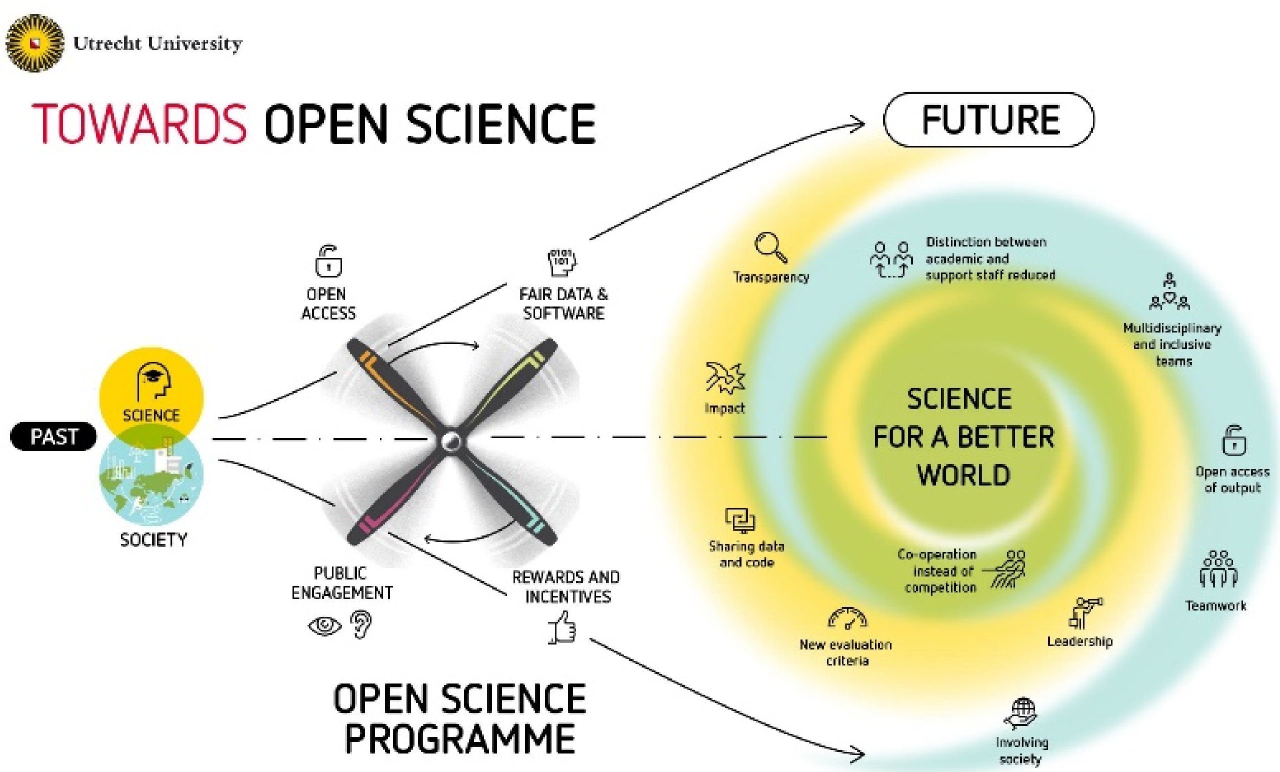
Report on the risks of Open Science and DORA.

Open Science and DORA are strongly associated with the Recognition and Rewards (R&R) policy in the Netherlands. file:///D:/Abstract%20and%20letters%202/position-paper-room-for-everyones-talent.pdf. R&R is a policy to provide for different university career paths, each with their own set of evaluation criteria. We support the idea of R&R providing multiple career paths in academia and thereby rewarding different talents. This aspect of R&R is therefore not the topic of this report. Our concern is on the impact that Open Science and DORA, as part of R&R policy, will have on academics who focus on research as their main career objective.

The premise of the **Open Science** movement is that the science community should (i) provide open access to data and publications, (ii) directly benefit society, (iii) involve the lay public, (iv) promote team science, diversity and cooperation and (v) promote leadership. See below the Figure on Open Science from the Utrecht University website. At first glance these five premises are all laudable goals, but how are these goals achieved and what can be the implications of this experiment in science policy?



The **DORA declaration** was set up in 2012 in San Francisco by a group of editors and publishers of scholarly journals. Two instructions to evaluators are paramount in the set of declarations at https://sfdora.org/read/ :

1) Do not use journal-based metrics such as the Journal Impact Factor (JIF) in assessments of scientists.
2) Judge research on its own merits.

DORA supporters underline the negative consequences of the JIF for science and scientists but is the proposed alternative an improvement or will it rather lead to an unworkable situation that will actually harm to science and society? The VSNU signed DORA in 2014, NWO and NFU signed DORA in 2019.

Here we review the combination of Open Science and DORA, as part of R&R policy. Our review has led to a number of conclusions and recommendations that are explained below.

CONCLUSIONS:

- The combination of Open Science and DORA disadvantages scientists in the fundamental natural sciences.

- Curiosity-driven science, selected on excellence, performs better on societal output than science selected on societal or industrial relevance.

- Open Science policies can harm science and scientists by disrupting selection on scientific quality and increasing bureaucratic burden.

RECOMMENDATIONS

- Focus Open Science policy on Open Access policy and implement it without harming (Dutch) science.

- Reconsider the signing of DORA. The Journal Impact factor should not be an all-dominant factor and its influence depends on the field, but its complete and science-wide ban according to DORA rules at NWO and some Dutch universities is too radical and harmful to scientists, in particular in the fundamental natural sciences.

- Protect funding for fundamental science at NWO and at universities as a (higher) percentage of the total national public research budget. Funding of fundamental research is endangered by Open Science policies and the related political emphasis on direct societal relevance, which causes a shift towards applied sciences.

- **The Netherlands should stay in the world top 5 on international science quality indicators.** If only out of (knowledge) economic necessity to continue its prosperity with costly challenges such as aging and climate change ahead. Upholding international science quality indicators, which have served Dutch science well for 30 years, is part of that.

Linking Open Science to DORA is harmful for fundamental science.
To us the tight link between Open Science and DORA appeared odd at first. One can benefit from Open Science without disrupting publication in society journals and prestigious high JIF journals such as Nature and Science. Such journals are highly valued and have high standing amongst scientists. They are part of the publication and evaluation cultures used by scientists based on best practice that has been built-up for decades.
Reasons for linking Open Science to DORA and implementing DORA on an institutional level are explained in the book *Open Science: the Very Idea* by Professor Frank Miedema, a strong advocate and figure head of the Open Science movement in the Netherlands. He was vice-chair of the UMC Utrecht and had to pay the high subscription prices of especially high JIF journals (page 186). Of note, in 2019 universities spent 75-100 million euros on subscription fees https://fd.nl/achtergrond/1308742/universiteiten-trekken-ten-strijde-tegen-betaalmuur-uitgevers. At a profit margin of 20% of those 75-100 million euros, universities lose maximally 20 million euros to publishers' profits, 0.6% of the annual budget of about 3 billion euros, they receive from government. One way to bypass publishers' fees was for scientists to start publishing in Open Access (OA) journals. As described in the book, there was one problem, OA journals have a lower standing (and a lower JIF) than the high JIF subscription/hybrid journals and scientists were therefore not willing to publish their work in OA journals. Adopting DORA into Open Science was meant to solve the *impactfactormania* (page 190) and thereby solve the above problem. When this failed (scientists still published in Nature, Cell, Science, etc.), the trajectory towards Plan Shock (Plan S) was started (page 198). Plan S is implemented at NWO since 1-1-2021 and forces scientists with NWO funding to publish immediate Open Access and if this is in a journal that is not full OA, the fee (about 10K euros for Nature and Cell journals) cannot be paid from the NWO funding and has to be found elsewhere. In 2024, under plan S, Dutch scientists can no longer publish (not even OA) in subscription journals. This appears a radical strategy with highly uncertain and potentially damaging consequences for Dutch science and scientists (https://sites.google.com/view/plansopenletter/open-letter), only to gain a minute financial gain. ERC has not adopted plan S https://erc.europa.eu/news/erc-scientific-council-calls-open-access-plans-respect-researchers-needs *as the ERC Scientific Council wishes to pay closer attention to a number of aspects whose importance has been rather*

underestimated. Most prominent among them are researchers' needs, especially those of young researchers who represent the future of European science and innovation. An important note to make in this perspective is that the OA model of publishing is likely to result in higher overall costs for publication (instead of the intended cost reductions) and is expected to have several unwanted side-effects, including poor peer review and predatory publishing (Open access—is it the way forward?: https://link.springer.com/article/10.1007/s12055-021-01282-2).

There was yet another reason for Miedema to link Open Science to DORA: to take away the perceived unfair advantage and hierarchy of the fundamental natural sciences over the applied sciences (pages xiii, 10, 23, 67, 83, 85, 88, 90, 95, 99, 102, 104, 121, 122, 150, 154, 152, 164, 166, 167, 169, 220, 228, 231, 232, a search on "basic" or "fundamental" finds the relevant phrases). According to the book, the importance of fundamental science should be reduced, and to achieve that goal the importance of publishing in (high JIF) journals that are typically highly valued by most scientists should be reduced as well (pages 88, 96, 102, 104, 166, 231). Fundamental scientists receive their standing/prestige from publishing in valued society journals and other high IF journals, so removing its importance was deemed an effective strategy to take away this mechanism (pages 88, 96, 102, 166, 231), which is what DORA does.

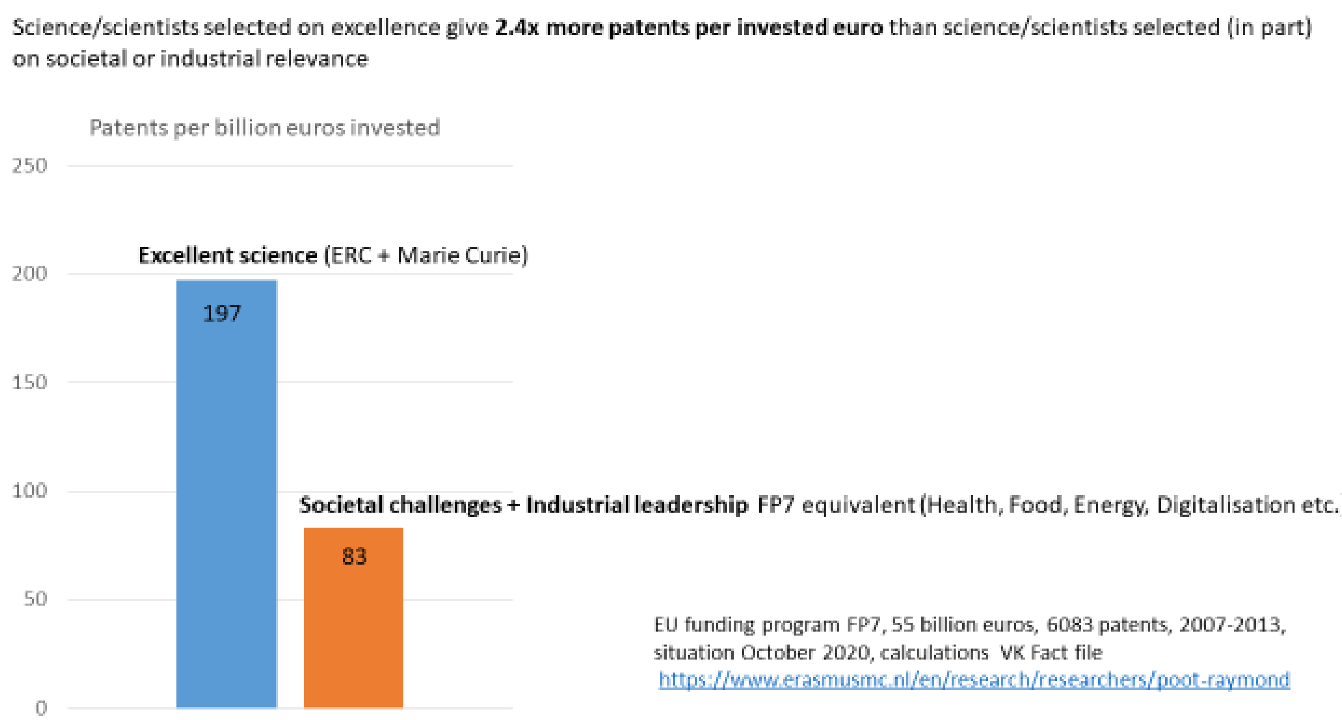
Another strategy to disadvantage fundamental science was to emphasize the societal relevance of research (pages 68, 80, 88, 89, 99, 102, 131, search with "societal"). Emphasis on the societal relevance of science is a theme that is also prominently present in current Open Science policies (see Figure above for an example). Fundamental sciences often have difficulty to predict the future societal use of basic research, putting them at a disadvantage from applied sciences (which often have a predetermined societal goal) in grant applications and evaluation protocols. Nevertheless, most key discoveries in the past 20 years in natural sciences have resulted from fundamental research, leading to many spin-off benefits for society as a whole, without direct involvement/reference by/to society in the first place (https://www.nature.com/articles/s41570-016-0001). Yet, attempts of fundamental scientists, such as Nobel Prize winner Ben Feringa, to explain that their work is likely to have future societal relevance, is described as a "knee-jerk reflex" (page 167). The ERC is put on the spot, which funds science purely based on excellence (page 97, 99, 152, 154, 182, 231), and the ERC denigrated as "high church science build on the myth of Legend" (page 151). NWO initially did not respond very well to Science in Transition, a movement towards Open Science started by a group of people including Miedema (page 92, 96). NWO and the ERC "tend to select classical researchers, based on the usual metrics that produce knowledge for the internal science market mainly" (page 231). The book by Miedema was retweeted over 100 times and liked nearly 200 times, suggesting widespread endorsement by the Open Science community.

The policies of Open Access and science by societal relevance are effectively implemented in the Netherlands. Plan S, the most stringent of OA policies, is the current OA policy of NWO and ZonMw, which are the main government distributers of science funds for scientists and dominate science funding in the Netherlands. Science by societal relevance is the vast majority of funding in the Netherlands with the Growth fund (Groeifonds) and the National Science Agenda (Nationale Wetenschapsagenda) as most recent additions. Blue skies (fundamental) research, selected on excellence only, accounts for just 5% of the Dutch public science budget. The NWO talent competition is 160 million euros per year, NWO open competition 130 million euros per year and the total budget close to 6 billion euros per year (not including the National Growth fund). This already small fraction of 5% is now falling victim to Open Science and DORA policies. The CV of the applicant is completely removed from grant application protocols in the life and exact sciences open competition grant schemes due to the Open Science policy called "team science" https://www.nwo.nl/sites/nwo/files/media-files/2019-Recognition-Rewards-Position-Paper_EN.pdf , page 7 item j. Talent competitions have a narrative CV, maximally 10 output items and mentioning JIFs in grant applications is forbidden.

Blue skies research selected on excellence provides the highest benefits for society and fosters talent.
With the aim to increase benefit from science to society, the above Open Science policy pushes science towards applied science at the expense of blue skies fundamental science. The crucial question is therefore whether science selected on societal relevance results in more benefit to society than blue skies research. The answer is no, it is the opposite. A quantitative analysis can be done with the big data of the EU research funding, which has a dashboard with all sorts of

information on output of the EU funding programs. https://webgate.ec.europa.eu/dashboard/sense/app/f586ea07-ebee-4054-9e0b-328be7de8e7f/sheet/d2f27d1a-6726-4055-8cb4-5b6897e80907/state/analysis

One can take many types of data from this site (right upper corner) including number of publications and their impact factors. Last year (October 2020), Raymond Poot looked into the FP7 program (2007-2013) and compared patents (IPR) per invested euro between the ERC and Marie Curie programs on one side, which both select only on scientific excellence, and the other programs that later became the Societal Challenges pillar and Industrial Leadership pillar of the succeeding program, Horizon 2020 (FP8). As their names suggest, these latter pillars aim to provide direct support for society and industry, respectively. FP7 granted 55 billion euros, achieved 6083 patents and ended 7 years before October 2020 and thereby provides a big data, mid-long term, perspective. At first sight patents per invested euro may seem a narrow definition of societal benefit. However, ERC and Marie Curie do not select for patents (and therefore have no bias) making patents per euro a good proxy for societal benefit, also for the many societal benefits that cannot be patented. The results are striking. **ERC and Marie Curie generated 2.4x more patents per invested euro than the combined programs of the Societal Challenges and Industrial leadership pillars** (Figure 2, below, calculation VK fact file at https://www.erasmusmc.nl/en/research/researchers/poot-raymond). Professor Bourguignon, president of the ERC said that the ERC received 17% of the funding of FP7 and produced 29% of its patents https://erc.europa.eu/news/erc-president-address-eu-competitiveness-council (2.1x more patents than the rest of FP7, Marie Curie accounts for the difference between 2.1x to 2.4x difference). This does not mean that applied sciences would not be highly useful, if only to implement all those patents, but it does put a firm strike through the notion that fundamental sciences would be only a hobby of curiosity-driven (and maybe even JIF-loving) scientists without societal relevance.



Another important aspect of blue sky science is that it attracts and retains talent. A report by the Royal Netherlands Academy of Arts and Sciences (KNAW) https://www.knaw.nl/nl/actueel/publicaties/aantrekkelijkheid-van-nederland-als-onderzoeksland showed that the number 1 factor that attracts and retains talent in The Netherlands is the ability to do and get funding for curiosity-driven science. Accordingly, the poor funding in The Netherlands for curiosity-driven (fundamental) science was a major worry of the KNAW for attracting and retaining talent in the Netherlands.

Open Science *public engagement* can distract from science.

Open Science puts a strong emphasis on engaging the lay public in research, as the tax payers pay your bills and accordingly should benefit from it and be involved in it. Engaging can be by public presentations, seeking advice from the public for research questions and involving the public in your research. Involving the public can be rewarding for scientists and the public, promote science appreciation, put new questions into the research area and put the view of the public/ patients across. However, engaging and involving the public can be time-consuming and disruptive for scientists' primary tasks, educating students and performing science. The fundamental natural sciences are here (again) at a disadvantage to the more applied and social sciences. Fundamental sciences usually tackle problems that are more removed from society. This makes them more difficult to explain and be appreciated by the general public. Fundamental sciences also often involve specialized equipment and lab settings, which makes it more difficult and time-consuming to productively involve the public in experiments. Often this is plainly impossible due to sterile environments (tissue culture), sensitive and expensive equipment and/or required technical expertise. Ironically, involving citizens in cutting edge nanotechnology semi-conductor science is very hard but without such research the public wouldn't have pocket-sized smart phones – arguably the pinnacle of 'public engagement'.

The Nationale Wetenschapsagenda (NWA, National Science Agenda) is a currently running 130 million euros per year science program in The Netherlands that requires involvement of the public and non-academic professionals, the so-called 'kennisketen', the 'knowledge chain'. Medical fundamental scientists are asked to involve nurses and other health workers into their specialized research settings. Subsequently, they run into great difficulty as these health professionals are not experienced in such environments, requiring adaptation and simplification of experimental set-ups. Patient groups need to be involved in setting research questions and discussing results. All in all, the public involvement in the NWA is a costly affair that distracts from science and education, especially in the fundamental natural sciences. It also bends science towards the applied sciences. The NWA is funded for 80% from fundamental science funds but was recently reassessed by NWO to be "between fundamental science and the development of a concrete product by industry" https://www.nwo.nl/cases/wetenschappers-moeten-die-brug-over , i.e. it is essentially a mostly applied sciences program. To our knowledge, the question is never asked by policymakers whether this is what the public wants, given the choice between engaging with science but possibly disrupting science and letting scientists get on with their job trying to do their best science with possible benefits for society. This is a justified question. Other society-paid professionals such as engineers and doctors do not involve the public in their bridge building and surgery. The public trusts them to know best and let them get on with their jobs. Why scientists have to be the exception to this consensus, given the above disadvantages, is a complete mystery.

Open Science *Team science* is ill-defined and acts counter-productively.

Open science puts emphasis on team science. The natural sciences all work in smaller or larger teams. What the Open Science emphasis on team science means in practice and how it is to be promoted therefore remains unclear to us. Team science is used by NWO as an argument (*Room for everyone's talent*, pag. 7 item j https://www.nwo.nl/sites/nwo/files/media-files/2019-Recognition-Rewards-Position-Paper_EN.pdf) to remove the CV from the open competition of the exact and life sciences (ENW-Klein). To run a competition based on merit without a CV creates a bizarre situation since the CV of the applicants predicts success more than any other factor, including the proposal itself. The use of 'team science' as an argument to remove the CV sets a dangerous precedent: Open Science policies can be used to take any action that seems like a good idea to policy makers. Team science is also used by NWO as an argument is promote science by consortia of multiple labs. A study in Nature with citation patterns of 65 million articles (1954-2014) (https://www.nature.com/articles/s41586-019-0941-9) showed that individual labs provide scientific breakthroughs whereas consortia expand on existing ideas. Consortia are often lead by well-connected senior scientists with a danger of suppressing young scientists and independent thought and action (see the above Nature article). To promote independent thought and give individual young scientists more (financial) opportunities to develop their own ideas, top-down instigation of consortia should be avoided.

Open science *diversity and inclusion*.

Diversity, for example in gender balance and ethnic minorities, needs to be promoted in The Netherlands. The percentage of female scientists in the Netherlands is the lowest in Europe, (https://twitter.com/DevilleSy/status/1457290347508293634/photo/1). In an appropriate strong catch-up, the NWO talent program Verniewingsimpuls awarded a higher percentage of women than men in the Veni, Vidi and Vici categories in the most recent years, 2019 and 2020. In absolute numbers, more women than men were awarded in 2019 and 2020 Veni and Vidi competitions. In the most senior talent category Vici (until 15 years after PhD graduation), in 2019 and 2020 only one third of the applicants were women, which was not fully recovered to 50/50 in the awarding. https://www.nwo.nl/onderzoeksprogrammas/nwo-talentprogramma NWO provides 1.5 year eligibility extension per child to women. It would be more efficient and appropriate if NWO bluntly subtracts 1.5 years (or more) per child from the research time after PhD and explains this policy to reviewers. Reviewers now still count output over time after PhD, where women with children often fall short. NWO has the Mozaïek program https://www.nwo.nl/calls/mozaiek-20-2021, which aims to provide grants to ethnic minorities in the Netherlands.

All in all, NWO competitions such as the above appear highly efficient policies to emancipate disadvantaged groups. An appropriate strategy would therefore be to funnel more money to such NWO competitions, which are highly competitive, have low awarding percentages (between 10% and 18%) and have not been increased in funding over the last 5 years. What Open Science can add to this in a merit-driven way is unclear to us.

Open Science *leadership* criteria should not be overburdening in promoting (young) scientists.
Open science takes leadership as a criterion for evaluations. Libraries have been written and endless courses have been given on what encompasses good leadership. Whereas leadership is an obvious criterion for leading complex organizations such as a university or academic hospital, a leadership check is also applied via Open Science to scientists willing to lead their department. Two scientists with an "excellent research CV" were not promoted to department head because they had to work on their leadership skills (https://www.volkskrant.nl/wetenschap/jonge-academici-vrezen-voor-hun-contract-als-ze-hun-grenzen-aangeven~b27aeabb/). Whereas it is difficult to judge individual cases, this appears to set a worrying precedent. A department head needs to provide a safe, fair and friendly working environment but above all, excellent scientists should lead younger scientists in their scientific endeavors. For young scientists it is much more important that the department head takes the right decisions on scientific direction than that she or he organizes the best department day ever, is a good "excel-sheet manager" or takes great care of the "jaargesprek". Over-burdening promotion procedures hold back young scientists from showing their talent in a wider context. In the rare cases that things do go wrong, HR at the university can step in and take action.

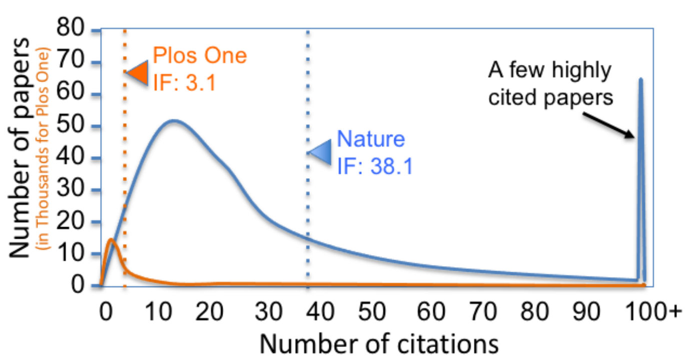
Open Science *Open Access* is a good idea that now requires proper implementation to not harm scientists.
Open Access is the most widely known part of Open Science. It promotes publishing with open access, publishing data early and in great detail for replication. We favor open access and transparency. It should however not lead to a lower quality of publications, disadvantage scientists, sabotage patent applications, strongly increase costs or lead to high bureaucratic burdens. NWO and ZonMw have imposed Plan S on their grantees from the beginning of 2021 demanding immediate Open Access of publications. Publishing OA in subscription journals requires paying the bill from outside your NWO funding (up to 10K for Nature and Cell journals). In 2024 under plan S, Dutch scientists can no longer publish (not even OA) in subscription journals. It appears that to keep up with the self-imposed timeline of policymakers, scientists are thrown into a highly uncertain publishing future, their major output and advertising route. As explained before, this will disproportionally affect the fundamental natural sciences.

DORA prevents the proper evaluation of science and scientists and harms fundamental natural sciences.
Approval of the San Francisco DORA declaration https://sfdora.org/read/ by institutes and funders eliminates their ability to use journal-based metrics such as the journal impact factor (JIF) for evaluations and stresses the need to assess research "on its own merits". We will explain in the next section that the JIF is an imperfect but good predictor of future citations for a publication and thereby of appreciation of the publication by peers. Here we will focus on the practical implications for evaluations of adhering to DORA.

In the evaluation of merits of research in especially the fundamental natural sciences, the JIF is an important parameter. Whereas other fields of science may point at other types of output, think societal use or influence on policy, fundamental natural sciences very much rely on the JIF as an indicator of impact and quality (see paragraph *Linking Open Science and DORA to disadvantage fundamental scientists and force Open Access publishing*, above). Over time, the citation score of a publication becomes an additional metric to consider. In particular in the fundamental natural sciences, under DORA one now relies on the evaluator reading the papers and from this deducing his or her own (subjective) opinion. This has two major practical caveats: 1. The evaluator will not have sufficient time to read the papers of the applicant. This applies in particular when multiple applications have to be assessed by evaluators. In the 2021 NWO VENI round, 19 applications had to be assessed by a single evaluator. 2. The evaluator may not have (in depth) expertise to properly judge the papers of the applicant. Within the life-sciences there are many fields that each require in-depth knowledge for a proper judgement. The trend within NWO to go from focused panels with relevant expertise to NWO-wide panels with members from all fields of science makes it impossible for evaluators to judge papers. At best, one panel member will have relevant expertise while a large majority have no knowledge at all on the research they are supposed to judge on its own merits. In the VENI 2021 round life-science evaluators had to evaluate hard-core physics applications under DORA rules. Journals within a field generally have a more stringent review with increasing JIF and are judged by reviewers that are experts in the field. All this high-quality judgment and time-investment is lost when it no longer matters if you publish in a journal with a JIF of 20, or a journal with a JIF of 2, with the latter having a far more easy/lax peer review. JIF information is imperfect. High impact papers are published in low JIF journals and bad papers occasionally appear in high JIF journals. JIFs differ between fields (for which one should and can correct). However, this would still be better than the above-described evaluator situations that are close to tossing a coin. As also described in the first section, this particularly harms the fundamental natural sciences. They rely heavily on the JIF as a mark of quality and impact, often having no other output criteria to put forward. Removing the JIF puts them at a (further) disadvantage to more applied sciences that can point at short-term societal impact.

An important task of staff members working at universities is to educate their students to become the best possible scientists/researchers/employees with a critical academic mind, knowledgeable of contemporary techniques and theories of their field of research. For this, they need to work at the fore-front of science, which in the natural sciences means in a global competition. Of course, competition should not overshoot and at this moment we are in a hyper-competition mode in The Netherlands. However, this is not caused by publishing in high JIF journals, but rather by insufficient funding at universities and NWO leading to too low success rates of grant applications.

The Journal Impact Factor is an imperfect but good indicator of appreciation by peer scientists.
The journal impact factor measures the average number of citations that papers in a journal get in the period of 2 years after publication. As citations are acknowledgement by peers, the JIF serves as a journal measure of innovation/novelty, originality, impact and quality. Accordingly, scientists (optimistically) guestimate their work and send their best work to top (JIF) journals and lesser work to lower journals. Editors and reviewers also know the JIF of the journal and review accordingly stringently. The reason the JIF is popular is that it predicts the number of citations that a paper will pick up over the years and can therefore be seen as mark of the quality of the paper, including its innovation and impact. This is especially relevant for recent papers (young scientists with short CVs!) that did not have the chance to acquire (many) citations. The JIF predicts citations inaccurately (big spread in actual citations between papers over time, see below figure) but clearly not randomly. The case in point is below, from the impact factor Wikipedia site.



Nature citations peak (most frequent/median citation score) at about 14 citations. Plos One citations peak at about 1.4 citations. The chance that a paper in Nature will get a higher citation score than a paper in Plos One is (far) higher than 50%, which formally shows that the JIF is predictive of citations.

A number of arguments have been raised against the JIF.

1) The higher citation frequency in high IF journals is solely due to a small number of very highly cited papers.
At least for Nature and Plos One (above figure) this is untrue. Yes, the median citation frequency (14 and 1.4) is not the JIF (38 and 3.1) but the difference in median citation frequency between Nature and Plos One is still 10-fold, i.e. a big difference.

2) High IF journals do not have higher technical accuracy in their data than lower IF journals (and often even (slightly) lower technical accuracy https://www.frontiersin.org/articles/10.3389/fnhum.2018.00037/full*.* This paper shows that high IF journals publish data that in some categories have slightly lower technical quality than lower IF journals (Fig. 1, 2, 6), equal quality (Fig. 3, 4) or the comparison is meaningless (Fig.5; incidence of spelling errors in gene names in supplementary data correlates with the length of the supplementary data, which on average is much longer in high IF journals and not compensated for here).
Papers in high IF journals are not selected on the technical quality of their data. Given that they have a sufficient level of data quality (and the above paper does not suggest they do not) papers in high IF journals are selected on impact, originality and novelty; the ground breaking research that most funders talk about in their impact paragraph.

3) Editors manipulate the JIF with tricks such as publishing on line before in print for example by artificially lengthening the 2 year counting period. This does inflate the JIF but not more than by a factor of 1.3 (https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0053374). Irritating, but it does not turn an IF 4 journal into IF 10.

4) Social effects of the JI. Perhaps the strongest arguments for DORA supporters for banning the JIF are its perceived social effects on the scientific community. "They are contributing to a huge rise in stress and mental ill health among researchers, they incentivize fraud, [and] they delay the progress and publishing of science." According to Stephen Curry, head DORA organization https://www.natureindex.com/news-blog/scientists-argue-over-use-of-impact-factors-for-evaluating-research . However, the body of work that he cites on twitter https://twitter.com/Stephen_Curry/status/1425160083873452036 in this context https://wellcome.org/reports/what-researchers-think-about-research-culture makes no connection between the JIF and bad health effects.

Removing the JIF leads to randomization of selection and disadvantages fundamental scientists in the natural sciences (See the previous DORA section). How these 2 effects of DORA lead to a better health among scientists is unclear to us. To us, the limited number of faculty positions is the main source of competition and stress among young scientists. Removing the JIF as one of the selection criteria will not change that.

Upholding international quality criteria, including the JIF, correlates with the high performance of Dutch science.
Science in the Netherlands performs very well, especially considering its (far too) low budget. It is in the top 5 of the world on important science indicators (https://www.rathenau.nl/en/science-figures/output/publications/development-scientific-research-profile-netherlands). It was not always like this. In the 1980s Dutch science was not performing well. In the 1990s NWO introduced metrics, including the JIF, to measure output quality. Dutch Science has been in the lift ever since, despite its much lower budget compared to competing countries such as Germany and the USA. Correlation of metrics with high performance is not causation, but it does provide a firm warning on the likely consequences of removing metrics from evaluations. By far the biggest public science funders in the USA, the NIH and NSF (together 78% of USA public R&D funding in 2009) have not signed DORA.

The Netherlands needs to increase its productivity to meet future challenges such as aging and climate change. As we explained, a knowledge economy underpinned by much higher level of R&D funding is essential for this. https://www.volkskrant.nl/columns-opinie/veel-meer-investeren-in-wetenschap-is-mogelijk-en-noodzakelijk-voor-de-bv-nederland~b4292125/. To maintain our international R&D position, we also need to adhere to international science output quality criteria, which have served us very well over the last 30 years.

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