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Laudation on the occasion of the presentation of the Derek de Solla Price Award 2021 to Prof. Ludo Waltman at the ISSI conference, Leuven, 2021

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Dear Ludo,
It is my great pleasure to address you here in Leuven. It was a few years before my retirement, in October 2008, that two young guys appeared as participants of my annual lecture series 'Measuring Science'. Right from the start, they distinguished themselves from the other participants. Had they really come to my course to learn something? It seemed rather the other way around: they wanted to contribute their knowledge. That was remarkable because they did not come from a bibliometric work environment, they were Ph.D. students in economics at Erasmus University Rotterdam. Ludo Waltman and Nees-Jan van Eck were indeed exceptional participants. Both had been developing already for several years a new method for to visualize the similarity between objects. And no doubt, that is extremely relevant for making maps, landscapes of scientific developments, one of the most important themes within scientometrics and, particularly, bibliometrics. It was immediately clear to me and colleagues that two talented young people were on board here. By the end of the course I offered both of them to work in my institute, CWTS, with the agreement that they could continue their PhD work in Rotterdam, first in the form of a secondment and a few months later with a formal appointment. They agreed and that was the starting point of an increasingly intensive collaboration with an unprecedented large impact on the further development of the CWTS. By the way, the dean found it somewhat exaggerated to appoint two people with the same background at the same time. But I persisted in an all or nothing attitude.

On the first day of their work at CWTS Ludo asked me what they should do. I said: just do what you think is important, you know what kind of research we are doing here, what our problems are and what challenges we face. The two new young researchers did not start from scratch, they came fully packed: as said before, they were already busy publishing work on similarity measures and mapping techniques, but also on the h-index (van Eck & Waltman, 2008; Waltman & van Eck, 2009) and on journal impact factors. Then came the first fireworks. CWTS had developed its 'crown indicator', the most important bibliometric indicator in which the number of citations given to publications in a certain period time to a specific research group is normalized by the citation density of the relevant

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field. The crown indicator was the flagship of our institute. As a missionary I preached for years worldwide the strength of this indicator and its (proven) application value in research performance measurement. But then, shortly after the arrival of both newcomers, during a CWTS working meeting on a sunny morning, Ludo suggested, with a certain hesitation, a little bit nervous but nevertheless decided, that the mathematical basis of the crown indicator was not the best possible and he proposed another approach. And he quickly managed to convince us. It led to an extensive, sometimes quite heated international discussion. Under the combative title 'Rivals for the Crown' a series of fine and now highly cited publications followed (van Raan et al., 2010; Waltman et al., 2011a, b). Around the same time, another firework exploded: the launch of the further perfected VOS-viewer, a brand-new computer program for bibliometric mapping. The VOS-viewer completely revolutionized the visualization of scientific fields and their evolution. I particularly want to mention here the great merits of Nees-Jan van Eck in the development of this wonderful and freely available tool. It now has a large worldwide user community. The tool been used in hundreds of research articles. The publication in which Ludo and Nees-Jan present the VOS-viewer is meanwhile extremely highly cited (van Eck & Waltman, 2010). And again there was a further important milestone: the complete restructuring of the CWTS bibliometric database. For a number of reasons, optimizing this huge data system was for quite a long time a painstaking process. Almost in no time, Ludo and Nees were able to expand and improve the CWTS data system, into a very advanced but at the same time open and easily accessible structure.

In the meantime, I had stepped down as director of CWTS because of my retirement while continuing my work as research professor. Under the inspiring leadership of my successor, Paul Wouters, a further milestone was achieved: on the basis of the greatly improved CWTS data system a drastic improvement of the structure and presentation of the Leiden Ranking was a logical next step. Important elements of the new Leiden Ranking were field-normalized impact indicators based on the distribution of citations over publications (e.g., the top-10% indicator), fractional counting (Leydesdorff & Bornmann, 2011; Leydesdorff & Opthof, 2010), the extension with collaboration indicators, a sophisticated method to assign publications to universities and affiliated institutions, and stability intervals to provide insight into the uncertainty in bibliometric statistics. It is because properties like these that the Leiden Ranking is completely unique compared to the other rankings (Waltman et al., 2012). The top-10% indicator quickly took over the role as crown indicator. And meanwhile Ludo and Nees-Jan completed their thesis work and received their PhD in economics at Erasmus University Rotterdam (2011), on the same day. Ludo's thesis was highly econometric: computational and game-theoretic approaches for modeling bounded rationality. Nees-Jan's thesis was very bibliometric: methodological advances in bibliometric mapping of science. Both illustrated the front cover of their theses with a VOS-viewer made map of the contents of their thesis.

Most readers, I am sure, are familiar with the differences in citation density between fields of science. But an important discovery was the often remarkably large difference in citation density within fields of science, particularly within medical fields. The Leiden professor of neuro-surgery, Wilco Peul, showed that his field was formally part of neurology but that the clinical part, mainly surgery, had a much lower citation density as compared with the basic science part of neurology. In the application of field-normalized indicators based on the entire field of neurology – our standing practice in bibliometric evaluation studies – research performance in his subfield neurosurgery would be systematically underestimated. His concern proved to be right (van Eck et al., 2013). The result was a complete change of our field-normalization method. Not anymore based

on the WoS fields (journal categories) but on a new approach: the construction of a publication- (instead of a journal-) based classification system of science using the citation relations between publications. In addition, a mathematical method was developed to detect research communities (clusters) within this gigantic publication-citation network. Thus, Ludo together with Nees also contributed substantially to the field of data science and, in particular, complex network analysis (Waltman & van Eck, 2012, 2013). Based on these experiences, CitNetExplorer, a new software tool for analyzing and visualizing citation networks was developed and made accessible (van Eck & Waltman, 2014). With such algorithmic classifications of publications important aspects of the science system, particularly the organization of science into fields, growth and mutual interaction of fields, and emerging topics can be investigated in detail. Ludo explored together with Swedish colleagues how the identified clusters can be labeled, in other words, which name can we give to the many units found in the classification procedure.

In the context of the UK Research Excellence Framework (REF), an important exercise in research performance analysis, Ludo and Vincent Traag argued that agreement between metrics and peer review should be assessed at the institutional level rather than at the publication level (Traag & Waltman, 2019). The remarkable point here is that the latter has always been the longstanding practice of CWTS in our bibliometric evaluation studies. Apparently, this experience and knowledge have not reached the REF organizers. It illustrates again the importance of knowing and realizing which is the most appropriate way to apply bibliometric measures. Recently Ludo focused on the use of quantitative information to support research policy and on the importance of a theoretical framework in order to interpret the results of scientometric, particularly bibliometric measurements. This is where the concept of 'contextualized scientometrics' comes into play, an approach in which scientometric statistics is systematically enriched with contextual information. The idea is that we should abandon the situation where the bibliometrician says, on the basis of his/her measurements, that the performance of a research group is very good or not so good. Instead, the bibliometrician should offer information 'behind the numbers', for instance, a visualization of the underlying as well as relevant additional data, preferably in a time-dependent manner. So fortunately, bibliometrics can help and it is not all sorrow and misery. In that respect the development of open data sources, and particularly Ludo's efforts for the Open Citations initiative as core element of the broad and widely supported striving for open access in science are crucial. Ludo turned words into deeds. He resigned as editor-in-chief of the Journal of Informetrics together with the entire editorial board because of the publisher's refusal to make references openly available. And at the same time he launched the new open access journal Quantitative Science Studies.

No doubt that Ludo is an ambitious, very knowledgeable and experienced scientometric researcher who is also very active in the world of data base producers, publishers and research policy communities. Given his talents Ludo was appointed to Professor of Quantitative Studies of Science in 2018, ten years after his start at CWTS. The chair also focuses on further integration of research and teaching at CWTS within the Data Science Program at Leiden University.

Dear Ludo, I congratulate you on the receipt of the Derek de Solla Price Award. It honors your work and that of your colleagues. You are the third CWTS researcher receiving this award. It shows the sustainability in high quality and innovation power of our institute to which you have made and still make a great contribution.

References

Leydesdorff, L., & Bornmann, L. (2011). How fractional counting of citations affects the impact factor: Normalization in terms of differences in citation potentials among fields of science. *Journal of the American Society for Information Science and Technology, 62*(2), 217–229.

Leydesdorff, L., & Opthof, T. (2010). Normalization at the field level: Fractional counting of citations. *Journal of Informetrics, 4*(4), 644–646.

Leiden Ranking (2021) see https://www.leidenranking.com.

Traag, V.A., & Waltman, L. (2019). Systematic analysis of agreement between metrics and peer review in the UK REF, e29. *Palgrave Communications*, 5.

van Eck, N. J., & Waltman, L. (2008). Generalizing the h- and g- indices. *Journal of Informetrics, 2*(4), 263–271.

van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics, 84*(2), 523–538.

van Eck, N. J., & Waltman, L. (2014). CitNetExplorer: A new software tool for analyzing and visualizing citation networks. *Journal of Informetrics, 8*(4), 802–823.

van Eck, N.J., L. Waltman, A.F.J. van Raan, R.J.M. Klautz, & W.C. Peul (2013). Citation analysis may severely underestimate the impact of clinical research as compared to basic research. *PLoS ONE, 8*(4), e62395.

van Raan, A. F. J., Van Leeuwen, T. N., Visser, M. S., Van Eck, N. J., & Waltman, L. (2010). Rivals for the crown: Reply to Opthof and Leydesdorff. *Journal of Informetrics, 4*(3), 431–435.

Waltman, L., & Van Eck, N. J. (2009). Some comments on Egghe's derivation of the impact factor distribution. *Journal of Informetrics, 3*(4), 363–366.

Waltman, L., & Van Eck, N. J. (2012). A new methodology for constructing a publication-level classification system of science. *Journal of the American Society for Information Science and Technology, 63*(12), 2378–2392.

Waltman, L., & Van Eck, N. J. (2013). A smart local moving algorithm for large-scale modularity-based community detection. *European Physical Journal B, 86*(11), 471.

Waltman, L., van Eck, N. J., van Leeuwen, T. N., Visser, M. S., & van Raan, A. F. J. (2011a). Towards a new crown indicator: An empirical analysis. *Scientometrics, 87*(3), 467–481.

Waltman, L., van Eck, N. J., van Leeuwen, T. N., Visser, M. S., & van Raan, A. F. J. (2011b). Towards a new crown indicator: Some theoretical considerations. *Journal of Informetrics, 5*(1), 37–47.

Waltman, L., Calero-Medina, C., Kosten, J., Noyons, E. C. M., Tijssen, R. J. W., van Eck, N. J., van Leeuwen, T. N., van Raan, A. F. J., Visser, M. S., & Wouters, P. (2012). The Leiden Ranking 2011/2012: Data collection, indicators, and interpretation. *Journal of the American Society for Information Science and Technology, 63*(12), 2419–2432.