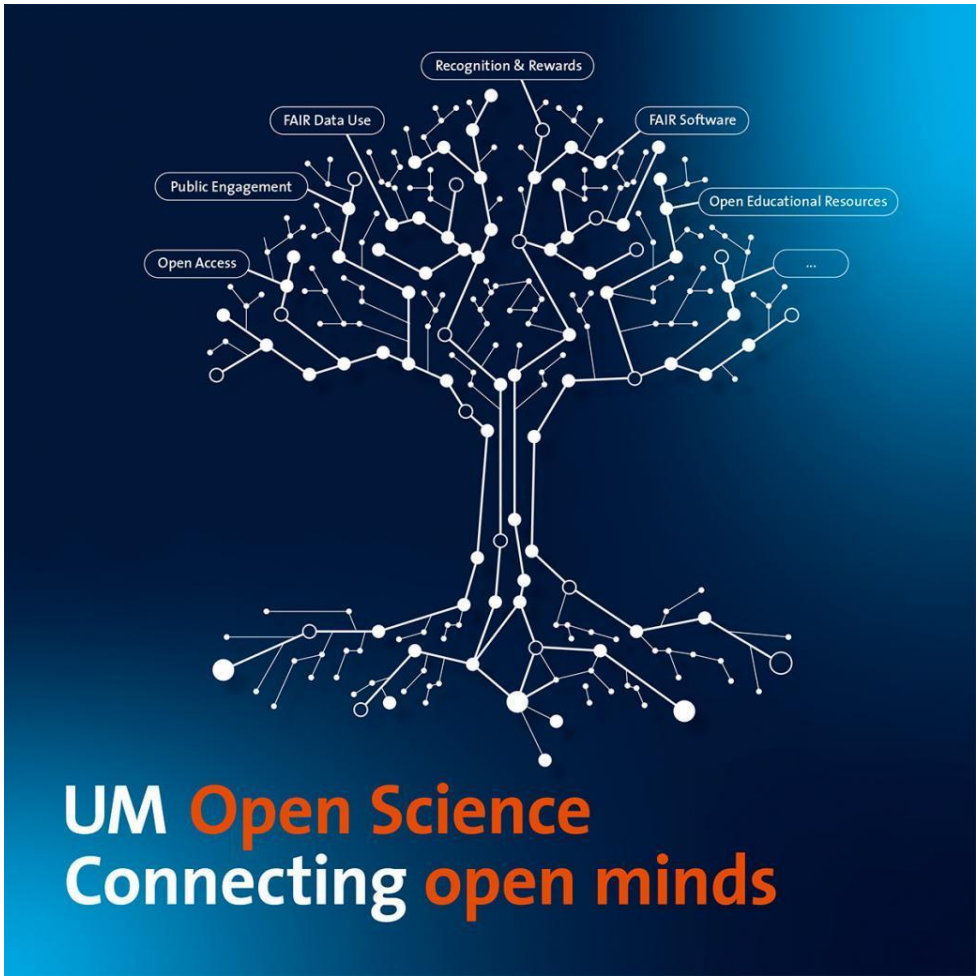


# POLICY "OPEN SCIENCE @ UM"

# –

# 2022-2026

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# 1. Introduction

In 2019 UM adopted an Open Science Policy[1]. The timeline of this policy ended in 2022, therefore it is time to evaluate the progress made, and define an updated policy for the next period (2022-2026).

Given the progress made (see paragraph 1.2), this update focuses on how Open Science at UM can be taken to the next level. Indeed, on the key areas of Open Science identified in 2019 considerable progress has been made. The objective of this next step is first to maintain and extend this progress, and to address areas that so far received less attention. More concrete, the scope of the policy is extended from mainly output-oriented to supporting the application of Open Science throughout the entire research cycle. Secondly, in this next step we acknowledge the need of UM faculties to have sufficient room to align Open Science initiatives at faculty level with research practices common in their respective disciplines.

The overall objective is to become a university where Open Science is the norm – as it is formulated in the Strategic Programme 2022-2026. In other words: *a university where research is shared as open as possible, as closed as necessary, while acknowledging disciplinary differences in research practice*. This ultimately means that every UM academic is familiar with the principles of Open Science, and knows how to achieve the following concrete goals:

- publish research results Open Access or make them openly available;
- apply FAIR principles to research output such as data and software;
- relate to the public and address societal concerns in research;
- make educational materials available to others;
- and, perhaps most of all, know and experience that all such aspects are recognized and rewarded.

Open Science is relevant for all disciplines. The word 'science' should not raise the impression that we only refer to disciplines in the natural sciences or related. All fields or disciplines are targeted, including those in the social sciences and humanities. However, we acknowledge that disciplinary differences exist, as we already mentioned in our tagline *as open as possible, as closed as necessary, while acknowledging disciplinary differences in research practice*. Such differences have their origins in research designs that are commonly used (for example confirmatory versus exploratory research), the type of data that are used as input for the research, or the sensitivity of topics studied and/or of the (personal) data collected. When it comes to data, the disclaimer of disciplinary differences is not suggesting that some disciplines do not work with data, but rather that in different disciplines, different types of data are used, that may require different ways of implementing Open Science principles.

In preparation of this update we gathered input during a UM Open Science knowledge exchange on 30 June 2021. Furthermore, we consulted the Chief Open Science Officer and the director of Academic Affairs, data stewards, the Service Integrator Research Data Management, the Scholarly Communications Officer, the Project Lead Open Educational Resources, the coordinator of the

[1] https://www.maastrichtuniversity.nl/research/open-science

Maastricht Platform Community Engaged-Research, the chair of Platform Research Ethics and Integrity, the Maastricht Young Academy, and Open Science Community Maastricht.

## 1.1 Summary

First, we briefly reflect on the ambitions and actions set in the 2019 policy. Next, we describe Open Science in the context of UM's Strategic Programme 2022-2026[2], as well as the national and international context. Turning to concrete goals, we will first propose some all-encompassing goals that tie all Open Science themes and initiatives together, i.e., goals that are not specific to one particular Open Science area. After this, we turn to the six specific areas of UM's 'Open Science tree' (see cover page), as well as a seventh area, preregistration, that we propose to add to the tree. For each of the seven branches we outline where we stand, where we want to go, and how we can go there. Here as well, ambitions and actions are put in the context of national and international Open Science developments. Finally, we propose a set of core decisions, that will lay a solid foundation for UM's Open Science policy.

In Appendix 1, we present an overview of the core decisions to be made and all proposed actions in this policy. Obviously, the period 2022-2026 will be too short for all actions to be realized completely. Instead, the idea is that we have compiled an inventory of all actions considered important to make progress on for Open Science to become the norm at UM.

The way to proceed is as follows. The core decisions lay the foundation for the remainder of the actions that follow from this policy. The executive board needs to decide on the adoption of these principles. Since we are aware that the period 2022-2026 will be too short for all actions to be realized completely, we recommend that the Chief Open Science Officer makes yearly plans about the advancement of Open Science, based on this policy. The Executive Board decides on these year plans. The actions in these year plans are at a central level; mostly the initiative is located at the Open Science officer at the UL, who also coordinates the execution of the entire policy.

The development of Faculty Action Plans is the responsibility of the faculties. Faculties are expected to include in their plans (a selection of) the proposed actions, where applicable building on the core decisions.

## 1.2 Reflection on ambitions from the 2019 UM Open Science policy

The 2019 UM Open Science policy proposed actions around four central themes, in line with the VSNU's key ambitions at the time:

1. Awarding and remunerating Open Science behaviour
2. Full Open Access to publications
3. Make research data optimally suited for reuse
4. Support and facilitate Open Science

For each Open Science theme, a progress update since the launch of the 2019 policy will be provided under the thematic discussion in Chapter 4. From a more all-encompassing perspective, the

[2] https://www.maastrichtuniversity.nl/strategic-programme-2022-2026

following aspects on which considerable progress has been made since the launch of the 2019 UM Open Science policy are worth mentioning:

- Rector Magnificus Rianne Letschert signed the DORA declaration on behalf of UM during the Open Science event on 25 October 2019. Meanwhile, the integration of Open Science practices and the DORA principles into career evaluation protocols is included in UM's Human Resources Strategy for Researchers (HRS4R).
- The UM Open Science webpage has been launched, intended as the one-stop shop for the UM community looking for information or support on Open Science.
- A researcher-driven Open Science Community Maastricht (OSCM) is in place now. The OSCM is part of the International Network of Open Science & Scholarship Communities (INOSC)[3] and takes its role as a bottom-up community in raising awareness and enhancing skills and knowledge around Open Science topics. One of the ways in which they do that is by organizing events such as the FAIR coffee lectures and ReproducibiliTea sessions. The OSCM has ambassadors in each faculty. They also serve as a sounding board that provides advice or input, for example in the consultation round for the 100% OA plans of VSNU or by participating in INOSC activities, including the writing of open letters[4] with Open Science advice at a national level. The University Library provides financial and practical support for the OSCM.

# 2. Open Science @ UM

## 2.1 Open Science fundamentals

"Open Science is aiming to make scientific knowledge openly available, accessible and reusable for everyone, to increase scientific collaborations and sharing of information for the benefits of science and society." (UNESCO)[5] "Open Science stands for the transition to a new, more open and participatory way of conducting, publishing and evaluating scholarly research. Central to this concept is the goal of increasing cooperation and transparency in all research stages." (National Programme Open Science)[6] Open Science is characterized in various ways, but two core values are key to the Open Science movement: *impact and transparency*.

When we talk about *impact*, we make a distinction between academic impact and societal impact. The first refers to the impact on fellow academics and/or the research field in a broader sense. The second refers to the impact on a specific target group outside of academia. This impact can be direct but is usually more indirect through impact on policy, professional practice or industry. Making research and the results to which it leads easily accessible to anyone having an interest in them increases the chances to realize either academic or societal impact. Open Access is perhaps the best-known and seminal manifestation of this principle, but it has developed further and now is a central theme to other areas within Open Science such as FAIR data, public engagement, and Open Educational Resources.

[3] https://doi.org/10.1093/scipol/scab039
[4] e.g: https://recognitionrewards.nl/2021/08/03/why-the-new-recognition-rewards-actually-boosts-excellent-science/
[5] https://www.unesco.org/en/natural-sciences/open-science
[6] https://www.openscience.nl/en/node/221

*Transparency* reinforces the concept of legitimacy, which is a core prerequisite for trust in science and academics. Transparency increases the trust of the public in the integrity of science (particularly relevant when funded by public money), and mutual trust between academics. Moreover, transparency makes it easier for academics to legitimate their work in evaluations with their managers.

## 2.2 National and international context

In November 2021, a follow-up on the first National Plan for Open Science (NPOS) was published in the form of a new ambition document that was "inspired by a long-term horizon in 2030 to make the full transition to Open and better science and to connect science to society." It is this very ambition that also inspires this UM Open Science policy. In addition, the vision that is formulated in the Ambition document is directly applied to UM: "By 2030, scientific knowledge will be freely available, accessible, and reusable for everyone. Open Science in the Netherlands will be embedded as a standard practice across all scientific disciplines from basic to applied sciences, in the natural, medical, social sciences and the humanities. (…)". Also in the recently signed administrative agreement[7] between the universities and the Minister, Open Science is presented as 'the norm'. To support this transition, the Minister allocated 20M Euro per year, which – according to the policy letter of the Minister[8] – will be managed by a new, to be installed *'Regieorgaan'.*

The four focus points of UM's 2019 Open Science policy were in line with the four NPOS themes at the time (i.e., 100% OA publishing, making research data suitable for reuse, recognition & rewards, stimulating and supporting Open Science). Nowadays, NPOS puts emphasis on three Programme Lines: Open Access, FAIR data, and Embedding citizen science. In the NPOS 2030 ambition document, recognition & rewards is considered as one of the requirements underlying the programme lines. In line with this positioning of the topic, we consider recognition & rewards as a critical part of the UM Open Science policy. When Open Science actions are not recognized and rewarded, Open Science remains a highly idealistic endeavour, while it should become mainstream. In addition, the open consultation round for the NPOS 2030 ambition document resulted in an exploration of how to encompass Open Education under the Open Science umbrella, which aligns well with our decision to address Open Educational Resources in the UM Open Science policy as well.

Internationally, Open Science is also pursued and supported. Trying to sketch the full range of international Open Science developments would be beyond the scope of this policy. However, two international networks in which UM participates are worthwhile to mention as they may possibly affect UM's Open Science practices. The Young European Research Universities Network (YERUN) is committed to actively support the transition towards Open Science, as is explicated in their statement on Open Science. YUFE (Young Universities for the Future of Europe) supports Open Science primarily within the YUFERING initiative, but also in other projects.

## 2.3 Open Science in the context of UM's strategic programme 2022-2026

In UM's strategic programme 2022-2026, a first-class research culture is sketched in which "Open Science is the norm, which entails stakeholder participation, FAIR data principles and data

[7] https://www.tweedekamer.nl/kamerstukken/detail?id=2022D31200&did=2022D31200
[8] https://www.tweedekamer.nl/kamerstukken/brieven_regering/detail?id=2022D25614&did=2022D25614

management, open-access publications and other research output, and more." According to the programme, UM research "contributes to solving societal issues, both regionally and beyond", an ambition in which Open Science can also play an important role.

On a deeper level, we see that the transparency and impact that are inherent to Open Science foster the "environment in which safety, inclusivity, collaboration, scientific ethics and integrity are of paramount importance" described in the strategic programme, provided that the adagio 'as open as possible, as closed as necessary' is respected. Consequently, there is a strong connection with the work and objectives of the Platform Research Ethics and Integrity, for which the concept of transparency is a key driver.

## 2.4 UM's Open Science tree

In the 2019 policy, Recognition & Rewards, Open Access and FAIR data use were already mentioned as Open Science areas that the policy was focusing on. Over the past years, we have seen the attention for other Open Science themes emerging, which has eventually led to a UM Open Science tree with six 'branches' and room for additional branches to occur in the future.

Such an additional branch indeed occurred within the further development of the Open Science movement, as preregistration has become increasingly important. Preregistration is the idea that research designs are published before the actual research is carried out. The design is as specific as possible, and addresses at least the research questions and analysis plan and if applicable the hypotheses, and the data or data collection method that will be used for testing. The ultimate goal of preregistration is transparency by enabling a distinction between confirmatory and exploratory analyses. Preregistrations are sometimes reviewed, like a paper, and this may even go so far that a paper based on preregistered research is accepted for publication, whatever the outcomes in fact are (i.e. registered reports). Obviously, this latter part of the development intends to counter the publication bias that is well-known in certain fields of research, i.e. the phenomenon that journals have a preference to publish papers with positive results. The adagio 'as open as possible, as closed as necessary' is definitely applicable to preregistration. The fact that preregistration is considered an Open Science practice may wrongfully lead to the impression that the hypotheses and methods are shared openly from the start of the project onwards. There can be multiple reasons why this information should not be available at the start of a project, which is why registries provide the possibility to register a timestamped version of the protocol that becomes available only after completion of the project. We propose to add preregistration as a seventh theme, and hence as a seventh branch of the Open Science tree. By doing so, our Open Science tree will incorporate all phases of the research cycle, including the preparatory phase.

This leads to a UM Open Science tree with the following seven branches:

- Recognition & rewards
- Open Access
- FAIR data use
- FAIR software
- Public engagement
- Open Educational Resources
- Preregistration

Although we acknowledge that these branches can be interrelated to some extent, we will discuss each of the branches separately in this policy.

### 2.5 Evaluating Open Science policy

It is a good principle to apply a Plan-Do-Check-Act (PDCA) approach to any policy. The Check phase of this PDCA cycle refers to measuring the progress of the policy in quantitative and qualitative terms. We advocate applying this PDCA approach also to the Open Science policy, and hence call for the use of KPI's in the various areas of Open Science. However, in line with the spirit of the culture change in academia of which Open Science is also part, we recognize that there must also be room for qualitative evaluations. Central, however is the idea that policy proposals should be accompanied *a priori* by an explanation of how the effects of the policy will be monitored.

Another aspect of this evaluation is the impact this Open Science policy effectively has. Recall that Open Science has two central goals: transparency and cooperation. When developing a set of indicators, each of these goals should be reflected equally. To monitor progress on these goals it is highly likely that different indicators are needed for each of them. For example, making research data sets publicly available serves the goal of transparency, whereas the frequency of re-use of data sets sheds light on the goal of cooperation. An important difference of this policy as opposed to the 2019 policy, is that the scope of the policy is extended from mainly output-oriented to supporting the application of Open Science throughout the entire research cycle. However, measuring Open Science activities at UM throughout the research cycle is not sufficient. Insight into the ways and extent to which others – inside and outside of academia – interact with the research work as a result of that is equally important.

## 3. Next steps for Open Science @ UM from 2022 onwards

To take Open Science @ UM to a next level and really make Open Science the norm for the way academic research is conducted at UM, we will first propose some all-encompassing actions that tie all Open Science themes and initiatives together: actions to strengthen the stem of the tree, so to say. These Open-Science-encompassing actions are then followed by a thematic discussion, in which we zoom in on each of the branches of the tree consecutively.

### 3.1. Proposed Open-Science-encompassing actions

The following concrete plans are proposed for the overall facilitation and support of Open Science:

1. The UM Open Science webpage is intended to serve as the one-stop shop that was one of the ambitions in the 2019 policy. However, we see that it does not serve this purpose optimally yet, mainly because it is not well known among UM staff. Awareness campaigns are needed to improve this. Such campaigns will be developed in collaboration with Marketing & Communication and the faculties.
2. To enable monitoring of Open Science developments at UM, UL will develop a dashboard, using our Current Research Information System (CRIS) as the basis, displaying data on Open Access, and other Open Science elements when possible, e.g. reuse of data, use of OER, DataVerse and other support tools when applicable. Encouraging the registration of other Open Science outputs and activities in the CRIS will increase the quality of the monitoring. Moreover, it can improve the findability of these outputs.

3. Legal Affairs will be involved to formulate adequate guidelines on author's rights and responsibilities and on ownership/authorship required to make well-informed decisions on preregistration, Open Access publishing (Gold or Green), sharing of data, software or educational resources, and which licenses to use. Strengthening the legal base of these decisions will prevent reprisals, for example with respect to the Plan S Rights Retention Strategy or the Taverne amendment in Open Access publishing. In this advice, also the topic of knowledge safety[9] should be considered.
4. For Open Science to become 'the norm' at UM, embedding this topic in the on boarding of new employees can be helpful. Information on Green Open Access and ORCID (Open Researcher and Contributor ID) is currently already provided in the on-boarding phase. This could be taken one step further by incorporating these into the workflow of the registration of a new employee and/or by broadening the scope of Open Science information offered during on-boarding. HR will be involved to realize this.
5. Attention should also be paid to the usage of openly shared resources. In other words, if we enable and support UM academics to share their resources, we should also make them aware and knowledgeable about the availability and accessibility of resources of others and the conditions under which they can reuse these resources; also referred to as 'circular science'.
6. Embed Open Science in education, as will be explained in more detail below.

### 3.1.1. Open Science and education: "Practice what you preach"

UM propagates Open Science as the norm in research. Therefore, it makes sense to emphasize the importance of the concept of Open Science in our education, in particular those aspects of our education that concern conducting research. Consequently, we propose to integrate Open Science in UM's education.

Academic education is characterized by its relationship to research. Therefore, Open Science should be an integral element in all teaching at UM. We propose to integrate the principles of Open Science in all phases of our students' education. Wherever possible, embedding the principles in the existing curriculum is preferred above introducing Open Science as a stand-alone element in the curriculum.

PhD students should receive extended training on Open Science principles. PhDs in essence are trained to become independent academics, and they are the next generation of academics for whom the Open Science principles will delineate the natural habitat of research. This is already recognized in the Graduate Schools project of UM, as Open Science is one of the three topics of the mandatory Graduate Schools programme for all internal and external PhD candidates at UM, since 2021. A set of online modules provides an introduction to Open Science in general, and to Open Access and Research Data Management in particular, followed by a dedicated interactive interdisciplinary session. Needless to say, it is recommendable to make Open Science trainings available to all UM academics, not only at the PhD level.

9 https://www.universiteitenvannederland.nl/files/documenten/Domeinen/Integrale%20veiligheid/VSNU%20Kader%20Kennisveiligheid%20Universiteiten.pdf

Following up on the above-mentioned PhD training in Open Science, we recommend to encourage PhD students and supervisors to pay attention to Open Science aspects when setting up the research plan. Furthermore, PhD students will be encouraged to indicate in their dissertation the degree to which their doctoral research is 'Open'. For example, are research results published Open Access? How FAIR are the data used? Is software accessible? To what extent is the public engaged in the research? etc. This may take a variety of forms in the dissertation, however it must be clear that the 'openness' of the doctoral research will not play a role in the assessment of the dissertation. Instead, this account of 'openness' is meant to reflect the fact that Open Science is the norm, and that new PhDs are indeed trained to be open on this topic.

### 3.1.2 Revision of the Research Data Management Code of Conduct

The current Research Data Management Code of Conduct originates from 2014, when the Open Science movement was in its infancy. The Code requires a revision to accommodate the developments of the Open Science movement since the release of the current Code. The starting point of a revision of the Code should be how to enable FAIRness and the principle of being 'as open as possible, as closed as necessary' and how to decide on the required or preferred extent of openness or closeness. The desirability of FAIRness and potential requirements to share data (e.g., from funders) should be balanced with the necessity to protect data "against theft, misuse, damage or loss", taking into account issues concerning intellectual property and the confidentiality of collected data, especially when it is hard or impossible to guarantee anonymity in case of personal data. Given that a dataset hardly ever exists in isolation, the Code should also consider related outputs of the dataset (e.g. preregistration, software, publications).

In addition to the current Code, it is advised to also pay attention to situations in which data are the result of Team Science. Is it in such cases clear who "the researcher" is? After all, "the researcher" has explicit responsibilities in the Code. In addition, the situation that academics change positions may require a more profound regulation. Furthermore, the Code should probably be clearer on the distinction between data storage in facilities provided by UM, and public resources. Finally, the procedure to give permission to use data should be made smoother, in line with the fundamental idea of Open Science, that data are a public source of research.

## 3.2. Faculty Action Plans

Next to the Open-Science-encompassing actions that apply equally to all faculties, we furthermore propose that every faculty formulates an Open Science Action plan, in which the faculty indicates what actions will be taken and by whom in the period 2022-2026, i.e., analogous to the time frame of the Strategic Plan. Such action plans will be faculty-specific, as not all faculties are on the same pace when it concerns the transition to Open Science and the needs and priorities will likely differ as a result of disciplinary differences in research practice. Such action plans should take care of alignment with the Open-Science-encompassing actions 1-4 mentioned above and explicitly address the implementation of Open-Science-encompassing actions 5 and 6 on a faculty level. The action plans should at least address the inventories of current practices and needs for the newer themes (i.e. FAIR software, public engagement, Open Education Resources, preregistration) and explain how the recommendations related to each of the branches of the Open Science tree are put into action, or why they will not be taken up (yet).

The Faculty Action Plans are not static. On the contrary, we would expect updates of these action plans each year to be discussed in the Spring meetings. Furthermore, it is well conceivable that faculties identify their own objectives in the various themes within the Open Science realm that may come on top of the efforts to achieve the goals in this policy. FAIR action plans are already in place for every faculty but may need to be updated, and faculty-level plans on Recognition & Rewards are currently under construction; these can of course be incorporated in the Open Science action plans.

Note that Open Science is also explicitly mentioned in VSNU's Strategy Evaluation Protocol 2021-2027. In the self-evaluation, the research unit reflects on how it involves stakeholders, to which extent the research unit opens up its work to other academics and societal stakeholders, how it pays attention to other aspects of Open Science and what its future plans are in this respect. Even if Open Science was not yet considered by the research unit for the past period, the assessment committee evaluates the unit's considerations and plans for the future with regard to Open Science. In line with this, UM Library's Research Intelligence team provides quantitative indicators such as the percentage of Open Access publications when supporting a research unit in their SEP evaluation.

It is highly recommended to involve faculty ambassadors from the Maastricht Open Science Community in the design of the action plan for their faculty, particularly for the newer topics of embedding Open Science in education and preregistration. For each of the other Open Science topics, experts can be consulted in the design of the action plan. An overview of these experts is provided in Appendix 2.

# 4. Thematic discussion

Below, we discuss the state of affairs on each of the seven branches of UM's 'Open Science tree', and we present the objectives and actions on the way towards these goals for the next years. We recognize that it is not realistic to expect that within every faculty all goals can be reached in the time span of this policy (2022-2026). However, we propose that each faculty will devise an Open Science action plan addressing all recommendations listed under the seven branches at least to some extent, on the way to become a truly Open Science university.

## 4.1 Recognition & rewards

The Recognition & Rewards programme plays an important role in the context of Open Science. Stimulating Open Science is explicitly mentioned as a main goal of the initiative in the nationwide position paper Room for everyone's talent. According to the position paper, "Open Science is bound up inextricably with the modernisation of the system of recognition and rewards. It requires time and attention from academics that cannot be automatically translated as traditional academic output such as publications, but which can have a significant impact on society, science and academia (such as sharing research data)." In a poll commissioned by NWO, 64% of academics in the Netherlands indicated that Open Science is currently not sufficiently recognised and rewarded. As such, recognizing and rewarding Open Science activities will be an essential step towards a culture in which 'Open Science is the norm', as outlined in UM's Strategic Programme 2022-2026.

The targets and actions of the Recognition & rewards initiative at UM will not be repeated in this policy. Alignment between Recognition & rewards and this Open Science policy is covered as UM's Open Science officer is represented in the portfolio subcommittee of the UM Recognition and rewards programme.

## 4.2 Open Access

### *Where are we?*

- Although the ambition to achieve 100% Open Access (OA) by 2020 has not been reached completely, we do see a steady rise in the percentage of OA publications. In 2020, 65% of UM journal publications were available in Open Access, either by publishing them as gold OA in a full OA (29%) or hybrid (27%) journal or by making it available in a repository via the green OA route (10%).
- All OA support is brought together in the OA portal.
- The Open Science module of the Graduate Schools programme includes an intro to Open Access publishing and a section on how to publish Open Access.
- Read & Publish deals have been negotiated with a large number of publishers, making it possible for UM staff to publish Open Access in these journals free of Article Processing Charges (APC) or with a considerable discount. Note that these deals all have a limited duration, and new negotiations may be necessary in the future if the transition of hybrid journals to a full Open Access model takes longer than 2024 – the transition year initially proposed in Plan S[10].
- There is a UM version of the journal browser available where authors can easily find information about APC deals and regulations around green OA.
- The possibilities for Green Open Access – either of the Author-Accepted Manuscript (AAM) or the Version of Record (VoR, i.e. published full-text) under the Taverne amendment – have been successfully promoted amongst UM staff and workflows for these possibilities have been optimized.
- After a positive advice from the Research Platform, a pilot has started in collaboration with the faculties of Arts and Social Sciences and Law to explore and experiment with measures to stimulate Open Access with respect to books (i.e. a fund and a UM Open Press).

### *Where do we want to go and how can we go there?*

We maintain our ambition of 100% Open Access (OA). Ideally, this percentage is reached as much as possible via Gold or Diamond OA, as these OA types guarantee immediate Open Access and licenses that allow for reuse. The Green route will make it possible to reach 100% OA, even when there are situations in which publishing Gold or Diamond OA is not possible. The extent to which Gold, Diamond or Green OA is used will depend on suitable outlets and the financial resources needed and available, which should also be taken into account in the preferred publishing strategy of a faculty.

Taking into account the recommendations from Pleiades feasibility studies, commissioned by VSNU, on 100% OA for Dutch journal articles and for Dutch book publications, we get to the following actions for UM at central or faculty level:

1. Making use of monitoring information in the negotiation of Read & Publish deals, in increasing awareness amongst UM staff of missed opportunities for Open Access publishing, and in determining and/or adapting the preferred publishing strategy of a faculty.

[10] The full objective of cOAlition S: "With effect from 2021, all scholarly publications on the results from research funded by public or private grants provided by national, regional and international research councils and funding bodies, must be published Open Access or made immediately available through Open Access Repositories without embargo." cOAlition S supports transformative agreements to encourage subscription publishers to transition to Open Access.

2. Following national developments towards new types of arrangements[11], particularly for OA outlets relevant to UM's research fields. Exploring or negotiating such arrangements may also require insight in the total OA publishing costs scattered throughout UM, in order to get a full overview of the potential financial advantages.
3. Raising or increasing awareness about funder requirements and funding options for Article Processing Charges (APC) or Book Processing Charges (BPC), such as the NWO OA book fund amongst academics currently working in NWO-funded projects or applying for NWO funding.
4. Continue promotion of Taverne for book chapters as well as journal publications.
5. Use available platforms and stakeholders to spread the word about the potential benefits of OA articles and books.

For actions 3, 4 and 5 the Faculty Action Plans should address the best suitable communication channels or approaches to spread the word amongst academics from the particular faculty. Also, funding options (action 3), publication types and/or outlets (action 4 and 5) that are particularly relevant for a certain faculty, can be explicated in their Faculty Action Plan.

## 4.3 FAIR data use

Data are the fuel of research. The concept of data is not restricted to what can be caught in numbers, but covers basically anything that is used as input in research. This includes indexes, text, spoken word, sound, images etc., and therefore it encompasses all disciplines in academia.

Consequently, the concept of FAIR data is similarly relevant to all disciplines and all research and we want to keep the scope of research data to be FAIRified as wide as possible. This implies that the FAIR concept will be applicable to all research that is done at our university. Realistically, applying FAIR to all data in this broad definition will not be in sight in the time window of the policy we describe here. However, we should at least start thinking and developing ideas about the realization of the FAIR data concept in those contexts where data are not quantitative (e.g. Library Special Collections, interview transcripts).

### *Where are we?*

Working towards a FAIR university in 2023, the community of data driven initiatives (CDDI) facilitated and enrolled several activities:

- Governance model for Research Data Services, based on Service Integration;
- FAIR-showcases across all UM faculties and research disciplines. The showcases are made possible by the involved academics in collaboration with different CDDI members.
- Tooling like DSRI, DMP-online, storage finder with the Maastricht data repository and DataverseNL as trusted data repositories;
- RDM portal where information, services, tools and trainings considering Research Data Management are brought together;
- A full RDM trainings curriculum is being developed, including dedicated representation of the topic in the Open Science module of the Graduate Schools programme;
- Data Stewards are positioned at every faculty as first point of contact for academics;
- Faculty FAIR action plans in order to make research data at least findable and accessible

[11] Publish deals with Gold OA journals, Diamond/non-APC or Contribute-to-Open constructions

- RDM experts community is in place for RDM supporters.

### *Where do we want to go and how can we go there?*

Increasing FAIR RDM by optimizing the supporting services and tooling throughout the research life cycle by:

1. Working on further integration of the four service domains (Data Stewardship Services, Data Brokership, Data Infrastructure and Data Sciences Services);
2. Using an integrated UM-Research Data Services platform that will help academics to conduct proper Research Data Management in an effective and efficient way.
3. Optimizing supporting services, trainings and tools and integrating them into the RDS platform.

With regards to action 2, the Faculty Action Plans should address the implementation and promotion of the Research Data Services platform at faculty level. With regards to action 3, the Faculty Action Plans should address desired optimizations for the faculty, and elaborate on the best way to share these needs with stakeholders to ensure they can be embedded in the RDS platform.

## 4.4 FAIR software

According to the NL eScience Center definition, research software is an umbrella term that includes any piece of code, script, package, tool, library, or programme written or used for research. Therefore, research software can be 1.) a research tool (e.g., SPSS); 2.) a research analysis (e.g., Python code); 3.) a virtual research environment (VRE). Looking at this definition, FAIR software is applicable to many more academics than the ones in software-intensive disciplines that may consider this term as applicable to them. Consequently, awareness should be increased that the FAIR software branch also encompasses analysis code and that it thus also applies to academics in less software-intensive disciplines.

In line with the national plans for thematic Digital Competence Centers, we consider FAIR data and FAIR software as complementary. However, also in line with these national initiatives, we observe that the current state of affairs in terms of reusability is far less optimal for software than it is for data and that the role of software is not sufficiently recognized.

### *Where are we?*

Although FAIR software is a relatively new branch on UM's Open Science tree that was not included in the previous Open Science policy, some activities in this field can be identified:

- A four-day workshop "Coding basics for researchers" has been piloted in a joint effort of the Institute of Data Science, the ICT Service Centre, and the University Library. This workshop has been positively evaluated, but was not developed into a regular part of the FAIR trainings (yet).
- The ICT Service Centre has made the UM GitLab environment, that they initially set up for code versioning and sharing in the I-technology domain, available to the full UM community (incl. I-research and I-education). GitLab allows for version control and collaboration on software code within the UM community. The usage of this tool shows a strong growth over time, which underlines that this service fulfils a need in the UM community.
- Currently, UM research departments create their own best practices, guidelines, and communities to organize their FAIR software activities. However, no centralized overview or coordination is in place.

The UM Library is in close contact with the Netherlands eScience Center on the topic of FAIR data and software. The advancement of FAIR software practices and policy within the team of Data Stewards and the wider UM community is strengthened through an eScience Center fellowship[12].

### *Where do we want to go and how can we go there?*

To embed support for FAIR software within the current RDM support, the following actions are proposed:

1. Inventory current practices in storage, sharing and reuse of software. Inventory how infrastructure and support is currently organized at decentralized levels within UM. Based on that inventory, identify gaps in awareness, knowledge and/or support on FAIR software.

After the inventory, the following actions can be taken based on the outcomes:

2. Adapt services and tooling accordingly and centralize where possible or desirable. The adaptation of services potentially includes developing and providing trainings such as the previously piloted workshop "Coding basics for researchers". The tooling potentially includes tools that allow collaboration on software outside the UM community.
3. For versioning and collaborating on software within the UM community, promote the use of GitLab as a tool through:
    - Increasing awareness of the existence and added value;
    - Exploring the advantages of starting a UM GitLab environment dedicated to research and education. An advantage of such a split could be that certain premium features are freely available when used for research and education purposes only.
    - Investing in resources so that the expected increase in support requests after promotion of GitLab can be processed adequately.
    - Investing in training possibilities for academics. The coding workshop that has already been piloted could be a good way to do so, but resources are required to continue this initiative.
    - Embedding its use in education for students whenever relevant.
4. Equip Data Stewards with the necessary basic skills to support FAIR software, including the writing of Software Management Plans (SMP), within their respective faculties, thereby consulting the national thematic Digital Competence Centers whenever relevant. As Data Stewards have to encompass the whole array of FAIR in their services, the support that they can provide on FAIR software will only be basic. Depending on the types of research conducted in a faculty, specific expertise on faculty level is necessary to reach the goal of FAIRness of software.
5. Promote the creation of SMPs[13] to ensure responsible use of research software. These plans provide legal certainties (terms of use), and technical certainties. They also describe appropriate licenses and disclaimers regarding the use or misuse of the software, which sets responsibility and liabilities. Finally, an SMP will be able to declare how the software will be maintained in the future. In the creation of these plans, it should be taken into account that having metadata

[12] This fellowship has been awarded to Pedro Hernández Serrano, Data Steward at the University Library.
[13] See for example: https://www.rug.nl/digital-competence-centre/research-data/research-software-management/

available does not mean that the research software is disclosed. It can still be confidential but FAIR.

6. Encourage academics to think about FAIRness of software (incl. dependencies on other software and libraries) at the start of a project by addressing it in the proposal phase or when setting up a data and software management plan. This includes the time and support needed for maintenance, and potential risks of (openly) sharing software.

The Faculty Action Plans should describe the outcomes of the inventory proposed as action 1. Based on this inventory, it should be explained which expertise and support is needed on faculty level, given the common research practices (see actions 2 and 4), and if and how actions 3, 5 and 6 can be taken up at faculty level as a next step.

## 4.5 Public engagement

A variety of terms is used to describe activities aimed at engaging the public in research. Out of this large variety, for Open Science @ UM we deliberately chose the term 'public engagement', with the intention to encompass a range of activities that is as broad as possible. However, when looking at the broad definition of 'citizen science' that the National Programme Open Science (NPOS) uses, one may conclude that this equally spans the whole potential range of public engagement activities. NPOS follows the citizen science definition of Science Europe[14], which distinguishes four forms of citizen science that mainly differ in terms of the engagement and motivation of citizen scientists:

1. Crowdsourcing – these are the least participatory projects and use volunteers simply as a means to collect data from distributed sensors, or to provide computing power.
2. Distributed intelligence – projects which may provide participants with some basic skills before asking them to collect and potentially interpret data.
3. Participatory science – Participants are involved in steering the direction of the research from problem definition to data collection.
4. Extreme – citizens are involved at all stages in the development of the project and work to achieve their own goals.

The use of terms like participants, volunteers and citizens may seem to imply that we only refer to individuals, but public engagement activities also encompass collaborations with organizations in the public domain. We acknowledge that academics can also conduct other activities than the types listed above (e.g., science communication) with the aim of engaging the public. However, in the context of Open Science we consider only the type of activities defined above as public engagement to be supported through this policy.

### *Where are we?*

At Maastricht University, there is no comprehensive mapping at central level of research projects involving citizen science or academics actively practicing public engagement. Nevertheless, we can find many interesting and valuable examples of citizen science and public engagement in various faculties, faculty units or ad-hoc initiatives.

[14] Science Europe Briefing Paper on Citizen Science, June 2018

Only at the fourth level, extreme citizen science, there is a centralized initiative within UM, the Maastricht Platform for Community-Engaged Research (MPCER). This platform was launched in October 2019 as a multidisciplinary platform for employees at Maastricht University who do/support, or are interested in doing/supporting, community-engaged research.

The platform defines "community-engaged research" as research that has all of the following three characteristics:

1. Intends to have an impact by deploying research to resolve societal challenges
2. Actively involves the relevant community in the research process
3. Shares the research results with the relevant community

Characteristic 1 and 2 can be clearly recognized in UM's Strategic Programme 2022-2026, where (1) certain Sustainable Development Goals (SDGs) are identified as specific societal challenges to contribute to[15], and (2) stakeholder participation is mentioned as an aspect of Open Science and societal engagement as an explicit aspect of research and education at UM.

### *Where do we want to go and how can we go there?*

The NPOS working group Citizen Science[16] states that "citizen science projects require special skills, that need to be stimulated and trained. Since these skills, as well as the time invested in organizing and maintaining citizen science groups, are not comparable to more common research methods, attention is needed for the way in which this type of research is recognized and rewarded, and the way in which support is provided by the institution (both in terms of content and financially)." Translated to the UM context, this leads us to the following recommended actions for the future:

1. Collect best practices throughout all UM faculties that can serve as an example for fellow UM academics.
2. Make an inventory of existing connections with citizens and/or societal institutions with the TEFCE toolbox (Towards a European Framework for Community Engagement in higher education), and recognize and facilitate the organization and maintenance of these connections.
3. Explore the needs of UM academics conducting public engagement activities in their research and the extent to which these needs can be facilitated within the institution (e.g. locations for trainings or for meetings with citizens, possibilities to lend out devices through the library).
4. Formulate guidelines on the types of research for which public engagement is recommended, which can be used by academics to decide on whether and how to engage the public in their research.
5. Explore whether activities at citizen science levels 1, 2 and 3 can also be supported through MPCER or whether other existing structures within the institution are more suitable to support those activities.

[15] According to the Strategic Programme 2022-2026, UM focusses in particular on good health and wellbeing (SDG 3), quality education (SDG 4), climate action (SDG 13) and peace, justice and strong public institutions (SDG 16). We also contribute to several other SDGs, such as reducing inequality (SDG 10), fostering responsible consumption and production (SDG 12) and building partnerships (SDG 17)

[16] https://www.openscience.nl/files/openscience/2020-11/NPOS%20%282020%29%20Kennis%20en%20krachten%20gebundeld%20%E2%80%93%20citizen%20science%20in%20Nederland.pdf

The Faculty Action Plans should describe the outcomes of the inventories proposed as actions 1, 2 and 3. The Faculty Action Plan should also include guidelines as proposed under action 4, which are based on the inventories (actions 1-3). Finally, a proposal for the preferred form of support (as described under 5) should be included.

## 4.6 Open Educational Resources (OER)

Open Educational Resources is a specific topic within the broader theme of Open Education. Open Education Resources do not only refer to materials with a specific educational purpose, but also include Open Access publications.

### *Where are we?*

Since 2019, UM Library has been affiliated with the program 'Towards digital (open) educational resources' within the Acceleration Plan for Educational Innovation and ICT. In this program, UM collaborates with various other higher education institutions on activities aimed at supporting the lecturer (and student) in compiling and using an optimal mix of educational materials. One of the activities that the zone has included in its plans is the development of an infrastructure for sharing and reusing (semi) open educational resources (OER). In this context, the UM participated in a national SURF pilot aimed at further development of the SURF Sharekit and link to the SURF Search Portal. As part of this pilot, UM participated in the professional community on Information literacy and joined forces with various (UM-transcending) initiatives in which creation and sharing of educational material is one of the goals (e.g., Dariah Teach, Sectorplan Bèta & Techniek, Tool Anatomy platform, Web of Law). The 'Accelerating with EduSources' scheme in which UM also participates, is a continuation of this pilot.

### *Where do we want to go and how can we go there?*

Within UM, an increasing need is perceived to store (self-created) educational materials and make them available; for example in the context of professional communities in which teachers participate on behalf of the institution, or for information literacy education provided by the University Library. In addition, during an inspection carried out last year by the UVO[17] Foundation, some issues about the correct use of copyrighted material were raised. Along with information provision about these restrictions, OER could be promoted as an alternative source for which such issues are less likely to occur. Open Education (incl. OER) is currently explored as a topic to be included in the NPOS 2030 ambitions.

With that in mind, the following actions can be formulated for OER:

1. Follow the national developments regarding Open Education as part of the National Programme Open Science and when necessary broaden the scope of Open Education activities that we focus on as UM.
2. Investigate the current use of OER (from authors inside or outside UM) in education and gain insight into the (un)willingness of teachers to use and share OER, in addition to or instead of licensed material
3. Offering an OER collection by:
    - Making already existing OER collections findable and accessible

[17] Uitgeversorganisatie voor Onderwijslicenties

    - Building and expanding a collection (on EduSources) that is as open as possible and as closed as necessary, in collaboration with UM teaching staff and communities that have already decided to make educational resources available and are looking for a platform
    - Collaborating with projects within the OCW/SURF Incentive Scheme (incorporating the output for education in EduSources).
4. University Library staff development, so they know how to (support the) search for, select and offer OER for education with the necessary metadata for optimal findability.
5. Stimulating the (re)use of OER through:
    - Domain specialists, who can include OER in their discussions with block coordinators about the selection of materials for education (as an alternative or in addition to licensed material).
    - Informing UM employees who currently use their own (not open) publications for education about the possibility of publishing OA.
    - Creating an OER support website (updating the existing Open Education website), linking it with the Open Access Portal and Copyright Information Point;
    - Develop and offer webinars, workshops or online guides and provide (didactic) support in the design of educational materials (aligned with or part of UTQ or CPD activities).
    - Presentations for relevant UM stakeholders (e.g., education platform, library committees, faculty education meetings) to increase awareness.
    - Messages in (faculty) newsletters.

The Faculty Action Plans should describe the outcomes of the inventory as proposed in action 2. Taking this inventory into account, the plan should make clear what would be the best suitable communication channels or approaches to spread the word amongst academics from the particular faculty for the promotion mentioned in action 5, and which faculty stakeholders should be taken into account here.

## 4.7 Preregistration

The concept of preregistration and the reasons for including it in our Open Science policy are explicated in section 2.4.

### *Where are we?*

Within UM, a few actions or initiatives with regard to preregistration can be identified:

- The Open Science Community organized a preregistration workshop;
- CAPHRI, one of the FHML research schools, provides information about protocol registration on their website under the umbrella of quality assurance;
- Preregistration is stimulated in the area of research using laboratory animals.

However, a central overview of preregistration support or activities at UM is currently lacking and it is unknown whether the above UM examples are related in any way.

### *Where do we want to go and how can we go there?*

Preregistration is a valuable practice from the viewpoint of transparency. We are aware that this practice is much more common in some disciplines than in others. Nevertheless, we suggest putting preregistration on the agenda in all faculties and including it in the Faculty Action Plans for Open Science, as it can be a valuable practice for qualitative and/or exploratory research as well. However,

the pace or target of development may differ, depending on how common and suitable the practice is in a certain faculty.

Concrete actions to take for this newest branch on the UM Open Science tree are:

1. Inventory current practices around preregistration and needs for support on this topic.
2. Invest in skilling of Data Stewards to provide targeted advice on preregistration.
3. Formulate guidelines on the types of research for which preregistration is recommended, which can be used by academics to decide on whether or not to preregister their research.
4. Formulate guidelines on where (and where not) and how to preregister a research design, and which pitfalls to take into account when using preregistration platforms also in other phases of the research project.
5. Exploring the possibilities for signing a data processing agreement as an institution with one or more preregistration platforms to ensure that data shared on the platform are processed according to appropriate security protocols.

The results of the inventory under action 1 should be described in the Faculty Action Plans. Faculty-specific points of attention for actions 2-5 can be formulated based on these inventories, if considered necessary. Actions 2-5 are therefore clearly next steps that can only be taken upon completion of the Preregistration sections of the Faculty Action Plans.

# 5. Open Science – next steps

## 5.1 Governance and Finances

For Open Science to become the norm at UM, all plans and proposals above should be supported by an adequate governance structure, and sufficient financial means.

To ensure governance on the executive level, we propose that the Rector Magnificus explicitly adopts Open Science as part of her portfolio. On a strategic level, the role of the Chief Open Science officer is to represent UM in NPOS. This role is currently positioned at the University Library. To strengthen the positioning of Open Science developments on a strategic level within the academic community, we propose to appoint an academic standard bearer who operates in tandem with the Chief Open Science officer. Next, on an operational level, the Open Science officer oversees the Open Science activities at UM level. This role is positioned at the University Library as well. We furthermore propose that each faculty (or, if desired, research units within the faculties) dedicates at least 0.2 fte per year to catalyse the development and implementation of the Faculty Action Plans. It is highly recommended that the faculty ambassador in the Open Science Community fulfils a role in this process.

In line with the timeframe of UM's Strategic Programme, the Open Science policy presented here spans the time period 2022-2026. The Chief Open Science Officer should develop an overall plan for this time period with clear prioritization. Progress on this plan should be evaluated yearly (see section 2.5) and reported accordingly. The faculties should report to the Open Science officer, who in turn reports to the Chief Open Science Officer, and together they report to the Rector Magnificus. In 2026, the Chief Open Science Officer should develop a plan for the continuation of the Open Science programme.

An important assignment of the Open Science officer is to gain insight into the current costs of Open Science, while explicating the benefits reached (note that these benefits are not necessarily monetary). Currently, there is no systematic overview of such costs (e.g., APC/BPC costs paid at research group level, investment of resources to enable FAIRification of data). Many initiatives are considered as part of running business, such as UL's activities in the realm of Open Access, the platforms that are offered for Research Data storage, as well as for Open Educational Resources. Also the cost that are made for FAIR data, in particular those that result from the assignment of a Service integrator and Data Stewards should be inventoried, and presented as a consequence of the Open Science policy. Finally, the costs involved with the MPCER should be made clear. On top of that, one of the first tasks of the Open Science officer will be to gain insight into the additional costs at UM level involved with the actions proposed in this policy. Examples are the costs regarding the involvement of Legal Affairs staff, possible extensions of MPCER scope, not to forget the extension of the task of the Open Science officer him/herself. Each Faculty Action Plan should also elaborate on the costs involved.

## 5.2 Short term actions

The Faculty Action Plans play a central role in this policy. We propose that the faculties should present the first version of their action plans to the UM board in the Spring meetings of 2023. In this version, the inventories for the newer themes (i.e. FAIR software, public engagement, OER, preregistration) are expected to be completed.

That means they will most probably work on developing these plans in the Fall of 2022, and we propose to give a trigger to this at the Open Science festival that the Open Science Community plans to organize in the Fall. Potential ways to do this are through a keynote speech by our rector presenting the policy, and/or through a Faculty Action Plans workshop for Open Science ambassadors, policy makers, or other staff involved in writing these plans. The Open Science officer will also be involved in the organization of this festival. The theme of this festival should reflect the basic thought of this policy: how can we take the next step in becoming a university where Open Science is the norm?

# Appendix 1: Overview of Proposed actions

*Actions labelled with an '*' are to be addressed in the Faculty Action Plans.*

| | |
|---|---|
| Core decisions | 1. Explicitly make Open Science part of the portfolio of the Rector Magnificus<br>2. Appoint a highly esteemed professor as standard bearer of Open Science, who operates in tandem with the Chief Open Science Officer<br>3. Each faculty dedicates at least 0.2 fte per year to catalyse the development and implementation of the Faculty Action Plans<br>4. Add 'preregistration' as the seventh branch of the Open Science tree<br>5. Gain more insight into the current costs and benefits of Open Science as well as the costs and benefits involved with implementing this policy<br>6. Faculties develop tailor-made action plans on the implementation of this Open Science policy. These plans are discussed in the Spring meetings 2023 with the Executive Board<br>7. Launch this new Open Science policy at the Open Science Festival, scheduled in Fall 2022 |
| Open-Science-encompassing actions | 1. Improve the positioning of UM's Open Science webpage as a one-stop shop<br>2. Pay more attention to the (quantitative or qualitative) evaluation of this Open Science Policy. This includes the assessment of the effect on transparency and impact<br>3. More explicitly incorporate legal aspects of various Open Science policy actions<br>4. Include Open Science information in the on-boarding process of new staff members<br>5. Promote and monitor the use of openly shared resources<br>6. Embed Open Science in education<br>7. Revise the Research Data Management Code of Conduct |
| Recognition & rewards | Refer to the Recognition and Rewards initiative at UM |
| Open Access | 1. Make more use of monitoring information on Open Access publishing<br>2. Follow national developments regarding arrangements with publishers or platforms<br>3. *Raise awareness among research staff on funding opportunities for Open Access publishing<br>4. *Continue promoting Taverne for book chapters and journal publications<br>5. *Inform stakeholders about the potential benefits of OA publishing |
| FAIR data use | 1. Working on further integration of the four service domains<br>2. *Promote the use of an integrated UM-Research Data Services platform<br>3. *Optimize supporting services, trainings and tools and integrate them into the RDS platform |
| FAIR software | 1. *Inventory current practices and identify gaps in awareness, knowledge and/or support<br>2. *Adapt services and tooling accordingly and centralize where possible or desirable<br>3. *Promote the use of GitLab as a tool for versioning and collaborating on software within the UM community<br>4. *Equip Data Stewards with the necessary basic skills to support FAIR software |

| | |
|---|---|
| | 5. * Promote the creation of Software Management Plans (SMPs)<br>6. * Encourage academics to think about FAIRness of software at the start of a project |
| Public engagement | 1. *Collect best practices throughout all UM faculties that can serve as an example for fellow UM academics<br>2. *Make an inventory of existing connections with citizens and/or societal institutions and recognize and facilitate the organization and maintenance of these connections<br>3. *Explore the needs of UM academics for support in community-engaged research and the extent to which these needs can be facilitated<br>4. * Formulate guidelines on the types of research for which public engagement is recommended<br>5. *Define the scope of the MPCER |
| Open Educational Resources | 1. Follow the national developments regarding Open Education<br>2. *Investigate the use of Open Educational Resources and the reason for doing so, or not<br>3. Develop and offer an OER collection<br>4. Train University Library staff for the support of teachers<br>5. *Stimulate the (re)use of OER |
| Preregistration | 1. *Inventory current practices around preregistration and the need for support on this topic<br>2. *Invest in skilling of Data Stewards on preregistration<br>3. *Formulate guidelines on the types of research for which preregistration is recommended<br>4. *Formulate guidelines on where and how to preregister a research design, and which pitfalls to take into account<br>5. *Explore the possibilities for signing a data processing agreement on the institutional level with one or more preregistration platforms |

# Appendix 2: Experts to be consulted for Faculty Action Plans

- Mariëlle Prevoo (Open Science officer, University Library): General support
- Faculty representatives Recognition & rewards
- Ron Aardening (Scholarly Communications officer, University Library): Open Access
- Faculty data stewards: FAIR data use, FAIR software, preregistration
- MPCER: public engagement
- Gaby Lutgens (project lead OER, University Library): Open Educational Resources