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Technology Transformations in Research Evaluation Metrics Data: library reference services and research intelligence in China

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Abstract:

Technology transformations in research data metrics are challenging librarians to re-position in the evolving cycles of research production, communication and evaluation. This paper focuses on a new reference and information service for research data analytics that was launched in 2017, including new needs and new skills in strategic research intelligence.

Librarians are challenged by the new and emerging strategic needs of universities for data-driven research intelligence that provides a comparative edge in the global world of higher education. Leading universities need research data to analyse the performance at multiple levels, including: the individual researcher, establishing clear expectations for career progression; research groups and clusters, collating researchers together to identify and communicate outstanding areas of research excellence; and, at the institutional level, to make national and international comparisons against other leading institutions around the world. They need to know and apply international assessment standards. They need libraries to deliver new reference and information services based on data analytics.

Technology transformations in research data metrics are enabling librarians to develop the new skills and a new position in the evolving cycles of research production, communication and evaluation. Publishers increasingly control the scholarly infrastructure. This provides both the challenge and

opportunity for librarians to develop new roles in data evaluation metrics: facilitating digital literacy in emerging areas, such as Using Google Scholar institutional level data to evaluate the quality of university research; delivering expertise in research technology tools for data, such as SciVal; and, communicating through data visualisation of research evaluation data and the analysis of data in research intelligence reports and presentations.

This paper focuses on a new reference and information service in China for research data analytics that was launched in 2017. There is a discussion of how new university needs have provided the strategic drive for librarians to develop skills. These skills include data extraction, analysis and visualisation, building on traditional librarian strengths and expertise. This has driven the development of the library's position and influence in strategic research intelligence services.

The project and service development is significant for showcasing a new role for librarians in relation to research data evaluation metrics linked to publication strategies for authors and strategic intelligence for institutions.

Keywords: Bibliometric Analysis; Citation Analysis; Publication Analysis; Strategic Intelligence; Research Evaluation Metrics Data

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1. Introduction

Technology transformations in research evaluation metrics data are challenging librarians to re-position in the evolving cycles of research production, communication and evaluation. One traditional focus of library reference and information services has been scholarly communication. The established traditions range through: complex enquiries related to content and discovery; open access to publications and data; research data management; and bibliometrics. Cycles of research production have become a feature of some libraries under digital humanities and digital scholarship portfolios. Research evaluation is becoming ever more important for universities, but it is not always part of library services.

This paper focuses on a new reference and information service in China for research data analytics that was launched in 2017. There is a discussion of how new university needs have provided the strategic drive for librarians, including the emergence of bibliometric based services, and the possible future impact of dazzling new and emerging technologies. Evolving reference and information services are described: scaffolding basic bibliometrics; research skills teaching and clinics; and research analytics. The skills assessed include data extraction, data analysis and data visualisation, building on traditional librarian strengths and expertise. This paper ends by highlighting challenges: complexity and change; disciplinary cultures; and positioning.

2. Technology Transformations

Technology transformations challenge librarians to reassess three areas for reference and information service development: strategic alignment with universities; bibliometric based services; and, the possible impacts of new innovations, notably predictive analytics.

2.1 Strategic Alignment

Librarians are challenged by the new and emerging strategic needs of universities for data-driven research intelligence that provides a comparative edge in the global world of higher education. Universities need research data to analyse the performance at multiple levels, including: the individual researcher, establishing clear expectations for career progression and promotion; research groups and clusters, collating researchers together to identify and communicate outstanding areas of research excellence; and, at the institutional level, to make national and international comparisons against other leading institutions with distinctive research intensive profiles. Universities need to know and apply international assessment standards; they need library leadership to develop new reference and information services based on research evaluation data analytics which are strategic, identifying current patterns and indicating pathways towards future success.

2.2 Libraries and Metrics

University libraries provide a wide range of research evaluation, research impact and bibliometrics based services. Since 2007, the University of New South Wales has delivered the Research Impact Measurement Service, evolving in response [1]. In New Zealand, Victoria University of Wellington Library has repositioned to deliver a research impact and metric services, collaborating with the planning team, the Vice-Provost Research, including detailed reports with analysis and one-to-one research consultations [2]. Leading Chinese universities provide research evaluation services [3]. Peking University Library, for example, used bibliometric analysis to produce disciplinary competiveness reports [4]. The University of Wuhan library service has developed since 1998 to include bibliometrics consultations, research outputs analysis and departmental/institutional research competitiveness analysis [5]. Shanghai Jiaotong University Library works with the Human Resources Office to provide research evaluation metrics on individual academic performance [6]. The Information Service of Zhejiang University Library provides a patent evaluation service and strategy consultation based on bibliometrics [7]. The Library's Research Outputs and Impact team at the University of Queensland have used bibliometric data to produce research intelligence reports [8], and this

has been identified best practice for our service development. However, “it can no longer be taken for granted that services traditionally provided by the library will necessarily continue to be in the library’s remit. Many services currently offered by libraries could be provided by other parties, and there is some evidence around the sector that they sometimes are” [9]. Bibliometrics, for example, could be a role for the library or other professional services departments at the university, notably the research office or strategy and planning [10].

2.3 Predictive Analytics

Predictive analytics have been highlighted as relevant to the higher education sector in 2018 [11]. The recent Association of College& Research Libraries Environmental Scan included implications of research evaluation and metrics and challenged librarians to collaborate with institutional leaders to support the use of citation and altmetrics [12]. One key technologies trend is BYOD: libraries are moving from ‘bring your own device’ to ‘bring your own data,’ with libraries partnering with researchers to analyse and visualise data for high quality publications. Libraries increasingly have spaces with unique and distinctive technologies that go beyond the devices and technologies that researchers can bring to a university. Artificial intelligence and the internet of things are ready to amplify the utility and reach of library services [13]. These spaces are physical and networked, with new possibilities for re-imaging the concept of real-time citation data and the related analytics for predicting the future for researchers in shared library spaces.

3. Bibliometrics and Research Analytics

The University strategy identifies SciVal as the tool for measuring research performance. The Library adopted a leadership role in advocacy for publication metrics and research evaluation: a launch event; advocacy roadshows; and exploratory meeting with colleagues in strategy and planning, as quarterly data began to be extracted for management reporting. University level research evaluation metrics data includes: number of annual journal publications; number of annual citations; field-weighted citation impact; international collaboration; publications in top journal percentiles.

The library support for research evaluation metrics data is now in three parts: scaffolding, to consolidate basic support; research skills teaching and clinics, to compliment traditional reference services and information skills; and, the emerging Research Analytics Service for strategic intelligence, which begins move the library in a new direction.

3.1 Scaffolding Bibliometrics

Scaffolding is this context is about providing the structure, framework and foundations for two interrelated possibilities: firstly, the support for colleagues in the university to help themselves and each other in basic bibliometrics without visiting or contacting the Library; and, secondly, enabling librarians to stretch to new heights where they can lead and partner in new ways of working for strategic analytics.

The library provides a reference and information service to other professional services at the University. Publication data is needed in China for local government assessment of research performance. This involves going beyond SciVal. The Library supports professional services colleagues in faculties so they can understand the data in different citation databases. Senior managers have personal assistants who can be trained to access the latest updates on performance against key performance indicators. Access to the latest data is supported through dashboards using the SciVal API. People do not need to come to the librarian, but this support and scaffolding positions the library as expert in bibliometrics.

3.2 Research Skills Teaching and Clinics

Research skills teaching includes publications and metrics. In our local context this encompasses: understanding what publication metrics are, notably the H-index [14] and alternatives [15]; how they are used in university rankings, including those based on Google Scholar citations, including emerging methodologies for institutional level data [16]); how they are used in university strategies and annual reports; how they can be used to set indicators and expectations for individual researchers and research groups; recent research, particularly where there is a visualisation of data (eg. [17]); and, the wider context of publications and discussion about metrics in research, including: the Declaration on Research Assessment [18], the Metrics Tide Report [19] and the Leiden Manifesto [20]. Research skills teaching about publications and metrics positions librarians as experts in research evaluation metrics data. Academic staff, professional services staff and postgraduate research students come to the library for individual one-to-one support through Clinics, such as: basic advice and guidance on bibliometrics; discussions to shape and inform researcher publishing strategies, ranging from guidance on inaccurate records in Scopus, consistent use of the institutional name and where to publish in journals; and, the evaluation of individual performance for academic promotion.

3.3 Research Analytics Service

In September 2017, the library launched a Research Analytics Service. Librarian expertise have been demonstrated as credible through research skills teaching and clinics, positioning the Library for strategic service development. The purpose of the new service is the discovery, interpretation, and communication of meaningful patterns in data to quantify research performance, particularly at the university or research group level. It is about describing, predicting and improving research performance to inform strategic decision making and to shape narratives showcasing excellence in research. It is about partnership working with senior managers who are leading research strategies.

The service has delivered strategic intelligence reports covering, for example: comparative benchmarking with top Chinese and Sino-foreign universities; analysis for senior management strategy away days, assessing publication in top journals, the impact of short-term changes in a subject and the importance of international collaboration; and experimentation with new methodologies, such as three-year average research metrics, as an indicator of performance.

Some of the most valuable aspects of the service are the consultancy conversations. Deeper levels of librarian expertise are utilised to explore the nature of specific metrics, such as field-weighted citation impact, and clarify particular needs to ensure the delivery of valuable reports and presentations with meaning to inform strategy monitoring and development. It is in these situations where the librarian is building credibility and developing new approaches, including both how the University might use bibliometric data and how the Library might have a role in extracting, analysing and communicating that data in new ways.

Perhaps because these conversations are outside the library and with senior managers, it is here where change happens: librarians are listening and better understanding University needs as articulated by leaders across the institution; there is a growing understanding about librarian skills and expertise and how they can be matched to organisation priorities; and there is an ever growing sense, increasingly shared, that the librarian is moving the University in a new direction by offering fresh perspectives and solutions to challenges. Library roles now encompass a broad spectrum of research data: from partnering in research data analysis during the research production process; to the communication and publishing of data in institutional repositories; and, the research data that is used in assessment and evaluation.

Competencies have been identified for librarian roles in supporting bibliometrics for information services and training [21]. The vision is about librarians being recognised for

expertise in research data and becoming partners in technology enabled knowledge production, communication and evaluation. Librarian roles in research evaluation metrics data are more strategic, involving new approaches to communication through visualisation technologies and relationship management across different organisational boundaries.

4. Reference and Information Skills

The new reference and information skills include data extraction, analysis and visualisation, in this case for research evaluation, building on traditional librarian strengths and expertise.

4.1 Data Extraction

There are more tools and platforms to enable data extraction. Elsevier, for example, provide multiple application programming interfaces (APIs) for data extraction from Scopus and SciVal. Librarians can then use software, such as Tableau, for dashboard data visualisation, aiding access to basic updates on metrics. This requires programming skills in order to better extract and manipulate data. Librarians need to be aware of the development of new tools that can be used for data extraction and data mining. They need to master the skills to use these tools – or learn to work alongside and in collaboration with people who do have these skills. The technical skills are beyond basic calculations; they include the collection, analysis, interpretation, presentation, and organisation of data; and statistical analysis related to research populations at national, regional and global distributions.

4.2 Data Analysis and Analytics

Presenting data in a beautiful way does not always tell a good and full story. Audience may be lost and confused by just looking at the data itself. Analysis is more valuable. The analysis helps to identify the issues behind the data which need probing and investigation. It allows identify patterns and trends for future development. The ability to provide an in-depth and valuable analysis is an essential skills for librarians who want to move into the research intelligence analysis area. The most challenging, perhaps uncomfortable, space for librarians is analytics; those areas were librarians are describing or predicting research performance have higher risk. There is a far greater possibility of been wrong or receiving blame. This is why the partnership working with senior managers and academics across disciplines is crucial.

4.3 Data Visualisation

Librarians are adapting to specialist data visualisation roles and working alongside professionals from different backgrounds to deliver consultation services. Duke University

Libraries, for example, has a range of data visualization consultants, including a GIS Librarian, Data Analysis Librarian, Data Visualization Analyst, Research Data Management Consultant, GIS Specialist and Data Interns [22]. New and emerging roles will involve different variations on Data Visualisation Librarian or Specialist and Data Scholarship Librarian or Specialist. Many libraries now have large-scale data visualisation technologies: the Hunt Library at North Carolina State University [23]; Duke University Libraries [24]; the University of Oregon Libraries Visualization Lab [25]. There are many more examples at universities, such as the Data Observatory at Imperial College London [26]. Part or the library vision is to deliver visual technologies for showcasing new knowledge and exploring research data. Adapting to technologies, however, involves more than technical skills. Interplay is vital between those involved in refining bibliometric methods and the recipients of the analysis [27], especially where there is greater risk with analytics or where we are navigating relationships with researchers and university leaders who want to tell different stories using data to support competing perspectives and positions.

5. Challenges

There are distinct challenges for librarians who have delivered reference and information services and research skills teaching: the complexity of change to scholarly communication infrastructure; disciplinary differences and cultures; and, communication and positioning.

5.1 Complexity of Change

Publishers increasingly control the changing scholarly infrastructure [28]. There is a growing demand for research analytics and we are now seeing what has been described as a "battle of the workflow portfolio titans" [29]. Librarian expertise might be based on one set of current proprietary workflows based on the current subscriptions, such as Scopus and SciVal. But there are other offers: Clarivate Analytics, Digital Science and Google Scholar. In our local context, China continues to follow the Citation Impact Upgrading Plan, with emphasis on Web of Science and the Journal Impact Factor [30]. This has included, for instance, the requirement for doctoral science students at some universities in China to publish English language papers in the Science Citation Index [31]. But responding to changes to national reassessment is complex, especially as some universities are global, operating in several countries and different assessments and approaches to metrics. The focus of our research skills teaching and advocacy is on the responsible use of metrics in evaluation. As librarians we are challenged to develop a

values-led approach that is not reliant on commercial products, especially in contexts where the current metrics data only provides an incomplete picture of research [12].

5.2 Disciplinary Cultures

One of the key strengths of subject librarians has been understanding disciplinary differences and cultures. The university level strategy and key performance indicators may be structured around a particular tool. Faculties and research groups have their own motivations wanting to have narratives to showcase their own successes. Business related disciplines have their own cultures, possibly using two of the internationally recognised systems: the Chartered Association of Business Schools (charteredabs.org/) and the Australian Business Deans Council (http://www.abdc.edu.au/). Humanities scholars may prefer Google Scholar, but only a substantial fraction of scholarly articles are included and books are excluded [32].

Librarians need to ask more and more questions to better understand the challenging disciplinary cultures at our universities. Which research evaluation systems are used to identify international excellence in research groups? How is data extracted from different systems and combined to produce new patterns with new insights? How do you compare different disciplines at different universities using different systems? Evolving reference and information services will need to deliver technology enabled solutions.

5.3 Communication and Positioning

Librarians need to understand changes outside the university but they need to be outside the library. In formal and informal interactions, librarians need to build relationships with academic researchers and postgraduate research students. Librarians are already well positioned as experts in bibliometrics, with expertise to answer basic and complex questions and to deliver research skills teaching. But they need to demonstrate that this expertise can be applied to institutional level challenges: understanding and measuring academic performance; identifying patterns and trends in the performance of research groups; and, facilitating the communication of narratives about distinctiveness and excellence in research.

Can the library be a neutral space? There is more emphasis on evaluating academic researchers and those researchers wanting to better understand how they are evaluated or how they might be evaluated in the future. An essential part for establishing a well-established service is partnerships with academics, with other professional departments and senior leaders for research. Librarians will need to work with individuals and groups at different times and at

different levels within the institution to support positions and narratives that are not always consistent or even complimentary.

6. Conclusion

The Research Data Analytics Service is significant in showcasing a new role for librarians in relation to research evaluation metrics data. The traditional library role was based around a neutral, trusted, safe space for reference and information services, where librarians had expertise and were comfortable. Research evaluation analytics are predictive, indicating future trajectories for success and excellence. There is reputational risk for individual librarians and the Library: data can be interpreted in multiple ways; predictions can be wrong; strategies need to be challenged.

The future for librarians is about being adventurous. It is about knowing that we are experts who will sparkle and shine beyond the bubble of the library walls. It is about demonstrating a commitment to supporting our colleagues in professional services and academia to blossom and flourish. It is about delivering distinctive visual technologies for exploring research data which transform research production, communication and evaluation. It is about transforming our position and future through technology enabled innovations.

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