Evidencing the Value of Australian Science Gateways

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Abstract: *Impact metrics play a key role in evidencing the value of science gateways, and a range of studies are now emerging that demonstrate the significance of science gateways in different ways. This paper examines some of the research approaches that are being utilized in this field, and discusses the value of different approaches in demonstrating different types of outcomes. The paper concludes by examining the Australian context, and reflects on how this is affecting the analytical approaches being employed to measure the impact of Australian-based science gateways.*

1. Introduction

With the continuing growth of science gateways internationally, a range of impact metrics are emerging to evidence their value. A range of research approaches and their outcomes are examined, followed by discussion of how Australian initiatives are affecting the analytical approaches being employed to measure the impact of Australian-based science gateways.

2. Approaches to Evidencing Value

Evaluation of the significance of science gateways is part of a growing field. While there is a field of research beginning to examine the value of physical infrastructure such as research facilities in providing digital infrastructure [1], there are challenges around identifying criteria for non-traditional research outputs, such as data sets, visualizations, software, and other applications.

Linked metrics, impact stories and altmetrics may provide part of the solution to measuring research outputs that are currently underrepresented in research evaluation [2]; however, there are are also other approaches. A landmark study by Lawrence et al. of over 5,000 members of the science gateway community evidenced the importance of digital tools to enabling research innovation, increasing efficiency and democraticising access; for example, 72% of respondents rated computational tools as very important or somewhat important to their work [3], and Hettrick's study evidenced that 68% of researchers cited their work as impossible without software [4].

Similarly, Beagrie and Houghton's study of the European Bioinformatics Institute demonstrates the extent to which the European Bioinformatics Institute's data and services facilitate research that could not otherwise have been undertaken [5]. However, as Beagrie and Houghton note: "Assessing the value and impacts of research data and related services is a relatively new field and no single approach dominates" [5, p.11]. There are also many challenges in evaluation, due to differences in how service usage is recorded, how collaboration is evidenced, and the diversity of services provided in facilities etc.

3. Impact Metrics in Context: Australian Science Gateways

The Australian situation is similar to a number of other nations, with a number of federal initiatives underscoring the increasing importance of demonstrating the impact of software infrastructure. While a number of studies have evidenced the value of research data [6], quantitative data on the value of science gateways is limited.

National eResearch Collaboration Tools and Resources (NeCTAR), an Australian government funded program that facilitates the development of Australian-based science gateways (called virtual laboratories), provides metrics of use for 12 science gateways, including number of users,

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https://gateways2016.figshare.com/

datasets and jobs completed [7]. These figures provide a clear indication of scale of impact and community, reflecting overall growth.

Quantitative data is now in demand, particularly analyses demonstrating economic impacts. For example, Houghton and Gruen's 2014 analysis of Australian national research data concluded that: "Conservatively, we estimate that the value of data in Australia's public research to be at least $1.9 billion and possibly up to $6 billion a year at current levels of expenditure and activity" [6, p.iii].Metrics that evidence effective research translation are being highlighted by one major Australian initiative, which focuses on measures of research engagement and collaboration as a forward proxy of impact [8]. Examples of potential research extension activities that could be considered relevant by this initiative include software or programs developed from research programs.

4. Conclusion

Australian-based digital platforms are continuing to explore a range of approaches to demonstrating value, and this paper concludes with reflection on how international and national initiatives may impact on approach to analysis of the value of locally built science gateways.

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6. References

[1] G. Abram, S. Adel-Naby, and D. Akin, "Towards a Scientific Impact Measuring Framework for Large Computing Facilities – a Case Study on XSEDE," 2014. XSEDE14 conference. https://xsede14.sched.org/event/1iOugU0/towards-a-scientific-impact-measuring-framework-for-large-computing-facilities-a-case-study-on-xsede.

[2] NISO Alternative Assessment Metrics (Altmetrics) Initiative, 2016. http://www.niso.org/topics/tl/altmetrics_initiative/

[3] K. A. Lawrence, M. Zentner, N. Wilkins-Diehr, J.A Wernert, M. Pierce, S.M. Marru, and S. Michael, "Science gateways today and tomorrow: Positive perspectives of nearly 5,000 members of the research community," *Concurrency and Computation: Practice and Experience*, 2015, 27(16): p 4252-5268. DOI: 10.1002/cpe.3526.

[4] S. Hettrick, "It's impossible to conduct research without software, say 7 out of 10 UK researchers," 2014. https://www.software.ac.uk/blog/2016-07-26-its-impossible-conduct-research-without-software-say-7-out-10-uk-researchers.

[5] N. Beagrie, and J. Houghton, *The Value and Impact of the European Bioinformatics Institute*, 2016. http://www.beagrie.com/EBI-impact- report.pdf.

[6] J. Houghton and N. Gruen, *Open Research Data*, 2014. https://www.ands.org.au/__data/assets/.../open-research-data-report.pdf.

[7] "Impact and Usage". 2016. https://nectar.org.au/about/impact-and-usage/.

[8] Australian Academy of Technology and Engineering, *Research Engagement for Australia: Measuring research engagement between universities and end users*. 2016. https://www.atse.org.au/content/publications/reports/industry-innovation/research-engagement-for-australia.aspx.