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Altmetrics: Help Your Researchers Measure Their Full Impact

Andrée J. Rathemacher

This report covers a program sponsored by the Scholarly Communication Interest Group of the Association of College and Research Libraries New England Chapter (ACRL/NEC), an independent chapter of ACRL. The workshop, titled “Altmetrics: Help Your Researchers Measure Their Full Impact,” took place on November 14, 2013 at Northeastern University in Boston, Massachusetts. Approximately 60 people attended.

Hillary Corbett (scholarly communication librarian and university copyright officer, Northeastern University) welcomed attendees to the program, promising that speakers would share their expertise in creating, managing, and using altmetrics to advance scholarly communication. Corbett defined altmetrics as “the creation and study of new metrics based on the social web for analyzing and informing scholarship.” She added that altmetrics “allow scholars to create a more complete picture of how their work is being accessed and used from the moment of publication—and sometimes years before traditional metrics would show any impact.”

Heather Piwowar, ImpactStory

The first speaker was Heather Piwowar (co-founder, ImpactStory). Piwowar holds a Ph.D. in biomedical informatics from the University of Pittsburgh and conducts research in the area of

research data availability and reuse. With Jason Priem, she co-founded ImpactStory, a non-profit, open-source, web-based tool that aggregates altmetrics and citations to reveal the diverse online impacts of articles, datasets, blog posts, and other research products.

Piwowar started with the statement, “Research evaluation matters.” She explained that research evaluation impacts who gets hired, who gets grants, and who gets a career in academia. Because of the high stakes of research evaluation, it also impacts where scholars publish, which journals succeed, which journal innovations succeed, whether researchers publish in journals at all, and ultimately, the whole structure of scientific communication.

The problem with our current system of research evaluation, explained Piwowar, is that much of researchers’ output is not included in the evaluation process. As an example, she used Carl Boettiger, a post-doctoral researcher in ecology at the University of California Santa Cruz. If we were to view a standard CV listing the articles he has authored, we would focus on the titles of the journals in which his articles appeared, using them as a proxy for the quality of his research. If we looked up his profile page on Google Scholar, we would see the number of times each of his articles had been cited, which is a step forward because it shows us the impact of every article independent of the publishing container in which it appeared. However, we would still be missing much of the impact of Boettiger’s scholarship.

In addition to writing journal articles, Boettiger posts computer code on github, makes his lab notebook available on his personal website, posts research data on Dryad and figshare, and posts article preprints on arXiv. When scholarly output like Boettiger's is available online, traces of how it is used become available, for example through records of saves in Mendeley, citeulike, and delicious; downloads from PLoS, Dryad, figshare, github, and SlideShare; recommendations by Faculty of 1000; and mentions on twitter and facebook. Traditional impact metrics like the impact factor and the *h*-index neither track the impact of alternative research outputs like datasets, computer code, and presentation slides nor do they measure impact beyond citations—like bookmarks, downloads, mentions in blogs or on social media platforms.

Piwowar displayed Boettiger's ImpactStory profile (<http://impactstory.org/CarlBoettiger>). ImpactStory allows Boettiger to track the impact of all of his research products, specifically to what degree they were recommended, cited, saved, discussed, and viewed by scholars and the public. Each metric is placed in context by showing its percentile relative to other items in the same category produced in the same year. For each metric, users can click on the raw count (i.e. "54 readers" on Mendeley or "17 tweets" on Twitter) to visit that metric source's external page for the item. This enables the viewer to drill down and see the demographics of who saved the article in Mendeley and to read the content of the tweets and who tweeted them, for example. This allows for a transparency that is missing with traditional metrics. Because ImpactStory provides metrics for a wide variety of uses and scholarly outputs, it allows researchers to demonstrate the impact of their web-native research in addition to more traditional scholarly outputs and therefore empowers them to create change in the system of scholarly

communication. It helps them tell the story of what kind of scholar they are, and of the impact their entire body of scholarship makes in the world.

Piwowar next addressed the question of how libraries can help promote the acceptance of altmetrics in the assessment of scholarship. First, she said, libraries can empower individual researchers to make their own cases regarding the impact of their scholarship by educating them about the availability of new assessment tools like ImpactStory. Putting assessment in the hands of the assessed, she claimed, is good for scholars and good for scholarship. Librarians can also raise campus expectations about how open resources and evaluation metrics should be. The era of costly paper-based products like the Institute for Scientific Information's citation indexes is long gone; everything now is digital, and usage data should be open and available through APIs. Librarians can also recommend that grant review committees and editorial boards of journals welcome diverse metrics of impact; even the simple phrase "We welcome evidence of alternative forms of impact" can make a difference. Finally, librarians can celebrate success by promoting awards for innovative scholarly products and supporting the altmetrics tools they believe in by promoting them but also by providing constructive feedback.

After a short question-and-answer session, Piwowar concluded with a list of ten reasons to include altmetrics on a CV. First, altmetrics provide additional information to evaluators. Second, including altmetrics de-emphasizes inappropriate metrics like journal impact factor by providing an alternative. Third, altmetrics uncover the value of recently published work, while citations can take a long time to accrue. Fourth, altmetrics show the value of all types of

scholarly products, for example data sets or public performances, and not just articles and books. Fifth, altmetrics recognize diverse impact flavors, for example, a paper or book chapter that is heavily assigned as reading in undergraduate classes because of its ability to clearly explain a topic or a paper that is not heavily cited in the research literature but which is used regularly in laboratories because of its methods section. Sixth, altmetrics reward effective efforts to facilitate reuse—when scholars take the time to add metadata to their scholarly products to better enable them to be discovered and reused, their altmetrics scores will be higher. Seventh, altmetrics encourage a focus on public engagement by measuring the value the public places on research through mentions in news and social media; funders and universities increasingly care about public impact. Eighth, altmetrics facilitates qualitative exploration through providing not just raw numbers but links to the actual context in which the research was used. Ninth, altmetrics empower publication choice; scholars can be evaluated on the impact of their research products however and wherever they were published; publication need not be limited to high-impact-factor journals or even journals at all. Tenth, altmetrics spur innovation in research evaluation by removing evaluation from the back room and allowing researchers to tell their own stories. In conclusion, Piwowar emphasized the importance of altmetrics being accurate, auditable, and meaningful and that they supplement rather than replace expert evaluation. People still need to read the articles.

Andrea Michalek, Plum Analytics

Speaking next was Andrea Michalek (co-founder, Plum Analytics). Michalek defines herself as a “serial entrepreneur” with over fifteen years experience in building solutions in search and natural language processing. In January 2012, she founded Plum Analytics with Mike Buschman, whom she met while working at Serials Solutions on the Summon Service discovery platform. Plum Analytics offers a service that collects impact metrics in five major categories: usage, captures, mentions, social media, and citations. It tracks over twenty different types of artifacts, including journal articles, books, videos, presentations, conference proceedings, datasets, and source code (<http://www.plumanalytics.com/about.html>).

The origin of Plum Analytics lay in Michalek and Buschman’s experience building a discovery platform that produced relevancy rankings using an algorithm favoring highly cited articles as well as current articles. Because citations take a while to accrue, and thus highly cited articles tend to be older, the highly cited results and the current results ended up cancelling each other out. Michalek and Buschman could not find a way to successfully filter for recently published impactful scholarship, and this was the problem they set out to solve with Plum Analytics.

After briefly reviewing the well-documented [1] problems with citation analysis, Michalek echoed Piwowar in observing that researchers have moved online. Traces of researchers’ activities on websites such as citeulike, Mendeley, Dryad, twitter, figshare, Google+, github, facebook, and others result in “scholarly data exhaust” that can be measured. To use a metaphor, if citation counts are the visible portion of the electromagnetic spectrum, Plum Analytics’ PlumX

product analyzes the full spectrum. In addition to citation counts, PlumX measures a variety of altmetrics that were formerly invisible.

Michalek explained that PlumX is built for big data. Plum Analytics' goal is to track all of the world's 18 million researchers, all of their scholarly output, and metrics for each of their research products. Data on researchers and their artifacts are ingested into PlumX from multiple sources such as Google Scholar, ORCID, VIVO (<http://vivoweb.org/about>), and institutional repositories, limiting the need for data re-entry, and each researcher is mapped to his or her artifacts. As PlumX harvests impact metrics, care is taken to ensure that metrics for all versions of the same item are counted and presented together. For example, an article may exist on multiple platforms (e.g. a publisher web site, PubMed Central, and disciplinary and institutional repositories). It may also be identified by a DOI, a PubMed ID, and multiple URLs.

PlumX measures five different categories of impact. These are usage (downloads, views, book holdings, interlibrary loans, document delivery), captures (favorites, bookmarks, saves, readers, groups, watchers), mentions (blog posts, news stories, Wikipedia articles, comments, reviews), social media (tweets, Google +1s, likes, shares, ratings), and citations (Scopus, Google Scholar, Microsoft Academic Search, patents). Michalek commented that given their extensive list of metrics sources and the more than twenty types of research artifacts they track, PlumX's approach to "altmetrics" is best described as "allmetrics."

PlumX is able not only to present these metrics at the levels of the research artifact and the researcher but also to group metrics to illustrate the research impact of a clinical trial, a grant, a department, an institute, a lab, or a journal, for example. Data products include directories, dashboards, widgets, and APIs. Plum Analytics sells their service to libraries and research offices with pricing based on the number of researchers being tracked. They will provide their metrics for display in institutional repositories at no charge, in exchange for repository usage data, after a small set-up fee. D-Scholarship@Pitt (<http://d-scholarship.pitt.edu/>) provides an example.

Nettie Lagace, NISO

The third speaker of the morning was Nettie Lagace (associate director for programs, National Information Standards Organization), who spoke about “NISO’s Altmetrics Initiative.” NISO is a non-profit association accredited by the American National Standards Institute (ANSI) whose mission is to develop and maintain standards related to information, documentation, discovery, and distribution of published materials and media. NISO is responsible for standards including ISSN, DOI, Dublin Core metadata, OpenURL, and MARC records. Standards are created through consensus by a community with various stakeholders. They operate as the behind-the-scenes “plumbing” that facilitates trade, commerce, and innovation. Standards reduce costs by supporting communication and interoperability across systems.

NISO is currently engaged in a project that could lead to standards for altmetrics. The initiative came out of a breakout session at the altmetrics12 meeting in Chicago in June 2012. In June 2013, the Alfred P. Sloan Foundation awarded NISO a grant to help facilitate the adoption of

altmetrics and the development of community consensus standards around them. NISO recognized that in order to move altmetrics forward out of the “pilot” and “proof-of-concept” phase, altmetrics needed to coalesce around commonly understood definitions, calculations, and data sharing practices. Altmetrics must be able to be audited, and organizations that want to apply them will need to be able to understand them so as to ensure consistent application. Some of the issues that NISO hopes to address through the altmetrics project are: What gets measured? What are criteria for assessing the quality of these measures? How granular should the metrics be to enable computation and analysis? What periods should the metrics cover? What technical infrastructure is necessary to enable exchange of the metrics data?

Lagace acknowledged that NISO’s effort to develop altmetrics standards had drawn some skepticism. Some have expressed concern that the field is too new, with no existing practice to build on, that standards should not simply be “invented,” and that the standard-making practice might be a diversion from real work that needs to be done. Lagace emphasized that NISO does not want to divert anyone from further innovation in altmetrics, and they want any standards or recommended practices that emerge to have traction. For this reason, the project is taking place in two stages, with the idea that by the time any output is created, the community will have a need for it.

Phase One of the project consists of holding meetings of stakeholders to define a high-level list of issues. Stakeholders include publishers, scholars, altmetrics producers, university administrators, and librarians. The first meeting took place in October 2013 in San Francisco in

conjunction with the PLoS Article Level Metrics meeting. Additional meetings are scheduled for December 2013 in Washington, D.C. in conjunction with the Coalition for Networked Information Membership Meeting and for January 2014 in Philadelphia in conjunction with the American Library Association Midwinter Meeting. In addition, public webinars will be held in early 2014.

After these meetings, NISO will create a white paper identifying the recommended practices or standards that need to be developed to speed the adoption of altmetrics, and they will seek public feedback on the white paper through public presentations. Phase Two of the project consists of creating a working group within the NISO structure to create recommended practices or standards. Lagace pointed out that recommended practices do not have the same normative or “must” kind of language that standards do. The choice to adopt recommended practices is optional. It is possible that recommended practices will result from the process, with standards to be adopted at a later time. Once practices and/or standards are adopted, NISO will engage in education and training efforts to facilitate implementation. NISO’s final report for the altmetrics project is due to Sloan in November 2015. NISO invites engagement from all interested parties and maintains a website (http://www.niso.org/topics/tl/altmetrics_initiative/) to share information about each step of the process.

P. Scott Lapinski

The afternoon sessions featured librarians who have incorporated altmetrics into their work. Speaking first was P. Scott Lapinski (digital resources librarian, Countway Library, Harvard

Medical School). Lapinski's responsibility as the principal support to the faculty and students of the Harvard Medical School and the Harvard School of Public Health for the NIH Public Access Policy has provided him with the opportunity to engage in many conversations about scholarly communication over the past several years, yet until about eighteen months ago, he knew very little about altmetrics. This changed when the Office for Faculty Affairs at Harvard Medical School asked him to speak to them about how to use the Web of Science to calculate a researcher's *h*-index. He began to research the *h*-index, seeking to become an expert in its strengths and weaknesses, and this led him to altmetrics. He read articles about altmetrics and learned how to use PloS Article-Level Metrics, ImpactStory, and Plum Analytics. As a result, he can now engage faculty in conversations about altmetrics whenever the opportunity arises. The topic of altmetrics also provides him with an opening to discuss author disambiguation and to encourage faculty to set up an ORCID profile.

Additional speaking invitations at Harvard resulted from this initial presentation on altmetrics. Lapinski also integrated altmetrics into his regular workshops on the NIH Public Access Policy and open access outreach activities. Because the NIH has become stricter about policy compliance, researchers are paying more attention, yet there are some non-compliant faculty who dismiss the policy as bureaucratic red tape. To counter this perception, Lapinski has used altmetrics to demonstrate to researchers the benefits of making their work open access. He began by comparing two sets of NIH-funded articles, half of which had been deposited in PubMed Central and half of which had not. Using Web of Science, he determined that the *h*-index, total citations, and average citations per article were significantly higher for the set of articles that was available open access. This held true even when he controlled for journal reputation by making

sure that the same set of journals was represented in each group of articles and by limiting the articles in PubMed Central to those that had been uploaded by the author directly. Finally, Lapinski used ImpactStory to create two “fake” author profiles. Under one profile he ingested the DOIs for 100 NIH-funded articles that had been uploaded to PubMed Central, and under the other profile he ingested the DOIs for 100 NIH-funded articles that were not in PubMed Central. After downloading and graphing the results, he found that compliant articles were selected more often by Faculty of 1000, had more tweets, were mentioned more often in Wikipedia, were saved more in Mendeley, and had more citations in PubMed Central. Lapinski uses this altmetrics data to show authors that complying with the NIH Public Access Policy will not only contribute to the greater good but also result in their research having more impact.

Panel of Local Altmetrics Users

Following Lapinski was a panel of local altmetrics users. Speaking first were Adele Wolfson (professor of chemistry, Wellesley College) and Megan Brooks (director, Research Services, Wellesley College). Wolfson is on the editorial board of the journal *Biochemistry and Molecular Biology Education*, published by Wiley. This journal, like other science education journals, has a very low impact factor simply because articles related to teaching are not often cited; rather, practitioners pick up ideas and use them in their classrooms. Wolfson explained that she was troubled less by harassment from the journal’s publisher about the low impact factor than by the fact that she knew articles about pedagogy and teaching were being used but there was no way to measure this use. She was put in touch with Megan Brooks, Deborah Linares, and Alana Kumbier at the library, and together they compiled a list of altmetrics that might reveal the

impact of teaching-related scholarship. These included citations in textbooks, mentions in grant proposals, evidence from course web pages and learning management systems of use by instructors, and presentations at meetings and workshops. Wolfson suggested a multi-pronged approach to raising the profile of the scholarship of teaching comprised of encouraging altmetrics companies to include these additional metrics, encouraging faculty working in the field to take full advantage of the altmetrics that currently exist, and making research and materials about teaching more available via social media sites so that altmetrics can be generated for them.

Megan Brooks added that as a result of their collaboration, Wolfson, Brooks, Kumbier, and Lenares wrote a short article for *Biochemistry and Molecular Biology Education* titled “Monitoring and Promoting the Impact of Pedagogically Related Scholarship.” [2] They also presented a seminar at Wellesley College’s Pforzheimer Learning and Teaching Center during which they demonstrated article level metrics tools for faculty, including Web of Knowledge, Google Scholar, Mendeley, Altmetric.com, and ImpactStory. They stressed the importance of DOIs as the “digital fingerprints” of online articles and showed how to perform a Google link search to find references to a specific URL. They highlighted social media sites for scholars like Research Gate and Academia.edu and talked about why faculty might want to create an ORCID profile. They encouraged teaching faculty to “pay it forward” so that the authors who influence their pedagogy will get credit. Faculty members who already blog or use social media platforms or bookmarking sites can link to the sources of inspiration for their teaching methods. They can also include citations on their online syllabi to works that have influenced their teaching. As a

result of this experience, Brooks looks forward to the library doing more with altmetrics for Wellesley faculty.

Lisa Palmer (institutional repository librarian, Lamar Soutter Library, University of Massachusetts Medical School) spoke next on the work she and her colleagues have done promoting altmetrics through their institutional repository, eScholarship@UMMS, and through education and outreach. Through eScholarship@UMMS, which runs on Digital Commons software from bepress, the library hosts three open access journals. Bepress provides authors with download statistics for their articles, but there is no publicly facing indication on bepress journal websites of the impact of each article. Desiring to demonstrate article impact, Palmer worked with bepress to set up a free API from Altmetric.com for one of the journals, the *Journal of eScience Librarianship* (<http://escholarship.umassmed.edu/jeslib/>). The “Altmetric” badge now appearing on each article page links to a display of the article’s Altmetric score and the score’s context. This integration with Altmetric.com is possible because Palmer assigns DOIs to every article; Altmetric.com requires unique standard identifiers such as DOIs, PubMed IDs, arXiv IDs and Handles. Palmer thinks altmetrics hold great potential for demonstrating the value of content in institutional repositories, especially of non-journal materials that are not included in traditional citation tools. A concern, however, is revealing low or zero metrics, since they could dissuade authors from depositing their work.

Palmer and her colleagues have also engaged in education and outreach around altmetrics by adding altmetrics information to their Libguide on open access, offering classes and

presentations on altmetrics, and creating ImpactStory profiles for selected researchers, which they use as examples. Their message to faculty about how to enhance the impact of their research is to be consistent with the form of their name and to register with ORCID; to share their research as widely as possible, including depositing in the institutional repository; to leverage social media; and to experiment with altmetrics tools to help tell the story of their research. The librarians at the Lamar Soutter Library want to help researchers understand that altmetrics are complementary to traditional citation-based metrics because they allow for assessment at the article level and can accommodate other research products, and that altmetrics will grow in importance in the future.

The final speaker of the day was John Furfey (senior automation services officer, MBLWHOI Library). Furfey noted that his library serves multiple research institutes including the Marine Biological Laboratory and the Woods Hole Oceanographic Institution. For about three years, the library has been supporting a home-grown researcher profile system based on the Bibapp project (<http://bibapp.org/>) that includes researchers and their publications. Librarians decided that it would be appropriate to incorporate altmetrics data into this system in order to expose researchers to altmetrics and gauge their reactions. Through free APIs that were very easy to implement, Furfey embedded metrics from Altmetric.com and ImpactStory into the system. (See <http://research.mblwhoilibrary.org/works/39340> for an example). After seeing the altmetrics data, researchers started asking questions, so two months ago Furfey offered a formal workshop on altmetrics. (His experience with the workshop confirmed the observation Piwowar and others had made earlier in the day: Do not begin a presentation with examples of altmetrics from twitter, as this may alienate more traditional researchers.)

A benefit of Altmetric.com is the ability to group together “trending” publications as well as to gather publications by researcher group. (See example at <http://research.mblwhoilibrary.org/static/en/trending/trending.html>). These groupings are gaining the attention of the institution’s communications department, which has used the list of trending publications to help decide what research to profile on the institution’s home page. The library’s altmetrics experience has also helped the education department at the Marine Biological Laboratory, which offers intensive science courses in the summer for post-doc students. These courses are grant-funded, and the grant-writers have been able to use altmetrics data on student outputs when they renew the grants to illustrate the value of the courses to the students and the greater science community. Altmetrics has helped the MBLWHOI Library connect with people at Wood’s Hole they would not typically have partnered with in the past and has resulted in librarians being seen as experts in the measurement of research impact.

[1] MacRoberts, M. H., & MacRoberts, B. R. (2010). Problems of citation analysis: A study of uncited and seldom-cited influences. *Journal of the American Society for Information Science and Technology*, 61(1), 1-12.

[2] Wolfson, A. J., Brooks, M. A., Kumbier, A. L., Lenares, D.A. (2013) Monitoring and Promoting the Impact of Pedagogically-Related Scholarship. Wellesley College Digital Scholarship and Archive. Paper 6. <http://repository.wellesley.edu/scholarship/6/>.

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