

Ministerie van Onderwijs, Cultuur en Wetenschap

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Subject Progress of open science

Also on behalf of the Minister of Education, Culture and Science and the Minister of Economic Affairs, I wish to inform you via this letter of the progress made in the field of open science. In 2013, a substantial and ambitious open access policy was established. During the Netherlands' Presidency of the Council of the EU in the first half of 2016, open science, which also includes open access, was a top priority. The Presidency was an excellent opportunity to make open science a high priority on the European agenda and to create a basis of support and make agreements that ensure better access to science.

The first section of this letter describes what open science is and why it is important. The second section sets out the results that have already been achieved. The third section looks towards the future. The agreements made during the EU Presidency must be followed up on as soon as possible. It is vital that we take further action now in order to fulfil the Netherlands' reputation as a leader in open science and to benefit as quickly as possible from the advantages that open science provides. For this purpose, we are asking for all parties involved to play their part.

1. Why open science?

Science is in a phase of rapid transition due to the rise of digital technology and new forms of collaboration. The way science is conducted is transitioning from publication of research results in scientific journals towards sharing and using all available knowledge at an earlier stage in the research process. The scientific process is becoming more and more open.¹ This enables scientists to share their

¹ The European Commission's definition of open science is as follows: 'Open Science represents a new approach to the scientific process based on cooperative work and new ways of diffusing knowledge by using digital technologies and new collaborative tools. The idea captures a systemic change to the way science and research have been carried out for the last fifty years: shifting from the standard practices of publishing research results in scientific publications towards sharing and using all available knowledge at an earlier stage in the research process.' (*Open Innovation, Open Science, Open to the World – a Vision for Europe*, European Commission, 2016.)

research and collaborate on complex social and technological issues across sectoral and national borders. This helps fulfil Article 27 of the Universal Declaration of Human Rights, which states: 'Everyone has the right freely to participate (...) in scientific advancement and its benefits.'

The following aspects are currently being developed for the purposes of open science, with significant efforts being made at both the national and international level:

- open access to scientific publications;
- optimal reuse of research data;
- adapting evaluation and reward systems that are in line with the objectives of open science.

Open science is essential for reasons of both principle and practicality. As a matter of principle, it is important that publicly funded research optimally benefits society. Results from this type of research must be made freely accessible within the framework as is outlined in this letter.

From a practical point of view, open science offers massive benefits to scientists, the business community and society as a whole. Scientists benefit from open science because they gain quicker access to the research results of other scientists in a wide range of different disciplines and countries. By building upon other scientists' research results, breakthroughs can be made quicker and the impact of research can be boosted. Making data sets available on a large scale greatly facilitates replication of research and checking its validity. This can help to further develop promising research results and to quickly phase out lines of research found to be invalid. Open research data enables the results of scientific research to be closely monitored and critically assessed, promoting the scientific integrity of researchers. Open science also brings about completely new ways to conduct science (e.g. citizen science), and promotes the use of new analysis techniques like text and data mining.

Erik Verlinde: beyond Einstein

Spinoza Prize winner Erik Verlinde recently shocked the world with a completely new theory about dark matter and dark energy. This theory could well succeed Einstein's famous formula $E=mc^2$ we all learned about in school, and turn the theory of relativity upside down. Verlinde's theory consigns the phenomenon of dark matter to science fiction, stating that gravity is not a force but a tendency of bodies to move towards each other.

The dissemination of Verlinde's theory departs from conventional scientific procedures. To introduce a ground-breaking theory like this to the world, many scientists would have chosen a journal such as Science or Nature. However, Verlinde opted to communicate his trailblazing article via the arXives open access e-print service. In this way, he made his article directly available to anyone in the world, which rapidly gained his publication worldwide media attention.

Businesses also greatly benefit from open science, as they can gain earlier access to the latest scientific and technological developments relevant to their business. This boosts their ability to develop innovative products and processes. In this way, open science boosts innovative capabilities, contributes to open innovation, helps reinforce our competitive position and stimulates economic growth.

Finally, society as a whole optimally benefits from open access to scientific research, as knowledge is made widely available and in a much shorter time. Government bodies and civil society organisations can apply the latest scientific insights in tackling all of the issues we face as society. Access to science means teachers can include the most up-to-date developments in their teaching and doctors can quickly and efficiently implement new diagnostics and therapies into their everyday practice. In this regard, it is important not only that research results are made available to everyone, but also that they are understandable to a broad audience. This can require an extra effort to make the results optimally accessible.

Medical professionals

A General Practitioner and a specialist who constantly had to deal with patients who were worried that they had contracted the latest disease featured in the newspapers decided to provide the patients with a better explanation of media reports on new medical developments and opinions. The two medical professionals recently launched the website doktermedia.nl, on which they comment on recent developments in medical science and how they are reported in the media.

2. What have we achieved?

In recent years, a great deal has been achieved in the transition to open science. In 2013, I established my open access policy in the Netherlands, and thanks to the efforts of all parties involved (scientists, universities, organisations providing

indirect government funding, scientific publishers, government bodies and politicians), open access publishing has gained huge momentum. At the European level, clear agreements were made during the Netherlands' EU Presidency regarding how to further develop open science. These included not just open access, but also the optimal reuse of research results and the adaptation to the assessment and evaluation systems necessary for the purposes of open science. I will describe the results achieved in the following section.

Open access to scientific publications

In 2013, open access to publicly financed scientific publications was put on the national political agenda with the goal of drastically changing the system of scientific publication and making the transition to open access. I called on the universities to include the aspect of open access in their negotiations with publishers and their communication with the academic community. Talks were also held with major publishers regarding their role in the negotiations. An agreement was made with the Netherlands Organisation for Scientific Research (NWO) that the issuing of grants would include a condition that all publications that emerge from the research must be made immediately available in open access form at the moment they are published, with no embargo period.

As of December 2015, publishing open access is now compulsory for all research funded by the NWO. Until 2018, there will be a transitional period in which researchers with a legitimate reason can be exempted from this obligation ('comply or explain'). However, from 1 January 2018 onwards, NWO will no longer grant exemptions, and any failure to comply with this condition will have (financial) consequences.

Together with the UKB (the Dutch consortium of the thirteen university libraries and the National Library of the Netherlands) and with the support of SURFmarket, the Association of Universities in the Netherlands (VSNU) has made deals with a number of major publishers who support open access publication. As part of these deals, both the cost of licences and the costs of open access publication will be settled in advance in one payment. The introduction of the open access components in the new agreements will not lead to higher total costs than the costs of the agreements in which only subscriptions fees were paid. The advantage of these national agreements is that individual Dutch authors do not have to negotiate their own agreements regarding open access publication fees. By 2018, the current contracts with seven of the major publishers will enable that at least 57% of Dutch publications published by these companies will be available via open access.

These successful negotiations with the publishers have certainly not gone unnoticed on the international stage. On 6 January 2016, an article was published in *Nature* entitled 'Dutch lead European push to flip journals to open access'. With this, the Netherlands has set an example for other countries. Our success has inspired countries such as the United Kingdom, Finland and Austria in their recent

and upcoming negotiations with scientific publishers. In this way, our country has made itself a leader in the field of open access.

Organisations embrace the open access objective

More and more organisations of note are subscribing to the goal of realising open access.

- For example, with the statement 'Christmas is over. Research funding should go to research, not to publishers', [LERU](#) (League of European Research Universities) has appealed for the transition of the publication system to open access. They also started a petition, calling on the European Commission to take steps to realise open access. This petition was signed by over 10,000 people and was presented by LERU on 27 January 2016, during the informal ministerial meeting of research and innovation ministers in Amsterdam.
- The [Max Planck Society](#) has developed a roadmap for the large scale transition to open access by 2020.
- Likewise, those who wish to receive a grant from the [Bill and Melinda Gates Foundation](#) have to publish open access (with no embargoes) and make their data available.
- [International linguists](#), with the support of universities, have come together to form the LingOA initiative, have broken away from their current publishers and now publish their articles open access – i.e. freely available to everyone – at very low costs.

Open science during the EU Presidency

To attract sufficient support, open science had to be raised to the international level. Together with my British counterpart, I established a non-paper to call on other European countries to join the powerful movement striving for open access to scientific publications.² Open science was subsequently made a priority for the Dutch EU Presidency by the government.³ By that point, Carlos Moedas, the European Commissioner for Research, Science and Innovation, had already made open science a key focus. This enabled us to pool our strengths. Thanks to the contributions of politicians and stakeholders, the Netherlands' EU Presidency resulted in substantial, ambitious European agreements in the form of EU Council conclusions.⁴

In January 2016, the informal ministerial meeting of research and innovation ministers, to which Bill Gates also made a contribution, sounded the starting pistol for the Netherlands' EU Presidency and the European discussion on open science. The stakeholders followed up on this during the Presidency Conference on 4 and 5 April, revealing great support for the transition to open science.

² Letter to the Dutch House of Representatives dated 23 March 2015 (TK 21 501-30 no. 345).

³ In addition to research-and-innovation-friendly legislation and the importance of investments in knowledge and innovation.

⁴ Letter to the Dutch House of Representatives dated 7 July 2016 from the Minister of Foreign Affairs regarding the results of the Netherlands' EU Presidency (TK 34 139 no. 18).

Organisations from the scientific community called on all parties involved to take action via the Amsterdam Call for Action on Open Science. The Call for Action established four key principles that also served as the basis for the European Council conclusions adopted in May 2016. Based on these principles, the Call formulated actions for all parties, enabling the EU Member States, the European Commission and stakeholders to start working towards open science immediately. These key principles are as follows:

- full open access for all scientific publications;
- a fundamentally new approach towards optimal reuse of research data;
- better quality assurance and the reward of open science within research assessment and evaluation systems;
- sharing experiences and alignment of policies within Europe.

During the Competitiveness Council in Brussels on 27 May 2016, the European Council conclusions on open science were unanimously adopted.

Open access to scientific publications as the option by default for publication

The most important agreement made at the European level is the decision to make open access the default method of publication by 2020. The route to open access (green, gold or otherwise) can vary between different countries and disciplines, provided this is done in a cost-effective manner and with no embargo periods, or at least with embargo periods that are as short as possible. The European Commission – together with the EU Member States – has been asked to create more facilities within Horizon 2020 for open access and compliance therewith. The Member States and stakeholders have been encouraged to follow this example at the national level.

It is also important to the Council that when people have access to scientific publications, they must also be permitted to use text or data mining when analysing the text. This last aspect is in line with the modernisation of copyright, for which the Commission has recently published a proposal. The House of Representatives has been informed of this separately.⁵

Optimal reuse of research data

Agreements have also been made regarding optimal reuse of research data, particularly from publicly funded research. Optimal reuse must be the target, based on the principle 'as open as possible, as closed as necessary'. This will take into account access regimes required due to intellectual property rights, protection of privacy, motives of security and competition and other legitimate interests.

The Commission was asked to set an example for stakeholders and Member States and to apply the principle of optimal reuse of research data – including the

⁵ Letter to the Dutch House of Representatives dated 4 November 2016 (TK 22 112 no. 2237).

use of data management plans and the FAIR principles – for the projects within Horizon 2020.⁶ Costs incurred by participants for these purposes must be eligible. In addition, the European Commission must promote data stewardship.

Long-term and secure storage of research data and metadata based on international standards is indispensable as well. Europe can benefit substantially from a European Open Science Cloud, in which research data can be stored securely in the long term and can be reused by people from all countries and disciplines. The Commission – together with the Member States and stakeholders – was asked to explore what type of policy and funding would be appropriate to achieve this aim, and to involve existing initiatives in doing so.

Evaluation and reward systems

By means of the Council conclusions, the Member States have also determined that mechanisms must be developed to encourage maximum sharing of research results and the corresponding research data. Assessment of the quality of scientific work should also be based on the work itself and on its impact on society as a whole, as opposed to the current situation in which the emphasis is on indicators such as the impact of journals and publication citation counts. The Commission, Member States and stakeholders must work together to develop and implement initiatives that enable more suitable quality assurance within assessment and evaluation systems.

Sharing experiences: Open Science Policy Platform

Just like the Amsterdam Call for Action, the Council conclusions also indicate the importance of cooperation and the sharing of experiences. The Commission, the Member States and the stakeholders have been called upon to cooperate on all levels, including outside the Union. Furthermore, the Commission, the Member States and the Open Science Policy Platform have been asked to collectively and regularly monitor the state of affairs regarding the activities necessary to ensure open science becomes a reality.⁷

3. What is the next step for open science?

The policies that have been established and the results of the Netherlands' EU Presidency have created significant momentum. It is now important for the objectives set by the EU to be translated into concrete actions, in order to collaboratively implement open science in the Netherlands.

⁶ The FAIR principles mean that research data must be findable, accessible, interoperable and reusable.

⁷ The Platform, which was established by the Commission, has two Dutch members: Prof. K.Ch.A.M. Luyben and Dr J. van den Biesen.

Open access to scientific publications as default by 2020

With regard to open access to publications, we endorse the European objective to make open access the default by 2020. This ambition is made feasible by pooling strength at the European level, enabling the process of open-access publishing to be hugely accelerated. In this regard, it is important that research funding organisations make open access compulsory, penalising any failure to comply with this requirement. In addition to this, universities must continue to negotiate with scientific publishers to enable open access publication, and encourage researchers to publish open access. This requires scientific publishers to develop publication models that tie in with the need to make scientific research available without any financial or legal barriers.

Research data: optimal reuse in line with the FAIR principles

Another challenge is to make research data FAIR. The recommendation is made in the Council conclusions to apply the FAIR principles to the storage of research data, making it findable, accessible, interoperable and reusable.

Evaluation and reward systems

Finally, connection must be sought with the international challenge to improve the way scientific work is rewarded. As was determined in the Council conclusions, researchers should be commended for sharing their research results. Scientific careers still depend too much on research performance indicators based on how many of their publications have appeared in journals that have historically been highly regarded (often with closed access).

National Plan for Open Science

Realising these ambitions requires the involvement and commitment of many different parties. I am asking a broad coalition of parties to soon draw up a National Plan for Open Science, describing the actions that will be undertaken in the Netherlands in order to realise these ambitious targets. The Council conclusions call for concerted action, and by means of the above, I aim to bring about this concerted action, as well as implement the Advisory Council for Science, Technology and Innovation's recommendation to draw up a masterplan under the government's supervision.⁸ I hereby ask the parties to establish a clear distribution of responsibilities and to coordinate activities. The Ministry of Education, Culture and Science will coordinate this plan in consultation with the Ministry of Economic Affairs. In addition, I hope that as many other parties as possible will get involved in the transition.

The National Plan will be endorsed at the beginning of this year during a stakeholder meeting. The Netherlands Open Science Platform will also be launched during this meeting. The platform's task will be to guide and monitor progress on the agreements in the National Plan. Furthermore, as part of the National Plan, the VSNU will regularly report on the growth in the proportion of

⁸ See the response to this advice dated 14 July 2016 (TK 31 288 no. 549).

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open access publications. By doing this, we will fulfil the agreements we have made at the European level and make open science a reality in the Netherlands.

State Secretary for Education, Culture and Science,

Sander Dekker