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# How Wageningen University and Research Centre managed to influence researchers publishing behaviour towards more quality, impact and visibility

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**Abstract**

Wageningen University and Research Center (WUR) is one of the most prestigious research institutions in the world in life sciences and improved significantly in several rankings over the last years. One of the `drivers` of this success story is a comprehensive quality management exercise based on Research information from an integrated CRI system, that managed to influence researchers publishing behaviour towards more quality, impact and visibility.
So first WUR`s highly efficient research quality management exercise is introduced, that was established some years ago and enrolls in 4 phases: (1) define quality criteria (2) measure quality criteria (3) interpret quality criteria (4) act accordingly. Comprehensive bibliometric figures from the last 10 years show, that the approach had the intended effect.
Furthermore the paper portrays the very inspiring strategy WUR applied to ensure acceptance and use of the system in favour of data quality and -quantity; the approach is based on an institution-wide network of CRIS `super-users`, who - after being educated and certified in context of a train-the-trainer exercise - in their organisational context act as evangelists, encourage colleagues to use the system and educate others.


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## 1. Introduction

In the race for fame and funding it`s on the researchers to make an institution succeed. Someone has to row this boat and if Oxford or Cambridge wins depends on the scullers. This is why institutions strive to "attract the best minds from all over the world"[1] by creating inspiring work-conditions. But it`s not all about wellness; researchers often are supposed to perform in line with the strategic goals of an institution, among them very often excellence and visibility in research.

Because excellence in research to a large extent still means excellence of publications produced, a lot of emphasis is put on trying to `optimise` the researchers publishing behaviour towards what can be defined as quality, impact and visibility of their publications. To achieve this many instruments of torture were produced, like an assessment-based stick and carrot approach, that rewards `right` behaviour with money - "most powerful tool for managers is funding"[2] - and sanctions the `wrong` one. But steering researchers like that turned out a hard thing to do and many of an assessment exercise did not obviously succeed. A 2014 investigation of the impact of the Danish national Assessment exercise on publishing behaviour at Aalborg University came to the conclusion:

*However, we do not have evidence supporting the assumption underlying the implementation of the Bibliometric Research Indicator, namely an increase in publications in prestigious journals.*[2]

This paper lines out, with what strategies and tools Wageningen University and Research Center succeeded in influencing its researchers publishing practice.

## 2. Research Quality Management at Wageningen University and Research Centre (WUR)

### *2.1. Wageningen's rise in rankings*

Wageningen University and Research Centre (WUR) is one of the most prestigious research institutions in the world in life sciences and after improving heavily over the last 10 years today holds top-ranks f.e. in Times Higher Education, THE-Life sciences, QS World University Rankings for Agriculture & Forestry and Environmental Sciences (table1).

Table 1. WUR`s ranks between 2011 and 2016

| Year | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 |
|---|---|---|---|---|---|---|
| THE | 47 | 73 | 77 | 70 | 75 | 144 |
| THE-life sciences | 16 | 18 | 22 | 22 | 17 | |
| QS-Agriculture & Forestry | 1 | 3 | 2 | 2 | | |
| QS-Environmetal Sciences | 4 | 7 | 8 | 10 | | |

### *2.2. Research Quality Management as a 4-phase circuit*

One of the drivers of this success story is a comprehensive quality management exercise for research output, that is based on research information from an integrated CRI system. Doing so WUR acts inspired by advanced quality management concepts, that unfold a `feedback` circuit, like it is sketched in figure 1.

Stripped down to the very core, this regulatory QM process comprises 4 phases roughly. 1st step always is to agree on a definition of quality and a set of specific, measurable and achievable quality criteria. Needless to say, that those quality criteria should be in line with the institution's strategic objectives. In a 2nd step quality of things is measured based on the agreed criteria; precondition for a proper measurement are on the one hand business processes ensuring that the relevant data is delivered in required quality and an integrated IT infrastructure on the other. In a 3rd step results are interpreted by putting them into relation to reference figures (like targets, benchmarks, resources invested etc.) in order to check, if the institution is on target or not. Last step is to react on the findings by making educated management decisions. Results of next assessment then show, if management decisions had the

intended effect. This way the cycle runs in itself forcing the institution into an ongoing agile process of measuring and adjusting.

Research institutions started to try to adapt models like these decades after the industry had started to practice it.[a] But this turned out to be a challenge for many reasons. One is to agree on specific, measurable and achievable criteria, or: indicators for `quality` of research within or across research disciplines, institutions and borders; and indeed compared to that problem solving the famous Gordian knot seems like a no-brainer.[b] Furthermore critics emphasize, that just like an intelligence test doesn't say anything about a person's intelligence, but instead much about his skills to pass intelligence tests, contemporary methods of measuring quality in research don't say anything about the quality of a researcher's research, but instead much about his skills to align with the quality measurement parameters applied.

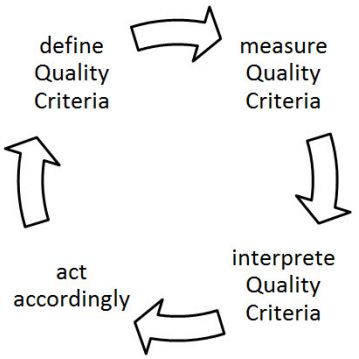


Fig. 1 regulatory quality management cycle

Despite that over time certain criteria have established, that seem to do the trick more or less. Those sets of indicators still heavily rely on publications and their impact, while other outcomes like patents, spin-offs, 3rd party funding, awards or promotion of young scientists are gaining relevance and become part of a broader and more sophisticated set of quality indicators.[c]

### *2.3. Defining Quality and Quality Criteria*

The strategic goals of WUR are redefined every 4 years. Based on the belief, that goals can only be achieved if supported by the whole organisation in depth, the process to agree on the institution's goals for the next 4-year-period ahead is neither a top-down nor a bottom up process, but a constructive discussion, in which Executive and Advisory Board and representatives of science managers and researchers from all parts of the scientific organisation are involved.

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[a] Cp. f.e. Nickel[3,4] (2014 and 2007) and Lane[5] (2014) on the use of this QM model at research institutions.
[b] Riechert u.a. (2014)[6] classified this challenge a "wicked problem", "for which different stakeholders do not even agree on what the problem really is, and for which there are no right or wrong answers, only answers that are better or worse from different points of view" (Riechert, p. 2).
[c] The trend towards `broader` metrics in the indicators can be observed f.f. When looking at the grand national assessment exercises. The German Council of Science f.e. in 2016 after roughly 2 years of Experts work published a recommendation for a unified research information data model supposed to ease reporting and quality management inside institutions as well as comparisons and benchmarking amongst institutions. The s.c. core data model research covers six fields in total: staff, promotion of young researchers, 3rd party funding, patents and Spin-offs, publications and infrastructure for research [cp. http://www.wissenschaftsrat.de/index.php?id=1312&L=]. In a comparable manner the UK Research Excellence framework heavily weights publications and their impact, but also takes into account other factors like "postgraduate student success rates, type and value of postgraduate studentships, value of externally won research awards, and various measures of wider research esteem, e.g. research prizes, editorship of scientific journals. These factors are generally grouped together under the heading of research `environment`." (McGrath e.a. 2014)[7]. For a discussion of the problem of elaborating `smarter` and more `meaningful metrics` when measuring quality in Science cp. Wolf B e.a. (2014)[8], Wolf B e.a. (2013)[9] and Wouters P (2014)[10].

The process is initiated by the management and in charge of coordinating the elaboration of the strategy documents is a s.c. `writing team`. It brings together and consolidates input from various sources like strategy working groups, strategy meetings with employees, discussions with stakeholders and what was sent to the mail address onewageningen@wur.nl. This then is forged into an inspiring and logical whole.[11]

Amongst the goals, which must be `smart` (specific, measurable, achievable, realistic, in time), is to increase international visibility of WUR by winning or defending high ranks in international rankings relevant for the field of life science.

### *2.4. Measuring Quality Criteria*

As an IT infrastructure to enable measurement of what is supposed to be managed, WUR made reports from the repository regarding publications, while the metadata of publications was derived from a CRIS-system; this was Metis from 2003 to 2015 and Elsevier`s Pure from December 2015 onwards.

WUR started as many other institutions by evaluating research groups by the number of peer reviewed articles. Registration of publications was encouraged because evaluation of research groups and researchers were based on publications registered in the CRIS-system only. Around 2005 the first bibliometric reports were made manually by using the Essential Science indicators (ESI), a Thomson Reuters product, as a benchmark. The bibliometric analysis gave WUR insight in the impact, as a measure of quality of individual publications. In 2007 WUR performed this bibliometric analysis in Access by combining Metis data with Web of Science citations and ESI benchmarks.

In 2008 WUR had a big evaluation of almost the whole university. To support this evaluation, it was decided to incorporate the bibliometric tool into the repository, to have the possibility to make a bibliometric analysis at any time for research groups, individual researchers and research programmes. The advantage of reporting from the repository was, that all data could be verified by the researchers themselves. In case of errors WUR received feedback from them, which enables the library to improve the data[12].

### *2.5. Acting accordingly (Tenure Track)*

In 2009 Wageningen University started with a tenure track for newly appointed staff members. One of the criteria was research output. Because for bibliometric analysis the publications have to be published at least 2 years to calculate a reliable impact, this was not suitable for the tenure track. But WUR discovered that publishing in a JCR quartile 1 journal was a very good precursor for high impact (table 2).

As a result tenure track candidates should publish more refereed articles and publish them in Q1 journals to gain enough credits (table 3). Not to leave people alone with this task and to support researchers to publish in high quality journals, courses and seminars are organised for researchers and PhD-students. On request, library staff advises individual research groups on how to improve their publication strategy.

Table 2. The effect of publishing refereed articles in JCR ranked journals. The values are calculated over the period 2005 to 2013.

| JCR | Top10% | RI |
|---|---|---|
| Quartile 1 | 31% | 2.49 |
| Quartile 2 | 14% | 1.35 |
| Quartile 3 | 8% | 0.94 |
| Quartile 4 | 4% | 0.62 |

Quartile: Journals ranked by impact factor in the top 25% of a subject category in Journal Citation Reports are in Quartile 1, 25%-50% in 2, 50%-75% in 3, and others are in Quartile 4. %T10: Percentage of publications within the top 10% most cited publications. RI: Relative Impact, or the item oriented field normalized citation score. The number of citations to publications compared to the world average of citations to similar publications (of the same age and in the same research field). The term "item oriented" means that the normalization of the citation values is done on an individual article level first, the average over all articles yields the RI

Table 3. Number of credits gained for refereed articles, book chapters and books in the Tenure Track. Scores differ for researchers in the field of natural and social sciences.

| Credits | Natural Sciences | Social Sciences |
|---|---|---|
| Ref.Article: | | |
| IF>20 | 20 | 20 |
| Q1 | 6 | 6 |
| Q2 | 3 | - |
| Q2-Q4 | - | 4 |
| Non-JCR | | 2 |
| Bookchapter: | | |
| Publisher A | - | 4 |
| Publisher B | - | 2 |
| Book: | | |
| Publisher A | 12 | 12 |
| Publisher B | 8 | 8 |

IF>20: Articles published in journal with Impact Factor larger than 20 in the year of publishing. Quartile: see table 1. Non-JCR: Article published in journals not ranked in the JCR. Publishers A/B: The WASS-SENSE book publishers ranking list 2015: http://www.sense.nl/gfx_content/documents/2015112_WASS-SENSE%20list%20of%20book%20publishers.xlsx

Because more and more of the existing staff members joined the tenure track, the percentage of Quartile 1 articles increased from 49 % in 2004 to 63% in 2015 (figure 1). In the same period the number of refereed articles increased from 1987 to 3387. This increase in refereed articles can be partly explained by decreases in other scientific output, in particular book chapters and conference proceedings. The impact of de refereed articles increases from 1.6 (2005) to 2.25 in 2013 (figure 2). This increase of scientific impact is also shown in the percentage of refereed articles that are within the top 10% most cited publications in their research field (figure 3). The combination of increasing number of publications and a higher impact per paper contributed to higher scientific ranking of Wageningen UR (table 1).

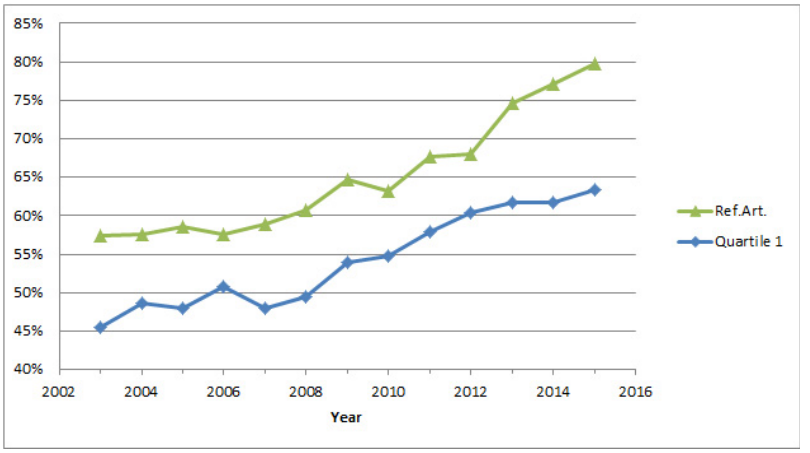


Fig. 2. Development of percentage refereed articles of the total scientific output (Ref. Art.) and percentage of refereed articles published in JCR quartile 1 journals (Quartile 1) in time.

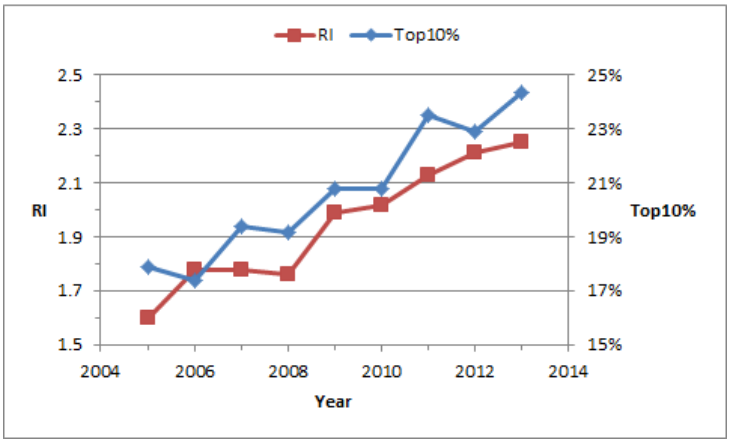


Figure 3. Development of RI and Top10% in time for refereed articles.

*2.6. - Discussion of bibliometric indicators used*

From 2009 to 2015 the average number number of refereed articles per JCR category increased with 19% (source: JCR database). If there was no effect on publication strategy, you should expect an increase of 7.2% to 58% (Q1+19% of Q2). In the same period the percentage of refereed articles which are published by WUR in Q1 increased from 54% to 63%, a rise of 18%. The number of Q1 articles increased from 1362 to 2290 an increase of 68%. For an institute that performs on world average 10% of their papers should belong to the top 10% and the the field normalized citation score (RI) should be 1. For WUR we see a significant improvement of Top10% from 20.8% in 2009 to 24.4% in 2013. This improvement is consistent with RI which improves from 1.99 in 2009 to 2.25 in 2009.

## 3. User Acceptance and Education

*3.1. Acceptance and User Education as precondition for a sufficient Data Quality and Quantity*

A sufficient data quantity and quality to base the measurement of quality on is the most important precondition to make the quality management cycle work. Contemporary commercial CRI systems include a number of mechanisms ensuring to `populate themselves` with data to a certain extent without the researchers contributing. Primarily publications can be regularly harvested from online sources and mapped to internal authors automatically. But still the amount of data in a CRIS to a huge extent relies on the user`s willingness to add data manually, primarily when it comes to content types like patents, spin-offs, prices, several forms of external academic engagement or promotion of young scientists, for which in most cases neither internal or external data sources, that could be integrated, are available.

So it`s absolutely crucial to make end-users actually use a CRIS by ensuring User Acceptance during Implementation on the one hand and User Education after GoLive on the other when planning to base a research QM on CRIS data.

*3.2. Acceptance - Problems and Solutions*

How much resistance to expect when implementing a CRIS very much depends on the `culture` of an institution; here `top-down` and `bottom-up` describe the opposed concepts. In best case employees of an institution are used to submit to regular assessment exercises weather institutionally or supra-institutionally coordinated; then no or only few Acceptance problems should occur. But if it`s a bottom-up culture shaped by the traditions of freedom of academia, there might be trouble ahead. Then Acceptance and User education should have a prominent place in the

CRIS implementation project planning. There are several strategies recommended to overcome resistance and have a succesful GoLive in the end. Some of them are discussed as part of project management, like stakeholder management or project marketing, while others are considered a part of what is called change management.

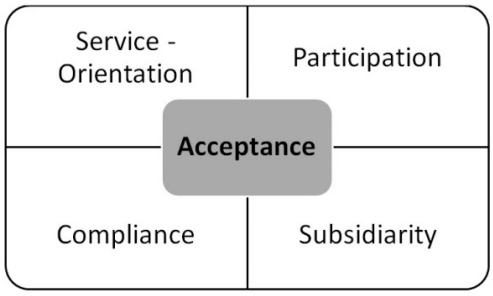


Fig. 4 - 4-fold strategy to foster Acceptance

What has proven to work, or at least to increase probability to work, is a 4-fold approach (figure 4), that (1) makes sure the application while supporting and enabling critical business processes offers services as attractive as possible for end users in order to create pull-effects for usage, (2) `embraces` scepticists and lobby groups from an early point of time by offering a constructive dialogue in order to allay concerns with transparency and good arguments, (3) elaborates a comprehensive IT-compliance concept ensuring that person-related data is processed in line with national or federal laws and regulations on data privacy and security and finally (4) engages a number of science managers from the institution as allies acting as advocates and evangelists in the part of the organisation, that they are responsible for.

### 3.3. Acceptance and User Education at WUR

#### *3.3.1 Reporting `Culture` and Tenure Track*

To document research output for WUR researchers is not a question of voluntariness, because the tenure-track model alone makes it very clear, that all output has to be registered in the CRI system. On top of that it`s well known that CRIS data, once it is in the system, is used for many purposes like the annual report of Wageningen UR, internal and external evaluation of research groups, researchers & research programs, publication lists of groups, researchers and research programs on the website or OAI-harvesting.

Because tenure track was only mandatory for new staff members, there was not a lot of resistance; on the contrary because of improved career opportunities a large number of the existing staff even volunteered for the tenure track.

#### *3.3.2 Decentralisation and a Network of Super Users*

While many institutions in order to educate users of a CRIS run centralised strategies, which means that one or more persons from central administration `tour` the organisation to spread the news and encourage staff to make a proper use of the application, WUR relied on a `decentralisation` strategy underpinned by a network of `super-users`.

This approach profits from the fact, that science managers with regional responsibility - like heads of faculties, institutes or matrix structures in which interdisciplinary research is organised - have the same strong interest and pressing need for academic reporting than central Administration and so reports have to be produced constantly on all institutional levels. This requires one or more persons in all of those organisational units, who are in charge of collecting and assembling data for reports anyway and did that long before central administration ramped-up a CRIS. Job titles may differ - might be a lecturer, PhD, assistant to the institute's head, secretary - but their role always is something that could described as Research Information Manager (RIM).

The WUR network of trained publication registry employees was established already during the 1990's. In most cases it was secretaries in charge of registering the output of their group. With the implementation of Metis in 2002 a 4-hour-education was mandatory for new Metis users; during these courses users learned about the different publication types, how to handle full texts and how to register this information. With the introduction of Pure, that replaced Metis in late 2015, all the Metis users had to visit 2,5-hour-educations to get familiar with the most important differences between Metis and Pure.

The Pure administrators maintain the network and are responsible for instruction of new users. To maintain a high data quality, access to the system is allowed only after a compulsory training. This network is informed frequently about updates, FAQs and imperfections that occur frequently. Because there is one in every research group, there is lot of interaction between researchers and staff responsible for output registration. This results in high rates of registration combined with high quality input.

## Acknowledgements

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