistent and public digital identifiers (e.g., ORCID) not only work behind the scenes to organize data, but provides a readily available method for distinguishing among researchers.

^b“Free and Fee” denotes the availability of a free version with limited functionality as well as pay-to-use version with enhanced functionality. Those services that offer a free trial, but require payment for continuation of a user account are denoted as “Fee.”

fore, it seems the quality of exposure on the Internet matters, perhaps more so than the quantity.

The need for researcher identifiers is clear, as names are not unambiguous enough to assert that one person is not another. The surnames Kim, Lee, and Park account for nearly one-half of all Koreans (Ghosh, 2013). “Nguyen” is a surname held by 40% of the Vietnamese population, far more common than “Smith” or “Jones” in European and American populations (Enserink, 2009). Given such ambiguity, the ability to track citations for researchers is severely hampered without unique identifiers.

Ambiguities even occur within single authority files of names and can include problems of pseudonyms and various roles played by an individual over the course of his or her life and career (Hickey & Toves, 2014). Names also change through marriage, divorce, or other life circumstances. A number of researcher identification services have been created in recent years to combat such ambiguity, but the quantity of services and diversity of features has made it difficult to know with which ones to engage.

Keyword searches of several databases were performed to understand the availability and breadth of research in the area of researcher services. Given the aforementioned inconsistent and often unclear terminology in research literature, we utilized the following terms: “researcher profile systems,” “researcher profile sites,” “academic profile platforms,” “academic network sites,” “academic profiling sites,” “citation management,” “academic networks,” “researcher networks,” “researcher identification,” “author identification.” Although keyword searches yielded few articles specific to this topic of researchers services, we identified several tangential articles (Ebadi & Schiffauerova, 2015); (Enserink, 2009); (Nentwich & König, 2014); (Ward, Bejarano, & Dudás, 2015). A number of articles investigated the purpose, functionality, and/or potential of a single service (Butler, 2012); (Schubert & Holloway, 2014); (Zaugg, West, Tateishi, & Randall, 2011) or provided a comparative look at two services (Kelly & Delasalle, 2012); (Van Noorden, 2014).

In addition to keyword searches, we reviewed all bibliographies yielded from articles to gather additional relevant research not captured via keyword searches. Articles gleaned from bibliographies included further insight from various topics, including: author self-promotion (“Author Resource Centre,” 2015); (“Help Readers Find Your Article,” 2016); libraries and researcher services (Bosman, 2015); bibliometrics, altmetrics, and academic social networks (Ortega, 2015); information and communications technology (ICT), research, academic networks, and knowledge construction (Montoya & Soledad, 2012).

The article most aligned with our research explains how “academic network sites have indeed become a part of the researchers’ professional life” in Norway (Mikki, Zygmuntowska, Gjesdal, & Al Ruwehy, 2015). The research team analyzed data from five “academic network sites”

(ResearchGate, Academia.edu, Google Scholar Citations, ResearcherID, and ORCID) in combination with demographic information from Norway's Current Research Information System (CRISTin) database in order to understand prevalence throughout Norway as well as variations by age, gender, and discipline. Building upon the foundation provided by Mikki and colleagues, our research broadens the geographic parameters as well as the number of platform to provide a close look at 19 Internet-based researcher services.

What follows is a systematic overview of services that aim to increase the visibility and recognition of an individual's scholarly activity. Although it is a large list, it is almost certainly incomplete. Services featured herein are included because of their large number of users, widespread availability, or because they were revealed through our review of the literature.

OVERVIEW OF SERVICES BY CATEGORY

Author/Researcher Identification

Researcher identifier services are intended to assign unique and unambiguous identifiers to people who conduct research and publish their findings. While identification systems have long existed for published works (ISBN, DOI, ISSN), the very idea of assigning numbers to people raises concerns about privacy and conjures Orwellian visions. Despite such concerns, the creation of unique and persistent digital identifiers furthers efforts for author disambiguation, helping to automatically recognize and gather the right publications, and aiding in greater visibility and wider recognition of scholarly activity. Each of the following services utilizes differing methods of author identification according to its own metrics and data sources. To a greater or lesser extent, each service attempts to automatically match publications with a researcher identity.

Although this article focuses on individuals, it should be noted that identifiers are also needed for organizations. Identifier systems for organizations may prove more difficult because organizational identity includes a series of legal issues, hierarchical ambiguity, and maintenance concerns. Nevertheless, visibility and recognition of organizations is also an important consideration in the fabric of researcher services for many of the same reasons that are important to the individual (e.g., funding, networking). Additionally, organizational visibility and recognition bolsters an individual's ability to be identified.

Digital Author Identifier (DAI)

Since 2007, every author employed at a Dutch university or research institute has received a unique national number (DAI) (Enserink, 2009). Developed

by SURF (the collaborative information and communications technology organization for Dutch higher education and research) in cooperation with OCLC PICA, DAI is the only independent, non-commercial identification number for Dutch researchers. Each DAI corresponds to a researcher page within the National Academic Research and Collaborations Information System (NARCIS)—the Dutch national portal for information about researchers and their work. The information found on the researcher page in NARCIS is drawn from the NARCIS database which is populated by various institutional repositories. DAI not only distinguishes between authors who share the same name, it also attributes publications using variations of an author's name including name changes resulting from marriage, divorce or other circumstances. Therefore, DAI aims to ensure that all of an author's publications can be traced, regardless of how his or her name is reported on individual publications. Although its comprehensiveness is impressive and offers a potential model, the applicability of DAI is limited to individuals affiliated with Dutch institutions.

Google Scholar Citations

A small organization within the search engine and Web services giant, Google Scholar has emerged as perhaps the single largest academic search engine on the Web. In addition to harvesting and indexing millions of peer-reviewed and non-peer-reviewed articles from publishers and open repositories, Google Scholar also offers individuals the ability to create profile pages using Google Scholar Citations. Quick to establish, easy to maintain, and largely automated, a Google Scholar Citations profile offers two primary benefits for researchers: (1) list of publications and (2) citation metrics. Built upon the robust Google Scholar foundation, this author/researcher identification service matches and automatically updates publications that it thinks are associated, thereby decreasing the time and effort required for maintenance. Alternatively, researchers can review updates before they are added to the publication list or opt to manually update articles. Google Scholar uses statistical modeling to differentiate among authors, nevertheless disambiguation is an ongoing challenge. If the automatic update system improperly associates article(s), an author has the opportunity to dismiss incorrect matches using a straightforward delete function. In addition to listing publications, Google Scholar Citations tracks citations using platform-dependent h-index, i10-index, and total number of citations. Citation metrics are computed and updated automatically as Google Scholar finds new citations for an author's work. While a private profile affords users full Google Scholar Citations functionality (e.g., list of publications and citation metrics), a verified public profile adds the additional benefit of making the profile suited for inclusion

in Google and Google Scholar results when people search for an author's name.

International Standard Name Identifier (ISNI)

The International Standard Name Identifier (ISNI) is managed by OCLC, certified by the International Standards Organization (ISO), and casts a wide net to cover not only researchers and authors, but also artists, publishers, inventors and performers. It is part of a family of international standard identifiers that includes identifiers of works, recordings, products and right holders in all repertoires, e.g., DOI, ISAN, ISBN, ISRC, ISSN, ISTC, and ISWC. ISNI holds public records of over 8.99 million identities, including: 8.46 million individuals (of which 2.55 million are researchers) and 525,636 organizations. According to its website, ISNIs are created after combing through hundreds of databases and are “assigned when there is a high level of confidence in matching new names to existing names in the database” (ISNI International Agency, n.d.). Once created, ISNI URIs are published as Linked Open Data along with their metadata, making them a potentially powerful source of authoritative information on the Semantic Web. The ISNI website also facilitates “enrichments, clarifications, and corrections” of metadata.

Microsoft Academic Search

Initially developed as a competitor to Google Scholar, Microsoft Academic Search is a beta service to explore data mining, named-entity disambiguation, and visualization corresponding to scholarly publications (Knies, 2014). Microsoft describes Microsoft Academic Search as an experimental research service developed to explore how scholars, scientists, students, and practitioners find academic content, researchers, institutions, and activities, and further states that the service is “not intended to be a production Web site” and that its existence as a separate site will likely cease upon conclusion of the research project (“Help Center—Microsoft Academic Search,” 2013). Similar to Google Scholar in intent, Microsoft Academic Search includes a researcher profiling and identification service. In addition to indexing academic publications, Microsoft Academic Search also strives to place research into context—displaying key relationships between and among subjects, content, and authors. An author profile is automatically created when a publication is added to Microsoft Academic Search. Unlike most author/researcher identification services, Microsoft Academic Search allows any user (signed in via Microsoft, Facebook, Yahoo!, or Google credentials) to modify basic profile information and/or publications about any other user. As noted by Van Noorden, the service's failure to “track even a fraction of

papers published since 2011” (Van Noorden, 2014) is a significant shortcoming. Despite its experimental status, lackluster performance, and corresponding criticism, Microsoft Academic Search is slated for integration into Microsoft’s existing search services. This appears to be an effort to differentiate itself from its main competitor, Google Scholar. Rather than use a separate search engine for academic information and scholarly content, all Microsoft search activity will appear in Bing search results (Knies, 2014).

ORCID

The Open Researcher and Contributor ID (ORCID) positions itself as an “an open, non-profit, community-driven effort to create and maintain a registry of unique researcher identifiers and a transparent method of linking research activities and outputs to these identifiers” (ORCID, Inc., n.d.). First proposed in 2009 it quickly gained the support of 23 organizations, including numerous commercial publishers (“Credit where credit is due,” 2009). It generates identifiers to individuals and organizations on request, and it also provides APIs for authentication and for systems to communicate with one another. Some publishers have begun to integrate ORCID into their publication mechanisms. ORCID allows the user to create a profile that includes resume-like elements such as education, employment, funding and publications. ORCID features the Über Wizard, which is a subcontracted service that, when authorized, connects to the researcher’s institution to extract funding award information. However, the wizard currently has limited application for librarians as it does not recognize funding sources such as the Institute for Museum and Library Services (IMLS) and the Andrew W. Mellon Foundation. ORCID can exchange data with figshare, ResearcherID, and Scopus Author ID upon request, although the exchange is not always bi-directional (see Scopus Author ID, below).

ResearcherID

A product of Thomson Reuters, ResearcherID generates identifiers for researchers and allows them to create profiles that include their titles, institutional affiliations, research interests and publication lists. It leverages other Thomson Reuters products by integrating with EndNote, a popular citation manager, and with Web of Science. It also provides the ability to associate with ORCID. ResearcherID creates publication lists when the author uploads them through EndNote, manually, or by searches conducted in Web of Science (Thomson Reuters, 2015b) (ResearcherID Web site). It exchanges data nicely with ORCID, so it’s a simple process to keep publication lists updated in ResearcherID, although some manual deduplication may be necessary.

There is a bulk uploading feature called ResearcherID Upload, which allows authorized members of an academic institution to create accounts en masse and upload associated publications, but it “requires familiarity with XML and Web service protocols” (Thomson Reuters, 2015a).

Scopus Author ID

Scopus is an abstracting/indexing service of the Elsevier Publishing Group that draws its information only from peer reviewed journals. Unlike Google Scholar it does not harvest from blogs, institutional repositories, or other Web sites. Like ResearcherID it also generates an identifier for the researcher, and it integrates with Elsevier’s SciVal product and ORCID. But while ResearcherID allows data transfer with ORCID in both directions, Scopus is currently only able to deliver its records to ORCID. Development is in the works for Scopus to be able to receive records from ORCID as well, and Elsevier says that functionality should be in place during the latter part of 2016 (Azoulay, 2016).

VIAF

The Virtual International Authority File is an OCLC-led project that has gathered tens of millions of names from authority files held in national libraries and other agencies around the world. The aim is to create “controlled entities and the relationships between them” (Hickey & Toves, 2014), by generating a “merged ‘super’ authority record” from the various authority files (OCLC, Inc., n.d.). VIAF is therefore not a system that individual users can engage with; individual records cannot be edited although they may be redacted from the database (Hickey & Toves, 2014). Another limitation of VIAF is that because its names are drawn from library authority files, they tend not to include article level authors unless those persons have significance in other contexts. VIAF is expected to play a potentially powerful role in providing linked data for the Semantic Web because it creates authoritative entities with relationships.

Academic and Professional Networking

Academic and professional networking platforms assist researchers in creating and maintaining a digital network among other researchers, academics, and organizations. By creating a user profile within a given platform, a researcher is able to provide information about his or her own work unique to each platform’s fields (e.g., publications, employment history, education background). Unlike the auto-matching common to author/researcher

identification services, the information provided in this category is more likely to be user-generated. Similar to other popular social media (e.g., Facebook), academic and professional networking platforms enable researchers to link through user-initiated searches and/or platform suggested connections based upon research interest, affiliation, geography, or other variables. It is yet to be determined whether the establishment of connections initiates collaboration or furthers research, funding, or related resources.

Academia.edu

Founded in 2008 with a goal of making academic research freely and widely available, Academia.edu is part repository, part social network, and part analytics monitoring. Registration on the site is free and allows users to connect with colleagues, post their own publications, and track the readership of their work. Following an Open Access model, Academia.edu allows users to download all papers posted to the site at no charge. As of January 2016, Academia.edu reports 8,325,534 papers have been added by the 30,148,823 academics who have signed up for the platform (Academia.edu, 2016). Users are provided Web analytics corresponding to profile views, document views, unique visitors, referring sites, keywords, etc. Academia.edu uses two metrics to report relative popularity of papers and authors. PaperRank is a function of the number of recommendations a paper has received, weighted by the AuthorRanks of the recommenders. AuthorRank is a function of the PaperRanks of the papers on the author's profile. In short, an Academia.edu user whose papers have high PaperRanks will have a high AuthorRank. A report published on the Academia.edu Web site by Academia.edu employees, (Niyazov et al., n.d.) claimed that "a typical article posted on Academia.edu receives approximately 41% more citations compared to similar articles not available online in the first year after upload, rising to 50% after three years, and 73% after five years." A previous version of the article claimed 83% more citations after five years, but that number was revised after criticism in *The Scholarly Kitchen* (Davis, 2015). In late 2013 Elsevier (shortly after purchasing Mendeley) issued takedown notices to Academia.edu as well as a number of universities and colleges in effort to remove unauthorized copies of articles published in Elsevier journals (Peterson, 2013). Although there has not yet been any additional legal action, as Wecker explains (Wecker, 2014), takedown requests are "cause for concern for academics who are drawn to the site precisely because it promises to disseminate their research." Moving forward, it will be interesting to see how academic publishers respond to the growing popularity and evidence-based importance of academic social networking sites such as Academia.edu.

Impactstory

Impactstory is an open-source, Web-based tool that helps scientists explore and share the diverse impacts of all their research products. While many researcher services give preference to publications (i.e., articles and books), Impactstory allows users to upload various types of research products (e.g., datasets, figures, preprints, published articles, slides, software, etc.). Impactstory aims to help scientists tell data-driven stories about their impacts in effort to build a new scholarly reward system that values and encourages Web-native scholarship (ImpactStory Team, n.d.). In many ways a hybrid researcher service, Impactstory is part LinkedIn (e.g., online CV), part Google Scholar (e.g., links to publications, bibliometrics, altmetrics), part VIVO and figshare (e.g., repository for data, slidesets, etc.). There are three methods for adding content to an Impactstory profile:

1. Linking accounts for continuous import from figshare, Github, Google Scholar, ORCID, Publons, slideshare, Twitter
2. Adding products individually by ID (i.e., Article PMIDs, Article DOIs, Dataset DOIs, GitHub repo URLs, Webpage URLs, Slide deck URLs, Video URLs)
3. Sending an email (publications@impactstory.org) whenever a user publishes something new

Intending to uncover and share all impact from every research product, Impactstory measures and reports a variety of metrics. As of January 2016, Impactstory reports more than 40 measures of impact from 18 platforms, with plans to add yet more (“Metrics,” n.d.). Similar to Academia.edu’s PaperRank and AuthorRank, Impactstory provides metrics corresponding to the profile as well as the owner’s scholarly products. A non-profit, Impactstory provides a free 30-day trial. Thereafter, \$60/year is required to maintain an active account.

LinkedIn

As the self-proclaimed “world’s largest professional network,” LinkedIn includes “more than 400 million members in 200 countries and territories around the globe.” Broader in scope than many of the other researcher services described in this article, LinkedIn seeks to “create economic opportunity for every member of the global workforce” (LinkedIn Corporation, 2016). Profiles are free to create and enable users to build professional identity and stay in touch with colleagues, classmates, and collaborators. Unlike other researcher services, LinkedIn requires users to manually update publication listings and other CV information. As a business-oriented social network, LinkedIn focuses on the discovery of professional opportunities, business

deals, industry news and insights. Beyond the free basic version, LinkedIn offers four premium versions with unique features for particular objectives (i.e., Job Seeker, Sales Navigator, Recruiter Lite, Business Plus) available with subscription fee. With its 2015 purchase of lynda.com and unveiling of University Pages (a profiling and ranking system), LinkedIn is increasingly involving itself in higher education (Fain, 2015). While most of these new features are geared toward prospective students and young alumni, academic researchers should watch future developments. Connectivity, visibility, and reputation of individual researchers will likely hold implications for institutions and vice versa. Given its broad scope, researchers will find LinkedIn suitable for creating and consuming content from academic as well as non-academic networks.

ResearchGate

Founded in 2008, ResearchGate aims to connect researchers and make it easy to share and access scientific output, knowledge, and expertise (ResearchGate GmbH, 2016a). Free to join and easy to establish, profiles are designed to help users connect with people, discover research, and view jobs. After inputting name, institution, and email information, ResearchGate attempts to attribute publications to a new user. Selecting “I am the author” or “This is not me” helps ResearchGate better identify which publications are likely attributed to a user. During this stage, ResearchGate also looks for name variations, further improving the accuracy of publication matching. Articles can be added to a ResearchGate profile via three quasi-automated options: author name matching, publication searching, reference manager (via import of BibTex, RIS, MODS, RefWorks, Refer/BibLX, Dblp, or XML), as well as entirely manual entry. Users can also add conference papers, working papers, negative or raw data, and other types of research content for which ResearchGate will create a free DOI. Dissatisfied with how the “dissemination of knowledge was slowed down by the way those papers were published and stored” (Madisch, 2015), ResearchGate strives to speed up the cycle of scientific feedback and influence by allowing users to link to upload full-text versions of publications. Based upon a user’s self-identified disciplines, subdisciplines, skills, and expertise ResearchGate creates a unique publication feed to help a user discover relevant content, researchers, and job opportunities. ResearchGate provides a variety of metrics to measure a user’s science impact. “Reads” is a single metric to measure exposure of all a user’s work on ResearchGate. It tracks the number of times someone: (a) reads the full-text or summary of any type of research on ResearchGate; or (b) downloads a file hosted on ResearchGate, including direct downloads from search engines. “Citations” shows both what a user has cited as well as where the user’s work has been cited and is automatically updated when

ResearchGate finds new or previously omitted citations. “Profile Views” measures how many people visit a ResearchGate profile, including country and research institution. ResearchGate also provides a comprehensive “RG Score” designed to measure scientific reputation based on how other researchers interact with a user’s content, how often, and who they are. Additionally, ResearchGate ranks institutions by the sum of RG Scores of their individual members (ResearchGate GmbH, 2016b).

VIVO

VIVO is an open-source Semantic Web application designed to enable team-based, interdisciplinary, cross-institutional, discovery of research and scholarship. The software and ontology support recording, editing, searching, browsing, and visualizing various types of scholarly activity. Populated with detailed researcher profiles (e.g., publications, teaching, services, and affiliations), VIVO provides powerful search functionality for locating people and information across disciplines and institutions. VIVO relies upon data imported from authoritative sources including institutional records (e.g., human resources, course listings, faculty activity information, etc.), bibliographic indexes, and grant databases. VIVO can also be supplemented with manual entry. The semantic functionality relies upon the integration of several existing ontologies (e.g., BIBO, Dublin Core, Event, FOAF, geopolitical, SKOS). VIVO data is annotated based on the VIVO ontology to semantically represent and integrate information about faculty research (i.e., educational background, publications, expertise, grants), teaching (i.e., courses, seminars, training), and service (i.e., organizing conferences, editorial boards, other community services) (Börner, Conlon, Corson-Rikert, & Ding, 2012). Unlike other researcher services addressed in this article, VIVO operates at an institutional scale rather than solely an individual level. Institutions can participate in the VIVO network (and by extension the Semantic Web) by installing and using the application and associated linked data. The requirement for local installation sets it apart from other networking services described here, and thus requires local administration resources. VIVO currently offers a multi-site search prototype (vivosearch.org) that allows users to sample the rich data available in VIVO from people, papers, grants, events, organizations, and concepts at eight universities.

Reference and Citation Management

Citation managers are highly useful tools that make it very easy to gather, manage, and store references and integrate citations into a research publication. Most facilitate a wide variety of publication types and allow citations

to be gathered simply by pasting a DOI or ISBN, from which the software then locates and structures the full citation. Citation managers generally offer cloud-based storage of limited size for free, and then a fee structure for storage increments. Some have plug-in software for popular word processors like Microsoft Word and will generate properly formatted in-text citations and bibliographies in a variety of accepted styles, such as APA, Chicago, Harvard, MLA, or Turabian. While it may seem peculiar to include reference and citation management platforms when discussing researcher visibility, these platforms maintain an important role within the researcher services landscape. Not only are reference and citation management services used widely throughout academe, but they are becoming increasingly connected with networking sites and identification services.

EndNote

EndNote, owned by Thomson Reuters, is a reference management and bibliography creation platform. The freely available, online-only package provides a basic citation manager with limited storage (50,000 references and 2GB of attachments). Presently, collaboration capabilities allow for sharing libraries with a small group of people. EndNote X7, the most recent premium edition available for purchase, provides unlimited storage and various advanced and customizable features (e.g., Cite While You Write, hyperlinked in-text citations, personalized rankings, read/unread status, PDF auto-importer, etc.). Available both online and as desktop software, EndNote X7 includes more than 6,000 reference styles, provides continuous background synchronization of all content (i.e., citations, attachments, reference groups and annotations), and enables users to share libraries with up to 14 collaborators. An EndNote account provides access to an online community where researchers can discuss research, ask questions, and receive feedback on ideas from a diverse group of peers, either privately with select users or publically with the entire EndNote community (Thomson Reuters, n.d.). As both services are owned by Thomson Reuters, an EndNote online profile integrates with a user's ResearcherID profile. This synchronization makes a ResearcherID publication list easily accessible within EndNote, thereby combining the authority and disambiguation of an author/researcher identification service with the outputting functionality of a reference and citation management service.

figshare

figshare is an online storage platform for researchers to share a variety of research products, such as datasets, graphics, presentations, posters, etc.

The service is free and includes 20GB of free private space and unlimited public space. In addition to preserving research output, figshare aims to enhance research impact by improving the dissemination, discoverability, and reusability of research content. Users can mark uploaded content with tags and metadata to improve searchability and discoverability. Project spaces allow users to share private data and collaborate with select figshare members. All publicly available research content (stored under Creative Commons Licenses) on figshare is provided a DataCite DOI, making it easier for others to use and cite the content. As an ORCID launch partner, figshare integrates seamlessly and features bi-directional synchronization with ORCID. This ensures all publicly available figshare outputs are added to a user's ORCID account and an ORCID publication list will populate within a figshare profile. Released in 2014, figshare for institutions provides administrators with various metrics to understand and control the reporting, management, dissemination of all digital research data at a university. figshare tailors its institutional service to accommodate university branding, storage needs, and research intensity. Costs vary with the unique needs of an institution.

Flow

Flow is a relatively new Web-based reference and document manager from ProQuest. Designed to facilitate cloud-based, team-oriented research, Flow offers a basic version for free with limited storage (2GB) and collaboration (up to ten people) as well as an upgraded pay-to-use version with greater storage (10GB), more robust collaboration (including annotation), and analytics reporting. Flow synchronizes a user's reference library with Microsoft Word and/or Google Docs to provide cite-while-you-write functionality. With an available plug-in, users are able to import citations from Web pages, tag and organize searches, import PDFs into the system, sync with Dropbox, and export references. ProQuest has announced that as of January 18, 2016, Flow will be integrated with RefWorks, its long-time citation management product (conversation with product manager at ProQuest booth, ALA Boston).

Mendeley

Mendeley serves as both a citation management platform and author/researcher identification service. Originally developed by an independent company as an open-science forum designed to capture alternative metrics to the traditional researcher impact factor, Mendeley was controversially bought by Elsevier in 2013 (Dobbs, 2013). Currently, Mendeley functions in both the desktop and online environments to manage references and create bibliographies, collaborate in public and private groups, and de-

velop a researcher profile to showcase interests and expertise. Mendeley also provides statistics about researcher readership and usage of a user's publications. Current research about Mendeley focuses on the service's role in enhancing altmetrics or its ability to more accurately capture researcher impact (Haunschild & Bornmann, 2016); (Fairclough & Thelwall, 2015). Subscribers initially sign up for free and have the opportunity to pay for increased storage space and enhanced group functionality.

RefWorks

RefWorks is a longstanding commercial, Web-based citation management software from ProQuest. In this system, users store and access reference libraries online, which can also be shared. RefWorks subscribers can link to e-journals that the institution subscribes to and collaborating websites in order to create a streamlined research and citation process. Users also have the opportunity to import RefWorks into MS Word documents to create in-text citations and bibliographies. ProQuest has announced that as of January 18, 2016, RefWorks will merge with Flow, another ProQuest reference and document manager.

Zotero

Zotero bills itself as a “free, easy-to-use tool to help you collect, organize, cite, and share your research sources.” Created by the Roy Rosenzweig Center for History and New Media at George Mason University, Zotero is an open-source research tool that can run as a stand-alone version (Windows, Mac, or Linux) or integrated within the Firefox Web browser, responsive to the content that the researcher is viewing (Cohen, 2008). Both versions include plug-ins for MS Word or LibreOffice, allowing easy import of citations into a document and automatic creation and updating of bibliographies. Users can pay a fee to receive more storage space. Beyond citation services, Zotero offers group and community functions. In a group, researchers share sources, collaborate, and find other researchers citing the similar works. By creating a profile, Zotero's “People” function allows the researcher to create a community and find others working on similar projects and share CVs and libraries.

SUMMARY

Researcher services have proliferated in recent years, creating a landscape that is vast with potential, but also confusing to researchers and the librarians

who work with them. The primary aim of this article was to bring some structure and description to that landscape, and to hopefully bring some clarity to the various options that are available.

We also tried to lay some groundwork on which we intend to build in later publications. In an article published in 2014, our research team introduced “new knowledge work” that libraries could engage in to develop a suite of services for constituents (Arlitsch, O'Brien, Clark, Young, & Rossmann, 2014). Those services included Semantic Web Identity, structuring metadata for search engines, centralizing faculty activity data management, developing social media strategies, and rethinking the book container through open extensible software.

The proliferation of non-profit and commercial services that we have identified in three major categories, and the growing attention being paid to them now entices us to expand the notion of new services that libraries can offer. We are convinced that researchers will benefit from having the products of their work distributed as widely as possible, and the institutions they serve will in turn benefit from their success. But, clearly, those researchers could use help in seeding and maintaining profiles in selected venues, and librarians are ideally positioned to offer such assistance. In a future article we plan to report on a framework of these services as they are currently being developed at Montana State University.

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