



## Journal Article

### **Metrics in research: More (valuable) questions than answers**

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## Metrics in research: More (valuable) questions than answers

Research metrics are easier accessible than some years ago, are more sophisticated, but not always easy to understand – and these metrics are widely discussed and disputed. Many of the metrics provide an external view of an institution and on the impacts its researchers have in the scientific community. In international university rankings, these metrics are reduced to rank numbers that attract lots of attention.

Let's take for example indicators derived from publication and citation data: this information is used in a standardised way as proxy for productivity and for quality of research activities. At institutional level, it is often used to demonstrate research strength. But it also gains more and more importance in today's higher education landscape, as an aspect of accountability.

But how can we make use of research metrics in decision-making of a Higher Education Institution (HEI)? Does this metric help to understand the 'business' of a HEI? Or can those metrics support evaluating the impact of measures taken?

First a brief comment on the DORA discussion: DORA – the San Francisco Declaration on Research Assessment – asks '... that scientific output is measured accurately and evaluated wisely'. It therefore claims to refrain from using journal-based metrics such as the Journal Impact Factor (JIF) for evaluation purposes. Many organisations support this initiative by signing the declaration, including ETH Zurich [1]. However, we have to keep in mind that the past two decades have brought new developments in research metrics that go far beyond the JIF and its flaws. Article-based indicators such as field-based citation scores for exam-

ple try to normalise the impact of a research output in order to make it more comparable. So, accepting DORA does not mean we have to ban any metrics from research evaluation, but we have to use "accurate measures and use them wisely".

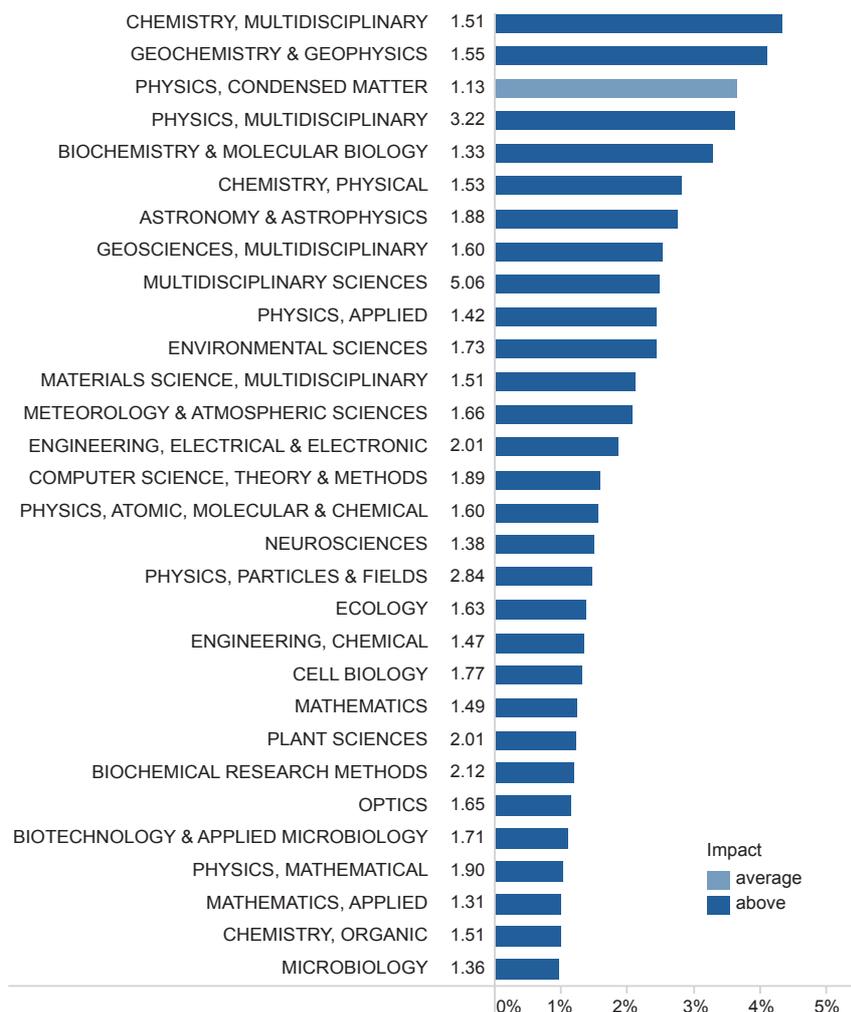
Critical evaluation and self-evaluation is part of the academic value system. It is generally accepted that the citations received can be seen as a proxy for the usefulness of the results presented in the publication, an information that is valuable for the reader. This shows that the 'quality' of the information is not defined in absolute terms but is measured against the needs of the user of the information – in that sense quality is contextual.

An external view, based on standardised metrics, may help revealing patterns and findings for discussions and may provide different perspectives worth to be analysed and understood. But most importantly, any evidence the metrics show need to be interpreted in context of the relevant questions. Therefore, standardised and accepted research metrics in an informed peer review or in an appointment process can – as one aspect of the whole picture – support the decision-making with objective and accepted measures.

- A research profile based on publications and (normalised) citations received gives a picture in what scientific fields the unit is active and what impact the published work has compared to the peers. Such a profile at institutional level showing for example an over- all impact above world average may be adequate for monitoring reasons in an accountability reporting and for gaining attention. But it does

not help if we want to use this outside view for verifying our quality assurance measures or for enhancing research quality within the institution. We need to link the outside view to internal organisational units and research groups in order to understand how these results develop.

- During a peer review process, one may find that a data-driven specific research profile of a unit  $X$  and its impact actually confirms the impression of the experts that were evaluating the unit. But does this help? Do those findings mean something for the strategy of unit  $X$ ? Is the unit 'on the right path' to achieve its goals? A research profile alone, especially if it is only a snapshot instead of showing the development over time, cannot answer this question. But it can help providing indicators that show how the published research is perceived in the community.
- What if the research profile shows that the performance is below what is expected? Is the research of the unit ahead of 'main stream research' and therefore not yet visible in the metrics used? Or is nobody interested in the results published any more? Peers knowing the field should be able to answer questions like these.
- If the profile gives a wrong impression of the research activity and the performance, is it just a question of the publication strategy and of choosing the right journals? Are there major activities in this unit that are not captured by the chosen metric at all? What means would be needed to make it visible?



**Figure 1:**  
An example of a Research Profile  
Portion of publications per research field and weighted influence (MNCS); MNCS is above the worldwide average (> 1.2), at the average (< 1.2 and > 0.8), or below the average (< 0.8).

Research profile based on ETH Zurich publications 2003-2012. Shown in the chart are the 30 fields holding >1% of the output each, covering 61% of all publications (of the total of 35700 articles and reviews from Web of Science [WoS]; Analysis by CWTS Leiden).

In this situation, alternative metrics such as views, downloads, mentions or shares in social media for example could add valuable information on the attention research results get. However, even though altmetrics in general provide more recent information, the interpretation of the findings is, again, more challenging. Compared to the above mentioned normalised citation based metrics at article level (where we evaluate the result against a well-defined total of similar articles), absolute numbers of downloads may be impressive but not very meaningful. Thus again, indicators need to be interpreted.

These are some of the many questions that arise when we want to make use of research metrics for internal decision support and for quality enhancement

discussions. As HEIs worldwide are more than ever confronted with research metrics, we should at least try to understand why an institution shows up as it does, and make use of this information.

This is the approach we choose at the moment at ETH Zurich: analysing external views that are based on research metrics (e.g. from rankings) and bringing it in line with internal perspectives, but also providing detailed analyses to specific questions. Findings and analyses are discussed and the discussion reveals if measures have to be initiated or if the results serve the purpose of monitoring.

## References

[1] As of October 23, 2016, 904 organizations signed DORA: <http://www.ascb.org/dora-member-type-organizations>



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