Towards a multidimensional *valuation* model of scientists

Nicolas Robinson-Garcia[1], Rodrigo Costas[2], Thed N. van Leeuwen[2] and Tina Nane[1]

[2] *N.RobinsonGarcia@tudelft.nl; g.f.nane@tudelft.nl*
Delft Institute of Applied Mathematics (DIAM), TU Delft, Delft (Netherlands)

[2] *rcostas@cwts.leidenuniv.nl; leeuwen@cwts.leidenuniv.nl*
CWTS, Leiden University, Leiden (Netherlands)

Introduction

The use of scientometric indicators for individual research assessment has been severely criticized over the years due to their limited capacity to discriminate between different scientists and capture differences in a statistically reliable manner (Costas, van Leeuwen, & Bordons, 2010). Nevertheless, science managers and policy makers make use of these indicators for recruitment of scholars, promotion or allocation of funds. This has provoked strong reactions from the academic community, such as the San Francisco Declaration (DORA, 2014), a specific mention warning on the dangers of using bibliometrics for individual assessment (Hicks, Wouters, Waltman, de Rijcke, & Rafols, 2015), or even a whole body of literature discussing the pros and cons of the H-index (Rousseau, García-Zorita, & Sanz-Casado, 2013), the most renown indicator for assessing individual research performance.

We argue that the greatest threat of the current use of bibliometric indicators for the assessment of scientists goes beyond technical or methodological decisions, and is more related to the irreflexive use of metrics at the individual level. We claim that this irreflexive use of metrics endangers the diversity of the scientific profiles researchers exhibit. This diversity is not only evident, but needed to ensure scientific progress (Milojević, Radicchi, & Walsh, 2018) and a breadth of societal and scientific outcomes (Woolley & Robinson-Garcia, 2017).

Some evaluation models for individual assessment have been proposed in the literature. But they have not been able to prevent the irreflexive use of bibliometric indicators. In our belief, there are three reasons behind this failure: 1) these models propose the introduction of a wide range of indicators, of which not all are necessarily operational; 2) they are framed in such terms that are difficult to operationalize; or 3) they deny the use of quantitative indicators without offering a viable and cost-efficient alternative.

By linking with the current literature and our own experience on conducting research evaluation, we here present a tentative *valuation* model which tries to balance between a conceptually-informed framework and a methodological viable operationalization. The model is designed so that it can be operationalized by making use of bibliometric indicators, although we acknowledge that it is sufficiently broad as to give room to non-bibliometric indicators.

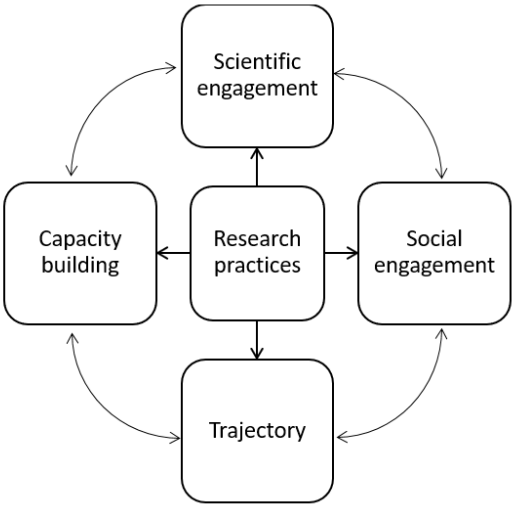

Figure 1. Evaluative dimensions of an individual

Main pillars of the valuation model

The model is structured into three distinct parts. The first and main one has to do with the actual performance of the individual in a set of five dimensions of the scientific practice. The second one addresses confounding effects derived from the individual's context, such as work environment, institutional logics or national policies shaping their performativity. The third pillar of the model relates to personal features of the individual. In principle, these characteristics hold little relation with researchers' performance, but can be of special interest for policy makers. For instance, science managers may be interested in promoting young researchers within a given programme, reduce gender inequality by encouraging the recruitment of women, or try to integrate and promote foreign born scholars.

Evaluative dimensions

We consider five dimensions as key factors to value the research performance of individuals. These are

presented in Figure 1. Scientific engagement, social engagement, capacity building and trajectory look into diverse aspects of the individual's academic activities. However, the research practices dimension is represented as an overarching dimension which affects the other four. In the following, we describe each dimension.

Capacity building refers to the capacity of the individual to create new knowledge, train new scholars or develop novel applications. Some indicators operationalizing this dimension could be number of publications, normalized citation score, but also number of PhD students supervised or generation of patents.

Scientific engagement includes activities and actions reflecting a proactive engagement of the individual with the scientific community. This not only refers to scientific collaboration or division of labour, but also to reviewing papers, editing journals or organizing and participating in conferences and seminars.

Social engagement is conceived here as outreach and interaction with societal actors. For example, different modes of engagement would be considered (D'Este, Llopis, Rentocchini, & Yegros-Yegros, 2015) as well as social outreach for instance by written for non-academic audiences.

Trajectory reflects aspects related to the academic background of the individual such as geographical mobility, disciplinary changes or previous work experience.

Research practices are conceived here as an overlapping dimension which modulates each of the other four based on how open or closed these are. For instance, share of OA publications would reflect openness in capacity building, while diversity of stakeholders could apply in the case of social engagement.

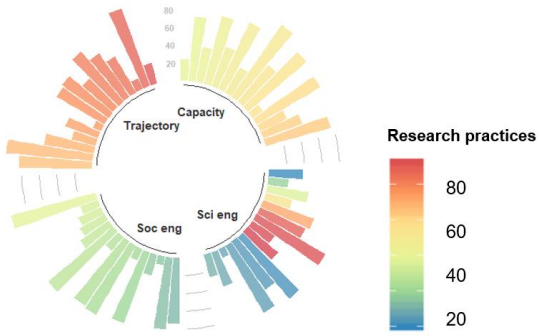

Figure 2. Profile of a fictitious researcher

Conclusions

This poster proposes a new valuation model of scientists which considers the wide variety of profiles and activities researchers perform. The model captures the heterogeneity of activities and roles researchers perform into five dimensions by which they can be profiled, also quantitatively. Figure 2 illustrates a potential visualization of such profiling. Furthermore, the model considers confounding effects mediating on individuals' performance as well as personal features which might be of relevance for science managers. The model is still under-development and still many caveats need to be solved as well as to the application of such a model on real case scenarios.

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