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Engaging in Performance Measurement: Introducing Bibliometric Services

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ENGAGING IN PERFORMANCE MEASUREMENT: INTRODUCING BIBLIOMETRIC SERVICES

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Abstract

In October 2015, the University Library at the Technical University of Munich started to offer bibliometric services to support researchers, university administration and university leadership. These services are designed to help them understand the meaning, limitations, and applications of bibliometric data as well as improve the visibility and impact of their own work and that of the university as a whole.

Seventeen months later, the University Library evaluated the newly introduced services. With more than 95 requests for bibliometric consultations between October 2015 and February 2017, they were successfully established and well accepted. However, the scope of the requests was much broader than expected, and the bibliometric team found itself becoming a point of contact for a multitude of further questions in the area of performance measurement.

A number of issues turned out to be recurrent and could be dealt with routinely, resulting in the creation of guidelines for author profile improvement as well as impact and visibility. On the other hand, many requests were one of a kind, often unexpected and challenging, and required individual approaches.

Firstly, the paper analyses the total amount of bibliometric requests at TUM during a time period of 16 months (topics, origin, subject specific issues, methodological and communicative challenges) and highlights findings and lessons learned. In the second part of the paper, the results of the evaluation, current issues, and possible next steps are discussed against the background of current bibliometric research.

Keywords*: performance measurement, embedded library services, bibliometrics, academic identity management, collaboration between university library and university management*
Sub-theme: Research Support Services

Introduction

The landscape of academic research is becoming increasingly competitive, and the focus on assessment is forcing both institutions and researchers to seek ways to demonstrate the value of their work (Hazelkorn, 2014; Keller, 2015).

The competitive efforts in German higher education and research accelerated in 2005 with the nationwide Excellence Initiative. The TUM developed a comprehensive series of programs in order to prove its reputation and to extend its ability to compete in the international arena. As a result of its efforts, the university was awarded University of Excellence status in 2006 and again in 2012 (Technical University of Munich, 2017a).

To support the Board of Management, university management, TUM departments and researchers in their efforts to compete successfully in the international arena, the university library was assigned the project of developing a comprehensive portfolio of bibliometric support services in 2014. In autumn 2015, the University Library started to offer tailored services for research evaluation and performance measurements (Leiss & Gregory).

Seventeen months later, the University Library evaluated the services in order to analyze the acceptance of the services, the outreach to TUM departments and administration, the scope of topics and applied methods, and lessons learnt.

The overall picture shows a positive development. With more than 95 requests for bibliometric consultations between October 2015 and February 2017, the new services were successfully established, with requests coming from almost all departments and units of University management and administration.

The scope of topics was broad and included standard bibliometric researches as well as general aspects of visibility and impact of research. The bibliometric team became a point of contact for a multitude of further questions in the area of performance measurement.

Partly the bibliometric team could answer the requests with bibliometric standard routines. However, a large number of requests were one-off, often complex and difficult to deal with. There was also a significant number of requests with confidentiality issues, or requests that could not be answered with bibliometric methods at all. In numerous cases, the data used (comprehensiveness as well as quality) set limits to the liability of the results. In some cases, requests revealed fundamental needs for improvement with regard to the affiliation designation for TUM, and author profiles in databases.

Being aware of the growing movement in recent years to advocate for the correct application and use of bibliometrics in the evaluation of research ("San Francisco Declaration on Research Assessment,"; Hicks, Wouters, Waltman, Rijcke, & Rafols, 2015; James Wilsdon et al., 2015) we analyzed topics and applied methods in all bibliometric requests. On that basis, we discussed the compliance of our experiences with the demands of responsible metrics in research evaluation.

Implementation of responsible metrics into practice

The ten principles of the Leiden manifesto focus on the importance of qualitative assessment and research context, on transparency, suitability and robustness of methods and data. Not opposing to metrics as such, the authors complain about a too optimistic and naïve approach to quantitative methods for research assessment. "Metrics have proliferated: usually well intentioned, not always well informed, often ill applied" (Hicks et al., 2015). David and Frangopol also point out that the problem is not necessarily linked with bibliometric methods as such but in most cases follows incorrect uses of bibliometric information (David & Frangopol, 2015).

Application seems to be the crucial point, and related issues are being discussed by library scientists (Coombs & Peters) as well as practitioners (Danish Research Indicator Network, 2016) background. Both agree that the manifesto is not straightforward to implement (see also (Bornmann & Haunschild, 2016). The scope of possible problems is diverse, including unclear or even misleading expectations from clients, vague or unknown preconditions of requests, misleading wording of requests, or missing information about the broader context.

The experiences at the TUM confirm these findings. However, the bibliometric team at the TUM was able to identify a number of recurrent problems, and to develop suggestions for improvement.

Bibliometric Services at the TUM

The Technical University of Munich (TUM) is a large research institution with approximately 40,000 students, 550 professors and about 6,300 academic staff. The University Library consists of nine branch libraries located at four locations in the greater Munich area and Bavaria.

The Library's current bibliometric service portfolio consists of:

- Courses on Visibility and impact of research (4 hours, approximately 10 – 15 courses per year, https://www.ub.tum.de/en/course/visibility-and-research-impact)
- Bibliometric and impact consultation service (https://www.ub.tum.de/en/consultation-service-bibliometrics-impact). The consultation service for bibliometrics and impact was added to the Library's service portfolio in January 2016.
- Bibliometric analyses on request, including bibliometric profiles for one or more researchers, proactive screenings to identify top scientists for specific positions, analysis and improvement of affiliation designation in literature databases, support with internal evaluation processes.

During the time period from October 2015 until February 2017, the number of requests amounts to 95, with three peaks in January (8), June/July (11 and 10), and November/December 2016 (10 and 13, see table 1).
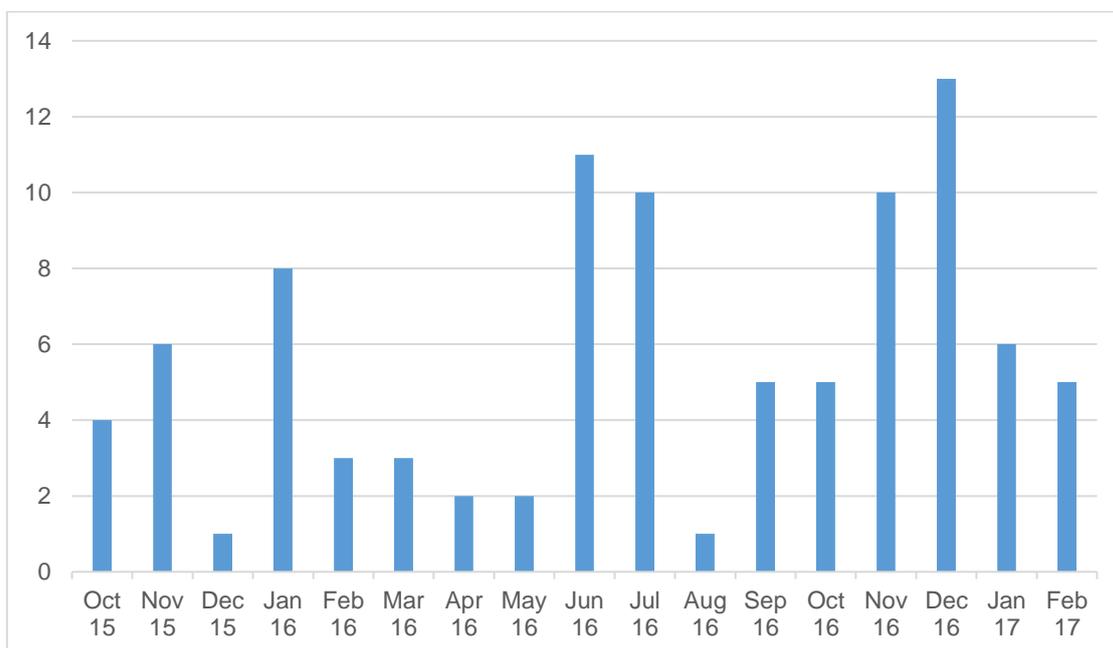

Table 1: Number of bibliometric requests from October 2015 to February 2017

Peaks correspond to public relations activities:

- Jan 2016: Promotion of Bibliometrics and Impact Consultation in newsletters to TUM staff and on university library website
- May 2016: Launch of dedicated university library website on bibliometric services
- Oct and Nov 2016: Presentations on the university library's bibliometric service portfolio to TUM Board of Management and TUM Extended Board of Management

Analyzed by topics, the request show a broad scope of interests (see table 2).

Table 2: Topics of bibliometric requests from October 2015 to February 2017

The largest number of requests (35) was for individual impact profiles, of either one individual or more, the most extensive request asking for bibliometric profiles for 44 researchers. These requests were, in most cases, related to evaluation processes of departments or institutes, to the selection procedures for academic awards, to recruiting and retention, or to monitoring and evaluation of individuals (for example tenure track professors, high profile scientists, or managing staff at departments or institutes).

Partly these requests were confidential in nature, and had to be handled with sensitivity. Transparency was an issue here, and it turned out that involving the evaluated personal was sometimes not possible.

The next three topics (Publication strategy (18), presentation and courses (14), help with author profiles (14)) are different in their nature: Individual scientists asked for support with their publication strategies or author profiles, or groups of scientists, PhD students or units of the university management and administration asked for courses or presentations on bibliometrics and visibility of research.

There were also a few requests on bibliometric theory and research (11). Even if bibliometrics is not among the prominent research areas at the TUM, individual scientists work with related questions like interdependence between publication behavior and societal or academic developments.

The overall pictures shows that the requests were diverse, and very often not comparable. Some requests were easy to handle, and were answered within 10 minutes. Other requests, especially those with bibliometric profiles for a large number of individuals, took up to two weeks. Others seemed to be straightforward at first glance but turned out to be methodically difficult, or even impossible to solve.

Bibliometric requests came from numerous units and departments at the TUM (see table 3).
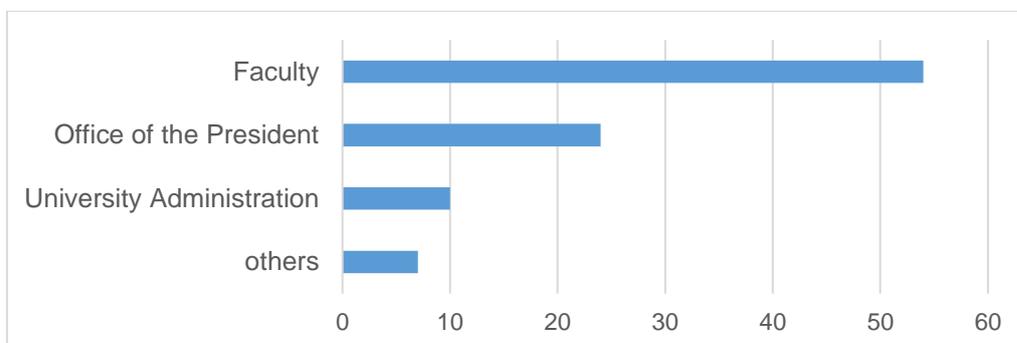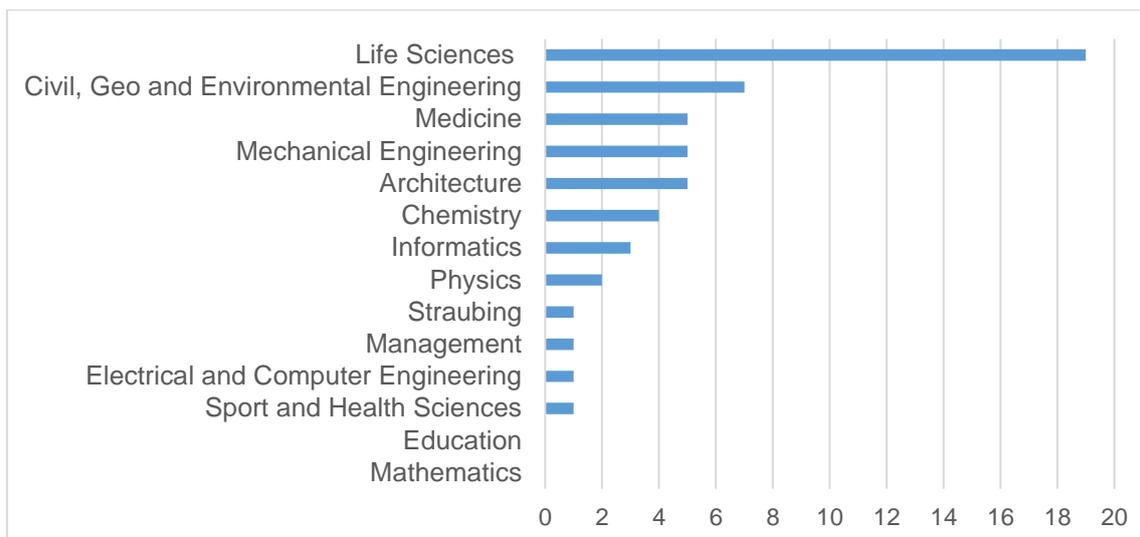

Table 3: Origin (general) of bibliometric requests from October 2015 to February 2017

The majority of requests came from TUM faculty (54, from offices of the dean, individual researchers, and faculty graduate schools). We received 24 requests from the president and his staff, primarily from the office of the president, recruiting and retention unit, tenure track supervision, executive search, and evaluation management. There were also requests (10) from other functional units or central service institutions, and Graduate Schools. Seven requests for presentations or support came from various origins, for example training institutions for librarians.

We analyzed the requests from departments with regard to their origin (see table 4).

The picture shows a very uneven distribution. Whereas one faculty (Life Sciences) contacted us 19 times, a few departments asked for support about 4 to 6 times. A number of departments addressed us once, or did not get in contact at all.

Table 4: Origin (faculty) of bibliometric requests from October 2015 to February 2017

The reasons for the uneven distribution are, as we suppose, only partially subject-specific, but might also be a consequence of the personnel composition of the bibliometric team. One of the team members works as subject librarian on the campus for life sciences in Freising / Weihenstephan, another one is subject librarian for civil, geo and environmental engineering. Both of them could build on existing contacts, new contacts were easily established. Furthermore, the department of life sciences is the largest department with approximately 5.000 students and 80 professors.

However, there are other reasons for the uneven distribution, too: In some departments, there was an explicit message from the management to enhance publication strategies, and visibility of publications. In these cases, staff members in the office of the dean started to engage in visibility enhancement measures, and contacted us several times.

Questions from faculty often referred to general topics (author profiles, publication strategy), but also touched details of visibility and impact issues, as for example:

- subsequent addition of ORCID to published papers
- meaning and applicability of cumulative impact factor
- most useful chronological order when clearing author profiles in Web of Science, Scopus, Google Scholar and ORCID
- author identity issues after marriage and change of name.

The president and his office mostly asked for bibliometric profiles of individual scientists, or a group of scientists. Sometimes the focus was on collaboration – for example the number of co-authored papers as a means to find out about synergy in newly founded cross-departmental institutes, or on collaboration between the TUM and other universities or research partners.

Faculty Recruiting and Retention asked us for suggestions of highly cited top-scientists for vacant posts at TUM, or double check scientists whom faculty appointments committees suggested.

Lessons learnt and next steps

The number of requests, as well as the acceptance of bibliometric services in the TUM, confirm that the new service area of the university library was successfully established. However, due to the diversity of the field, the learning curve is far from complete. There are lessons learnt, especially with regard to acceptance, standardization and transparency, which we would like to share, as well as plans how to further enhance and tailor bibliometric services for the TUM.

1. Get the University Board of Management on board

The increasing competitiveness of higher education and academic careers is on the agenda of university leadership and individual researchers alike. Those responsible for the university's

reputation, seek ways to demonstrate the excellence of their institution. Talking about impact measurement and competition for excellence opens doors. On the other hand, in departments and in the university management there is very often still a lack of knowledge about bibliometric indicators, their influence on rankings, and possible ways of improving them.

Starting points for getting the support of the board of management and president were, in our case:

a) On the personal level: Check the author profiles of the university leadership. In our case the president's profile in Scopus was mixed with a namesake, for the benefit of the other scientist. Via his secretary we communicated this situation to the president's office and found open ears.

b) On the institutional level: Analyze university rankings with regard to publication indicators, and check affiliation issues in the relevant databases. If there is another unit responsible for rankings in your institution, get in contact with them. In the responsible unit at TUM, there was immediate support for our activities to increase the visibility of publications. This included the development of official regulations for author profiles and TUM affiliation designation.

c) Support for recruiting and retention: Bibliometric data can provide additional information for personnel decisions, which is greatly appreciated by human resources management.

In October and November 2016, we were invited to present our service portfolio to the

- • Board of Management (president, chancellor, and vice-presidents)
- • Extended Board of Management (with about 30 representatives of TUM management including deans from all departments)
- • Research Staff Assembly
- • Different faculty meetings

The presentations ensured the university leadership's support, demonstrated options for the enhancement of research visibility, and initiated dozens of requests for support with bibliometric issues.

2. Raise awareness

The level of knowledge about bibliometrics is much lower than we expected it to be. Even among professors the number of those who do not use Web of Science and Scopus, and are unfamiliar with author profiles and affiliation issues, is quite high. On the other hand, almost every researcher and executive has heard about common indicators like impact factor or h-index and has a vague understanding of what they might mean, often incomplete or even wrong. Furthermore, researchers meet a demand to enhance their online visibility, with details often being not clear to them and vaguely annoying. They are reluctant when they have the impression they must create and maintain any new profiles.

For the time being, the visibility of senior staff at the TUM is not satisfying.

For example, 41 professors from the department of computer science (data collected in February 2017):

- ORCID:
  - o 10 individuals with an identifiable ORCID
  - o In 11 cases ORCID unclear (someone with correct name but no public information available and thus not identifiable)
  - o 20 without ORCID.
- Web of Science
  - o 28 individuals not searchable in WoS due to inconsistent author profiles or too many different article groups.
  - o 5 with several article groups
  - o 8 with clear identity
- Scopus
  - o 17 individuals identifiable

- 24 individuals with multiple author identities, some of them were searchable with reservation (combining most appropriate article groups), others were not searchable at all.
- Google Scholar
  - 31 individuals with a Google Scholar Profile – this must have been communicated somehow with success!

We realized that we needed convincing arguments for researchers to enhance their profiles. There is not always a need to create any additional profiles. An author with publications listed in WoS and Scopus has author profiles anyway, but they might be wrong or incomplete, with severe consequences for the visibility of the author.

A comprehensive and up-to-date publication list is key not only to bibliometric research but to visibility of research in general. Scientists usually are proud of their academic career and see an immediate need to intervene, once they realize they have a distorted identity in literature databases.

3. Transparency

Researching someone's bibliometric indicators is much less straightforward than one might think, especially for researchers with a large number of publications. The main problem is the author identity, and limitations in coverage and consistency in literature databases.

We realized that search strategy and diligence of the performed search have considerable effects on the metrics. The most difficult task is to prepare a publication list for the citation report, within the database you have chosen for your research. For example, when searching for an individual in Web of Science without using ResearcherID, you will look into the article groups assigned to authors with the same or similar names. These article groups may amount to 200 or more, with dozens of article groups with only one publication in the end. On the other hand, when using the ResearcherID you have to check the "date added" and make sure the list is up to date and complete.

Evaluations can have considerable effect on an individual's career, and need to be reliable and transparent. We realized that it is important

- To define search strategies, e.g. we wrote a bibliometric research guideline as a step-by-step instruction of how to research bibliometric indicators
- To develop a culture of open methodology, e.g. to be as transparent as possible about our bibliometric searches, include information within bibliometric results lists about search strategy, date of data collection, data bases, name of librarian, "health warning" about responsible use of metric data, issues involved with author profiles etc., and be prepared for questions about data and search strategy
- To offer a predefined set of indicators to choose from, according to clients' needs
- To document everything we do, especially methodological difficulties, data inconsistency, and issues with author profiles
- To avoid misplaced concreteness and false precision (Hicks et al., 2015)

4. Regulations and guidelines

We found that in some cases a lack of guidelines or even institution-wide regulations caused problems. This was especially true with author profiles and affiliation designations.

Author profiles

The majority of researchers is not aware of author profiles in general, and of their specific author profiles being mixed or distorted. In several cases, we identified TUM researchers with mixed identities in the literature databases Web of Science or Scopus. This was especially confusing in one case, where both researchers involved worked at the same institute and published together, with their family names being almost similar.

We developed a manual for creating and maintaining author profiles in literature databases (Technical University of Munich, University Library, 2017). The leaflet helps you clear up your profiles in Web of Science, Scopus and Google Scholar, get an ORCID iD and link it with other information sources. Originating in the promotion of ORCID in the University Library, the

Technical University of Munich is a founding member of the German ORCID consortium (http://www.orcid-de.org/konsortium/) and recommends the use of the ORCID iD for all authors.

However, things are, again, much less straightforward than they seem at first sight, especially for researchers with a large number of publications. Researchers want to spend as little time as possible on their author profiles and rely on automated updating routines between relevant data sources. These do not always exist, and if they do, they do not always operate accurately. For the time being, there is no easy answer to this problem.

Affiliation designation

The representation of the TUM publications in literature databases was incomplete and inconsistent, with name variants, spelling mistakes, and individual institutes, chairs or local addresses as affiliations. Two umlauts in the German name caused transliteration effects of all sorts, the official English name was determined only in 2015.

In addition to this, there is still a lack of awareness about the importance of correct affiliation data, so we advocated for official guidelines concerning affiliation statements, and supported the Board of management with this. The TUM publication guidelines were enacted by the TUM Extended Board of Management in November 2016, and send out to every professor, promoted via newsletter and made available online on the webpage of the University Library (Technical University of Munich, 2017b).

We also started to check affiliation data in literature databases and inform database provider about necessary corrections: map addresses to affiliations, merge or delete affiliations, or clarify parent/child relations. There was a major affiliation clearing in Scopus, ending in May 2017. We got a list with more than 2000 addresses belonging to the TUM and checked it for wrong relations between parent and child affiliations, non-included wholly-owned subsidiaries of TUM, and eliminated multiple duplicates due to spelling or transliteration mistakes.

These efforts have shown considerable effects on the total number of publications, attributed to the TUM. However, only a unique identifier for organizations will provide a sustainable solution for this problem. For the time being, there is no such initiative as ORCID for institutions. ORCID plans to launch an affiliation module (OrgID) using ISNI and Ringgold Organization Identifiers. The project was started in January 2017 by DataCite, ORCID, and Crossref and will refine the structure, principles, and technology specifications for an open, independent, non-profit organization identifier registry to facilitate the disambiguation of researcher affiliations (ORCID, 2017).

5. Conflicts of interest

Research evaluation and performance measurement are a touchy subject, and many researchers have ambiguous feelings about it. On the one hand, they wish so enhance their research impact and are happy to improve their publication strategies. On the other hand, they suspect bibliometrics to be just another way of controlling, since bibliometric data often have the potential to inform employment or publication decisions.

At the TUM, literature databases containing bibliometric indicators are accessible for all staff members via campus license (Web of Science, Scopus) or via internet (Google Scholar). In this sense, there is no transparency issue with the data (also see (Loughborough University, 2016)). Nevertheless, a systematic research for an individual researcher collates data from different sources and thus provides condensed information about somebody's publication outcome (see (Gorraiz & Gumpenberger, 2015; Gorraiz, Gumpenberger, & Wieland, 2016). This is especially problematic for those researchers who are not aware of their author profile inconsistencies.

Bibliometric services might easily be drawn into conflicts of interests. There is an issue with monitoring and controlling, especially if the evaluated individual must not be contacted due to the confidentiality of the request.

There are useful measures to improve this situation, at least in the long term. With rising awareness of author profile enhancement and bibliometric methods, researchers start to clear up their author profiles and make sure that their publication lists are complete, and bibliometric indicators can be calculated with confidence. However, we try to contact evaluated individuals and offer consultation for academic identity management, whenever possible. Ideally,

instructing unit and evaluated individuals are both on-board of the bibliometric research process and cooperate in increasing the individual's visibility, to the benefit of both parties.

Bibliometric requests often contain highly sensitive date, like names of candidates for recruiting processes, or awards. We suggest making sure that you know who has access to this information, and that this information is stored in a safe place. For those requests, we do not apply the university-wide used ticketing system for e-mails, but individual e-mail addresses.

6. Communication

A major challenge with introducing bibliometric services emerges only at second glance.

In some cases, requests seem straightforward. Only by chance, or when delivering the data and explaining their meaning and limitations, we find out that the purpose of the request was something completely different. Not being familiar with bibliometric methods, the requesting party sometimes does not understand that their request did not correspond to their aim.

For example, we were asked to research the 10 professors of TUM with the highest h-indices. The hidden agenda, not communicated at first, was to find out if a specific individual was amongst these 10 professors. Apart from methodological problems (in order to determine the h-index, you have to prepare the publication lists, separately for each individual), the result would reflect age and subject-specific publication behavior more than anything else. H-indices are not comparable across age groups or subjects.

When we get requests that are not easily comprehensible and not agreed on in preliminary conversations, we talk it through with the requesting unit or staff member. Very often, to know the purpose helps us to clarify the set of indicators needed, and to deliver a bibliometric result which fulfills the requesting person's purpose much better than their original request (see also (Danish Research Indicator Network, 2016)).

Nevertheless, there is a tendency to see precision and reliability in bibliometric data, which is not there.

We drafted a disclaimer notice to detail the limitations of using bibliometric data in evaluations. The disclaimer is based on the main points of the Leiden Manifesto and the San Francisco Declaration on Research Assessment.

The final packet that the Library produces and delivers to the requesting person, includes the disclaimer notice, the bibliometric data, notes about specific difficulties and inconsistencies, and a summary of the search strategies used. As a rule, these data are delivered via e-mail and accompanied by a conversation via telephone or in person, in order to explain the context and limitations of the research.

7. Staying up to date

There is still a fast development going on in bibliometrics, especially with regard to altmetrics (EUROPEAN COMMISSION, Directorate-General for Research and Innovation, 2017; Konkiel, Madjarevic, & Lightfoot, 2016), the development of new indicators (for example Scopus CiteScore), and application issues. The discussion on how to improve data reliability and consistence is far from settled.

Staying up to date is a major challenge and needs to be part of the team's everyday work. We subscribed to blogs and newsletters in bibliometrics and neighboring fields, joined mailing lists and keep an eye on new publications. Conferences and trainings can add to this but are too limited in time and too selective in order to replace informal further training.

In November 2016, we organized a IATUL conference on visibility and research impact at the University Library of TUM and invited experts in the field to present on challenging or controversial topics. More than 70 librarians, research support specialists, data specialists and staff from university administrations attended the conference (https://www.ub.tum.de/forum-bibliometrie).

Discussion

The University Library is committed to using bibliometric indicators responsibly and sensibly, and subscribes to the 10 principles of the Leiden Manifesto. However, against the background of the outlined experience, an implementation of the Leiden Manifesto turned out to be restricted in many regards (see table 5).

Leiden Manifesto of responsible metrics	
1 Quantitative evaluation should support qualitative, expert assessment	➡️
2 Measure performance against the research missions of the institution, group or researcher	➡️
3 Protect excellence in locally relevant research	➡️
4 Keep data collection and analytical processes open, transparent and simple.	⬆️
5 Allow those evaluated to verify data and analysis	➡️
6 Account for variation by field in publication and citation practices	⬆️
7 Base assessment of individual researchers on a qualitative judgement of their portfolio	➡️
8 Avoid misplaced concreteness and false precision	⬆️
9 Recognize the systemic effects of assessment and indicators	⬆️
10 Scrutinize indicators regularly and update them	⬆️

Table 5: Compliance with the Leiden Manifesto at the University Library of TUM

1 Quantitative evaluation should support qualitative, expert assessment

Even though we totally agree with this statement, there are de facto limitations to our area of influence.

Qualitative assessment of researchers, institutes or departments is not part of the library's service portfolio (see also (David & Frangopol, 2015)). The bibliometric team of the University Library provides bibliometric data, which contribute directly to assessment procedures. However, we do not supervise the subsequent assessment, performed by requesting units, and are not involved in the actual use of the data provided.

We see it as our responsibility to prevent misuses of bibliometric data. We always add information about the responsible use of metrics to all data delivered, and seek conversations with the requesting parties before and after the bibliometric research. We give advice on how to use quantitative data and indicate lack of clarity or reliability.

The bibliometric team offers comprehensive bibliometric consultations for individual researchers, with large amounts of collated data. In these consultations, we can control the data interpretation. In other cases, we contribute to large-scale assessment processes and are not involved in the actual assessment procedures.

2 Measure performance against the research missions of the institution, group or researcher

Our handling of this principle is, to some extent, similar to #1. As a rule, we provide data but do not measure performance. Very often, we are not informed about research missions of institutions, groups or researchers.

3 Protect excellence in locally relevant research

There is an explicit demand at the TUM to choose journals for publication, which are indexed in Scopus or Web of Science. Depending on subject specific publication behavior, there are researchers at the TUM who primarily publish in German journals and conference proceedings. Very often, these titles are not indexed in literature databases, and do not meet the requirements of indexing.

In some cases, we support faculty in their effort to include specific journals into Scopus or Web of Science, or advice editors on how to improve their journals in order to meet indexing requirements. We also help researchers to find alternative, indexed journals for publication.

4 Keep data collection and analytical processes open, transparent and simple.

This principle is largely implemented at the TUM, see above.

5 Allow those evaluated to verify data and analysis

Very often not possible due to confidentiality issues. Whenever possible we involve evaluated researchers and offer support with clearing up their author profiles and enhancing their publication strategies.

6 Account for variation by field in publication and citation practices

We usually do not perform field-weighted analyzes but deliver unweighted data. Even if the methodology of field-weighted performance indicators are well advanced, they are often not transparent, and can result in misleading precision. We point out that it is not effective to compare researchers across age or subject. If desired, we provide analyses of a researcher's academic community, as point of comparison.

7 Base assessment of individual researchers on a qualitative judgement of their portfolio

See #1 and #2.

8 Avoid misplaced concreteness and false precision

Implemented through disclaimer, explanatory conversations and documentation / transparency of data. Whenever bibliometric research cannot be performed with confidence, we rather do not deliver any data.

9 Recognize the systemic effects of assessment and indicators

We do recognize the systemic effect of assessment and indicators, especially when advising on publication strategies. However, especially young researches very often cannot opt out but have to prove their excellence within the emerging system of performance measurement.

10 Scrutinize indicators regularly and update them

This principle is implemented largely, with routines of further training for members of the bibliometric team, and tailored, specific solutions for bibliometric requests.

Conclusion

The analysis of bibliometric requests at the University Library provides some valuable insights. Outreach activities were effective; the bibliometric services were successfully established. Requests came from various units of the TUM, with a broad scope of topics. The awareness of library services has increased, and the Library's position as a leader in research support services has been strengthened. A lot of requests turned out to be unique, others were recurrent and served as motifs to develop information material, regulations and guidelines.

The analysis also showed that considering and implementing the concept of responsible metrics is not easy but can serve as a directive, and inform the further development of bibliometric services at the TUM.

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