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Purposeful Metrics: Matching Institutional Repository Metrics to Purpose and Audience

Todd Bruns

Eastern Illinois University, tabruns@eiu.edu

Harrison W. Inefuku

Iowa State University, hinefuku@iastate.edu

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Purposeful Metrics: Matching Institutional Repository Metrics to Purpose and Audience

Abstract

A key tool to making institutional repositories work is the successful use of repository metrics. These metrics are generated through repository platforms and third party sources such as Google Analytics and Altmetrics, and are generated in-house by repository managers. The successful repository manager turns metrics into quality assessment tools, matching the metric source to the appropriate audience and purpose. Imaginative uses of metrics market the repository and stoke faculty participation. Providing meaningful metrics to repository stakeholders proves the value of institutional repositories to contributors and funding stakeholders. Purposeful metrics play a key role in establishing institutional repositories as an integral technology in the research enterprise of the institution.

Disciplines

Scholarly Communication

Comments

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Purposeful Metrics: Matching Institutional Repository Metrics to Purpose and Audience

Todd Bruns and Harrison W. Inefuku

Introduction

The last 10 years have seen gains in the acceptance of open access (OA) among scholars through the growing availability of OA journals (Laakso et al., 2011 and in the development of funder-based policies advocating or mandating open availability of funded research (Xia et al., 2012). Discipline repositories, starting with arXiv in 1993, have grown to a large number of repositories in more than 40 subject areas. Additionally, new avenues of OA have recently sprung up in the creation of “scholar commons” such as Academia.edu and ResearchGate.

Institutional repositories (IRs) are currently in the middle of their second decade of development, with the three most commonly used repository platforms launched in the early 2000s (EPrints in 2000, DSpace and Digital Commons in 2002). Despite being created to promote open access to research and scholarship, and growing in number and size over the past 10 years, institutional repositories continue to be seen primarily as the province of libraries (Thomas, 2007) rather than the new wave of scholarly communication that OA journals and discipline repositories are coming to be seen as.

In order for researchers, universities, and funding agencies to view institutional repositories as a central pillar of the OA movement, repository managers need to prove the value of their repositories. To prove their value, repository managers rely on metrics, some platform provided, some created in-house. Successful use of metrics relies on selecting metrics that are meaningful to repository stakeholders. In other words, metrics that are collected and reported need to support the interests and goals of their appropriate audiences.

Metrics are commonly thought of as quantitative—download counts to demonstrate access and visibility, leading to higher citation rates (Antelman, 2004; Eysenbach, 2006; Gargouri et al., 2010); upload counts to document institutional repository growth; and Web analytics to ascertain visitor demographics and behavior. All three primary repository platforms provide metrics tools for the purpose of assessing repository growth and access, supplemented by metrics provided by third parties (Web analytics, citation measures, and altmetrics, for example) and locally developed metrics. These metrics are valuable in communicating with stakeholders, although repository managers may not be taking full advantage of these tools. A recent survey on assessment for digital collections in Association of Research Library member libraries indicates that a significant majority of respondents used assessment to measure functionality and to guide development, while only half of respondents indicated that they used assessment for stakeholder buy-in (Ochoa, Taylor, & Sullivan, 2014).

This is not a chapter about institutional repository assessment. Rather, it is about the collection and reporting of repository metrics for a variety of purposes and audiences, including

repository assessment. Metrics are a basic tool for proving the value of repositories. For library and university administration, institutional repositories need to demonstrate they are worth the financial and staff resources allocated to them. For academic and research units and faculty authors, repositories need to demonstrate they are worth the time needed to collect and submit publications. Effectively demonstrating the value of repositories through metrics requires an understanding of stakeholders and their objectives in using institutional repositories, and identifying and reporting metrics that show whether the repository is meeting those objectives.

Identifying Metrics: Understanding Audience and Purpose

Essential to the successful use of metrics is identifying an audience (repository stakeholders), recognizing a purpose (the stakeholders' interest in the repository), and tying it to a metric (what is being measured) that demonstrates how the repository is fulfilling that purpose (Inefuku, 2013). Commonly identified stakeholders in institutional repositories include the library, faculty members and other authors, academic departments and other campus units, university administration, the institution's governing boards, and accrediting agencies. These stakeholders form the audiences for repository metrics.

As noted by Poll and te Boekhorst (2007), "The perception of library quality will differ in the stakeholder groups. Users see library quality according to their experience with the services they use. They will not care for the efficiency of background processes, but for the effective delivery of services." Repository stakeholders will require metrics that are tailored to meet their needs. The type, granularity, and frequency of metrics reported is dependent on the audience, as each audience has differing interests in repositories:

University Administration

- Demonstrate scholarly output
- Increase visibility and impact
- Fulfill granting agency public access requirements
- Accreditation
- Comparison to peer institutions
- Membership in associations (e.g., Association of American Universities)

Campus Unit

- Demonstrate scholarly output
- Increase visibility and impact
- Fulfill granting agency public access requirements
- Accreditation
- Comparison to peer departments
- Recruitment of faculty and students

Faculty

- Demonstrate scholarly impact
- Increase visibility and impact

- Fulfill granting agency public access requirements
- Attain promotion and tenure, performance evaluations

Students

- Secure employment or further education
- Increase visibility and impact

Library and Repository

- Demonstrate impact of repository
- Assess growth and success of repository
- Improve services and discoverability

By providing useful and appropriate statistics to authors, departments, the university, and other stakeholders, the library demonstrates its value as a vital partner in research, scholarship, and scholarly communication. Reporting metrics can lead to new or continued usage of the repository's services. For internal purposes, gathering metrics provides a means of benchmarking success and growth, though some argue that the longitudinal aspects of growth should be studied to assess strength (steady upload amounts) *or* weakness (slow growth punctuated by bouts of large batch uploads), revealing the sustainability of repository growth (Carr & Brody, 2007).

Determining which metrics are appropriate for different audiences requires an understanding of the campus—its mission, its priorities, and its culture. This information can be gathered from the strategic plans of universities and campus units. The need for repository metrics may be driven by accreditation and external review cycles, grant reporting deadlines, and tenure and promotion calendars. These needs will also determine the schedule and frequency of metrics reporting.

The needs of common audiences will vary from university to university and each audience's needs are, to some extent, dependent on local contexts. Demonstrating the number of local and/or in-state visitors may be important for land grant universities, which have a mission to disseminate knowledge to the community, public universities that must be accountable to taxpayers, and universities interested in building strong town-gown relations. Smaller liberal arts universities may be more concerned with connections between institutional repositories and the classroom, or may place a greater emphasis on attracting student authors, while large research universities may focus their attention on increasing the visibility of grant-funded research. For research universities that are members of the Association of American Universities, repository metrics can be useful in demonstrating the impact institutional repositories have on increasing the visibility and usage of scholarship in support of membership criteria. Tying repository metrics to the missions of stakeholders will position institutional repositories as a key player in supporting their core functions. The following section describes commonly measured repository metrics that can be used to support the interests of a range of audiences. See this chapter's Appendix A for a crosswalk of commonly measured metrics, audiences, and purposes.

Commonly Measured Repository Metrics

Item Downloads

Audiences: Accrediting agencies; governing board; university administration; campus units; authors; library; repository

Source: Platform-generated

Item downloads is the most commonly used metric for institutional repositories, demonstrating usage of materials in repositories. This metric is used both to reinforce behavior (encouraging faculty/authors to continue to deposit new material) and to encourage behavior (bringing in new faculty/authors to the repository). The audience determines the level of granularity of this metric. Individual authors will need the item downloads for every item of theirs in the repository. For other audiences, this might be reported in aggregate, as an average, or in lists of top downloaded items.

Number of Items in Repository

Audiences: Accrediting agencies; governing board; university administration; campus units; authors; library; repository

Source: Platform-generated

For repositories that include metadata-only records, the number of items in the repository is an indicator of the scholarly output of a university. For these repositories, identifying the percentage of items in the repository that have full-text availability is useful in assessing the success of the library's engagement in scholarly communication and open-access discussions on campus. Breaking the number of items in a repository into categories can also aid in measuring the research output of a university and tracking compliance with open-access mandates of granting agencies.

Item Uploads

Audiences: Accrediting agencies; governing board; university administration; campus units; authors; library; repository

Source: Platform-generated

This metric measures how many items have been uploaded to a repository in a specific time period and can be tracked across time. Item uploads measures the growth of the repository. For repositories that are integrated into research information systems, tracking the number of uploads into a repository can measure the scholarly output of a university. This metric can be segmented by campus units, by type (peer-reviewed articles, theses), depending on the intended audience. Upload numbers are used mainly to demonstrate IR health and vitality, although as pointed out by Carr and Brody (2007), large batch uploads may be a sign of lack of sustainability. Uploads are often also referred to as "documents" or "content" or "items" in the repository, and this metric is often used to demonstrate not only sustained growth but also diversity of the content in an institutional repository. Many repository managers report uploads by content type or by collection. Upload metrics also seem to suggest explosive repository early growth averaging 366

documents per month, followed by slower sustained growth of 165 documents per month by the third year of the repository (Dubinsky, 2014).

Location of Visitors

Audiences: University administration; campus units; authors

Source: Web analytics (e.g., Google Analytics)

Tracking and reporting the location of repository visitors can be used to demonstrate several things, including the national/international reach of repositories and the percentage of visitors on college and university networks. Demonstrating the number of statewide or local visitors may be important for repositories of land grant universities or universities with strong town-gown relationships. Although many repository managers use Google Analytics to report visitor rates, locations, search terms, and sometimes search engines/traffic flow, these are rarely tied to specific downloaded items and instead are usually reported universally.

Participating Units

Audiences: University administration; campus units; library; repository

Source: In-house recordkeeping

If the repository is valued by university administration, then they may be interested in seeing who is utilizing the service. Repository managers can use this metric to assess the success of outreach and education efforts. Identifying which units have little to no participation is useful in targeting education and outreach activities.

Participating Faculty

Audiences: University administration; campus units; authors; library; repository

Source: In-house recordkeeping

Lists of faculty who have submitted their scholarship to institutional repositories are useful to university administrators and campus unit heads in determining uptake in faculty. Identifying gaps can allow repository managers to target influential faculty members and scholars on campus.

< Gathering Metrics

Platform Metrics: Downloads, Uploads, Location, Citations

Each of the three primary repository platforms provides download counts as a basic feature. EPrints reports download counts in a variety of graphic ways (graphs and pie charts), DSpace can display metrics at levels ranging from item to collection (if enabled by the repository administrator), and Digital Commons communicates download counts via e-mail reports to authors and repository managers, as well as an “Author Dashboard” that shows both download counts in graph form as well as Google Analytics–harvested locations and search terms used (Konkiel & Scherer, 2013).

As open-source platforms, repositories and contractors working in DSpace or EPrints may develop more robust reporting infrastructures to supplement or replace the reporting features built into the platform.

In DSpace, download statistics may be displayed at the site, community, collection, or item level, if this feature is enabled by the repository administrator. Digital Commons provides a Readership Map that adorns the home, community, and collection pages of its repositories. This map lists the total number of downloads and items in the repository and places a pin on a world map identifying where each download has occurred since the page was loaded.

Third-Party Metrics: Web Analytics, Citation Measures, Altmetrics

Many repository managers supplement the reports generated by their repository platforms with metrics gained from third-party sources, including Google Analytics, Scopus, and altmetrics.

Web analytics (with the most popular system being Google Analytics) are used by repository managers to track repository visits, user demographics, user behavior, and usage of social media, and to improve search engine optimization. Tracking user behavior and measuring content discovery through search engines, social media, and referring Web sites is useful for repository managers looking to improve their systems and measure repository visibility.

DSpace and EPrints offer citation metrics if the hosting institution has a subscription to SciVerse Scopus API (Konkiel & Scherer, 2013). Each platform offers means of collecting or displaying altmetrics (alternative metrics, based on social media) as well. By integrating citation measures and altmetrics into their repositories, repository managers enable authors and readers to see the impact of scholarship in one location. This convenience may encourage authors to deposit their work in institutional repositories. “Publishers like PLoS and the subject specialist Arxiv repository display article-level metrics along with the record describing the article. Institutional repositories [. . .] may do the same, but authors may be anxious to see visitor numbers aggregated and displayed in total each time, from all locations and versions of the article” (Kelly et al., 2012).

The Ranking Web of World Repositories (<http://repositories.webometrics.info/en>) is an initiative started by Cybermetrics Lab, a research group of the Consejo Superior de Investigaciones Científicas (CSIC) led by Isidro F. Aguillo. It is also a misnomer in that the research group states that the site is not actually a ranking (Ranking Web of Repositories, 2014), but rather aims to create quantitative standards for measuring the visibility and impact of scientific repositories and to promote OA (Ranking Web of Repositories, n.d.).

To list the repositories, the group compiles an index of four weighted criteria pulled from search engines (Aguillo, Ortega, Fernandez, & Utrilla, 2010): size (number of pages indexed by Google), visibility (the total number of external links pointing back to the repository, as determined by MajesticSEO and Ahrefs), rich files (the number of full-text items available), and a Google Scholar rating (number of pages in Scholar), which are used to determine the composite total ranking of the repository.

Although the ratings generated are an indicator of the visibility of repositories, the rich files ratings are based on the number of URLs accessed by Google ending in “.pdf.” This leads to an undercounting of full-text items available in Digital Commons– and DSpace-based repositories, as these platforms include filename extensions in the URLs of full-text files. Additionally, search engines such as Bing provide different results than Google for this measurement.

In-House Metrics: Spreadsheets and Reports

Many repository managers create in-house–generated spreadsheets and monthly statistics that detail information that cannot be tracked easily or efficiently by repository software. These statistics may enumerate nonuploading work that has been accomplished (e.g., the number of items digitized) or tied to institutional structure (e.g., the number of faculty from a given department who have submitted publications to the repository). The style and range of in-house reports remains fluid and varies from institution to institution and repository manager to repository manager, although common in-house–generated metrics include campus institutional repository participation rates and benchmarking against previous years’ metrics, peer institutions, or average repository growth.

Repository Networks

Federated repository systems that aggregate content from a range of repositories are useful in comparing repositories. In the United Kingdom, IRUS-UK (Institutional Repository Usage Statistics UK) provides COUNTER-compliant usage statistics from all participating repositories, providing opportunities for member institutions to benchmark their repositories against others.

The Digital Commons Network aggregates content from all Digital Commons-based repositories into a federated search platform. The network is organized by discipline and provides several tools for comparing repositories. Each discipline provides lists of “Most Popular Institutions” and “Most Popular Authors,” which are updated monthly. There is also a pie chart that indicates what percentage of items available in each discipline are being contributed by which universities. There is currently neither automatic reporting of this metric, nor a means for requesting the metric for desired timeframes, so repository managers are obliged to manually gather these notices per month. Nevertheless, this can be a powerful metric for demonstrating faculty/author and institution impact.

Reporting and Utilizing Metrics

Repository Assessment and Performance Indicators

Collecting and interpreting metrics is necessary for repository managers to assess the services they provide to their universities. For a young repository, generating quick metrics is essential (Gibbons, 2004): batch uploading electronic theses and dissertations as a first collection in a repository results in significant download count reports, which can then be used to market

the repository to faculty by demonstrating real results even before most faculty are participating (Bruns, Knight-Davis, Corrigan, & Brantley, 2014).

Some, however, have argued that repository managers subsist on an overreliance on “bean counting” and lack of standardization (Cassella, 2010; McDonald & C. Thomas, 2008; G. Thomas, 2007), arguing for an establishment of performance indicators (PIs) that provide benchmarking as well as demonstrating contextual value and success, while still others (Royster, 2014) have advocated that institutional repository success is largely a product of being heavily invested as a faculty scholarship and publishing support service.

A key argument in favor of adapting performance indicators beyond metrics is that the value of an institutional repository is not only in producing upload and download numbers, but in effecting change in the scholarly communication environment (Mercer, Rosenblum, & Emmett, 2007). A number of scholars have advocated for assessment “beyond bean counting” in the establishment of PIs (Cassella, 2010; Thomas, 2007). As there is not yet an established standard of PIs, the advocated indicators vary. Appendix B in this chapter lists indicators that have been identified by different authors and standards.

The value of PIs is in providing context to metric statistics. Identifying the appropriate audience and connecting that audience to a metric, while providing the analysis as to what the metric means and why it matters, is essential to utilizing metrics to make repositories work. Institutional repositories have yet to mature as an embedded technology that is essential to the research enterprise of the institution. Making sense of metrics and demonstrating the success of the repository by using PIs assists with moving the repository into the center of the institution’s research life.

Supporting Campus Unit and University Assessment

Institutional repositories are useful for universities and campus units seeking to summarize and highlight research activity. At Iowa State University, the associate department chair for research and the associate department chair for teaching for the Department of Agricultural and Biosystems Engineering were interested in illustrating departmental research activity at a faculty retreat. In order to do this, they requested download totals for each faculty member in the department, as well as average download counts for all departments in the College of Agriculture and Life Sciences and the College of Engineering. The repository manager provided these metrics to the associate chairs, who then manipulated the data so they were sorted by total downloads and average downloads, providing context to the download reports each faculty member could access individually.

Occasionally, the very existence of a repository leads to activities and creation of metrics data that can be used at the institutional level. At Eastern Illinois University (EIU), repository staff, inspired by the work of Margaret Heller (2013), ran a project where all library databases were surveyed to locate EIU faculty publications for the past five years. These data were compiled into a spreadsheet, run against the SHERPA/RoMEO copyright database, and used to

find OA faculty publications that were not in the EIU IR, The Keep. This resulted in 19 new faculty members added to the repository.

An unanticipated use of this data came via a request from EIU's North Central Association Self-Study committee. Thanks to the repository study, there existed data on the publications of EIU faculty for the past five years and the previously compiled spreadsheet was included in the institution's self-study documentation. These data would not have been readily available had the repository not existed. This fact was not lost on university administrators, proving the value of the repository to the institution.

Annual Reports

Annual reports are a common method used by repository managers to report their growth, highlight accomplishments, and promote their repositories to a general audience encompassing all of the repository's stakeholders. A sampling of repository annual reports is available through the Digital Commons Collaboratory, which features 11 annual reports. Although limited to Digital Commons repositories, these reports represent a variety of institution types, including two law schools, one Canadian institution, and by Carnegie Basic Classification, one Baccalaureate/Arts & Sciences college, four Masters/Large programs universities, one Research University/High Level of research, and three Research University/Very High Level of research universities.

Many of these annual reports meet both these purposes by reporting metrics and tying them to particular purpose(s) and/or audience(s). Frequently reported metrics include downloads and uploads by content type, lists of most frequently downloaded items, visitor location (including top countries), and average number of downloads/item. One report utilized downloads to demonstrate diversity of authorship in their repository. Two of the reports state vision/mission statements of the repository, while three specifically tie repository metrics to their institution's strategic goals or mission statement. The common usage of the Google Analytics maps and countries lists were used to demonstrate repository visibility and impact. In several cases metrics related to publishing were highlighted and clearly pitched in terms of marketing to potential new clients.

“Empty” Metrics

An example of metrics outside the box, one that has been utilized by both authors of this chapter, is the use of “empty” metrics, or the absence of participation or content. In the case of Iowa State University, the Digital Commons Network's discipline repositories were used to demonstrate to agricultural and biosystems engineering faculty that they were absent because they hadn't been participating in the repository. Each discipline repository in the Digital Commons Network includes a pie chart that breaks down the proportion of OA full-text works contributed by Digital Commons repositories. Using this pie chart, the repository manager was able to tap into a regional and athletic rivalry, showing that more than half of agricultural engineering publications in the network were coming from the University of Nebraska–Lincoln

(Inefuku, 2014). This inverse use of the metric resulted in an influx of faculty participation in the repository—within months, Iowa State was the largest contributor of agricultural engineering publications available in the network (Bankier, 2013).

A similar case of “empty” metrics was the creation of empty collections in the EIU institutional repository, The Keep, for the purpose of assessing potential value. A study of Google Analytics demonstrated that a placeholder page for the campus newspaper, without content, was receiving a lot of visitors. This demonstrated the value of that content, and digitizing the newspaper for inclusion in the repository became a priority.

Using Metrics to Argue for Funding

Another case of an outside-the-box metric is the use of a metric to demonstrate impact related to peer institutions and use those data to argue for funding. A useful tool for this purpose is the Digital Commons Network’s monthly “Most Popular Authors” lists. At EIU, the regular appearance of biological science faculty on the “Most Popular Authors” lists was used in the university’s initial pitch to the Illinois state legislature for funding for a new science building. The regular ranking of EIU faculty in a network of 260+ repositories across the world demonstrated the quality of research that, it was argued, validated the investment.

“Shout-Outs”

An undeniable thrill for authors participating in an institutional repository is discovering where their work is being downloaded. One of the benefits of the Digital Commons Readership Map is the visual element of seeing real-time downloads appear as pins being fastened to a map. This graphic element has been added to at least one journal as a selling point for journal visibility. Another use is e-mailing faculty/authors notices when their work has been downloaded to interesting areas: with the Readership Map one can zoom in on a location, so as an example, one of this chapter’s authors was able to e-mail his faculty member that her paper had been “downloaded to someone in Central Park in New York.” This kind of use of a metric adds a definite element of fun to faculty/author participation and is very likely to encourage positive word-of-mouth information about the repository.

Conclusion: The Repository at the Heart of the Institution

Academic libraries’ increasing involvement in the scholarly communication process provides opportunities for libraries to insert themselves as invaluable partners in the research process. Institutional repositories provide two pivotal services to the institution: a digital embodiment of the scholarship, student work, activities, history, and value of the institution, and growing new open-access publishing environments and services for scholars. In identifying purposeful metrics and reporting them to appropriate audiences, repository managers engage in an activity that is essential to making repositories work. The collection and reporting of metrics are valuable tools repository managers can exploit to sustain and encourage faculty participation in repositories.

As participation in institutional repositories increases across campus, the need to deliver meaningful metrics to stakeholders will increase. Royster (2014) argues that a service-oriented approach works to stoke high levels of voluntary deposit, and also works to highlight the unique contributions to scholarship of the institution and its scholars, thereby meeting one of the important criteria of PIs: to connect the repository to the heart of the research community of the institution and to match the institution's strategic goals.

In order to be able to compare repository metrics across institutions, the gathering and reporting of metrics needs to be standardized. While this is enabled through national repository networks in countries that have them, there is currently no solution in the United States that encompasses all repository platforms. As institutional repositories mature, the collection and reporting of meaningful, contextualized metrics will enable libraries to effectively demonstrate that repositories are a key service that supports the mission and goals of their host colleges and universities.

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Appendix A: Crosswalk of Metrics, Purposes, Tools, and Audiences¹

| Audience | Metric | Sources | Purpose |
|---------------------------|---|--------------------|---|
| Granting agencies | Downloads | Platform-generated | Measure scholarly impact |
| | % of items with full-text availability | Platform-generated | Demonstrate compliance with open-access mandates |
| Accreditation agencies | Downloads | Platform-generated | Measure scholarly impact |
| | Number of items | Platform-generated | Measure scholarly output |
| | Uploads | | |
| | Visitor locations | Web analytics | Demonstrate visibility and reach of scholarship |
| | Average number of downloads | Platform-generated | Demonstrate scholarly impact |
| | Average number of downloads for peer institutions | Repository network | Benchmarking against peer institutions |
| Governing board | Statistical highlights | Platform-generated | Demonstrate scholarly impact; highlight scholarship with high usage |
| | Top downloads | | |
| | Number of items | Platform generated | Measure scholarly output |
| | Uploads | | |
| | Average number of downloads | Platform-generated | Demonstrate scholarly impact |
| | Average number of downloads for peer institutions | Repository network | Benchmarking against peer institutions |
| University administration | Participating units | In-house | Measure repository uptake |
| | Participating faculty | | |
| | % of faculty participating | | |
| | Number of items | Platform-generated | Measure scholarly output |
| | Uploads | | |
| | Visitor locations | Web analytics | Demonstrate visibility and reach of scholarship |
| | Average number of downloads | Platform-generated | Demonstrate scholarly impact |
| | Average number of downloads for peer institutions | Repository network | Benchmarking against peer institutions |
| Campus units | Participating faculty | In-house | Measure repository uptake |
| | % of faculty participating | | |
| | % of faculty participating in other departments | In-house | Benchmarking against peer departments |
| | Downloads for unit | Platform-generated | Demonstrate impact of unit's scholarship |
| | Downloads per faculty | Platform-generated | Evaluate impact of faculty scholarship |
| | Number of items by unit | Platform-generated | Measure scholarly output of unit |
| | Uploads for unit | | |
| | Number of items by faculty member | Platform-generated | Measure scholarly output of faculty; demonstrate |

¹ This table is modified from Inefuku, H. (2013, July). *More than seeing what sticks: Aligning repository assessment with institutional priorities*. Poster presented at Open Repositories 2013, Charlottetown, Canada.

| | | | |
|------------|---|--------------------|--|
| | Uploads per faculty | | compliance with campus open-access mandates |
| | Average number of downloads | Platform-generated | Demonstrate scholarly impact |
| | Average number of downloads for peer institutions | Repository network | Benchmarking against peer institutions |
| Authors | Downloads per item | Platform-generated | Demonstrate scholarly impact; promotion and tenure |
| | Uploads | Platform-generated | Demonstrate scholarly output; demonstrate compliance with campus open-access mandates |
| | Altmetrics | Altmetrics sources | Demonstrate visibility and interest in research |
| | Number of citations | Citation measures | Demonstrate scholarly impact |
| Repository | All of the above | All of the above | Demonstrate success of the repository; recruit new participants; enumerate work done; improve services; benchmark with repositories at peer institutions |
| | Visitor demographics and behavior | Web analytics | Search engine optimization; improve visibility of repository; improve services |

Appendix B: Lists of Performance Indicators

| Source | Performance Indicators |
|-----------------|---|
| Thomas (2007) | <ul style="list-style-type: none"> • Inputs • Outputs • Impact on End-Users • Impact on the Institution |
| Cassella (2010) | <ul style="list-style-type: none"> • User Perspective <ul style="list-style-type: none"> ○ Percentage of scholars depositing work ○ Average number of items per scholar ○ Number of communities ○ Number of downloaded items annually/monthly/daily • Internal Perspective <ul style="list-style-type: none"> ○ Number of items deposited annually/daily ○ Full-text availability of documents ○ Full-text availability of articles ○ Number of active collections ○ Number of value-added services • Financial Perspective <ul style="list-style-type: none"> ○ Cost per deposit ○ Cost per download • Learning and Growth Perspective <ul style="list-style-type: none"> ○ Number of FTE repository staff ○ Expenditures on staff training |
| ISO 2789 (2013) | <ul style="list-style-type: none"> • Number of archives documents • Number of documents with unrestricted access • Number of documents added during the reporting period • Number of items that are metadata only • Number of records without documents added during the reporting period • Number of access to the repository • Number of downloads of units (full documents or parts of documents) |