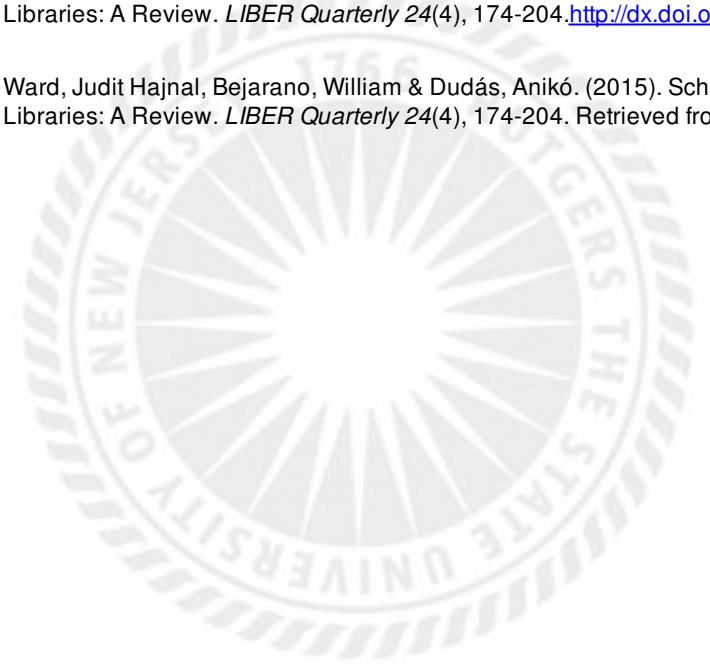
Scholarly Social Media Profiles and Libraries: A Review



LIBER QUARTERLY
THE JOURNAL OF THE ASSOCIATION OF EUROPEAN RESEARCH LIBRARIES

Vol. 24, no. 4 (2015) 174–204 | ISSN: 1435-5205 | e-ISSN: 2213-056X

Scholarly Social Media Profiles and Libraries: A Review

Judit Ward, PhD, MLIS

Rutgers, The State University of New Jersey, USA
judit.ward@rutgers.edu

William Bejarano, MA, MLIS '15

Rutgers, The State University of New Jersey, USA
bejarano@rutgers.edu

Anikó Dudás, PhD, MLIS

Pázmány Péter University, Budapest, Hungary
dudas.aniko@btk.ppke.hu

Abstract

This article aims to point out emerging roles and responsibilities for academic librarians with the potential of better integrating the library in the research process. In order to find out how to enhance the online reputation and discoverability of individual faculty members as well as their affiliated institutions, the authors worked side-by-side with researchers in the United States and Europe to explore, create, revise, and disambiguate scholarly profiles in various software applications. In an attempt to understand and organize scholarly social media, including new, alternative metrics, the authors reviewed and classified the major academic profile platforms, highlighting the overlapping elements, benefits, and drawbacks inherent in each. The consensus is that it would be time-consuming to keep one's profile current and accurate on all of these platforms, given the plethora of underlying problems, also discussed in detail in the article. However, it came as a startling discovery that reluctance to engage with scholarly social

Uopen Journals | http://liber.library.uu.nl/ | URN:NBN:NL:UI:10-1-117130

media may cause a misrepresentation of a researcher's academic achievements and may come with unforeseen consequences. The authors claim that current skills and competencies can secure an essential role for academic librarians in the research workflow by means of monitoring and navigating researcher profiles in scholarly social media in order to best represent the scholarship of their host institutions.

Key Words: altmetric; discoverability; researcher profile; scholarly selfie; scholarly social media

1. Introduction

In addition to subject-specific reference questions and literature searches, academic librarians all over the world have been assisting users routinely with topics related to citation analysis and bibliometrics in support of their research, scholarly publication, and communication. The queries are mostly related to traditional metrics, including journal impact factors and individual performance indicators, such as citation count or h-index.

More recently, however, requests also indicate a strong interest and diverse information need regarding alternative metrics, such as individual article download counts or some particular metrics provided by one of the numerous popular scholarly social media applications. While trying to make sense of the copious metrics offered by these evolving new platforms, the common feature of these inquiries led to two major questions. First, *how is it possible to compare scholarly output across these platforms*? For example, since the citation count of the same author in Web of Science, in conjunction with all metrics derived from it, significantly differs from the number provided by Google Scholar Citations, which one is correct? The second, closely related question, *where should one create an author profile?*, expresses reasonable concerns about the longevity of scholarly social media applications.

In order to answer these two seemingly simple questions, one should be familiar with not only the research workflow and the evaluation of scholarly performance, but also the current social media applications. Thus, added here is a third question, compelling for the librarian community: *what can librarians do to help researchers navigate the maze of these applications?*

2. Social media in academia

Researchers are known to follow everyday social media, such as Facebook and Twitter, with great reluctance (Mas-Bleda, Thelwall, Kousha, & Aguillo, 2014; Mendez et al., 2009). However, ignoring the scholarly applications may lead to a misrepresentation of their academic achievements and may come with unforeseen consequences, not only to them and their institutions, but also to their colleagues and students (Hajnal Ward, Bejarano, & Dudas, 2014). The complete lack of an online presence can limit a researcher's visibility, and undesirable search results may be discovered before desirable ones (Bik & Goldstein, 2013).

Scholarly reputation and discoverability of research have always been a top priority for scientists (Hoover, 2014; Peters, 2014; Woelfle, Olliaro, & Todd, 2011). With the increasing popularity of collaborative and citation management applications, as well as new metrics to track scholarly impact, social media gained a new importance in scholarly communication. Peer use and word of mouth quickly resulted in the acceptance of one or more scholarly social media platforms within a particular academic community. According to a survey conducted by *Nature* in May 2014, based on the data provided by about 3,500 scientists from 95 countries, Google Scholar is known by over 70 per cent of the respondents. ResearchGate has been found to be the best known scholarly social media platform (better known among scientists and engineers than the popular social media outlet Twitter) with 29 per cent registered in the past year. These figures refer only to scholars' familiarity with the applications, not their satisfaction. The survey also revealed that the majority of the respondents simply created and maintain their profile without using other, more advanced features offered by the applications (Van Norden, 2014). It has been also claimed that "a growing body of evidence suggests that public visibility and constructive conversation on social media networks can be beneficial for scientists, impacting research in a number of key ways" (Bik & Goldstein, 2013).

Social media for scientists have recently become a hot topic. For all the reluctance on behalf of scientists, networks proliferate (Mangan, 2012), tools have a potential to measure research impact (Haustein & Siebenlist, 2011), and scholarly social media have been reviewed extensively (Bik & Goldstein, 2013; Ortega, 2015). Different fields of science are reported to use social media in academia such as biology (Crawford, 2011), technology, engineering, and

mathematics (Galloway, Pease, & Rauh, 2013; Giglia, 2011), and humanities (Hammarfelt, 2014). Researchers are inundated with introductions as well as detailed guidelines about how to use social media in general (e.g., Goodier & Czerniewicz, 2012; Gruzd, 2012), how to benefit the most from engaging in social media (Bik & Goldstein, 2013), and how social media can enhance their visibility (Bar-Ilan et al., 2012; Giglia, 2011; Goodier & Czerniewicz, 2012).

Well-researched are the various methods of constructing metrics from social media for academic purposes, such as counting twitter citations to estimate the likely impact of articles (Eysenbach, 2011). The recently launched and still emerging field of altmetrics (Priem, Groth, & Taraborelli, 2012a) suggests new indicators of scholarly impact. The literature tends to be concerned with impact measures rather than scholarly communication itself or scholarly communication networks (Thelwall, Haustein, Larivière, & Sugimoto, 2013). Several studies analyse the relationship between traditional and alternative measures of scholarly reputation, (Ortega, 2015; Torres-Salinas, Cabezas-Clavijo, & Jiménez-Contreras, 2013; Weller & Strohmaier, 2014), and the implications of altmetrics on academic and research libraries (Rodgers & Barbrow, 2013). In contrast, there is surprisingly little research about the scholarly social network platforms themselves, and there is even less literature on researcher profiles and the impact of these profiles on scholarly communication, collaboration, and research.

"Profile" is listed first among the eight distinctive functions of social media for scholarly use in a recent summary of the academic use of Social Network Sites (SNS) (Nentwich & König, 2014). *User profiles* are "digital representations of users and as such, the central nodes of SNS. Various kinds of information can be made available to other members in a pre-structured way, from contact information to tracking of user activities. In some SNS it is also possible to have specific profiles for organizations. Thus, profiles are like enhanced calling cards of individuals, organizations, and groups. Some SNS experiment with special scores to automatically rate user activity on the basis of their activity in the SNS, thereby creating a potential metric for reputation (e.g. RG Score in *ResearchGate*)" (Nentwich & König, 2014, pp. 110–111).

The big surprise of the past few years has been the sudden and unexpected popularity of the new scholarly profiles, created and/or regulated by scholars,

who, perhaps not too long ago, were unwilling to embrace social media. The researcher profile is not merely an ephemeral snapshot at a specific point in time, but instead it serves as a scholarly portrait of a scientist, and has a great potential to promote the scholar's oeuvre, discoverability, reputation, and, in the long run, citations. Scholarly social media platforms generally interpret science in the broadest sense and encourage open access to not only scholarly articles, but presentations, data sets, negative results, grey literature, notes, drafts, and so on (Piwowar, 2013; Priem, Taraborelli, Groth, & Neylon, 2010; Thelwall & Kousha, 2014; Weller, 2015). Often granting access to full-text articles, the "scholarly selfie"[1] also provides more information on the scholar's research outside the traditional publishing spheres. The new indicators used in the researcher profiles complement the traditional metrics, and have the potential to provide a more complete view of the scholar's impact (Fenner, 2014; Ortega, 2015).

Researcher profiles in the scholarly social media follow the general practice of social networking applications. Scholars have to register, create, and/or claim their profile by setting up an account, which often requires affiliation to an educational or research institution. The platform serves as a collaboration site with plenty of opportunities to share their research, follow other scholars' work, and offer and solicit opinions on work in progress. Based on the articles and other research-related documents scholars upload to these platforms, statistical data can be monitored and collected on traditional and new metrics, including views, download counts, shares, or citations. The scholarly social media also became a venue to find research partners, co-authors, and collaborators, as well as new jobs (Hajnal Ward et al., 2014). The structure of the scholarly social network "could be a valuable data source to explore aspects of informal scholarly communication, especially if the new academic social websites revolutionize research as much as the Internet did" (Thelwall & Kousha, 2014, p. 729).

3. Scholarly performance indicators in academic libraries

Librarians have assumed leading roles in the advancement of new technologies and pioneered meaningful applications related to bibliometrics and social media. Academic librarians keep abreast of new advancements and technologies related to research, while researchers and librarians have both

developed a keen interest in figures to quantify research. Several bibliometrics topics were covered by librarians and information specialists (Bar-Ilan et al., 2012; Cronin, 2001; De Groote, 2008; Hood & Wilson, 2001; Jacso, 2008; Leydesdorff, 1998), and scholars from a variety of fields have also published extensively on topics related to the issues in bibliometrics (Abt, 2000; Boyack, Klavans, & Börner, 2005; Hall, 2014; Hicks, 2005; Hirsch, 2005; Schreiber, 2008; Vinkler, 2010). Scientists and librarians working in conjunction on citation analysis agree that the output indicators are just as good as the data input (Cronin, 2001; De Bellis, 2009; Jacso, 2008; Meho & Yang, 2007; Noruzi, 2005; West & McIlwaine, 2002). The situation is no different in regard to scholarly social media.

3.1. Traditional metrics

Scholarly impact is traditionally assessed by statistics and complex mathematical formulas, which quantify research output and scholarly reputation in various contexts. The science of bibliometrics has been around for over fifty years, providing tools for the quantitative analysis of academic publications (Bornmann, Mutz, Neuhaus, & Daniel, 2008; Boyack et al., 2005; Meho, 2007; Moed, 2006; Vinkler, 2010). In the long run, as they represent scholarly impact, they are considered as established factors, which are used in making hiring, promotion, and funding decisions, among others.

Bibliometric indicators may represent the reputation of an individual scholar, such as total publication count and citation count (total and average); a journal (the impact factor from Thomson Reuters Scientific being the most accepted); an institution; or even an entire country. In addition to the most commonly used indicators for authors, new metrics, such as the h-index (Hirsch, 2005), the g-index (Egghe, 2006), and further variations are also used to measure the researcher's scholarly output (Schreiber, 2008). Similarly, in the case of journals, in addition to the well-known impact factor, new metrics have evolved, such as the Eigenfactor or SJR (SCImago Journal Rank) based on the Google PageRank™ algorithm (Hajnal Ward, Stewart, Cox, Candon, & Cook, 2011; Moed, 2006; Vinkler, 2010).

Sources of traditional bibliometrics include Web of Science (with its databases provided by Thomson Reuters Scientific) and Scopus by Elsevier. Used mostly in natural sciences and social sciences, their proprietary data

have been instrumental for decision makers in hiring, promoting, or funding scholars. Their robust data, illustrated with visually pleasing evaluation charts and graphs, are displayed on an individual author's profile. The Web of Science profile tracks the scholar's activities via the total number of publications and citation count, as well as metrics computed based on these figures, such as the h-index or average citation count. Drawn from the entire database, citation maps can show the scholarly impact of any given article by displaying citing articles.

The third important bibliometrics tool, Google Scholar, is open and free to everyone, and as such, is widely used all over the world. Crawling its own collection, Google Scholar calculates similar metrics, such as citation counts. It should be noted that each database computes its metrics from its own data, which can result in inaccuracies and overinflated metrics (Hajnal Ward et al., 2011; Jacso, 2008; Meho & Yang, 2007).

3.2. Alternative metrics

Traditional citation metrics are far from being perfect, and as such, have been criticized extensively (Abt, 2000; Gorraiz, Gumpenberger, & Schlögl, 2014; Moed, 2006; Sud & Thelwall, 2014). With a new approach to science (open access, open data, open repositories, open science), new horizons opened up in evaluating scholarly performance with several tools to gather alternative metrics, including PLoS Article-Level Metrics, ReaderMeter, CitedIn, total-impact, altmetric.com, and ScienceCard (Weller, 2015). The increasing popularity of social media applications resulted in new ways of scholarly communication and new metrics proliferated to assess scholarly impact called altmetrics (Cronin, 2001; Fenner, 2014; Galloway et al., 2013; Piwowar, 2013; Priem et al., 2012a; Priem, Piwowar, & Hemminger, 2012b; Sud & Thelwall, 2014). Altmetrics is defined as "the creation and study of new metrics based on the Social Web for analysing, and informing scholarship," in the Altmetrics Manifesto by Priem et al. in 2010 on their site (Priem et al., 2010). The term is used interchangeably with alternative metrics, or for any kind of non-traditional scholarly performance indicator, while "altmetric" is branded as a subscription-based service at altmetric.com to compile article level metrics by providing "a cluster of servers that watch social media sites, newspapers, government policy documents and other sources for mentions of scholarly articles" (What does altmetric do?), 2015.

The web-based alternative indicators of scientific impact show the potential of measuring any kind of scholarly activity. Traditional metrics consider journal publications as the cornerstone of the author's work, while the newer metrics can be computed on the basis of other research-related data and output, such as data sets, blog posts, or white papers, just to mention a few, as sources. In addition to citations of these items, new metrics can cover any data showing impact such as page views, downloads, comments on the text, mentions in tweets or posts, or social bookmarks (for more, see literature review on altmetric in (Thelwall et al., 2013). There seems to be a correlation between traditional and alternative metrics. Recent study results show that the most cited articles within recent years also have significantly higher altmetrics indicators (Torres-Salinas et al., 2013).

The new measurements derived from the social web are increasingly advocated and widely used as early indicators of article impact and usefulness (Thelwall et al., 2013). Several studies have investigated alternative metrics and their relationship with traditional citation indicators (Bornmann, 2014; Ortega, 2015; Torres-Salinas et al., 2013), and found statistically significant associations between higher metric scores and higher citations for articles in six of the eleven altmetric (Twitter, Facebook wall posts, research highlights, blogs, mainstream media and forums) in medical and biological sciences and for articles with at least one altmetric mention (Eysenbach, 2011; Thelwall et al., 2013).

Alternative metrics are claimed to provide an opportunity for institutions and researchers to bridge informal academic discourse with the formal output of research. As more scholars move their communication to open social spaces like public blogs, social networks, and Open Access journals, this discourse and its impact becomes traceable and measurable (Rodgers & Barbrow, 2013). Social media and article-level metrics may thus be particularly important for unveiling research impacts that cannot be reflected in traditional scientific metrics. For example, some articles may be rarely cited, but heavily read and downloaded by academics (Priem et al., 2012b). The social web is also suggested to help satisfy the need for timely metrics. An article may be publicly endorsed within hours of publication, mentioned in a tweet or blog, discussed on a forum or a social network site, and saved in a reference manager. These can be considered as proof of instant impact of the scholar's work (Sud & Thelwall, 2014), and actual use from the user's perspective (Gorraiz et al., 2014). Another major argument for the use of alternative metrics lies in the

different interpretation of impact. Citations only assess the impact of scholarly literature on those who cite, which completely neglects other audiences of scholarly literature who may read, but do not cite (Thelwall et al., 2013).

The new metrics assume that scholars are actually engaged in the online social environments, and interact with scholarly products in the social web. Research shows a variety of the use and coverage of social media environments (Haustein et al., 2014). Researchers are encouraged in various ways to take advantage of the scholarly social media, and new rules reflect some recognition of unorthodox research output. The National Science Foundation started to request scholarly "products" in the biosketch along with the grant applications instead of publications starting in 2013, which indicates that these new advancements have been in the focus of attention (Piwowar, 2013). The new format of the NIH Biosketch, effective after May 25, 2015, also shows changes in the language, using "contributions to science" instead of "peer-reviewed publications" as section heading (NIH biosketch sample document). The European research collaboration ACUMEN (Academic Careers Understood through Measurement and Norms) has developed criteria and guidelines for Good Evaluation Practices (GEP), a flexible framework for a standardized individual researcher's portfolio, including multiple webometric and altmetric indicators as well (ACUMEN Portfolio, 2014).

A scholar's presence in the social media will probably not replace the reputation computed by traditional bibliographic methods. As one of the latest responses to alternative methods of measuring scholarly impact, a brand new metric has been computed to indicate as a measure of discrepancies between a scientist's social media profile and actual scholarly activities. The "Kardashian Index" plots the total citations of a sample of researchers-twitterers against the number of their Twitter followers only to point out the so-called "scientific Kardashians"[2], i.e., the ones whose actual impact, based on scholarly citations, does not measure up with their social media presence (Hall, 2014).

3.3. Scholarly selfies

A major development in the assessment of scholarly impact is the sudden expansion of author profiles or researcher profiles, called here "scholarly selfies", both in proprietary databases and in social media. The word "selfie"

was voted the word of the year of the Oxford Dictionaries in 2013 with a unanimous decision (The Oxford Dictionaries..., 2013). By their definition, a selfie is "a photograph that one has taken of oneself, typically one taken with a smartphone or webcam and shared via social media". Adding the adjective "scholarly" expands this meaning to denoting the snapshot a researcher has taken and shared on a scholarly social media platform at a given time, resulting in a scholarly profile, sometimes including a photo. The concept also indicates that researchers are willing to take control over their online reputation by claiming responsibility over their presence.

The above mentioned alternative metrics are widely used by the scholarly profiles to complement traditional scholarly performance indicators. Simultaneously with the growing popularity of the new metrics, scholarly social media profiles have become commonly accepted in the academic communities, proven by the large number of scientists joining one or more of these applications (Crawford, 2011; Foley & Kochalko, 2012; Goodier & Czerniewicz, 2012; Gruzd, 2012; Hajnal Ward et al., 2014; Mangan, 2012; Thelwall & Kousha, 2014).

The idea of a researcher profile is not new, since proprietary databases also feature their authors by using the publication data from their own sources and presenting them as an author page. Web of Science and Scopus both provide a profile page for authors whose articles are indexed in their databases. Traditional author profiles include author's institutional homepages, and profiles mandated or suggested by an institution (such as the Rutgers University Faculty Survey at http://oirap.rutgers.edu/surveys/facsurv.html), a grant funding organization (such as the NIH Biosketch and author profile tool MyNCBI at http://www.ncbi.nlm.nih.gov/sites/myncbi), a national academic administration (such as the Hungarian Scientific Works – Magyar Tudományos Művek Tára, MTMT https://www.mtmt.hu), or a country's portal for accredited doctoral schools with the research profiles of the core-member professors and supervisors (such as the Hungarian Doctoral Data Base at http://www.doktori.hu) (Hajnal Ward et al., 2014).

Scholarly selfies, however, follow the rules of social media applications. Researchers have to set up an account, or, in other versions, claim a pre-fabricated one, and build a profile, similar to LinkedIn or Facebook. Then they can read newsfeeds, join groups, make friends, follow other researchers' activities, and use the forum for communication about their research. A scholarly

social media platform also features bibliographic records of the researcher's publications, either from its own database or uploaded by the author. The latter allows listing the previously mentioned unorthodox products of research, such as datasets and even negative results. Based on the records in the author's profile, statistical data on views, downloads, and citations are instantly available. Tagging their research interests provides a great opportunity for discoverability and access for potential co-authors. Many platforms offer a Q&A section to discuss scholarly issues or just bounce off ideas as well as job postings (Bik & Goldstein, 2013; Rinaldi, 2014).

Unbeknownst to the scholar, the most popular applications may generate researcher profiles from their own database or through their established search engines. With their strong focus on particular research areas, scholarly social media applications, such as ResearchGate, Academia.edu, and ORCID, offer platforms to document scholarly output, using both established and unorthodox metrics. The applications promote discoverability and increase opportunities for collaboration. Some can be helpful in the daily work of researchers, such as those that offer file sharing and citation management capabilities, while others have solved the problem of disambiguating authors with their unique researcher IDs (Bik & Goldstein, 2013; Foley & Kochalko, 2012; Haak, Fenner, Paglione, Pentz, & Ratner, 2012; Hajnal Ward et al., 2014; Rinaldi, 2014; Thelwall & Kousha, 2014; Thelwall & Kousha, 2015).

4. Researcher profiles in the scholarly social media

A classification of social media networks used for scholarly purposes (Nentwich & König, 2014) lists eight main functions, with the main topic of the current study, ***user profiles***, as first on the list. The second, ***communication***, includes messaging, chatting, discussion forums/groups, microblogging, nudging, and videoconferencing. The third is ***networking***, same as on Facebook with lists of contacts/friends, searches for more contacts, search functions (both partly automated), invitations, etc. The next function is called "***directing attention***", and relates to features such as displaying current issues on the opening page ("feed"), external notifications (via e-mail or messages), and the "Like" and "Share" buttons. The next function is related to ***groups***: members can find others with similar interests, can benefit from the digital environment for discussion and collaboration with services such as discussion

forum, file upload, collaborative writing environments, tools to administer participants in events, selective access to groups, and passive membership. Another function is the built in ***calendar*** to coordinate dates, plan, and market events. A valuable feature is the ***literature-related functions*** such as searching for academic literature by giving access to other databases, publication lists and database entries of members; compiling bibliographies; open access archive; various attention direction services like notifications, based on topicality, semantic relationships, "Have read" buttons, commenting or rating, "Share this" function, access statistics, and visualization of networks of co-authors. Finally, a miscellaneous category called ***further services*** may include specialized and target-group-specific services, for example job exchange services, blogging, embedding of services of external providers via apps, and advertisement (Nentwich & König, 2014). Scholarly social media applications use more or less of these functions, depending on the main purpose of the platform.

A user profile, created by the researcher, has a great potential to mirror the author's scholarship, which includes the choice of how much they wish to disclose online about themselves and their work. Five main types of academic persona were observed on the social web with fluid boundaries between them: formal, networked, comprehensive, teaching and uncontainable (Barbour & Marshall, 2012). The rather static and simple ***formal self*** has minimal interactivity and resembles earlier generations of Web sites; institutional faculty pages could be the typical example. Close to this in functionality are the MTMT and MyNCBI with SciENcv. Scholarly social media profiles present the ***networked self***, a more public presentation of the individual within the traditional academic frame, focusing on sharing ideas and networking. The professional social media platform LinkedIn can be used for these networking purposes, but tends to be used more in a "formal self" capacity, so it can be classified somewhere in between the two. The online persona called the ***comprehensive self*** uses social media for both academic and personal purposes. In addition to a scholarly online presence, one also keeps in touch with friends and family members via social media applications. Scholars engaged in instructional activities may favour a special ***teaching self*** with the focus on students as opposed to colleagues, a great opportunity to connect with digital native students. Finally, opting out without engaging in social media at all does not mean that one has no online presence. This online persona is labelled as the ***uncontainable self***, which comes with the risk that others will create one for them, and might be criticized or even defamed, for example by students using sites such as ratemyprofessor.com (Barbour & Marshall, 2012).

The extent of social media engagement varies among those involved. Five profile types were observed according to activity levels and usage intensities (from lowest to highest): me-too presence, digital calling card, passive networking, active networking and communication, and cyberentrepreneurship (Nentwich & König, 2014). In academia, the most frequent scenario is probably the lowest degree of user participation; consenting to a very rudimentary profile with random contacts and infrequent online activities. The second-most frequent case allows creating a slightly more detailed profile, such as a more complex personal homepage (hence the name *digital calling card*) but no online interaction. Scholars involved in networking passively are characterized by using the network in irregular intervals for other (previously known) members, reacting to automated suggestions to contact other users, and sporadic communication with other members. A much higher level of involvement leads to active networking and communication, such as being regularly online, using further services, participating in group forums, and actively searching for potential networking partners. The highest level of the online presence and activities, labelled as *cyberentrepreneurship*, is when the individual does not only actively participate in the online activities, but does it for the benefit of others too by moderating forums, administering groups, taking control of institutional profiles, and giving feedback to the site developers. This is the rarest form of participation of researchers in the scholarly social media (Nentwich & König, 2014).

4.1. The librarian's role: scholarly selfies classified

Scholarly social media applications can be best understood and differentiated via a typology based on their main focus and primary goal. A classification offered previously points out the differences in five major areas: profiles related to *search-engines* (Google Scholar Citations and Microsoft Academic Search), *filesharing* (academia.edu, BEPress Selected Works, figshare, and ResearchGate), *researcher IDs* (ORCID, ResearcherID), *citation management* (Mendeley, CiteULike), or *specific research areas* (MyNCBI, Social Science Research Network) (Dudás, Ward, & Bejarano, 2014; Hajnal Ward et al., 2014).

Added here are two more evaluative dimensions: social media interoperability and author control. These dimensions better describe the variety of functionalities, along with the choices currently available for researchers in terms of enhancing their online presence. It should be noted that the features

with which the individual applications are tagged are not mutually exclusive, and one application belongs to several categories. For this classification, the primary function has been used, to provide guidance for those interested in the main characteristics of scholarly social media opportunities as well as for those wishing to make their choices for their online presence. A special distinction across the platforms should be made in advance: while in most cases the researcher is responsible to set up a profile, many of these platforms feature built-in, or better to say, pre-fabricated profiles, without notifying the author. These dormant profiles might have been created on the basis of papers uploaded by co-authors or collected and indexed by the database.

4.2. Traditional profiles meeting social media

Researcher profiles have existed in subscription databases and on institutional websites for a long time. A simple faculty homepage, updated once or twice a year, can be a good starting point to create one's online presence and place the researcher's scholarship into context. Without dynamic features and the most current information, these pages fulfil the bare minimum of a scholarly profile. Some universities have started to use their home-grown applications to provide their faculty with a more dynamic version, which can be updated by the faculty member more easily. Instead of having to wait for a webmaster to upload content, the researchers and instructors have full control over their profile, such as in the Rutgers Faculty Survey by Rutgers, The State University of New Jersey. This is a questionnaire-type database, which has the capabilities of generating output in all required forms for reappointment, promotion, as well as a CV and a website for the faculty member. The final text is based on the data entered by the faculty member, and it is in their best interest to keep it current to meet all requirements in the next promotion cycle.

Another similar advancement is the result of the new biosketch format mandated by the National Institutes of Health (NIH). The biosketch, required for any grant-funded research proposal and subsequent research report, has always had restrictions in terms of length and content. Currently, NIH suggests that the fields in the form should be populated from the researcher's data generated from the MyNCBI profile to ensure that it is compliant with all policies. The form also features a link to the researcher's MyNCBI bibliography. Maintained by the National Center for Biotechnology Information of the U. S. National Library of Medicine in Bethesda, MD, the MyNCBI

bibliography not only pulls open access articles published by the author from PubMedCentral, but it also communicates with the electronic submission systems via NIH and eRA Commons. The latest addition to the group is SciENcv (https://www.ncbi.nlm.nih.gov/sciencv/), a researcher biosketch profile service, which acts as the intermediary between the MyNCBI bibliography and the biosketch for the grant proposal required by the NIH. With the capability of adding bibliographic entries manually, now the authors can keep their bibliography current, including records not automatically pulled from NIH-compliant databases, as well as formats such as book chapters or less traditional scholarly output.

In Europe, there is a growing need for comprehensive regional bibliographies that cover full outputs of scholars and organizations, including all research fields, all publication types, and all languages (Dudás et al., 2014; Engels, Ossenblok, & Spruyt, 2012; Sivertsen & Larsen, 2012). In the social sciences and humanities (SSH), the two traditional bibliometric subscription databases (Web of Science and Scopus) focus on scholarly publications in English. However, "research outputs include not just those articles published in international journals, but also articles in national journals, academic book chapters and books, books aimed at a more popular audience, monographs, reports in the 'grey literature', and non-published outputs from fields such as the performing arts" (Martin et al., 2010, p. i). In particular, these gaps led to a national academic bibliometric database in Hungary, called the Database of Hungarian Scientific Works (Magyar Tudományos Művek Tára, MTMT) founded in 2009 with the aim of providing a current, comprehensive, and authentic overview of the national publication output and its impact. MTMT is a national research publication documentation system, a specific mixture of social media and shared, traditional electronic bibliographies. Basic bibliometric indicators, such as the total publication count and citation count, statistics by domestic/foreign languages, items by home country/abroad, number of articles in scientific peer reviewed journals/non-scientific journals, and other features are calculated, taking into consideration field differences in publication and citation norms. Interconnected with other evaluation systems, MTMT is the prime source for basic bibliometric data in Hungary. MTMT author profiles can be linked to other web-based profiles, such as the author's institutional home page, Web of Science via Researcher ID, Scopus, ORCID, Google Scholar, or ResearchGate. They can also be connected to other local or regional systems featuring similar academic profiles, such as the portal of Hungarian Academy of Sciences and Hungarian Doctoral Council.

The librarian's role in the above instances is to keep abreast of the new advancements, whether related to one's home institution, a funding agency, or any administration, and experiment with workflows on the new platforms with the help of a handful of researchers, who are willing to experiment and share profile data. Once comfortable with the platform, the new role the librarian can assume might include providing guidance and assistance, and even training for research assistance to benefit from these applications.

4.3. Engaging in the (scholarly) web: author control

Scholarly social media profiles can be placed anywhere on a dynamic scale based on the control the user has over them: from fully author-controlled to fully platform-generated. Author control is independent of other features. For example, search engine-based profiles and sharing applications (see later) might already have a dormant profile, which needs only to be activated by the user. On the other hand, some or all of the content can or cannot be altered, again, depending on the platform.

The level of control might be none, such as in most subscription-based profiles (e.g., Scopus, ISI Highly Cited). In such a case, the author's page is generated by the application. There is only a little latitude to request modifications, such as merging several profiles accidentally created for the same author (for example, due to name discrepancies). Most scholarly social media applications tend to require the researcher's initiation to set up a profile with the appropriate credentials, which is almost immediately populated by the publications attributed to the author within the database, such as Google Scholar Citations, ResearchGate, Academia.edu, etc. The bibliographic entries are added either from the result of crawling the scholarly web, such as in Google Scholar Citations and Microsoft Academic Search, or pulled from existing records either collected and indexed by the database or uploaded by co-authors with existing profiles, such as in ResearchGate, MyNCBI, Academia.edu, etc.

The highest level of author control is provided with the potential of adding virtually any format to the profile, such as in ResearchGate, which greatly promotes sharing alternative scholarly output. In addition to the traditional peer-reviewed papers, for example, PowerPoint presentations can also be uploaded and assigned a digital object identifier (DOI) in the system.

Scholarship is interpreted in the broadest sense, yielding to alternative ways of evaluation as suggested by altmetrics, and the author has full control over the content to be uploaded, including the decision to provide full text.

The ease of full-text uploads provides a significant contribution from the librarians to the profile-creating process, namely, raising awareness about copyright issues, including restrictions, journal policies, fair use, and professional courtesy, since most platforms do not and cannot verify copyright ownership. The librarian can also help with the settings of notifications to prevent annoying messages inundating the researcher's mailbox, since by default, most of the platforms feature an opt-out notification system.

4.4. Searching the (scholarly) web

Researcher profiles have the potential to provide an overview of the scholar's work by listing publications and highlighting major achievements. Search engines crawl the entire web, including research-related pages, thus making scholarly profiles based on search engines the easiest way to find out about a scientist's work. With its extensive database of scholarly publications, Google Scholar (GS) showed a great potential as a citation index at its inception (Noruzi, 2005), and has been used successfully to locate known items and to review the literature on a topic. The same database serves as foundation for scholarly profiles, available after registration, for virtually anyone who has ever published. Launched in 2012, GS offers one of the simplest options to create a profile. After setting up a plain profile page with affiliation, contact information, and picture, as well as a link to the researcher's home page, GS populates the profile with the author's articles, and the related metrics, such as citations to the articles, h-index, and some other metrics and graphs. The bibliographic records are linked to the source, which may lead to the full-text via the user's own article-linker software, if subscribed to the particular journal. This is all done for the researcher and requires just a small amount of time to set up, though GS is not free from problems (Jacsó, 2012).

The same applies to the second platform based on a search-engine, Microsoft Academic Search, which offers a pretty profile page, pre-fabricated with basic metrics and charts. However, what the author gains at the setup is easily lost while trying to consolidate data, correct items wrongfully attributed to him or her, and add missing items. This application claims to be a research project

created to follow information seeking in academia, and has not been updated (Orduna-Malea, Ayllon, Martin-Martin, & Lopez-Cozar, 2014). GS tends to overinflate researchers' scholarship, while Microsoft Academic Search is just the opposite. A common feature, in our experience, is the low count of non-English publications. Hungarian LIS papers are rarely found. Although there is an option to add articles manually, it is very time consuming and beats the purpose of a search-engine based application in the first place (Jacsó, 2011). GS and Microsoft Academic Search both could be used for evaluation proposes only if applied along with other citation indexes as a way to supplement that information (Ortega & Aguillo, 2014).

These two offer the least amount of control over the researcher profile, and as such, result in the least accurate data, causing the most frustration to the researcher with the over- or underinflated metrics. Apart from requesting the consolidation of the multiple profiles, there is no chance to correct a Microsoft Academic Search profile, which seems to be futile in the absence of updates anyway. The role of the librarian is to assist the authors to set up the basic profile in Google Scholar Citations and show how to manually add missing publications. It should be pointed out that the more accurate the data input, no matter how laborious and strenuous the process is, the closer to reality the metrics will be. Since researchers tend to prefer the inclusion of book chapters on their publication list, done so by GS, the librarian can also point them to manageable applications, where the data can be corrected and manipulated to compute the correct metrics, such as Publish or Perish and Scholarometer.

4.5. Sharing research

With a mission to expedite research all over the world, file-sharing systems, such as ResearchGate, academia.edu, or figshare, have shown the fastest growth and the greatest potential to create virtual research communities. Created by scientists for scientists, these applications are also promoting Open Science, since they wish to provide fast, free, and open access to research results by taking advantage of networked information environments and collaboration. The modern technologies behind these applications ensure that all file formats can be uploaded quickly and as simply as possible, then stored in a secure and easily accessible, cloud-based repository, while they also offer a variety of collaborative tools and even APIs to make the best use of the content. ResearchGate and academia.edu were each used by one fifth

of the respondents according to a survey about using scholarly social media (Haustein et al., 2014).

The two main platforms, academia.edu and ResearchGate (researchgate.net) were launched in 2008, while figshare was first launched in 2011. Academia.edu was founded by an Oxford University philosopher as an academic social network site and currently has twelve million registered users. Part of its original purpose was to connect authors to readers so that it would be easy to send a query on a paper that had just been read (Mangan, 2012). Located in Cambridge, MA, ResearchGate has nearly four million members, after reaching three million in June 2013. ResearchGate targeted mostly the individual researchers at the beginning, and now expands to specific communities of users (Gewin, 2010), which explains the communication, collaboration, and sharing functions. Business investments show that the world outside academia also keeps an eye on scholarly social media: ResearchGate received over 35 million dollars from investors including Bill Gates (Van Norden, 2014). It should be noted that, similarly to other social media applications, these numbers show the registered users with profiles in various phases of completeness, rather than ones who actively use these sites. Figshare, advertised as "a community-based open data platform for scientific research," was first launched in January 2011 and relaunched after receiving support from Digital Science, a new division of Macmillan Publishers. Figshare offers unlimited storage space for data that is made publicly available on the site with full control over the management of their research (Open data platform figshare…, 2012).

In addition to monitor the trends and preferences within a scholarly community and show potential benefits, the librarian's role can be multifaceted. As is the case with any database, social media platforms are only able to generate metrics based on their own data. ResearchGate, for example, keeps track of download counts and citations; it even computes its unique number to indicate the author's scholarly impact, the so-called RG score, but all figures are calculated only from its own database. In other words, the author's citation count will rise if the citing article is in the RG database. This is not any different in the case of the subscription databases either, however, a social media database seems to be more unpredictable and contingent on its contributors, who may or may not favour a particular database. To promote inclusion, these platforms also make suggestions to add publications, invite authors and collaborators, and similarly to other, non-scholarly social media

applications, they tend to push information in as many ways as possible. The librarian can bring these facts and features to the researcher's attention and help optimize settings and preferences.

4.6. Managing research: citation management as added service

Proprietary citation management applications, either web-based or desktop, such as EndNote, RefWorks, BibTex, and Reference Manager, now compete with free choices such as Zotero or CiteULike. A special configuration of scholarly social media is the application that combines all of the advantages mentioned so far with the functionalities of social bookmarking and citation management on the same one platform.

Established in 2007, the originally London-based and free Mendeley now links several, if not all, functionalities offered by other scholarly social media platforms within the same application, including an author profile, citations and bibliographies, social networking features (newsfeeds, comments), full-text search across papers, usage-based readership statistics, and public groups to share reading lists (Zaugg, West, Tateishi, & Randall, 2011). As a result, it has become possible to use a single platform for searching the scholarly literature, organizing and sharing search results, reading and annotating the articles, writing and sharing drafts with co-authors for comments, and creating the final text with references. Mendeley offers an option to set up private groups to collaboratively tag and annotate research papers, and there are apps for various devices, such as the Mendeley Desktop app, iPhone app, and iPad app. It is also possible to migrate content to and from services, such as Mendeley to ORCID. The platform boosts over three million users now enjoying either its free, basic version or the premium fee-based platform. Mendeley is considered important in indicating interest in the research from the readers' angle (Li & Thelwall, 2012). The fact that Elsevier purchased Mendeley in 2013 hints that there is a market for complex software applications in research that also include social media-inspired functions. Readership data from Mendeley is useful to capture knowledge transfer across scientific disciplines, since it shows impact earlier than citation counts. (Mohammadi & Thelwall, 2014). With its nearly eight million articles, CiteUlike (citeulike.org) is competitive with Mendeley, although the correlation between the bookmarking data and citation counts have been found more appropriate for research assessment with data from Mendeley (Li & Thelwall, 2012).

Librarians have long been conducting instructional sessions on how to use reference management systems. Providing training in Mendeley or demonstrating the advantages of CiteULike could be added to their responsibilities in an academic library setting. Librarians should also be part of university-wide discussions about whether to adopt one free system over another, or decide on the campus-wide premium subscription to Mendeley from Elsevier.

4.7. Disambiguating research: ID

The problem of a unique and general identifier for researchers is not new (Foley & Kochalko, 2012; Haak et al., 2012). Proprietary databases created their own identifiers to disambiguate authors, such as ResearcherID by Thomson Reuters or the Scopus Author Identifier. Each scholarly social media platform has its own identifier, such as Google Scholar ID, ResearchGate ID, etc. A promising 2012 initiative, called ORCID (Open Researcher and Contributor ID), available at orcid.org, offers a solution to automate the collection of one's research output and related metrics via a 16-digit code, independent of providers, platforms, or applications.

ORCID was founded in 2012 as a non-profit organization comprised of publishers, funders, and institutions like Nature Publishing Group, Wellcome Trust, and Cornell University. Similarly to a DOI, the digital personal identifier is unique, and the ORCID account can be connected with other applications, platforms, and websites including MyNCBI, the Hungarian MTMT, Web of Science, figshare, and Impactstory, among many others. Once connected, information can be pushed back and forth between them, thus allowing to automatically import the same information to multiple places, rather than having to enter the same information over and over. Over 1 million researchers have ORCID IDs so far (Foley & Kochalko, 2012; Haak et al., 2012). Name variations during a researcher's career or due to diverse methods of data entry across platforms lead to inaccurate or multiple author profiles within the same database or social media platform, and as a result, miscalculated metrics and inaccurate representation of one's scholarly impact (Hajnal Ward et al., 2014). ORCID has a great potential to consolidate name variations across scholarly social media and traditional author profiles.

Although ORCID is still a relatively basic service with gaps in its coverage, librarians should raise awareness of the potential. Even though one cannot

edit incorrect entries or export profile information everywhere, it has been integrated with a major researcher profile system, the MyNCBI, which serves as the basis of the new NIH-mandated biosketch with its SciENcv application.

5. Making sense of scholarly social media: the role of the librarian

Emerging scholarly social media applications, alternative metrics, scholarly selfies, open science, open access – these are just a few new features academic librarians have come to embrace recently. Already involved in both bibliometrics and social media, librarians seem to have a unique opportunity to monitor new trends in the evaluation of scholarly output across the disciplines and follow major social media platforms with scholarly performance indicators. Many librarians got involved in the scholarly social media early either as researchers themselves or as reference on how to set up the accounts and create their profiles. Libraries, along with higher educational and research institutes, play a key role to open science as they pass their own Open Access initiatives, such as the Scholarly Open Access at Rutgers (Rutgers Open Access Policy, 2012.)

Researcher profiles on social media platforms represent a new and exciting way of promoting one's scholarship. In concert with the acceptance of unorthodox research output and the appreciation of new metrics to represent impact, the individual's "scholarly selfies" have gained importance through the options the hosting platforms offer to improve the research and publication process. In addition to listing one's traditional publications, such as journal articles and book chapters, the researcher profiles suggest considering non-traditional results and formats, such as data sets, codes, negative results, grey literature, blogs, and annotations. The platforms provide great opportunities to engage in research in a new way: communicate and collaborate with colleagues, discuss scientific topics, find co-authors, and so on. The exchange of full-text publications is often part of these sites, whether uploaded or requested as professional courtesy. The researcher profiles, with publications, data, and scholarly discussion, are open and visible to the world, which means that not only the privileged have access to science. The researcher and the host institution will benefit from a greater visibility and improved discoverability. The profiles provide data for altmetrics, and

as such, serve complementary metrics to traditional citation analysis, representing the scholar's work in a more complete way. Scholarly selfies in mass also have an impact on the greater scientific community in terms of making science more transparent and open, disclosing research results faster and for broader audiences, and in the long run, speeding up the advances in science.

The authors investigated each scholarly social media platform on its own merit, and assessed their potential use for their particular audiences. Organizing and assessing the most popular platforms resulted in a better understanding of the advantages of one application over the other when creating academic profiles, or "scholarly selfies" for a particular purpose. Reviewing the applications would not have been possible without the active participation of the researchers, since many of these platforms target a specific field of science or are related to grant funding. Working with both highly-cited and early-career authors, it became discernible that many applications had dormant or pre-fabricated profiles with an uncontainable digital persona. This means that even if researchers were reluctant to take control over their online presence, they could not prevent their digital persona potentially misrepresenting their academic achievements. Ignoring scholarly social media can be detrimental to scholars and might lead to unforeseen consequences, not only to them and their institutions, but also to their colleagues and students. Even though maintaining scholarly social media profiles is often considered as a distraction or even a complete waste of time, the platforms and tools have the potential to augment academic careers, if used appropriately (Bik & Goldstein, 2013).

This discovery served as a major revelation in terms of the role of librarians, and came with the responsibility to educate our faculty members. By furnishing scientists with sufficient information on the evolving new world of scholarly social media, they will be better positioned to make decisions about whether they wish to take the opportunity offered by social media. Academic librarians have a unique position to participate in these exciting new advancements in science by exploring the role of the librarian or information specialist in a technology-rich environment. The consensus is that researcher profiles are sorely needed, but it would be time-consuming to keep abreast of all new developments. It is not the best use of a scholar's talent to try to sort out scholarly social media or spend time on manual data input. Librarians, working with a variety of academics, have the chance to follow the trends of scholarly social media platforms and altmetrics, and play an active role in

promoting this specific area of information literacy and raise awareness of copyright issues at the same time. The role of librarians ranges from pointing researchers toward the direction of some compelling evidence supporting why they need social media (Bik & Goldstein, 2013) to actually investigating the impact of their university's research in less traditionally established venues. With new services, such as navigating the scholarly social media, the librarian is probably the best person to convince those who refuse to use the library (Cronje, 2013).

Last but not least, librarians can also use all of the above mentioned platforms for their own scholarship to create a more accurate online persona. There are numerous tools available, with a special regard to librarians in academic libraries (Izenstark, 2014). The new skills and hands-on experience in techniques to build and optimize digital identities will result in being considered as an authoritative source in the ever-changing field of scholarly social media, in addition to enhancing visibility for both their libraries and themselves. Reaching the highest level of engagement in scholarly social media, librarians can become cyberenterpreneurs for the benefit of research and science.

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Notes

[1] "Scholarly selfie" is a term coined by Judit Ward for in-house use in 2014 based on the 2013 word of the year, but was popularized in conferences by the authors and was accepted in the academic librarian community.

[2] *Keeping Up with the Kardashians* is a popular American reality television series that has aired since 2007. The proper noun has gained a new meaning in American English. According to the Urban Dictionary, a "Kardashian" is "famous only thanks to physical attributes and free exposure via the internet".