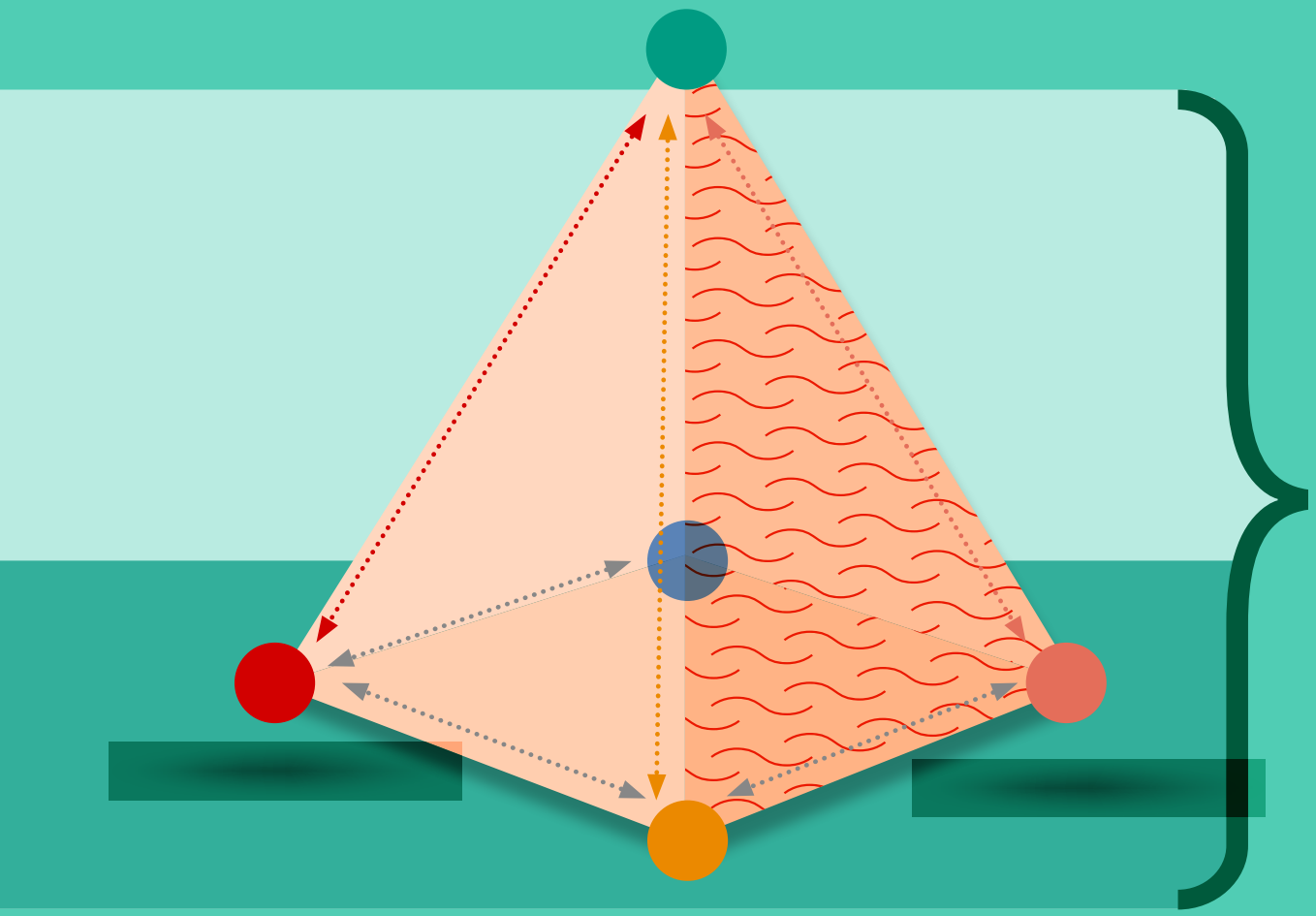
# *UNL* Open Science agenda

Our road map towards structural and sustainable embedding of Open Science at our universities in the years ahead



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Universities *of* *The* Netherlands

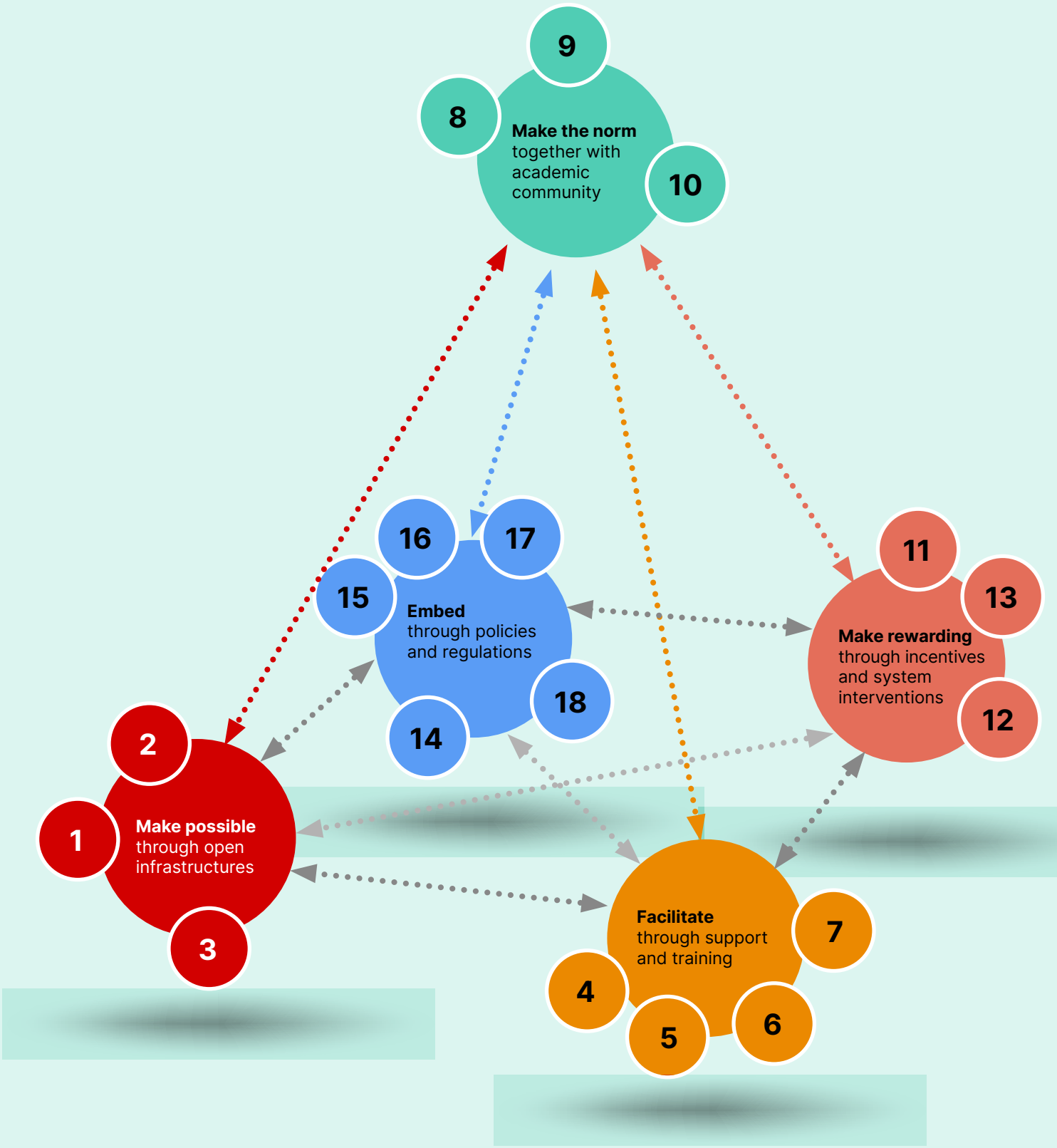



**Figure 1: The 18 UNL focus areas within the five prerequisites as governance model for Open Science transition.**

# Contents

# The Open Science agenda of the universities

Open Science is a long-term transition that applies to both scientific research, higher education and the knowledge transfer/impact mission of universities. At the end of 2022, the strategic Open Science objectives were defined nationally[1] in the NPOS2030 Ambition Document and Rolling Agenda. The development of Open Science practices is strongly linked to academic values and principles in a more open, participatory approach to research and education. Appendix 1 summarises this further. This leads to greater confidence in scientific knowledge, both within and outside of academia, and accelerates scientific progress, innovations and global collaboration and participation.

**Prerequisites for a systemic approach to research culture change**

The transition to Open Science is primarily a culture change with the necessary, gradual adjustments to the activities of universities and the academic community. As a governance model, the Dutch universities are adopting the Strategy for Culture Change model, which aims to bring about a change in research culture.

This is based on the following five prerequisites (see also Figure 1):

1. Make Open Science **possible** through open infrastructures
2. **Facilitate** Open Science through support and training
3. Make Open Science **the norm** together with the academic community
4. Make Open Science **rewarding** through incentives and system interventions
5. **Embed** Open Science through policies and regulations

Given the dependencies between the levels, these prerequisites must be approached in an integrated, systemic way. The UNL agenda for Open Science is implemented on the basis of these five prerequisites, with the various content areas cutting across them (see Figure 2).
The (strategic) objectives defined and the many focus areas/projects will generally have to be managed in an integrated way in accordance with these five prerequisites and continuously comply with the underlying values and principles (see also Appendix 1). This applies relates not only to management of the Open Science activities of each university but also to the joint management of all aspects of research, education and knowledge transfer/impact.

1 The NPOS ambition document was adopted following two open consultation sessions, in late 2021 on the ambitions and later in 2022 on the strategic objectives in the rolling agenda. In the final NPOS ambition document, the focus is on scientific research, despite many suggestions being made during consultation sessions that Open Education be included, in line with UNESCO, for example.

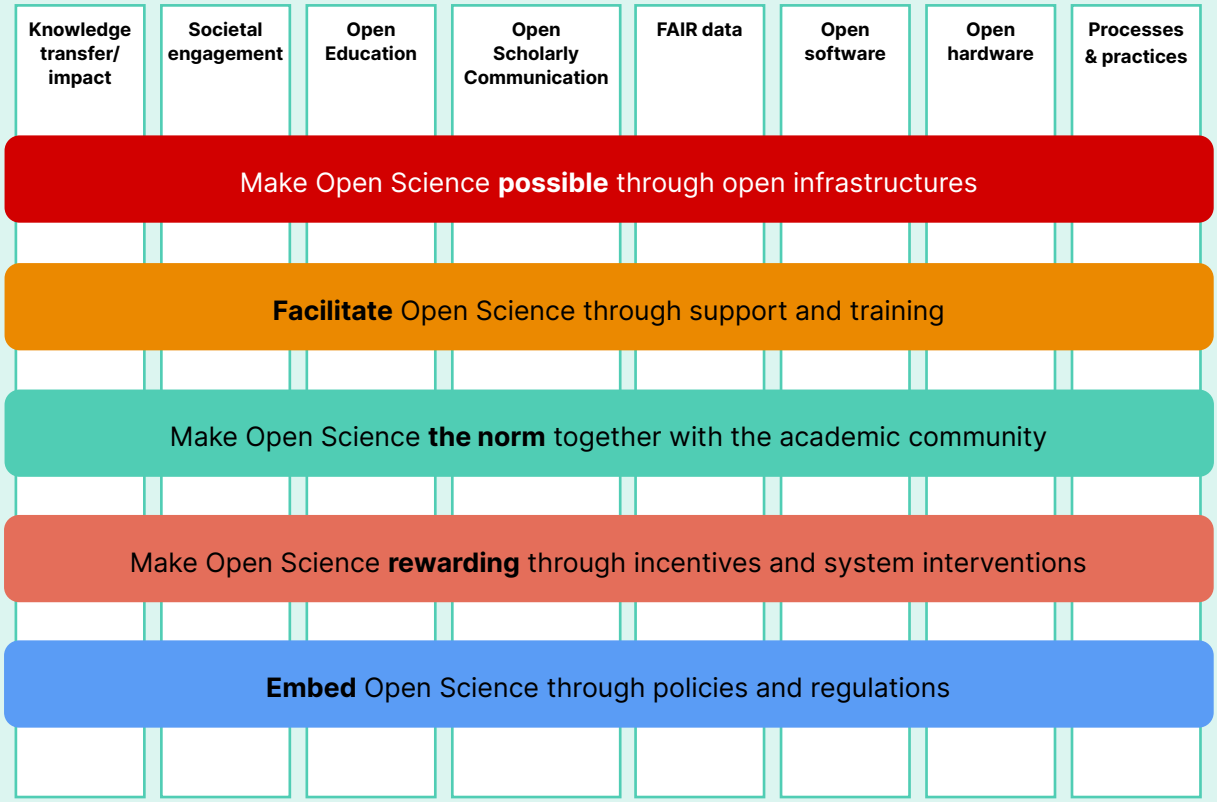



**Figure 2: Governance of UNL agenda for Open Science in accordance with the 5 prerequisites (horizontal) in the governance model. The content lines to which the UNL agenda for Open Science relates are shown vertically.**

# 1.1 *Make it possible* through open infrastructures

Make Open Science **possible** through open infrastructures
1. A federated network of repositories enabling access to a wide range of scholarly works
2. A central warehouse for (enriched) open metadata
3. Public platform for meaningful delivery of scholarly works

An important prerequisite for the Netherlands' Open Science ambitions is supporting open infrastructures. Researchers, lecturers and other university employees must be able to make scholarly works[2] available to everyone in as open and as FAIR (Findable, Accessible, Interoperable and Reusable) a way as possible. Supporting infrastructures must enable this in as efficient a way as possible without too much investment being required in terms of time. And it is crucial that these infrastructures continuously safeguard academic values (Appendix 1). Governance based on digital sovereignty must ensure that both the software/algorithms used and the scholarly works stored within those infrastructures support academic values. Governance based on data sovereignty and the CARE[3] principles are needed to protect autonomy and self-determination of (local) knowledge. This means, among other things, that control over scientific knowledge, publications, data, metadata and the infrastructure required for this remains with scientists and scientific institutions, without excluding collaboration with non-scientific parties.

This requires (inter)national agreements over a technical and organisational infrastructure, which must be created in collaboration with all national stakeholders and (inter)national partners, in line with international developments such as the European Open Science Cloud (EOSC) and innovative publishing platforms. In line with the NPOS2030 ambition document, the universities will focus on three types of open infrastructures.

### 1 A federated network of repositories enabling access to a wide range of scholarly works

The publishing landscape is changing and with it how supporting infrastructures enable the publication of articles and other scholarly works[2]. Local and (inter)national repositories support the publication and storage of scholarly works. At international level, the European Commission is leading the way through the open publishing platform Open Research Europe (ORE). The European Commission is examining to what extent support for ORE can be extended to other (national) stakeholders. At national level,

2 We distinguish here (non-exhaustively) between the following types of scholarly works:
- Publications, e.g. academic articles, professional and academic publications, conference output, books and book chapters, dissertations, monographs.
- Teaching materials, e.g. syllabi, readers, textbooks, exams, presentations during lectures, (video) recordings of lectures, MOOCs.
- Software, e.g. computer models, algorithms, software codes, descriptions, data and software packaged in executable.
- Data(sets), e.g. (descriptions of) research data, analysed data, databases, clinical trial data, synthetic data, collected data.
- Models, e.g. prototypes, objects, (further) developed equipment for research or as a result of research.
- Protocols: research protocols, intervention protocols, instrumentation protocols, etc.

3 The acronym "CARE" stands for Collective Benefit, Authority to Control, Responsibility and Ethics. See https://www.gida-global.org/care.

we invest jointly (NWO, UNL/UKB and KNAW) in the journals platform Openjournals.nl. The universities of Leiden, Groningen, Delft, Tilburg, Nijmegen, and now also Maastricht, provide infrastructure for publishing journals and/or books. As universities, we also already invest in local and (inter)national infrastructures for other scholarly works such as software, data(sets), learning materials and models. Universities will further strengthen the development of these repositories of various scholarly works. Services provided by commercial parties will be needed as long as they safeguard academic values and digital sovereignty. We will also work, in a national/international context, towards a sustainable architecture of coherent and mutually reinforcing initiatives.

## 2 A central warehouse for (enriched) open metadata

The importance of **research information** is increasing. This is information on who is conducting scientific research on what and when, the funding and partnerships involved, the results that are produced and what impact it has on whom. The information is used in many different ways: for monitoring, justifying or evaluating, or to determine the (scientific and societal) impact of the research (see also use cases in report end 2022). The importance of independent information and analysis on scholarly works has been included since the negotiations with Elsevier in 2019/2020. And UNL has already agreed that research information must be openly accessible as far as possible under the control and ownership of the academic community. UKB is investing in a qualitative data hub (UKBsis) with reliable and detailed information on Dutch publications. In addition, UKB has invested in the replacement of NARCIS as national portal (working title Netherlands Research Portal in OpenAIRE) and various activities and (pilot) projects have been launched in connection with the ORIA agenda in 2023. This should lead, in the years ahead, to a sustainable infrastructure in which effective initiatives are strengthened and coherently maintained. It is important that everyone invests in comprehensive and accurate open metadata in local and (inter) national databases with the necessary feedback loops for improving quality between these databases.

## 3 Public platform for meaningful delivery of scholarly works

Making scholarly works openly available does not guarantee their broad and effective use outside of the academic community. In other words, accessibility is not always sufficient for non-academic users. If the scholarly works are to be made understandable and reusable, various services and additional investments are needed. This goes beyond science communication and will also be achieved through partnerships with societal actors across the entire chain of scientific research and higher education (societal engagement). A public platform with supporting services should make it possible to increase the accessibility and applicability of scholarly works. To this end, services will have to be developed to support the search query, for the selection of search results and how to understand and apply them. A national partnership led by UKB will complete a feasibility study by the end of 2023.

# 1.2 *Facilitate it* through support and training

**Facilitate** Open Science through support and training
4. Embed Open Science in curriculum and training of staff/as a mandatory component for employees
5. Strengthen capacity for making scholarly works FAIR
6. Strengthen capacity for various societal engagement practices
7. Open Science in higher education

Sufficient capacity must be available within universities to make Open Science practices easier for researchers and lecturers. We strive here for a good balance between what researchers and lecturers can do themselves (through team science or otherwise), and where the burden can be taken off them as much as possible. It is important that there is sufficient capacity in terms of commitment and available skills at all levels of the university (including leadership).

Clear communication around things such as tools, infrastructure, templates and efficient ways of working that can help make Open Science practices easier is crucial here. This can be achieved by offering a comprehensive, and where possible domain-specific, range of courses and training for all university employees. Ideally this will be embedded in the curriculum of researchers, lecturers and students and will be relevant to their day-to-day tasks. That way, universities ensure that the necessary knowledge is built up among researchers and (would-be) lecturers.

### 4 Embed Open Science in curriculum and training of staff/as a mandatory component for employees

In the day-to-day practice of research, many opportunities for Open Science remain unexploited due to a lack of understanding among employees of the options, issues and tools/infrastructure. Many knowledge institutions run workshops and courses, but they are often not a standard part of the curriculum and training. Open Science workshops and courses within institutions must become a regular part of the PhD curriculum, and developments in the field of Open Science must feature regularly on departmental agendas. Universities are already taking steps to embed the Open Science mindset in the training and education context (open attitude as a learning objective and an open attitude when designing and delivering education, see also focus area 7). At national level, an environment can be set up centrally for the sharing of workshops/courses and relevant tools and infrastructure, and the sharing of best practices for embedding Open Science training within institutions. Institutions are supported in this by a national platform, from which the creation and sharing of knowledge and course materials is coordinated and promoted.

### 5 Strengthen capacity for making scholarly works FAIR

Scholarly works, including articles, learning materials, data and software (see footnote 2) must be made FAIR & CARE as far as possible in order to make them as findable and usable as possible for scientists and other actors (including machine readable). In recent years, universities have already made great strides in the field of research data support. Nevertheless, making scholarly works FAIR is not yet sufficiently the norm within the academic community. This is partly due to the considerable time investment associated with making scholarly works FAIR,

so, as things stand, many scientists perceive this as an administrative burden. When it comes to making open source software, open hardware, protocols and educational resources FAIR, policies, capacity and standards are still lacking, although universities are taking steps to set up data management and research software support and help with developing (open) educational resources (e.g. via the growth fund project Npuls). Further strengthening of the vision and policy on support will help relieve the burden further; strengthening of leadership skills around making scholarly works FAIR must also be considered. If support is to be organised in the best possible way, an integrated vision with regard to primary and discipline-specific processes (including a move towards more team science) is essential. This requires a strengthened positioning of LDCCs (Local Digital Competence Centres) and TDCCs (Thematic Digital Competence Centres), possibly evolving into Open Science Competence Centres. There is also a need for better collaboration and use of identical standards at national level.

## 6 Strengthen capacity for various societal engagement practices

Societal engagement including citizen science[4] are relatively new areas of work and a great deal of work therefore needs to be done to further develop capabilities in this regard among researchers and (would-be) lecturers, among other things training and support. Here too, there will be a focus on leadership skills around valuing and encouraging societal engagement practices. A number of universities are currently exploring support options around this theme, ranging from simple online information provision for researchers to Citizen Science Labs that serve as sources of information, community hubs and incubators for scientists seeking interaction/collaboration with societal partners (and vice versa). In a move towards evidence-informed policies, work is also under way on developing structural forms of support and active links with policy workers (e.g. knowledge brokers). In addition, societal engagement has a strong relationship with science communication and strengthening of the universities' knowledge transfer/impact mission. A more uniform approach at national level helps to further develop and strengthen both the interactive function of the hubs and expertise and capacity around the assimilation of a range of different societal engagement practices into research and education.

4 The full spectrum of societal engagement practices includes Science Communication, Public Engagement, Societal Dialogue and Citizen Science (https://www.ucd.ie/research/portal/outcomesandimpacts/publicengagementandengagedresearch/).

## 7 Open Science in higher education

Universities will also apply Open Science in higher education, both in university curricula and by applying principles and values when developing and delivering education. Open Education is a broadly inclusive concept which includes many elements that help to make the educational process, educational organisation and educational provision (more) open. On many of these elements, there is already some degree of collaboration, while in the case of other elements there is an aspiration in this regard or activities are still fairly isolated. In all kinds of forms of increased access to education, for example, such as open educational resources and MOOCs, forms of open technology (e.g. open statistics software JASP) that strengthen the connection with society, such as open pedagogy, community service/engaged learning, challenge-based learning and mixed classrooms. In addition, some universities are already incorporating Open Science principles and practices when training students to become the next generation of scientists.
If Open Education in all its elements is to become the norm, the various elements of Open Education will have to be managed in an integrated way at administrative level. Take, for example, how additional investments in open access affect the Easy Access scheme, how negotiations with publishers over textbooks based on Open Scholarly Communication relate to the National Action Plan for Digital and Open Educational Resources, how the agreement framework around educational data with publishers in primary/vocational education and training relates to the development paths in HE, or how investments in the Groeifonds project Npuls already affect control over educational resources and the need to make education more flexible.

# 1.3 *Make it the norm* together with the academic community

Make Open Science **the norm** together with the academic community
8. Strengthen knowledge sharing and building through Open Science Communities within the institutions
9. Open science practices with stricter (quality) standards
10. Make it the norm through collaboration at international level

If Open Science is to become the norm, engagement of and acceptance by the academic community is crucial, because it is the academic community that shapes the culture of openness, equity, diversity, inclusiveness, integrity, collaboration and transparency on a day-to-day basis. This involves refining thoughts (values) and actions (behaviour) within adapted common frameworks and agreements. As well as making scholarly works, including underlying infrastructures, open and FAIR, participatory and inclusive research practices must be embedded as part of regular research, education, funding and innovation processes. It is important here to identify the needs of different communities, to trigger the sharing of experiences, and to collaboratively develop revised processes, norms and quality standards.

## 8 Strengthen knowledge sharing and building through Open Science Communities within the institutions

It is crucial that universities encourage the formation of active and diverse Open Science Communities within the institution, bringing together university staff and interested parties from outside academia. Open Science Communities (OSCs) are bottom-up, academic community-led social infrastructures organised according to different themes and topics. Communities give employees within each university the opportunity to learn about various Open Science practices in an informal way and to exchange experiences and they can also encourage knowledge sharing and raise awareness of Open Science principles and practices. OSCs also have a snowball effect, creating broad support for making Open Science the norm[5].

5 See https://academic.oup.com/spp/article/48/5/605/6313404.

## 9 Open science practices with stricter (quality) standards

If Open Science practices are to be promoted, ways of working and agreements within science, higher education and knowledge transfer/impact will have to be strengthened and sometimes adapted to the values and principles behind Open Science, including the expectations and requirements of society. This calls for discussion and exchange in association with research schools, scientific disciplines and networks around, for example, diversity & inclusion, reproducibility and digital sovereignty. Universities facilitate ownership of the academic community in further improving their professional practices (procedures/standards), including ownership of public open infrastructures (see focus areas 1, 2, 3 and 16) and joint training courses (see 4, 5, and 6). This will also lead to further improvement of the primary process and support processes from HR, ICT, legal affairs, libraries, science communication and the role of DCCs (moving towards Open Science Competence Centres).

## 10 Make it the norm through collaboration at international level

International collaboration strengthens professional practices and encourages the exchange of knowledge and experiences between academic communities. The 'normalisation' of Open Science practices takes place primarily in an international context. At international level, academic communities are generally organised by domain. Strengthening of Open Science professional practices must also be done internationally, often by scientific field/discipline and in collaboration with international organisations. As Dutch universities, we must take up our position in this regard, within Europe and globally - often we are also seen as leading the way (e.g. around SEP, Recognition & Rewards, digital sovereignty).

# 1.4 *Make it rewarding* through incentives and system interventions

Make Open Science **rewarding** through incentives and system interventions
11. Reward Open Science in HR policy
12. Incorporate Open Science into institutional and national policies
13. Accelerate Open Science with well-timed system interventions

Open Science as a transition requires a change in thinking (values), action (behaviour) and organisation (policies and laws and regulations) at system level. This is important because it helps determine how this transition will be managed. A transition is characterised by incremental as well as radical changes and can be influenced, in terms of speed and direction, through a range of smart, well-timed interventions. The Dutch Recognise and Reward (E&W) programme can be seen as a more radical intervention while the move towards a fairer, sustainable Open Scholarly Communication landscape has so far been mostly incremental.[6] The type of intervention depends to a large extent on the transition phase that the various components of Open Science are in. In some components (societal engagement, open software, open hardware, open educational resources), we are still in the development phase where the emphasis is on culture change, creating urgency, and institutional transition. In other areas, a 'coalition of the willing' is already in place and steps are being made towards broadening support and the participation model to be selected.

If the transition to Open Science is to be facilitated, structures need to change in such a way that its values and practices not only improve professional practice and quality of science but that its contributions and impact are also better recognised and rewarded.

## 11 Reward Open Science in HR policy

In the current academic climate, practices that reflect Open Science principles and values are not yet the norm. In addition, it appears that practices that work against Open Science principles are still sometimes more valued and rewarded more. In this context, we must jointly develop tangible quantitative measures of and qualitative evaluations of contributions to Open Science values and practices. This includes the value and impact of approaches to societal engagement for science, policy and society, replication and reproducibility as crucial components of the research process and (where possible) open sharing of the (intermediate) results of scholarly works in research and education. This must lead to changes in the way new employees are selected and existing employees are promoted; Open research and education practices will be used as a starting point for annual performance and evaluation interviews with employees. The implementation of this line must be carried out in close consultation with the Recognise & Reward programme. The 2023 Recognise & Reward road map also identified Open Science as a focus area. To this end, the embedding of Open Science in HR policies must take place in close consultation with others.

6 The principles of Open Access are set out in the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (2003).

## 12 Incorporate Open Science into institutional and national policies

Review and evaluation standards will also need to incorporate Open Science practices. At European level, the Coalition for Advancing Research Assessment (CoARA) has taken the lead in the reforming of research assessment (CoARA working groups and National Chapters). These, and other refinements, will need to be factored into the way in which research is conducted (more team science) and the way in which we evaluate research and research groups. These will need to be closely aligned with processes within universities aimed at evaluating and assessing more open research, open education and increasing (societal) impact. Linking to the quality cycle and (annual) programmes of research units is seen as an important tool. At national level, Open Science principles and practices will be taken more strongly into account in academic integrity (NGWI), evaluations and reviews of researchers and research groups (e.g. SEP), assessing the impact of scholarly works, evaluations of curricula, etc.

## 13 Accelerate Open Science with well-timed system interventions

How can we collectively influence the speed and direction of the Open Science transition at system level? How do these developments reach the researcher and encourage behavioural change? What is the importance of leadership in this and how will we manage this? This requires universities to design and oversee targeted interventions in a national/international context. From grassroots projects that bring about gradual changes in values, behaviour and organisational capacity to targeted interventions to encourage meaningful reuse and further development of both data, software and educational resources. We must also collectively undertake more disruptive system interventions along the lines of Recognise & Reward, e.g. around redesigning the publication landscape to make it a more academic-led scholarly communication system and/or broadening the knowledge transfer mission of universities to ensure more (broad) societal impact. Often, these system interventions will need to be accompanied by a business case which highlights how they help resolve the problem (or part of it), describing organisational and financial implications and clearly allowing for organic growth.

# 1.5 *Embed it* through policies and regulations

**Embed** Open Science through policies and regulations
14. Adaptation of funding instruments to promote Open Science
15. Strengthen Open Science through laws and regulations
16. National/international procurement conditions or joint development of digital services
17. Strengthen university policies
18. Nationwide monitoring of progress towards making Open Science the norm

Open Science is an indispensable tool for creating a more effective, reliable, equitable and innovative common knowledge system that benefits society as a whole. It is important to consider national/international policies to safeguard the role of academia in society and specifically within this to set out tried and tested and adopted Open Science elements in policies facilitated by laws and regulations. Policies create the conditions and environment within which Open Science can develop and the opportunities for it to move rapidly towards becoming the norm. This involves the adaptation of financial instruments, supporting laws and regulations, and national (procurement) conditions for digital services and nationwide monitoring. The impact of interventions and policies must be monitored[7].

## 14 Adaptation of funding instruments to promote Open Science

Funding instruments can both hinder and promote Open Science. If Open Science (including Open Education) is to be embedded in a sustainable way, the way scientific research and higher education is funded may need to change. In addition, financial incentives for innovations in science and education will also have to accelerate developments in Open Science. Open Science NL, for example, will develop instruments that are consistent with Open Science principles (e.g. increased participation outside the academic community) and, when awarding incentive grants, will also impose requirements on funding during and after the end of project grants. Tools that ensure that structural embedding is effective will have to be developed. The adaptation of various funding instruments will require collaboration between knowledge institutions, together with grant providers and ministries.

7 A good example is how legislation has strengthened the position of the green Open Access route in the Netherlands (through the Taverne amendment). After a targeted pilot to test basic principles for implementation of the amendment, it has been incorporated into the policy of every university. The work processes were then designed and adapted accordingly, which increasingly leads to optimised implementation for university employees.

## 15 Strengthen Open Science through laws and regulations

The government and the European Commission have a role to play in terms of supporting legislation and regulations that safeguard or strengthen the position of universities, researchers, lecturers and students. An issue to be considered here is digital sovereignty when using services provided by multinationals and big tech around education systems and scientific infrastructure (see Appendix 1). It is neither efficient nor effective to negotiate the terms of guarantees of sovereignty separately with each provider every time contract negotiations take place. We must focus on ways of embedding everything in legislation and regulations in order to protect academic values and to strengthen the position of universities. Thanks in part to lobbying by the Netherlands in conjunction with European networks, this is now to some extent on the European agenda (e.g. ERA02).

## 16 National/international procurement conditions or joint development of digital services

Academic values (see Appendix 1) must be guaranteed, including (the retention of) copyright and open licensing of scholarly works. To this end, these must be translated into principles, standards frameworks and standards for digital services and used when procuring commercial systems and services and when developing in-house (ICT) systems. As well as developing public open source alternatives (see under Open Infrastructures), commercial services will also be purchased in the future (especially for those tools and services that are not part of universities' core business). Here, there is a role for government, grant providers and knowledge institutions to jointly determine the terms and conditions for these commercial services. The knowledge institutions have already made a start on this in recent years, among other things by drawing up Seven Guiding Principles for Open Research Information and a Working Agenda for Digital Sovereignty (under development with SURF).

## 17 Strengthen university policies

As well as national instruments around funding (14), laws and regulations (15) and joint procurement/development (16), university policies will also need to be strengthened. Every university must have clear policies around the implementation of national/international laws and regulations for all types of scholarly works. It may be necessary to draw up and manage joint policies, e.g. around more integrated management of the Open Scholarly publication landscape in terms of quality (e.g. of specific journals/publishers), quantity (how many articles do we publish where), price control (costs are constantly increasing) and Open Access as a goal. This also involves drawing up policies following successful interventions, and also including it as an obligation for research groups (e.g. SEP) and university employees (e.g. in accordance with requirements of grant providers).

## 18 Nationwide monitoring of progress towards making Open Science the norm

The government, grant providers and knowledge institutions have a nationwide remit to monitor progress towards making Open Science the norm. They will develop targeted incentives, interventions and policies and measure their impact. Research into the impact of various Open Science actions is essential here. This is partly a task for Open Science NL, in terms of the effectiveness of their own work programme and the impact of associated incentive funding at least. However, the responsibility for overall monitoring of all aspects of Open Science will lie with the knowledge institutions. In the context of implementation of the administrative agreement, the universities have also agreed to monitor the progress of Open Science.

# Towards an operational UNL Open Science agenda

**University Open Science activities**
Universities and knowledge institutions are committed[8] to making Open Science the norm and embedding it sustainably across the board with all actors. Every institution has the intention and responsibility (while respecting that institution's autonomy) to make Open Science part of day-to-day practice and to facilitate it in a targeted way. Over the coming years, universities will focus their activities on the five prerequisites for a successful transition towards making Open Science the norm. This will be achieved partly through the efforts of the academic community, from within research groups and faculties, and partly through centralised facilitation at university level (through university Open Science programmes/activities or otherwise) and focused leadership.

**Joint Open Science projects**
The universities will scale up some aspects of their Open Science activities both organisationally and technically, so that, for example, effectiveness and quality are increased or time is saved. The universities will act jointly on the above-mentioned 18 focus areas within those five prerequisites. Some focus areas will also lend themselves to being taken forward in a national/international context. To this end, over the forthcoming period, the universities will start developing project plans and grant applications. This will include the required level of implementation and where the activities will have the greatest impact. These projects will be embedded as far as possible within existing structures and activities (E&W, Knowledge Security, SEP, NGWI, regular support services) and will specify which activities will (have to) change or are no longer needed. To this end, project plans will be related as far as possible to existing funding streams. In some areas, incentive funding will be desirable.

**Roles and funding**
Generally speaking, all of the aforementioned focus areas/projects will require investment from universities. A distinction must be made here between:
a) investments that universities collectively consider important - without or prior to funding;
b) applying for and co-financing incentive funding or other grant programmes;
c) long-term funding of follow-up projects on expiry of the initial grant.

In the case of these focus areas/projects where joint investment is required in particular, mutual agreements will have to be drawn up. On the one hand at UNL level, and on the other through (administrative) consultations with other national/international parties. Some will have to be implemented jointly through sector plans, for example, or in an umbrella or other context (e.g. SURF, European, international by discipline). On a temporary basis, this can be financed (in part) by grants from Europe, growth funds or Open Science NL (OSNL).

8 In the Administrative Agreement on Higher Education and Science of 14 July 2022, it was agreed by the Minister of Education, Culture and Science, the Association of Universities of Applied Sciences and the Association of Universities of the Netherlands that the institutions would continue their efforts to make Open Science and Open Education the norm. And by signing the covenant around Open Science NL parties have committed themselves to translating the Open Science ambitions into concrete policies and their implementation within their own organisations. Internationally through EC agenda and UNESCO recommendation on Open Science.

**Relationship with Open Science NL**
Among other things, the Ministry of Education, Culture and Science encourages the transition to Open Science through OSNL (20 million euros a year up to 2031), after which Open Science must be embedded in the knowledge institutions. The funding provided by OSNL must be seen as incentive funding, i.e. funds for a temporary project (a certain number of years), often with a limited scope (restricted mainly to components within Open Research). These are targeted incentives that, for example, accelerate developments and pool and coordinate efforts at national level more effectively. In early 2023, the covenant for OSNL was signed by fifteen partners and the Ministry of Education, Culture and Science. The 2024-2025 work programme was published in December 2023. Appendix 2 shows where incentive funding from OSNL can be expected in relation to the focus areas in the UNL agenda.

**Over the coming years, universities will focus their activities on the five prerequisites for a *successful transition* towards making Open Science the norm.**

# Appendix 1: Open Science in summary

Open Science is the broad transition of scientific research, higher education and knowledge transfer (impact) activities in such a way that both the results and processes of scientific knowledge creation, evaluation and communication are accessible and reusable for science and society as freely and as early as possible.

Open Science is already having a positive impact on science and society. Scientific results that are openly available generate more scientific impact and ensure that a wider audience is reached. Open Science facilitates the (re)use of research results within and between disciplines, and connects science with society. With Open Science, the integrity and quality of scholarly work is also verified and, if necessary, corrected with the resulting improvement in reproduction, replication and reuse. This leads to greater confidence in scientific knowledge, both within and outside of academia, and accelerates scientific progress, innovations and global collaboration and participation.

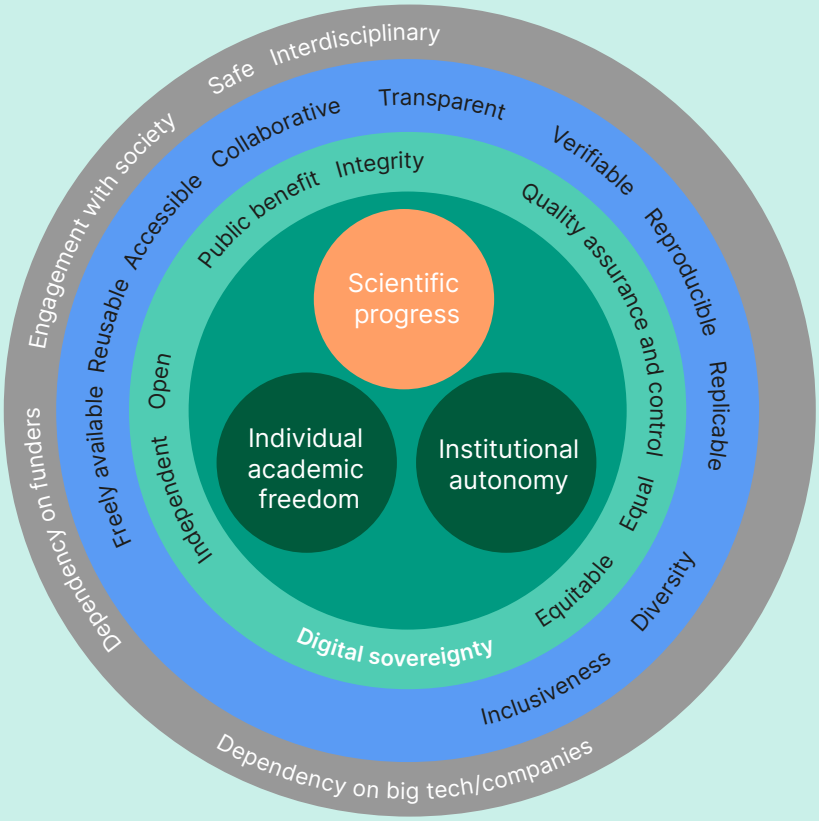
**The dot on the horizon**

Open Science is a long-term transition of both scientific research, higher education and the knowledge transfer/impact mission of universities. It is mainly a culture change with the necessary, gradual adjustments to academics' activities. It is important to specify here the strategic objectives that national organisations are collectively striving to achieve through Open Science. These were collectively defined at the end of 2022 in the NPOS2030 Ambition Document and Rolling Agenda[9]. Open Science will lead to a strengthening of academic work processes so that:

- Results and processes of scientific knowledge creation, evaluation and communication are freely available, accessible and reusable for science and society wherever possible.
- The scientific process and the results thereof are transparent and are shared and recorded at the earliest possible stage, to the benefit of both higher education and society. This ensures that the integrity and quality of scholarly work is also verified and, if necessary, corrected.
- (Future) academics are supported and trained effectively in putting Open Science principles into practice. Both in terms of (open) processes for knowledge creation, evaluation and communication and in making scientific results and educational resources FAIR and machine readable, so that they can be reproduced, replicated and reused by themselves and others.

In other words, it's not just about the end products of research and education but all the intermediate products that lead to them. It's not about the chain of knowledge creation, it's also about all the steps and data for evaluation and communication, in the broadest sense.

9 In 2030 the efforts of the NPOS have led to:
- close collaboration between knowledge institutions, government, industry, and citizens to strengthen the international position of Dutch science and optimise the processes of creating, sharing, and communicating knowledge for the benefit of society.
- inclusive, efficient, and transparent processes of scientific (co-)creation, evaluation, quality assurance and communication.
- the removal of barriers to creating, reading, reusing and evaluating all Dutch scholarly output, so everyone can access scientific knowledge in a sustainable way and benefit from it.
- products of and for knowledge creation, like data and software, being findable, accessible, interoperable, and reusable (FAIR), and open in as far regulations allow.




**Figuur 3: Academic and public values that are important to Open Science[10].**

## Governance based on the values and principles behind Open Science

The above-mentioned objectives and Open Science practices are strongly linked to the academic values and principles in a more open, participatory mode of research and education. Figure 3 illustrates the relationships between these and many other specified values.

In the university context, three values are key: (1) scientific progress, (2) individual academic freedom and (3) institutional autonomy. The latter two fall under academic freedom in its broadest sense. The transition to Open Science is explicitly linked to values such as openness (open where possible), equality, equity, diversity, inclusiveness, collaboration and transparency, integrity and public interest / shared benefit. Figure 3 summarises this further based on a number of related reports[10]. Projects and activities not only within Open Science but also in related programmes must focus on the uniform implementation of these common values and principles.

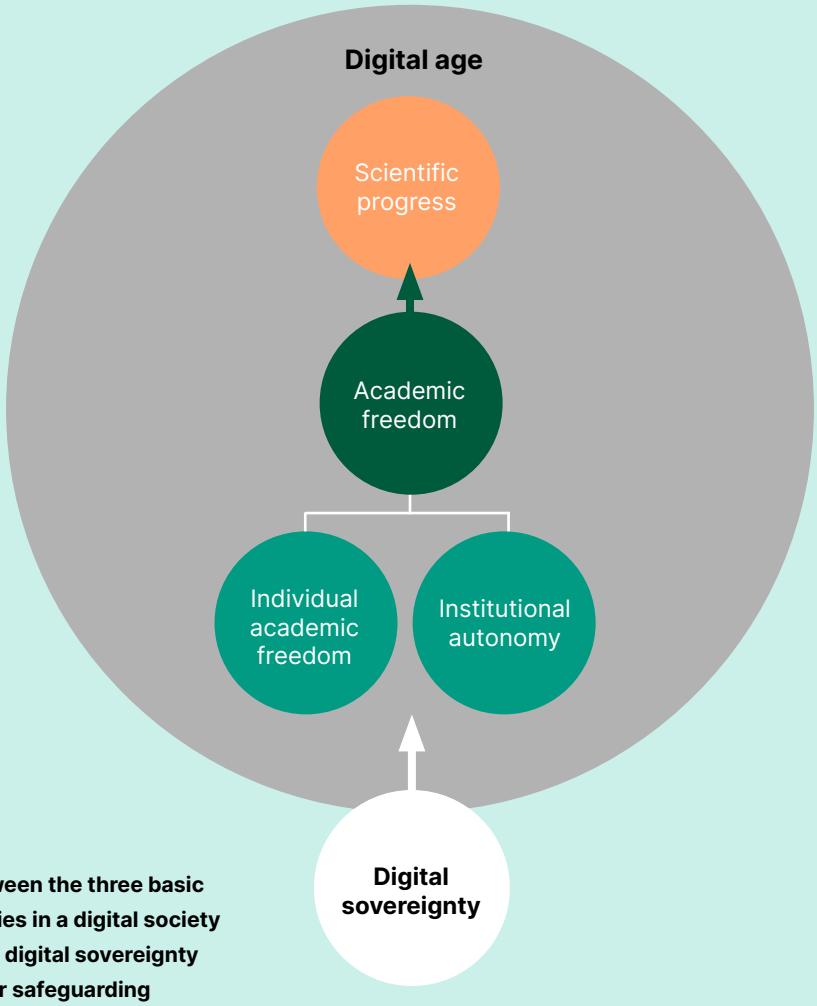
## Guiding principles

In line with UNESCO recommendations[11], these values have been translated into the following five guiding principles.

- Scientific knowledge is a common good and access to it is a universal right.
- Scientific results and processes must be as open as possible, but as restricted as necessary.

10 These are considered in more detail in, among other documents: AWTI (Advisory Council for Science, Technology and Innovation) letter (2023), IvIR (Institute for Information Law) report (2023), Powerful and Vulnerable (2023), Academy Lecture, KNAW (Royal Netherlands Academy of Arts and Sciences) (2023); KNAW-report (2021), LERU paper (2023), NPOS2030 Ambition Document and Rolling Agenda (2022) and UNESCO Recommendation on Open Science (2021).

11 UNESCO Recommendation on Open Science, https://unesdoc.unesco.org/ark:/48223/pf0000379949. =en : open, transparent, collaborative and inclusive scientific practices, coupled with more accessible and verifiable scientific knowledge subject to scrutiny and critique, is a more efficient enterprise that improves the quality, reproducibility and impact of science, and thereby the reliability of the evidence needed for robust decision-making and policy and increased trust in science.




**Relationships between the three basic values of universities in a digital society and the position of digital sovereignty as a mechanism for safeguarding them (IViR, 2023).**

- Reproducibility and control are essential to guarantee the quality and integrity of scholarly work.
- Diversity, equality and inclusiveness are essential to the success of Open Science.
- Academic and digital sovereignty must be protected.

In the university context, these are therefore embedded in values such as scientific progress, individual academic freedom and institutional autonomy (Figure 3). Digital sovereignty, as a guiding principle, is a mechanism here and an essential prerequisite for safeguarding academic values and principles in the digital age (see IvIR-rapport, 2023).

# Appendix 2: Relationship to Open Science NL work programme 2024-2025

The 2024-2025 work programme of Open Science NL[12] (OSNL) is subdivided into the following five clusters:

1. Capacity building for Open Science,
2. Open Science infrastructure,
3. Robust research processes,
4. Evidence base for Open Science,
5. Empowering Open Science communities.

Within these five clusters, the work programme describes 15 instruments for which a total of 62.6 million euros of (initial) grants will be awarded in 2024 and 2025 (the 20 million euro grant from 2023 has also been added to this, as have the 2.6 million euros to offset wage/price increases). In general, the 15 instruments correspond well to the action lines that UNL identified earlier in 2023 as suitable for national incentive funding by OSNL. The table below is largely taken from Appendix 1 of the Open Science NL work programme 2024-2025.

| Instrument OSNL | Budget 2023-2025 | Relationship with UNL agenda |
|---|---|---|
| **1. Capacity building** | | **Facilitate overlap with Open Science through support and training** |
| 1.1. National Training Platform for Research Data Professionals | 4.8M€ | Part of UNL focus area 4 |
| 1.2. Strengthening local and thematic DCCs | 15.3M€ | Part of UNL focus area 4 |
| 1.3. Citizen Science Hubs | 2.0M€ | Part of UNL focus area 6 |
| 1.4. Enabling and strengthening institutional open publishing | 0.3M€ | A targeted but limited intervention within UNL focus area 13 |
| **2. Infrastructure** | | **Make open science possible through open infrastructures** |
| 2.1. Open Science Infrastructure Programme | 17.5M€ | UNL focus areas 1, 2 and 3 |
| **3. Transparent research processes** | | **Content line across the five prerequisites** |
| 3.1. Replication Studies Program | 5.2M€ | Part of “make the norm” prerequisite |
| 3.2. Research Software Sustainability Programme | 6.0M€ | Open and FAIR software is one of the content lines in UNL agenda (see Figure 2) |
| **4. Evidence base for Open Science** | | |
| 4.1. Research on Open Science | 2.8M€ | Some relationship to focus area 8 and especially 18 |
| 4.2. Designing participatory citizen science calls | 0.1M€ | Part of UNL focus area 14 |
| 4.3. Monitoring and evaluation | 0.4M€ | Part of broad monitoring in focus area 18 |
| **5. Empowering communities** | | **Some degree of relationship with ‘make it the norm’ through active involvement of the academic community** |
| 5.1. Open Science Festival | 0.3M€ | Of interest to all knowledge institutions |
| 5.2. Open Science meetings and conferences | 0.6M€ | Part of UNL focus areas 9 and 10 |
| 5.3. A national Open Science Communities network (OSC-NL) | 1.1M€ | Part of UNL focus areas 8 and 9 |
| 5.4. Citizen Science network NL | 1.1M€ | Sees UNL as a separate network/community within focus area 9 |
| 5.5. Recognising and rewarding Open Science | 1.4M€ | Part of UNL focus area 11 |

12 Open Science NL. (2023). Open Science NL Work programme 2024-2025. Open Science NL. DOI: https://doi.org/10.5281/zenodo.10074873.

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