



Assessing Contribution, Assessing Value — Metrics in a New Context: An NFAIS Virtual Seminar

Citation analysis has long been a popular metric for tracking the scholarly research output of scientists. Now, however, many new alternative metrics (altmetrics) have appeared, and they are providing us with new ways to measure the research output of not only scientists, but also organizations and publications. A day-long virtual seminar hosted by NFAIS on March 28, 2014 featured presentations from several information professionals discussing various aspects of altmetrics.

Judy Luther, President, **Informed Strategies**, led off with a review of the assessment landscape. She noted that there has been an increased focus on research productivity since the economic crash of 2008, which has changed the roles of many of the stakeholders. Researchers, publishers, and librarians have long been interested in tracking scholarly output, but now funders, provosts, and authors are also interested. Funders are concerned about the benefit of research to society and its validity; provosts are concerned about the status of their institution; and authors want to see the reach of their research. **Luther** also cited the “Becker Model” (see below) as a thorough way to examine all the outputs of a researcher because it looks at the broad applications and the economic benefits of the research. She also said that the widely used Impact Factor (IF) of journals was never meant to measure everything, but until the emergence of systems for dealing with altmetrics, it was a major measurement factor. Conversations are now moving beyond authors and citations to readers, downloads, society, and new metrics.

We are still going through the transition from print publishing to digital, and content now appears in a variety of types: datasets, source code, patents, etc. Many articles are supported by datasets, and access to them is important. **Luther** mentioned three prominent service providers with platforms for deriving these measurements:

- Plum Analytics (<http://www.plumanalytics.com>), now owned by EBSCO, and primarily used by academic institutions,
- Altmetric (<http://www.altmetric.com>), owned by Macmillan, the publisher of *Nature*, and mainly used by publishers, and
- ImpactStory (<http://impactstory.org>), which was developed by two graduate students and focuses on open access data.

The core infrastructure of analytics includes several identifiers: Digital Object Identifiers (DOIs), ORCID (for disambiguating author names), FundREF (to identify funders and link them to an author's work), and Ringgold (an identity database of institutional identifiers). Using these identifiers, authors are able to obtain feedback on the number of people reading their work, and even the geographic distribution of their readers.

Content is becoming personal because many altmetrics are about people. For example, Microsoft Academic Search (<http://academic.research.microsoft.com/>) has the capability of displaying an author's network of co-authors or citations in visual diagrams. (The visualization below shows the citation network generated by Microsoft Academic Search for **Professor Carol Tenopir**, a prominent academic researcher and educator at the **University of Tennessee**.) Google Scholar is now also showing citation data. Such visualizations let authors know how wide their reach has been and where they are having an impact.



Microsoft Academic Search Visualization of Carol Tenopir's Citation Network

New initiatives include Growkudos (<http://www.growkudos.com/>), a free service that helps researchers promote their content by linking resources to it and distributing a summary to a variety of social media platforms, and Hypothes.is (<http://hypothes.is/>), a platform for the collaborative sharing of knowledge.

William Gunn, Head of Academic Outreach at **Mendeley**, described how **Mendeley** helps researchers make their content compatible in today's digital era. Users are provided with “library” space in which they can download and store articles of interest to them. The system then collects metadata about the articles and the researchers and tracks signals about who is adding to their libraries and who they are sharing the content with, enabling new forms of discovery. Each time a document is read, it is stamped with metadata.

Gunn discussed problems with relying on IFs and citation data to measure the impact of research:

- Citation data typically takes a significant amount of time (possibly years) before meaningful data on an article accumulates, which is too slow for an early-career researcher. In contrast, **Mendeley** is fast because it collects data every day, and it can show the relationship between readers, not just authors, and citations.
- The IF was not intended to be more than a way for a library to understand the usage of their collections, but it has grown to take on a wider role which it cannot fill well, especially in some fields in which articles have large numbers of authors. The process of determining a journal's IF is unscientific and arbitrary.

*Note: An article reporting on a Webinar with **Jan Reichelt**, one of **Mendeley's** Co-Founders, can be found in the June 2014 issue of *ATG*, v.26#3, p. 72.*

Kristi Holmes, Bioinformaticist at the **Becker Medical Library, Washington University** at St. Louis, asked how we measure not what we can but what matters, and what things people typically count. She noted that papers, grants, etc. are artifacts of the scholarly process. Citation analysis is a traditional measurement tool, but publication data does not

continued on page 78

provide a full measure of research impact. The Becker Model tracks outputs that have been disseminated to locate indicators that demonstrate evidence of research impact. It supplements publication analysis, and its Website (<https://becker.wustl.edu/impact-assessment>) provides guidance to researchers on its application. Although some criteria, such as reviews, new funding, invited lectures, and awards, are probably familiar to researchers and publishers, others such as new diagnostic criteria, curriculum guidelines, clinical practice guidelines, and quality measure guidelines, may not be as well known. Some general issues and challenges include:

- Time lag between research discoveries and applications,
- Lack of public availability of supporting documentation,
- Difficulty in operationalizing and reliably measuring research indicators, and
- Difficulty in comparing evidence of research impact across different areas in a standard manner.

An open source semantic Web discovery platform, VIVO (<http://vivoweb.org>), enables the discovery of research and scholarship across disciplines in an institution. It runs on a semantic-based platform and allows information to be integrated with data from other institutions.

As described by **John Chodacki**, Product Director, **Public Library of Science (PLoS)**, PLoS is a leader in using article-level metrics (ALMs). It has optimized networked-enabled research by building an infrastructure to support more efficient transactions and has redefined publication criteria, provided open access for all, and has instituted tracking measures (ALMs) such as usage statistics, citations, and altmetrics. (See <http://article-level-metrics.plos.org>)

Context still matters and it is important to get the big picture, which is what ALMs provide. The goal is to measure all the conversations surrounding an article, not just the usage. Here are two cases for ALMs that show the viewpoint of the author and the researcher.

Author	Researcher
<p>Self-Metrics</p> <ul style="list-style-type: none"> Measure the impact and reach of their work Benchmark article performance against others Evaluate publication decisions to maximize the impact of their work Communicate impact of research to employers, funders, potential collaborators 	<p>Research & Discovery</p> <ul style="list-style-type: none"> Gauge value of any article with post-publication peer review Conduct custom searches that account for research impact Collect relevant articles and organize based upon array of criteria Gain insight into article's impact within context of related research Analyze trends/behaviors across a database of academic literature

ALMs reveal where and how articles are being used over a time span, but the integration of ALMs into discovery and evaluation is still a work in progress.

PLoS provides a “metrics” tab on each page of its search results that leads to ALM Reports (<http://almreports.plos.org>), a Web-based tool allowing researchers to create a narrative of research activity and examine visualizations summarizing views of the ALM data. Within PLoS, these data are used to improve business intelligence, deepen editorial capabilities, deliver a richer product, and streamline publishing operations.

Michael Habib, Product Manager of Elsevier’s Scopus service, agreed with **Chodacki** that altmetrics are not the same as ALMs; they are complementary to citations and not a replacement for them. Scopus is working to greatly reduce the emphasis on the IF as a promotional

tool by presenting it as only one of a variety of metrics that provide a richer view of journal performance. The San Francisco Declaration on Research Assessment (DORA, http://en.wikipedia.org/wiki/San_Francisco_Declaration_on_Research_Assessment) goes further; its signers seek to halt the use of the IF as a means of evaluating the impact of scholarly articles.

Two new metrics have recently appeared: the Source Normalized Impact per Paper (SNIP), which weights citations based on the total number of them in a discipline, and the SCImago Journal Rank (SJR), which is based on the premise that “not all citations are created equal.” See <http://www.journalmetrics.com> for details. A recent article characterizes altmetrics in five classes:

5 buckets of data classes for Altmetrics (Scopus)

- **Social activity** – characterized by rapid, brief engagement by users on platforms used by the general population – Twitter, Facebook, Delicious, etc.
- **Component re-use** – the re-use of the constituent elements of the research product – data, figures and code
- **Scholarly commentary** – in-depth engagement by people using scholarly platforms, such as Science Blogs, F1000Prime reviews, etc.
- **Scholarly activity** – indirect measurement of activity by people using scholarly platforms, e.g. Mendeley, Zotero, Citeulike.
- **Mass media coverage** – coverage of research output in the mass media

Source: M. Taylor, Towards a Common Model of Citation, Research Trends (35), 19-22 (2013). Available at: <http://www.researchtrends.com/issue-35-december-2013>

Altmetrics can give significantly different views of an article than simple citation counts. For example, one article that was cited only five times was downloaded into a Mendeley library by over 54,000 people, showing that it has had a very large impact. Altmetrics allow Scopus to display usage on both scholarly and social platforms, thus indicating international interest, interdisciplinary effects, scholarly commentary, and mass media coverage. For example, here is a typical display showing the geographical distribution of accesses to an article:



(This article happened to be about the Fukushima nuclear disaster, which explains its large Japanese interest.)

ORCID (Open Researcher and Contributor ID, <http://orcid.org>) provides authors with a unique identifier which disambiguates them from all other authors. New metrics like ORCID and FundRef are making it easy for individuals to take control of how they present themselves to the world.

In a study by Scopus of the most widely recognized metrics, only about 1% of those surveyed knew the term “altmetrics” a year ago, but awareness is rising; this year 5% of the respondents do. By far, the most widely recognized term was “impact factor.” Younger researchers and

continued on page 79

those in the Asia-Pacific area find altmetrics valuable in getting name recognition, and there is a strong interest in the developing world to use altmetrics to evaluate research.

Here are Habib's conclusions:

- Choose methods + metrics appropriate to level and impact type assessed (DORA)
- Don't confuse level with type (aims ≠ altmetrics)
- Don't use just one metric, promote a variety of metrics
- Awareness of metrics correlates to acceptance, raising awareness matters
- Younger researchers and those from the Asia-Pacific region are generally more open to new metrics
- Choose transparent and standard methods and metrics

Andrea Michalek, Co-Founder of **Plum Analytics**, suggested these categories of ALMs:

- Usage: viewing,
- Capture: downloading, saving,
- Mentions: comments, blog postings, Wikipedia links, news articles,
- Social media: promotional, and
- Citation: a traditional metric that is still important.

Altmetrics provide access to the full impact spectrum and provide a feedback loop: how the article can help the researcher to obtain funding, provide an indication of the ROI of the research, and provide new data to make funding decisions. **Michalek** said that we must not depend solely on ALMs but must look at who is influencing whom (she called this the "data exhaust"). Sources of metrics run the gamut from A to Z (almost):



Research output is more than articles; it is important to measure all of it, including blog posts, conference papers, datasets, figures, grants, source code, videos, and other types of writings beyond the journal article. Books should be included, even though their metrics are harder

to obtain. (Amazon and WorldCat are good sources of mentions and reviews.)

Plum's product, PlumX, is built to accommodate big data. Its goal is to track all of the world's researchers, all of their output, and metrics for each. Currently its database contains 18 million researchers worldwide and over 120 million scholarly articles. Users can build dashboards by identifiers and incorporate the same article published in different places, with metrics for each copy. A challenge is to present the data with minimal bias, which is achieved by allowing data to be compared in many ways, grouping a set of articles and comparing like with like, and exposing the links to the original sources.

Altmetrics give us a new way to track research. They turn big data into information and allow people to make decisions on it. PlumX is mainly being used by researchers at academic institutions who are monitoring promotional efforts for their research, discovering other researchers, finding where in the world other researchers are using their work, deciding where to publish their work, and tracking the work of collaborators.

Nettie Lagace, Associate Director of Programs at the **National Information Standards Organization (NISO)**, reported on NISO's altmetrics initiatives. Standards are created by a community in a spirit of consensus and trust. The NISO altmetrics program originated from a discussion group at an **ACM** conference in 2012 and is being funded by a grant from the **Sloan Foundation**. It is addressing such questions as:

- What can be measured and how do we measure it?
- Which measurements are valuable?
- Is there consistency in what is counted?
- How can work be connected to contributors?

Meetings of stakeholders have been held and a white paper is being written. The final report is due in November 2015. All material from the initial meetings is available on the NISO Website (http://www.niso.org/topics/tl/altmetrics_initiative/).

John Leslie King, Professor of Information at the **University of Michigan**, wrapped up the seminar with a look at the academic reward system and how it might be affected by altmetrics. He said that there is much ambiguity around impact, and metrics can help resolve that. The big issue in the academic world is tenure, which is primarily a 20th-century institution that will not be changed by metrics. It is often harder to change an institution than to get rid of it, and **King** thinks that tenure will disappear in about a generation because most reasons for it are now moot, and everything is controlled by contracts today.

Metrics are tied to the output of scholarship. It is likely that they will play more of a role in the reward system. Most faculty members do not have a problem with metrics as long as they understand what they are.

Donald T. Hawkins is an information industry freelance writer based in Pennsylvania. In addition to blogging and writing about conferences for *Against the Grain*, he blogs the *Computers in Libraries* and *Internet Librarian* conferences for *Information Today, Inc. (ITI)* and maintains the *Conference Calendar* on the ITI Website (<http://www.infotoday.com/calendar.asp>). He recently contributed a chapter to the book *Special Libraries: A Survival Guide* (ABC-Clio, 2013) and is the Editor of *Personal Archiving*, (*Information Today*, 2013). He holds a Ph.D. degree from the **University of California, Berkeley** and has worked in the online information industry for over 40 years.