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# A Look at Altmetrics and Its Growing Significance to Research Libraries

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## EXECUTIVE SUMMARY

Many people involved in the scholarly communications process – from academics, students, and researchers, to publishers, librarians, and learners – are participating in a dynamic digital context now more than ever; moreover, digital acts of communication and dissemination of scholarship leave traces of impact that can now be culled and quantified. Altmetrics, metrics based on the social web, provide an opportunity both to more acutely measure the propagation of this communication and to reconsider how we measure research impact in general. While the use of social media and analytics and the structure of tenure and promotion practices are not consistent across or even within disciplines, the practices and experimentation of early adopters, from researchers and institutions to industry, yield stories, lessons learned, and practices worth investigating. Researchers and academic librarians both face new opportunities to engage and support the use of altmetrics tools and methods and to re-examine how scholarship is defined, collected, preserved, used, and discussed. This report summarizes the major trends, opportunities and challenges of altmetrics to both researchers and academic research libraries and outlines ways in which research libraries can participate in shaping this emergent field. Also featured in this article is a micro-case study featuring a partnership between the University of Pittsburgh and Plum Analytics that illustrates how libraries can begin to map out their role on campus in this arena.

### Introduction

Many scholars seek to reimagine the way academic scholarship is shared, discussed, and valued based on the powerful and unique affordances of our networked digital environment.<sup>1-3</sup> Academics, students, researchers, learners, and librarians participate in scholarly practices in a dynamic digital context now more than ever. Critical analysis, opinion, and feedback are posted on personal or institutional blogs. Online information networks are established to support common understanding of emerging trends and tools within disciplines. Scholarly content such as preprints, journal articles, book chapters, and poster presentations are being archived in open access repositories and are freely accessible.

These digital acts of disseminating and sharing scholarly and academic production leave traces of impact, in things like download and view counts, links and mentions in citation management tools, and content sharing across a suite of social networks. These traces are being collected, examined, and considered under the umbrella term “altmetrics”, defined as “the creation and study of new metrics based on the Social Web for analyzing, and informing scholarship.”<sup>4</sup> Altmetrics demonstrate one aspect of the changing landscape of scholarly and academic production, dialogue, and use. Altmetrics also illustrate the changing methods of both bibliometrics and scientometrics.<sup>5</sup> Through new tools that enable comments, and measure downloads and shares, the process of and engagement in scholarly communication and research becomes more visibly conversational between public consumers of information, peer scholars, and institutions (for examples, refer to the appendices). As a facet of this changing landscape,

altmetrics provide an opportunity to more acutely measure the propagation of this communication and reconsider how we measure research impact.

Researchers and librarians alike face new opportunities to engage and support the use of altmetrics tools and methods and to re-examine how scholarship is defined, collected, preserved, used, and discussed. This report summarizes the major trends, opportunities and challenges of altmetrics to both researchers and academic research libraries and outlines ways in which research libraries can participate in shaping this emergent field.

## **The Current State**

Altmetrics provide a lens through which to reimagine the scholarly discourse that is based on open, transparent, democratic and inclusive practices and values.<sup>6</sup> Because scholars are now able to easily share their work online, in an open environment, their work becomes available to the broader public to review, examine, use, or criticize. While concerns around assigning value to collected metrics certainly exist, altmetrics can provide a responsive model that addresses the increasingly rapid pace of research dissemination and discussion in which academics already engaged.

New publication methods extend and remediate the dissemination of research outputs beyond formalized and traditional journal publishing.<sup>7</sup> Moreover, today, many researchers and scholars share the process and building blocks of their work, not merely the product. Datasets, algorithms, grey literature, classroom resources, and assets like videos, blog posts, and photos become part of the shareable research process.<sup>8,9</sup> While the generation of these types of artifacts are not novel, the often-rapid display and distribution of them on the open web or through research networks is becoming more commonplace. Institutions, funding agencies, and industry now have the opportunity to incorporate these types of output into the evaluation of scholarly and research impact.<sup>5</sup> Feedback loops and opportunities for innovation and discovery have the potential to arise earlier and at different stages in the research process precisely because it is increasingly being made transparent and reproducible. Native web research and scholarship necessitate a new model or models for dissemination and evaluation, some aspects of which will be examined in the following section.

### *Changing Pace of Research & Measures of Value*

Conventional methods of filtering and assessing quality scholarship and academic production no longer fully and accurately serve digital practices of scholarship. As a result, there is interest in, and active research around, revolutionizing these processes. For example, scholars like Dan Cohen, Founding Executive Director of the Digital Public Library of America, have been developing tools to address the gap between traditional, print-based scholarly workflows and digital scholarly workflows.<sup>10</sup> The uses of altmetrics are yet another development in this domain,

where people are using new forms of technology to measure the value of different scholarly work products in novel and more comprehensive ways.

Several factors affect this space, but speed and scale are leading forces. Digital dissemination has vastly increased the amount, quality, and type of research available to both scholars and the public.<sup>6</sup> In many cases, this scholarship is made immediately available for use, analysis, and impact within academic circles and to the public. Established models of assessing the value of a scholarly product such as peer review, citation, and a consideration of journal-based metrics, are all processes and metrics that can require weeks, months, and years to complete. This mismatched pace necessitates consideration of the ways in which new practices and evaluation strategies can be reconciled with established practices. Post-publication peer review has been raised as one potential solution to this research output bottleneck, but this is only one component of the larger issue of timing.<sup>2</sup>

Jason Priem, Ph.D. candidate from the School of Information and Library Science at the University of North Carolina, Chapel Hill, and others have criticized journal-based metrics, such as the Journal Impact Factor (JIF), as focusing on the wrong unit, for example, the journal rather than the researcher, of measurement to establish reputation. Scholars of altmetrics are calling for these newer forms of measurement to be considered as complementary to traditional measures like citation, peer review, and the JIF.<sup>11</sup> They argue that, in addition to fostering openness, access, and broader engagement in scholarship, altmetrics enable post-publication filtering of relevant or quality research, more nuanced peer-review and a new rationale for publishing models such as the megajournals like PLOS ONE (<http://www.plosone.org>), SAGE Open (<http://sgo.sagepub.com>), and PeerJ (<https://peerj.com>).<sup>12</sup>

Priem is not alone. In 2012, a group of researchers from the American Society for Cell Biology (ASCB) along with editors and publishers published a declaration calling for the need to improve the ways in which scientific research outputs are evaluated. Called the San Francisco Declaration on Research Assessment (DORA), this declaration outlines the ways in which the ASCB and other signatories have determined that the JIF no longer suits their needs. One point raised in DORA is that research should be assessed on its own merits, not on the basis of the published location.<sup>13</sup> While the JIF is still a widely used measure of academic impact, it is important to consider how well established institutionally based metrics can coordinate with emergent measures such as altmetrics.<sup>14</sup>

Altmetrics may offer a deeper, more contextually based lens into understanding and measuring various forms of research impact and value, but this inserts a host of unanswered questions about the complex nature of how scholars, institutions, libraries, and the public determine different forms of impact, quality, and value in digital and analog communities. A great concern of many users and researchers of altmetrics continues to be that of the standardization across different metrics. For example, Jason Priem, who coined the term ‘altmetrics’, asks the questions: Does a

tweet mean the same as a citation? In what context might a tweet mean more than a citation?<sup>15</sup> Scholarly communications researchers are beginning to identify different “flavors” of impact based on different audiences, different information needs, network effects, and a dynamic landscape of tool development and use.<sup>11</sup> Understanding these flavors more fully, and indeed the value of altmetrics in general, requires qualitative research about the emerging field of altmetrics.<sup>11</sup> To that end, the National Information Standards Organization (NISO), has recently accepted the challenge of beginning the dialogue of standardization around altmetrics. In June 2013, NISO announced a two-part project to “study, propose, and develop community-based standards or recommended practices in the field of alternative metrics.”<sup>6</sup>

While keeping in mind that altmetrics is a developing, non-standardized set of tools, methods and theories, what follows are proposals of the potential value of altmetrics to both researchers and research libraries alike.

### **Use to the Researcher**

Altmetrics provide an opportunity for institutions and researchers to bridge informal academic discourse with the formal output of research. As more scholars move their conversations from “dark” social spaces<sup>16</sup> like listservs and closed research networks to open social spaces like public blogs, social networks, and Open Access journals, this discourse and its impact becomes traceable and measurable.<sup>11</sup> While the use of social media and analytics and the structure of tenure and promotion practices are not consistent across or even within disciplines, the practices and experimentation of early adopters, from researchers and institutions to industry, yield stories, lessons learned, and practices worth investigating. Professional organizations such as the American Society for Cell Biology (ASCB), the Association for Information Science and Technology (ASIS&T), and the Association of Learned and Professional Society Publishers (ALPSP) are all investigating the use altmetrics in their fields.

Many researchers, colleges, and institutions stand to benefit from the use of altmetrics tools and practices as a way to reimagine research dissemination, impact, and engagement. Priem posits that altmetrics can provide three sets of values to faculty: a more nuanced account of academic contributions, a more holistic perspective of the impact or use of their scholarship, and the ability to engage in scholarly discussions within and across disciplines in new ways.<sup>11</sup> Understanding the nuances of how research is used within academic communities and outside them have the potential to be very useful to both the researcher, the institution, and funders in determining what projects to fund or even which components of projects to fund and disseminate. The general public may find a very different utility in research products and publications than an institution, professional organization or funder. With altmetrics tools, these uses can be teased apart and evaluated more easily.

However, long before ‘altmetrics’ was coined as a term, researchers have been engaged in investigating and making sense of the more social aspects of research such as their motivations for and perceived value of sharing research data.<sup>17</sup> Some disciplines in the hard sciences have well-established open sharing practices. For example, arXiv.org, an e-print repository of preprints of scientific papers in the disciplines including physics, statistics, quantitative biology, and computer science, has a twenty-year history of open access publishing and redistribution of academic works. ArXiv.org and other similar models form a basis for understanding how sharing research findings in a large-scale, discussion based setting impacts research.

Some early adopters’ view altmetrics as tools to enable a more nuanced understanding of the ways in which their published research impacts various communities. One researcher interviewed for this paper believes that “research should speak for itself.”<sup>18</sup> Still, he uses a combination of analytics from Google and altmetrics.com (Appendix A) to more effectively understand the audiences for which his research resonates. This, in turn, determines his dissemination techniques and prioritizes opportunities for further financial support for his work. These altmetrics tools offer faculty a more nuanced view into use of their research, not simply who but where, what, and sometimes even how.<sup>11</sup> Currently, most altmetrics tools and resources are focused on the researcher level, or the “one,” as Roemer and Borchardt write in “Institutional Altmetrics”.<sup>19</sup> While institutionally coordinated use of various forms of metrics, including more traditional venues such as Scopus and the Book Citation Index, are not fully integrated into the workflows of social media based altmetrics, they can still provide the individual researcher with a suite of lenses to use to more holistically understand the impact of their research.

Currently, many early adopters may be less concerned about the broader impact of these tools and practices on the process of evaluating or mapping of scholarship, and more focused on how these tools and practices can help them market themselves and their research. Informal and formal social networks, from Twitter to Facebook to the Social Science Research Network (SSRN) and Mendeley can all provide information to researchers about how their research is consumed, discussed, cited, or reused across a wide variety of audiences. Altmetrics tools like ImpactStory (Appendix A) and academic social networks like Research Gate (Appendix B) now provide the opportunity for researchers to view and analyze these impacts in a unified view though they still leave interpretation of the results up to the researcher. With altmetrics tools, researchers can now parse assets of the research process in new ways, stitching these assets together to create different packages for dissemination, consumption and reuse.

arXiv.org is a well-established, historical example of the type of the social aspect of research networks seen with more contemporary altmetrics tools and practices. In many cases, however, these strategies are currently employed in a very distributed, ad hoc manner by faculty across different disciplines. Currently the researcher, rather than a trusted third party such as an institution or a publisher determines much of the value placed on sharing assets, data, and other process-based features of the research in open or public facing repositories or social networks.

Preprints of accepted publications or post-publication archival copies are more formally recognized research and data sharing practice than dissemination of data sets or peer review via blogs. However, faculty move between institutions and, increasingly, many are employed on annual or contractual appointments.<sup>20</sup> Altmetrics tools and services can be used to aggregate and highlight content created by the researcher rather than associate scholarly products solely with the institution. Moreover, because altmetrics can track a variety of activities and work products, they can also reflect and communicate the impact of teaching and service activities thereby offering a more holistic view of the scholar's work.<sup>11</sup> Through academically oriented social media platforms integrating altmetric philosophies and practices (for examples, refer to Appendix B), researchers now have the ability to create dynamic records, "living CVs,"<sup>11</sup> that can capture contributions regardless of institutional affiliation or scholarly output format and a suite of altmetrics values generated from the works.

### **Libraries, Librarians, and Altmetrics**

The rise of digital tools supporting altmetrics offers opportunities for libraries and librarians to maintain currency in research and scholarly production processes and, in some cases, illustrate their value to researchers in new ways. Reference services like Mendeley<sup>21</sup> and publishers like Wiley<sup>22</sup> are already experimenting with including altmetrics concepts and approaches in their services. Some altmetrics companies like Kudos (launching in 2014)<sup>23</sup> are specifically targeting publishers wishing to engage in altmetrics as clients. Libraries stand to benefit from actively participating in this space in order to shape its productive development and use.

Altmetrics have been used to illustrate the value of Open Access journals and practices, and the use of institutional repositories.<sup>12</sup> Libraries' investment in developing and fostering open access policies and infrastructure, developing institutional repositories (e.g. University of Michigan's Deep Blue), and supporting various forms of academic commons are complementary to the practices, perspectives, and purposes of altmetrics. Libraries are also well poised to facilitate the rapid development of multimedia and multimodal artifacts associated with the academic and research processes. For example, libraries can augment existing workflows, repositories and cataloging systems to ingest, organize and preserve these artifacts for the scholarly record. Libraries are in a position to be able to develop infrastructure to support how research and researchers engage effectively with scholarly communication tools, practices, and resources at an institutional level. As researchers engage with social media, including experimenting with emerging and dynamic platforms and tools, new opportunities emerge for librarians to continue to act as experts in navigating and evaluating quality information, making recommendations or developing systems to organize such information, and providing consultation on how to develop, organize, store, and share the process of research.

Recently librarians such as Pease, Galloway, Roemer and Borchardt<sup>9,19</sup> have engaged in the discussion of precisely how libraries and librarians can facilitate the development of altmetrics



and help to determine appropriate metrics evaluation and use at both the researcher and institutional levels. Scholars Lapinski, Piwowar and Priem have also participated in this conversation, stating that “[l]ibrarians can provide this support in three main ways: informing emerging conversations with the latest research, supporting experimentation with emerging altmetrics tools, and engaging in early altmetrics education and outreach.”<sup>24</sup>

What follows is a continuation of this conversation, based especially on discussions with the University of Pittsburgh on their collaboration in a pilot project in collaboration with altmetrics company, Plum Analytics (<http://www.plumanalytics.com>).

### *Micro-Case Study: University of Pittsburgh Library System*

Academic research libraries, like the University of Pittsburgh Library System (ULS), are starting to engage and experiment with altmetrics in their academic communities. Recently the University of Pittsburgh ULS partnered with Plum Analytics to pilot ways to assess the impact of their university’s research in less traditionally established venues, like institutional repositories and social media platforms.<sup>25</sup> The administration at ULS views their experimentation with altmetrics as another way to connect scholarly communication directly to emerging needs and opportunities in the researcher’s world. The ULS also has a strong commitment to supporting open access on its campus and the partnership with Plum Analytics is one way of increasing this commitment, illustrating value, and providing tools for faculty to engage easily in Open Access practices.<sup>25</sup>

We spoke to Tim Deliyannides, Director of the Office of Scholarly Communication and Publishing and Head of Information Technology at the University of Pittsburgh Library System about his decision to partner with Plum Analytics.<sup>25</sup> Mr. Deliyannides acknowledges and embraces the experimental nature of this partnership and how it illustrates ways in which libraries can participate in low-risk experimentation with new tools and emerging scholarly practices.<sup>25</sup> This pilot showcases how libraries can actively contribute to the altmetrics landscape by conducting research about the value and use of these tools to academic communities. It is worth noting that the founders of Plum Analytics are also the former product management and technology directors of Serials Solution’s Summon, a product ULS already successfully uses, placing staff associated with Serial Solutions in a trusted position with the library.<sup>26</sup>

To date, the development team at Plum Analytics has been responsive to the exploration at ULS and through this process, the library has developed new inventory practices to continue to collect, organize, and share research activity at the university.<sup>25</sup> The library started with a set of handpicked faculty who were asked to provide a current CV. Librarians did much of the initial work for the pilot, putting publications and other research artifacts from the faculty CVs into the university’s institutional repository.<sup>25</sup> A Plum Analytics harvesting tool called PlumX takes all the metadata about those digital objects from the institutional repository and scans for citations,

mentions on social media, comments, downloads, views, and other forms of interaction on the web.<sup>25</sup> The PlumX interface then aggregates and visualizes all of the altmetrics data in an author-centric way, presenting the overall impact of a particular researcher rather than a particular publication. Mr. Deliyannides suggests that in the future, ULS may look to complement this kind of tool with an artifact-focused altmetrics tool, illustrating that the library sees value in continuing to explore and experiment in this space.<sup>25</sup>

In the future, to scale this service to the whole of the university's faculty, ULS may develop an automated feed that gathers and updates information from a researcher's "digital CV," a project the University is undertaking, into the institutional repository and from there into the PlumX environment. Deliyannides notes that more technical and institutional infrastructure will have to be developed at both the library and university level to offer this kind of service to the entire university community of researchers and faculty.<sup>25</sup> At the University of Pittsburgh, Mr. Deliyannides sees this as an opportunity to support the development and use of dynamic academic CVs and to provide deeper support for the academic and research communities.<sup>25</sup>

While the partnership between Plum Analytics and the University of Pittsburgh is not yet at scale, it offers important insight for other universities and libraries into how altmetrics are valued and used by academic communities and how libraries can successfully engage in this emerging field. Altmetrics acknowledges and makes visible the social nature of science and research,<sup>6</sup> and librarians are well positioned to provide feedback on how scholarly communities can effectively use these tools.<sup>19</sup> In the process, research libraries can consider developing altmetrics tools and resources such as interfaces and visualizations for their communities<sup>24</sup> or building infrastructure on which to develop new or more effective tools for researchers.

## **Conclusion**

While the measures of value that altmetrics illustrate are still being discussed, examined, and codified, the practices of further research dissemination, discussion, and development are well expressed in our current academic culture. In certain cases, the use of altmetrics allows institutions and scholars to more easily document the variety of impacts their scholarship and research have through dissemination across scholarly and popular networks; with altmetrics, this impact can be contextualized much more easily.<sup>5</sup> There are several skills, well grounded in libraries and information science, which are especially important to the productive investigation, deployment and maintenance of altmetrics. Librarians are already engaging in the altmetrics conversation, outlining opportunities for engagement and issues to address (such as citation standardization), as well as situating altmetrics in well established fields of information science.<sup>9,19,24,27</sup> Many academic libraries stand to benefit from engaging with facets of altmetrics, either as a vehicle through which to survey faculty behaviors and needs, or as a way to connect well established library services and expertise to emerging academic needs and practices.

Two ways in which libraries and librarians can participate in this conversation are to conduct more research about use of alternative metrics in determining value, quality, and impact in the research process and to start building infrastructure and developing ways to expose metrics at, for example, the dataset level that can support the archiving, reuse, and evaluation of an array of research assets.<sup>8</sup> Academic research libraries, such as the University of Michigan Libraries, are well poised to develop or enhance metadata systems, repositories and bibliographic workflows that capture the non-traditional artifacts being developed and disseminated as part of the scholarly and research lifecycles. Alongside investigating or developing workflows to support new digital identifier resources such as ORCID<sup>28</sup> for researchers or DataCite<sup>29</sup> for datasets, librarians can engage researchers to teach them how to preserve, or reuse research assets within disciplinary or institutional repositories. In order to do this, however, librarians must be well positioned to answer questions about the value of altmetrics to both administrators and individual researchers. More research is required to understand the relationships between established metrics of success and emergent metrics within disciplinary or specific scholarly communities and how these metrics can be standardized. Librarians will continue to vet, organize and add value to information pulled from altmetrics practices<sup>9</sup> and libraries should consider actively engaging this space to help shape it.

## Appendix A: Tools

### Altmetric

Altmetric gathers mentions of scholarly output in social and traditional media, government documents, and other sources and packages this data through three work products they sell, [The Explorer](#), [Embeddable Badges](#), and the [Altmetric API](#), and through a fourth product they offer for free, [the Bookmarklet](#). Metrics aggregated and presented in various ways through their four products include: number of Tweets, Facebook pages, mentions on Google+, Reddit, blogs or news outlets, and any readers on Mendeley, Connotea or CiteULike connected to each individual publication. The Explorer originated as the PLoS Impact Explorer,<sup>30</sup> a Finalist in the Mendeley/PLoS API Binary Battle of 2011.<sup>31</sup> They won an Elsevier competition, Apps for Science,<sup>32</sup> in 2011 and have also been funded by Digital Science. Librarians can request a free account by contacting the Altmetric support department.

The current Altmetric products require minimal effort on the part of the user. [The Explorer](#) does not require any inputs from the user to be functional. [The Bookmarklet](#) requires only a minimal one-time action on the part of the user: simply add it to your bookmarks toolbar and article level Altmetric data will appear when viewing a paper in the browser. The [Embeddable Badges](#) take a little more one time, up-front work on the part of the user, but once in place do not require any more attention.<sup>33</sup> Using Altmetric's API is necessarily more intensive but will likely be used by institutions or researchers particularly interested in altmetrics.

### ImpactStory

Initially called "total-impact," ImpactStory originated as a product from a hackathon at the Beyond Impact 2011 workshop. Scholars provide identifier numbers of or URLs to their publications and other work products to their individual profile pages. ImpactStory then displays article level metrics as a button next to each publication indicating the degree to which each was viewed, saved, cited, discussed, and recommended. The display gives viewers the ability to hover over this information to learn more about who is viewing, saving, citing, discussing, and recommending the scholarly works. The display attempts to provide a data-supported story of the researchers impact.<sup>34</sup> A full list of from what sites these metrics originate is located on their website.<sup>35</sup> ImpactStory has received funding from the Open Society Foundation, and the Alfred P. Sloan Foundation.

The way ImpactStory is currently modeled requires users to invest a moderate amount of effort into building their profile on the site. Users can import article identifiers to scholarly works from ORCID, Google Scholar, SlideShare, GitHub, or PubMed, or they may provide the DOI or a general URL for a website (e.g. a lab website). Unless a tool is built to automatically scrape this information from a CV format, this will be time and energy intensive and possibly confusing, however, as users will need to find each identifying number for all of their research output.

### Plum Analytics

Plum Analytics was founded by two of the creators of Summon from Serials Solutions. Their product, PlumX, tracks five types of impact about any of 20 types of scholarly content, from articles and abstracts to source code and videos. Impact metrics include usage statistics such as downloads, views, holdings at libraries and ILL requests; captures such as favorites and bookmarks; mentions such as blog posts, news stories, Wikipedia articles, and comments; social media buzz such as Tweets, +1's, likes, shares, and ratings; and citations on platforms such as PubMed and Scopus.<sup>36</sup>

PlumX displays the results of compiled altmetrics for individuals or their work as a spreadsheet, a bar graph, and two types of “sunburst” visualizations. In a “sunburst,” levels of information are ordered in concentric circles: the type of content is in the middle, the next circle displays the items in each content type, the next displays the entity scraped for data (WorldCat, Mendeley, an Institutional Repository, etc.) and then the final circle displays the data scraped (Cited by, Readers, Holdings). The sunburst can be ordered by number in each type, or by the degree of impact items have had. Plum Analytics has partnered with two institutions, the University of Pittsburgh and The Smithsonian, to beta test their product. In these pilot partnerships, the investment on the part of users was minimal: simply supply a CV and the Plum Analytics tool will scrape a set of websites to find the scholarly output.

## Appendix B: Social Networks

### [Academia.edu](#)

With a mission to “accelerate the world’s research,” Academia.edu has created a social network platform specifically for academics. Over four million people have signed up for an account, and the site hosts over 1.5 million papers.<sup>37</sup> The interface for researcher profiles is akin to a Google+ profile page. On the profile page, researchers can list their scholarly output by format (books, papers, talks, teaching documents, thesis chapters, or any other category the user creates) and include texts for download. Statistics presented on each profile page include: number of profile views, number of paper or book views, number of followers, number of books, papers, etc. Scholars with accounts can follow and send messages to others on the site, as well as link to their other social profiles, e.g. Facebook and Twitter. The Analytics Dashboard allows four perspectives: overview, documents, keywords, and countries which each display how Internet traffic landed a searcher to the scholar’s Academia.edu page. They are partially funded by Spark Capital, True Ventures and Spark Ventures.<sup>37</sup>

### [Mendeley](#)

Mendeley is both a citation management tool and social network for scholars with over two million users.<sup>38</sup> Scholars with Mendeley accounts can add PDFs of research products, organize them in their own set up of folders in their library, and collaborate with others by engaging with “groups”. Profile pages of people list typical information found on a CV, but also shows other users they are connected to and lists the groups of which they are members. There are metrics on pages for each research product on the site. These include the number of “readers” (users who have added a paper to their library or group) broken down by discipline, academic status, and location. Elsevier bought Mendeley in April 2013,<sup>39</sup> and the changes this acquisition will bring about are still unclear.

### [ResearchGate](#)

ResearchGate is very similar in its interface, goals, and functionality to [Academia.edu](#). As of June 2013, ResearchGate had three million members signed up for accounts.<sup>40</sup> Users have a profile page, may upload their publications and other files, or metadata about their scholarly output. This social network allows people to follow each other and message other users. There is a job board section where users can see job postings. Each profile page lists overview statistics including views, downloads and citations; top co-authors on publications; common research topics; and institutional affiliations. A profile page may also list information found on a typical CV such as research experience or educational background. Slightly more detailed statistics displayed on the profile page include views over time, and views by institution or country. ResearchGate produces an “RG Score” to represent scientific reputation. This score is a number broken into several components: number of publications, number of questions posted on the ResearchGate site, number of answers given, and number of followers. This RG Score is then compared with other users and binned by percentile.

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