



Delft University of Technology

TU Delft Open Science Programme 2020-2024 Research and Education in the Open Era Evaluation 2021 & Work plan 2022

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TU Delft Open Science Programme 2020-2024

Research and Education in the Open Era

Evaluation 2021 & Work plan 2022

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November 2021



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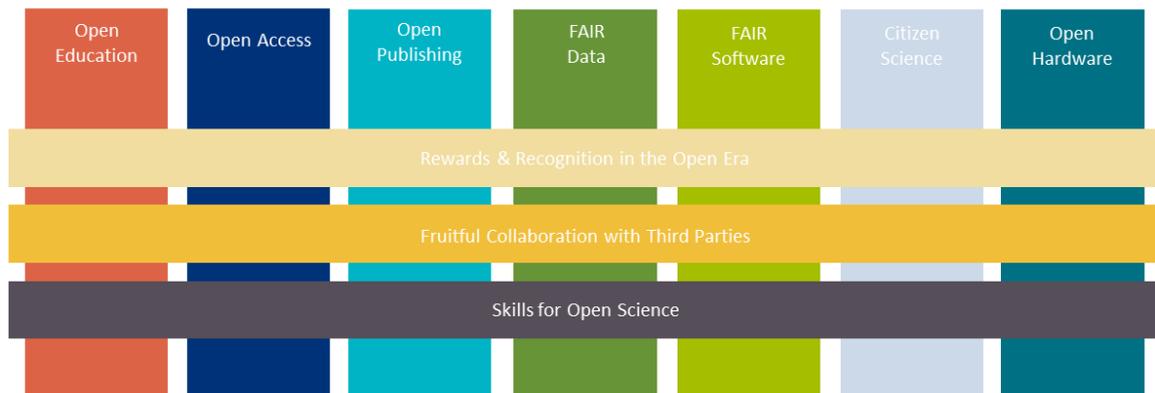
1. Introduction

The *Open Science Programme 2020-2024, Research and Education in the Open Era*, addresses key areas of scholarly engagement where restrictions limit the flow of academic knowledge. It proposes new approaches to the process of research, education and innovation, with a strong focus on academic rewarding and recognition, collaboration with third parties, and the development of skills.

The programme started in January 2020 with five interrelated projects: Open Education, Open Access, Open Publishing Platform, FAIR Data, and FAIR Software. The projects aim at creating and disseminating various types of resources for the benefit of TU Delft researchers, teachers and students, as well as the general public. They range from educational materials and software to a publishing platform. The outputs of the programme will be as open and FAIR as possible: findable, accessible, interoperable and reusable. In 2021 two projects were officially adopted by the Open Science Programme after a successful exploration phase: Citizen Science and Open Hardware.

Each project will address the following three preconditions for successful implementation: ensuring appropriate rewards and recognition, facilitating fruitful collaboration with third parties, and gathering relevant skills. These are therefore incorporated in the programme as cross-cutting themes for all projects.

Portfolio holder of the *TU Delft Open Science programme* is VRM Rob Mudde. The programme is coordinated by a steering committee, and will be managed by a programme team. Chair of the steering committee is Irene Haslinger, director of TU Delft Library. The other steering committee members are Jan Dirk Jansen, Dean of the Faculty of Civil Engineering and Geosciences (representing all faculties); Sacha Kroonenberg, director of Education and Student Affairs (ESA; representing all university services) and Frank van der Hoeven, who also chairs the programme team.



2. Evaluation 2021

Building upon the connections established in the first year, this second year of the Open Science Programme saw the team and partners collaboratively reaching some major milestones: the TUD Research Software Policy, TUD Policy on Open Educational Resources and the Recognition & Rewards Perspective were approved by the CvB; the first rounds of Research Data Management 101 Training and the Digital Competence Center’s calls for project support were successfully delivered to great appreciation from participants; the new TUD Open Science website was launched in November. In addition, connections with faculties were further consolidated: faculty management teams expressed support and enthusiasm to further collaborate, and the Open Science Community Delft continues to grow as more researchers are inspired to participate in and, in some cases, lead conversations in open research and education.

With the Programme and the achievements of the Programme team and community, TUD is internationally recognized as a leader in Open Science. The growth target open access for 2022 is 3% (to 84%). Our academics received open science awards and funding, and were invited to participate in national open science conversations (e.g. FAIR Data Tafel). Our team members are regularly invited to participate in national and international open science efforts, and asked to share our experience and learnings with colleagues in other institutions, at events and in various media.

Within TU Delft, the Programme has also built and consolidated strategic partnerships with other offices, such as the Integrity Office, the Innovation and Impact Center to provide advice for Horizon Europe applicants, the Diversity Office to promote diversity and inclusion in technology development, and the

Climate Action Hub and the Global Initiative to raise awareness on the importance of open science in climate research and in driving global impact.

The team is also joined by a few new faces this year: in February, Frank van der Hoeven started as the new Programme manager; Martha Otte replaced Sylvia Wouters as assistant of the programme team, Marieke Hopley is our new communications advisor, since Marieke Roggeveen left TUD. There were also some changes within the team: Michiel de Jong replaced Bea de los Arcos as co-lead of the education support project. Derya Ada became co-lead of the cross-cutting theme Fruitful Collaboration with Third Parties. Cath Cotton joined the team as the liaison for the integrity office, explicitly linking “Open” practices with issues such as Research Ethics, Research Integrity and Knowledge Safety. In addition, the Programme Steering Committee and Portfolio Holder Rob Mudde advised the establishment of an advisory board dedicated to the open education project; representatives from all phases in TUD education (bachelor, master, PhD, extension school) were invited to become a member.

We also learnt some key lessons this year. We learnt that:

- Building and sustaining capacities within our teams and partners are crucial to the success of the programme;
- Internal cohesion requires perpetual work - we learnt to continuously listen to existing and new team members to adapt the ways we collaborate and communicate ;
- The initial idea to start with a very large volume of projects is not going to work, instead a programme like this needs time to let projects mature and to grow spending.

Looking forward to 2022, we aim to further embed programme output into the regular programming around the university, to ultimately ensure that open science becomes the norm. Building upon the lessons learnt and the last two years of change and stakeholder management experience, we will:

- Build and strengthen partnerships within TU Delft, e.g. with Graduate School and Legal Services, to collaboratively embed appropriate open science practices into researchers’ and teachers’ workflows;
- Support faculty-specific implementation of open science, by working with key stakeholders to create open science teams and/or build incentives to practise open science at faculties;
- Build strategic communication campaigns and assets to increase awareness of and engagement with programme output, such that our community knows how to practise open science at every point of their research and education work;
- Explore the limits of ‘open’ from ethics and security viewpoints;
- Use the momentum of the Open Educational Resource policy to accelerate the uptake on Open Education.

Below, an overview of the 2021 highlights is given per project/cross-cutting theme.

Project Open Education

- Developing the Open Educational Resources policy (which has been approved by the executive board in October 2021), presented on the TU Delft Education Day;
- Published six Open Textbooks in 2021;
- Participates in the ‘nationaal versnellingsplan onderwijsinnovatie met ICT’ and established:

- An inventory of existing open textbooks;
- Workshops & stappenplan creating an open textbook.

Project Open Access

- **Plan S implementation**

A specific webpage was set up for TU Delft researchers with all the necessary details on the implementation of Plan S;

For the contract managers of the Innovation and Impact Centre, several presentations have been held about Plan S and the meaning for the scientists;

Nationwide meetings with guest speakers from the UK have provided insight into how to implement Plan S and specifically the Rights Retention Strategy at TU Delft.

- **Project Taverne**

The Taverne project, with its slogan "[You share, we take care!](#)" has been scaled up over the past year. Participation and consent are gathered via digital application forms. The number of participants grew to 400+ last year. More than 2,700 short scientific works were made available by Taverne as open access in the TU Delft Repository.

In September 2021, in cooperation with Legal Service, a roadmap towards introducing participation in Taverne as part of the employment contract at TU Delft was started. It is expected to complete in 2022 Q1.

- **Transformative publishers' agreements**

Socalled 'transformative agreements' were signed with Trans Tech Publications, SPIE, Portland Press (starting 2022), EDP Sciences (starting 2022). Negotiations are ongoing with American Inst. Physics as part of a national agreement. All these negotiations are aimed at optimally facilitating OA publishing for researchers, at counteracting the separate APCs to publishers from the faculties and at efficiently purchasing scientific content..

- **Growth open access and monitoring**

TU Delft's ambition is to make open access publishing the default and ultimately to aim for 100% open access. To measure this goal, the number of peer-reviewed articles is measured annually. For publications in 2020, the percentage is 81% and has therefore grown considerably compared to previous years. The national average for 2020 is 73%, with TU Delft leading the way. The growth target for 2022 is 3% (to 84%).

- **Infographics Open Access**

Various new infographics to help researchers understand how to publish Open Access research articles and the support available were designed and published.

Project Open Publishing

- Upgrades and improvement of Impact and performance ([social media features](#), [most read articles](#), [citation index](#) and [usage](#)). They are available and will be implemented for every publication;
- Our new Open Access Journals have published their first articles: [Journal of Coastal and Hydraulic Structures \(tudelft.nl\)](#) and [Journal of Delta Urbanism \(tudelft.nl\)](#);
- We have published three new Open Books and republished a printed book digitally;
- The Evolving Scholar (open peer review & Open Access journal) on the Orvium platform has its first community which is composed of more 72 members and over 50 submissions/ articles;
- Agreement with Publons for reviewer credits registration and reviewer finding is work in progress; should be completed by the end of 2021;
- Agreement with Altmetric.com for embedding Altmetric badges to articles and books is work in progress; should be completed by the end of 2021;
- Launch of "Author spotlight" series (interviews where our authors share the stories behind their publications and their thoughts on open publishing practices) within the TU Delft OPEN Publishing Blog where we highlight our latest developments and progress.

Project FAIR Data

- Developed and updated a [vision for RDM training](#);
- Launched the '[Research Data management 101](#)' training and coordinated the [Carpentry Workshops](#) at TU Delft and among the partners of 4TU.ResearchData;
- Led the organisation of the TU Delft Digital Competence Centre showcase event on 12 October, during which the data managers and Research Software Engineers highlighted their support for the research community at TU Delft (in collaboration with the FAIR Software Programme line);
- Coordinated the integration between GitLab and 4TU.ResearchData to enable researchers to more easily publish their software (in collaboration with the FAIR Software Programme line; to be finalized in 2022 Q1).
- Ad hoc trouble-shooting group comprising representatives from Privacy, Data Management and Human Research Ethics established to resolve research compliance issues arising at the interface between the legal and ethical dimensions of working with "Personal Research Data".

Project FAIR Software

- **RSEs /DCC**
In October 2021, the DCC successfully showcased their achievements from the first year during an online event that was attended by more than 50 faculty members and research support leaders from TUD and beyond.
- **Support software development / Code review**
So far within the projects of the DCC code review is done, but we are trying to make this a separate service. This should be implemented by January 2022.
- **Software Policy**

[The software policy](#) was implemented in May 2021, jointly with the FAIR Data project and it is accompanied by very useful [Guidelines](#).

- **Skill development for researchers**

We have a concept digital skills rubric that sketches the learning path of digital skills for software development and data management.

- **GitLab integration in 4TU.ResearchData**

The decision was made to reassign the budget for GitLab-storage to the GitLab/4TU.ResearchData integration. This integration is nearly completed. One issue, regarding licencing of objects, is not yet resolved. A communication plan is in the making. This has been done in collaboration with the FAIR Data project.

- **eLAB notebooks**

Both RSpace and eLABjournal are now approved by the cloud advice team. Functional management is in place (Madeleine de Smaele). We are currently setting up a communication plan to notify more researchers that this service is in place. This has been done in collaboration with the FAIR Data project.

- **Training**

Some RSEs/DM from the DCC have subscribed to training activities and they are looking at suppliers that provide online videos and materials.

Project Citizen Science

- Publication of the inventory report Citizen Science at TU Delft in “The Evolving Scholar”, the open access megajournal run by TU Delft OPEN Publishing;
- Brought together various stakeholders within TU Delft, Legal IP, Legal GDPR, HREC, Data management and Citizen Science researchers, to discuss the legal and ethical aspects of Citizen Science and to identify where researchers can find guidelines and support and what is still missing;
- Continuation of the Citizen Science pilot project Delft measures Rain. A paper was written following the first version of this pilot in 2020 on the needed addition for Citizen Science to the Open Science program. Both those involved in the other Open Science projects and some citizen scientists provided input/feedback on the paper;
- A Citizen Science module has been developed for the MOOC Open Science;
- Started design of Citizen Science website in relation to existing Waterlab website;
- Partner in Project proposal 'Open Urban Sustainability Hubs' to the ERA-NET Cofund Urban Transformation Capacities.

Project Open Hardware

The open hardware project has had the most success in 2021 in terms of conducting workshops and community building. They have so far run three different workshops:

- Open hardware badge workshop for the Open Science Festival;
- Open source robotics workshop;
- Building computer clusters using Raspberry Pi;

- All the workshops involved a wide range of participants and used equipment that were either designed in house and manufactured or using open source hardware components. All the design and development documents along with code have been released openly. To further address plans for supporting thesis and internship projects along with focus on involving all the faculties at TU Delft we have now hired a RHE (research hardware engineer) who starts from November 15th.”

Project Open Science Lab

The open science lab project didn't get off the ground. It was decided to remove the initiative from the programme.

Cross cutting theme Rewards and Recognition in the open era

- The committee Recognition & Rewards has held six dialogue sessions with the academic community in 2021 within TU Delft and one trial session with the data stewards. The two themes discussed within the dialogue sessions were [Room for your talents](#) and [Diversify career paths](#). The committee presented recommendations and a programme of projects to the Executive Board on May 4th 2021, which was finally approved on June 1st 2021. In June TU Delft published the [TU Delft Recognition & Rewards Perspective 2021-2024](#);
- In the recommended projects there are a couple linked to the open science programme: criteria for accent on valorisation, update academic performance criteria and metrics and CRediT. This is in line with the work plan;
- For metrics there is collaboration in the ARIA project with the main question: How can the recognition and reward approaches of TU Delft, EUR and Erasmus MC be optimally supported by state-of-the-art research intelligence? Also there is an initiative to discuss open metrics within the open science programme. An article was published on the library website on [CRediT](#), a simple method to acknowledge the diverse contributions to research outputs. This will also be promoted at faculties by data stewards and faculty information coordinators.

Cross cutting theme Fruitful Collaboration with Third Parties

- **Implementation scheme for publication of master theses in repository**; discussed with director ESA and Rob Mudde; now with John van Haare (3ME): on the request of Rob Mudde, a working group has been established with the following participants: Kolja Laane (ESA), Sadaf Vahabi-Barzi, Erik van Leeuwen (both Legal Affairs), Armand Guicherit and Rianne van den Bogerd. There have been three meetings with the working group, a memorandum has been drafted and interviews in the organization have been started;
- In September there was a meeting with the FS ('Faculteitssecretarissen') and ESA will take the next steps and interview the Directors of Education and the Heads of ESA within the faculties. After the interviews with the external stakeholders we will formulate recommendations and action points for Rob Mudde;
- **Data problems analysis**; Contacted the external lawyer and agreed on his involvement as to the following actions: 1. Drafting a memo, 2. Review on the current applicable policies within TUD, 3.

Involvement as to drafting possible guidelines/policies re research data within TUD (depending on the outcome of the internal working group), 4. Drafting useful templates (depending on the outcome of the internal working group);

- Contacted the following persons as to their involvement regarding this topic: Marta Teperek (head of Research Data Services), Yan Wang (Data Stewardship Coordinator), Paschalis Kontanas (Library), Merlijn Bazuine (I&IC), Jose van Vught (Contractmanager), Jack Pronk (researcher). These persons, including myself, will be working within the working group for practical solutions as to research data;
- Made a one-to-one interview with all these persons within the working group, currently working on a summary of all these interviews in order to formulate action points.

Cross cutting theme Skills

Several steps have been made to define the openscience skills framework. Based on a first draft the FAIR software project is working on an overview of skills for their particular topic. Citizen Science is developing a module for the open science MOOC.

Several courses that contribute to the learning and the applications of the skills in the daily practices have been given:

- six runs of “The informed Researcher”;
- 3rd run MOOC: sharing your research with the world with development and addition of a new module about research software;
- 1st run “Research Data Management 101”
<https://intranet.tudelft.nl/en/-/r4.a1-research-data-management-101>;
- The projects Open Hardware and FAIR software have also provided trainings and workshops.

All these courses will be offered through the TU Delft Learning HUB.

In order to meet the demand of data training 2 visions on training have been completed:

- Vision for RDM training;
- Vision on data literacy for BSc and MSc students at TU Delft.

3. From budget 2021 towards 2022

The work plan 2021 contained three new initiatives: Citizen Science, Open Hardware and an Open Science Lab. The intention was to see whether the programme could absorb these initiatives within the envelope of three million euros. Facing another year of underspending, it became clear that sustained support for Citizen Science and Open Hardware is possible. However, the Open Science Lab didn't take off as an initiative.

Looking back, it seems that the programme has been too optimistic that in Year 2 it could ramp up to the size of almost 1.2 million euros. The team needs more support to perform the tasks included in the programme. The approach for 2022 is to ensure that two-thirds of the budget is directed at additional staff to support the work.

To provide more flexibility in 2022, we use five 'boxes' in the budget that combine projects. As a result, the total sum of the tasks proposed by the projects may be larger than the available budget in the boxes where the spending in the past two years was significantly lower than the allocation.

Project/theme Amounts in K euro	Initial budget 2021	Budget realisation 2021 Q1-3	Budget 2022	Explanation
Open education	135	14	150	The Open Education/Publishing/Access projects accomplished real results in 2021 without using much of their allocated budget. The expectation is that spending picks up in 2022, especially after the acceptance of the policy on Open Educational Resources.
Open access	60	8		
Open publishing platform	70	0		
FAIR data	220	93	525	The FAIR projects with their Data managers and RSEs all in place are expected to show robust spending.
FAIR software	360	266		
Citizen Science	50	31	70	These two projects are still in a startup phase. The 2021 budget was not fully spent.
Open Hardware	40	0		
Rewards & Recognition	25	0	125	The cross-cutting themes are relatively light compared to the projects.
Fruitful collaboration	15	0		
Skills	35	0		
Contingency project costs	60	0	-	The underspending in 2020 and 2021 makes clear that the programme can do without a contingency budget.
Programme costs	140	110	155	The programme team is fully in place with externally hired programme leader, community manager, communications officer.
Open Science Lab	50	0	-	This initiative didn't have a follow up (it has been taken over mostly by Digital services plan TUD Library)
TOTAL	1260	522	1025	

4. Work plan 2022

The goal of the TU Delft Open Science Programme is to advance the practice of open science at TU Delft. However, we shouldn't lose sight that 'open' is a means and not an end in doing so.

Open access ensures that science developed with public means is accessible without hitting a paywall or other restrictions. In addition, it allows staff members at universities that cannot afford expensive subscriptions to access information so that the academic world becomes more of a level playing field.

Open data is essential to build trust in the outcomes and conclusions of research projects. It allows verification of results and ensures integer practices while other researchers can consider reusing these datasets in their own studies.

In the case of Open Education, it may all go one step further. It is not just about providing educational resources that can be downloaded and shared for free. Above all, Open Education assumes an interaction between staff and students in which they jointly create new material, through which the nature of didactics starts to change.

The TU Delft leads the pack when it comes to Open Access. The OSP delivered early 2021 its Open Software Policy. The pilots with data managers and research software engineers (DCC) made a good start.

For 2022 it would only be logical to make in a similar way work of the new policy on Open Educational Resources and forge a collaboration between Open Education and the Open Publishing platform as a facilitator of new open teaching materials.

We need to explore further the potential of the two new projects in the programme: citizen science and open hardware. Citizen science plays an essential role in the vision of the National Platform Open Science (NPOS).

And last but not least, the OSP needs to address the growing awareness that there are even limits to open. What do we share with whom? Ethical questions will arise from collaborating with countries that don't take human rights seriously or internationals that aggravate the climate crisis. We need to explore to add to 'as open as possible' the notion 'as closed as necessary', especially in the context of (international) partnerships.

In other words: there is enough work to do to fill another year.

Open Education

Project Leads: Nicole Will & Michiel de Jong

The project supports teachers in adopting and adapting teaching and learning methods through open education. It also helps to keep education accessible and affordable for students. The project builds on current practices such as Open Courseware and MOOCs. Support includes training, advice, tools and infrastructures, for instance for sharing and reusing teaching materials.

Deliverables 2022

Copyright & Open Licenses helpdesk	Related to the new OER policy, a guide must be developed for understanding Open licenses. Estimation of design and programming work.	€ 8 K
Teacher training (Open Education in UTQ)	Explore ways to make this an extension of existing teaching practices within UTQ (like organising courses and course materials), together with ESA.	
Implementation Open Educational Resources (OER) Policy	Developing OE practices within faculties. Connect with existing developments around education (f.e. master redesign). Taking inventory of existing (possible) open education practices and showcase them as best practices. Developing OE teaching practice of teachers already with a UTQ certificate.	€ 75 K 1 FTE appointment.
Open Textbooks	The budget is based on 6 books at €3 K for editing work + €20 K for additional costs for 4 books (4 X €5 K).	€ 38 K
Nanobiology OLMO	Supporting the development of open courses within the BSc program. SURF project focused on collecting and designing open educational resources.	SURF/ OCW subsidy
Replacing commercial textbooks	The Library is starting the Learning Resource Management System (LRMS) project. This project can be used as a tool to gain insight into the use of commercial and non-commercial materials, to be used as a baseline measurement for how OER is used within the university. Currently the project is funded by the Library. No additional costs before 2022.	
Grassroots pool	To be used to fund projects that showcase practical implementation of the OER policy. Starting up projects with faculties or programmes. Three projects for €20 K or 4 for €15 K. Faculties may supplement this.	€ 60 K
OCW curation	Transferring OCW to a new environment requires content curation. Provide materials with additional metadata.	€ 52 K

Open Access: Going Forward with Open Access

Project Lead: Just de Leeuwe

In the coming years, the focus of Open Access will be extended from peer-reviewed scientific articles to books, conference proceedings, book chapters, reports, reviews and educational resources. The project supports this development by addressing both policy and infrastructure aspects that are crucial to the further development of Open Access practices.

Deliverables 2022

Project Taverne	In September 2021, in cooperation with Legal Service, a trajectory was started to introduce Taverne into the employment contract at TU Delft. Q1 2022 administrative route Taverne to be completed.	-
Transformative publisher agreements	Specific contracts have been signed with Trans Tech Publications, SPIE, Portland Press (starting 2022), EDP Sciences (starting 2022). American Inst. Physics is still under negotiation as part of a nationwide agreement. The aim of all these negotiations is to optimally facilitate OA publishing for researchers, to counteract the separate APCs to publishers from the faculties and to purchase scientific content efficiently from TU Delft.	€ 30 K

Open Publishing Platform

Project Lead: Alenka Prinčič

Open Publishing is a form of scholarly communication that offers not only free access to scientific publications, research data and educational materials, but also provides the infrastructure and processes for creating open content. Open publishing infrastructures use open source software wherever possible, thus reducing the intrinsic costs of the publishing process. The project will deliver a publishing platform, together with services that will enable TU Delft researchers to adopt the open publishing principle.

Deliverables 2022

Platform	<p>Publishing platform TU Delft OPEN for three mainstream products is an ongoing deliverable that requires technical and functional improvements throughout the duration of the project.</p> <p>In 2022 focus on: upgrade OJS (one instance) and OMP (three instances).</p>	<p>€ 10 K (*external hire student and PHP developer);</p>
Platform innovation and development	<ol style="list-style-type: none"> 1. Mega-journal ‘Evolving scholar’ needs development that will include open post-publication commentary, Recognition implementation, e-Pub in ThES. 2. Exploring partnership with other platforms, e.g. Openjournals.nl (costs 10K for 2023) 3. ‘Enhanced/interactive’ publication format (for papers from new mega journal Evolving Scholar). Sub-project, costs for 2023). 	<p>€6 K</p>
Support	<ol style="list-style-type: none"> 1. Editorial support for the platform to facilitate the process for the creation of books and journals, and professional guidance to authors and editors. 2. Quality control for all published material – pilot with language- and copy-editors for books and textbooks published in 2022 rendering a recommendation for professional (external) service. 3. Professionalizing journal covers, books covers, textbooks, and cover images, creating user friendly template.) 	<p>€ 40 K (**0,4 FTE student + external service)</p>
Communication and Engagement with researchers and editors	<ol style="list-style-type: none"> 1. Stepwise guide to open publishing at TU Delft using series of infographics as basis. 2. Engaging researchers in Strategic Publication plan: acquisition through Communication- and Engagement plan (an earlier deliverable). In 2022 start with the prep, roll-out in 2023. 	<p>€ 10 K (external designer infographics);</p>

FAIR Data: making research data FAIR

Project Lead: Marta Teperek

The project creates a stronger bridge between the current policy, infrastructure and culture of data stewardship and scientific practice, for instance by exploring new roles like data manager, in order to fulfil the researchers' actual needs in managing their research data. A coherent approach to FAIR data, which also takes into account the limits to open data, helps make research more transparent and efficient.

Deliverables 2022

Data Managers Pilot	Two data managers	€150 K
Development of a course on managing personal research data	Dedicated course for researchers working with personal research (to be developed in collaboration with the data stewards, the privacy team and the Human Research Ethics Committee)	€50 K
Supporting communities working with specific types of data	Workshop in collaboration with Frictionless Data on making tabular data FAIR	€10 K
Limits of Open Data	Guidance on how to handle IP issues associated with data (e.g. ownership, licensing). <i>Led by Fruitful Collaboration with Third Parties programme line</i>	
Sustainability plan for the TU Delft Digital Competence Centre	Plan for sustainable funding for staff members of the TU Delft Digital Competence Centre. <i>In collaboration with the FAIR Software programme line.</i>	-
Team building & training	Support for training, team building and professional development of the TU Delft Digital Competence Centre staff members (Data managers and Research Software Engineers). <i>In collaboration with the FAIR Software programme line.</i>	-

FAIR Software: making research software FAIR

Project Leads: Meta Keijzer-de Ruijter & Mark Schenk

Research software is fundamental to contemporary research, particularly in the context of reproducibility. If Open Science is to contribute to better and more transparent research, research software needs to be treated with the same diligence as research publications and research data. The project will contribute to this goal by developing and facilitating various aspects of research software, including policy, infrastructure and organizational culture.

Deliverables 2022

Training	The DCC members will contribute to the definition and the development of the digital skills framework for researchers. Obtaining and developing learning materials will require a 15K budget, to hire helpers on dedicated tasks or buy materials. ICT Innovation is also willing to provide a budget for these activities.	€15 K
Research Software Engineers Pilot	During the second year of the DCC pilot, we are focussing on making a broader impact supporting researchers in research software development workflows, data management, storage, and publication of code and data. We hope to broaden the types of services we can provide to researchers.	€300 K

Citizen Science

Project Lead: Sabine Kunst

The exploration of Citizen Science has made clear that this form of research offers significant added value to Open Science. Active participation in scientific research by non-scientists offers an additional dimension to Open Science. TUD has already experience with various forms of Citizen Science and researchers are interested in this research approach. We identified the researchers' needs in sharing experience, of learning about possibilities of working with citizens, as well as the need for support and resources to engage in new forms of activities and acquire skills specific to practicing Citizen Science.

Deliverables 2022

Content platform/website	The Citizen Science website will be developed and provided with content. Points of interest: <ul style="list-style-type: none"> • together with the stakeholders involved, further develop the guidelines and support regarding the ethical and legal aspects of Citizen Science and make this accessible via the website. • coordination with the WaterLab website. 	€ 5 K
Training	The Citizen Science module for the MOOC Open Science provides an initial introduction to CS. As a follow-up step, a CS skills training course aimed at researchers at TU Delft will be developed in 2022.	€ 10 K
Support researchers	In 2022, we want to gain experience within one of TU Delft's communication themes in supporting researchers in the possibilities of Citizen Science as a way to involve non-scientists in their research and in this way contribute to communication to society.	€ 30 K
Knowledge sharing activities	The community of researchers interested in or experienced with Citizen Science is growing steadily. There is a need among them for knowledge exchange which we will facilitate in 2022.	€ 10 K

Open Hardware

Project Lead: Santosh Ilamparuthi

Open hardware or open source hardware is hardware whose design is made publicly available so that anyone can study, modify, distribute, make, and sell the design or hardware based on that design. The open hardware project in the Open Science Programme aims to introduce open source hardware into the Open Science movement at TU Delft. This will be accomplished by supporting students and researchers in making their hardware projects open source. Workshops and training sessions will also be conducted to further build the community.

Deliverables 2022

Community Building Open Hardware	Communication activities and workshops to raise open hardware awareness and participation from all faculties within TU Delft, and also to involve people from other universities and the general public.	€10 K
Training Open Hardware	The training provided will be of different forms, there will be regular “open hardware office hours”, where students and researchers can walk in to consult on their hardware questions, along with this there will be knowledge sharing by having students and researchers learn more about open hardware through lectures, workshops and tutorials. The training aspect also involves having the community members participate in the building of open source hardware projects.	€15 K
Research Hardware Engineer		€30 K

Recognition & Rewards in the Open Era

Project Lead: Ingrid Vos

To encourage the actual practice of open science principles, it is imperative that researchers and teachers are rewarded and recognized for their efforts. This cross-cutting theme will support the development of tools and initiatives that acknowledge activities and behaviour that contribute to all dimensions of open science practices, which will also lead to a significant cultural change.

Deliverables 2022

Criteria	New criteria for Valorisation (including Open Science aspects)	€15 K
Criteria	New Scientific Performance criteria (modernised with Open Science), Results ARIA project	€15 K

Fruitful collaboration with third parties

Project Lead: Rianne van den Bogerd

This cross-cutting theme focuses on guidelines, policies and regulations that help to deal with any issues or opportunities that arise in (developing) collaborations with third parties, with regard to the outputs delivered by the projects in the Open Science programme. Collaborate (with eg: the Integrity Office and IIC) to explore the kinds of practical dilemmas arising between “as open as possible” and “as closed as necessary” with respect to (international) partnerships. To contribute to the Knowledge Safety and (International) Partnerships initiative (ToR in progress).

Deliverables 2022

IP MSc Repository	IP questions regarding the publication of MSc theses in the Repository	-
Guidelines	Guidelines for a fruitful collaboration with third parties	-
Working groups	Landelijk werkgroep werkgeversauteursrecht” (VSNU) and the “Interne werkgroep werkgeversauteursrecht” (TUD)	-
Data Problems Analysis	Formal document/guidance as to the legal status of data, such as a) the (im)possibilities of ownership of/rights to data, b) possible IPR on data, c) how to deal with data following third party collaborations, d) possibilities as to licensing of data e) publishing of data	€10 K
Data Problems Analysis	Additional work 2022	€8 K

Skills for Open Science

Project Lead: Nicole Will

Researchers, teachers, students and support staff will (further) develop certain skills in order to be able to apply the open science principles in their daily practices. This cross-cutting theme will create an overview of the skills needed, connect the existing training modules (and training still in development) in the projects, and coordinate the further development of courses in a comprehensive way. A difference should be made between trainings (courses), where participants learn and acquire skills, and knowledge and activities like roadshows and presentations aimed for creating awareness on certain topics. This project only takes into account the trainings.

Deliverables 2022

Training Overview	Inventory of trainings from projects and cross-cutting themes. Standardized course description; classified by audience, levels, topics.	€10 K
Calendar	Coordinated training calendar.	€5 K
OS Personal Development Plan	Guidelines about skills levels depending on career stage.	€15 K
Data Literacy	Defining skills for data literacy aimed at BSc and MSc students and developing a pilot for a corresponding course.	€75 K (external temporary staff)
Skills Overview	Study that defines skills required and framework building	€3 K
Gap Identification		€1 K
OS Skills Framework		€1 K

In addition to the above mentioned projects and cross cutting themes, an exploration of the following topic will be conducted:

Ethics and Integrity in open Science

The topic consists of three sub topics:

- Limits to Open (as closed as necessary), i.g. in relation to the projects Open Access and FAIR Data
- Openness and Knowledge Safety/Openness in (International) Partnerships, in relation to cross cutting theme Fruitful collaboration with third parties
- Impact and Implementation (integrity of process and approach)

With as key deliverable for 2022 a proposal whether, and if so how, to incorporate 'Ethics and Integrity in Open Science' as a cross cutting theme into the 'TU Delft Open Science Programme 2020 -2024'

Annex 1.Team

The Open Science programme involves a growing team of experts with roots in various parts of TU Delft.

Portfolio holder

Rob Mudde, VRM, executive board TUD

Steering Committee

Irene Haslinger, Director TUD Library, chair

Jan Dirk Jansen, Dean CeG, representative of TUD faculties

Sacha Kronenberg, Director E&SA, representative of TUD services

Frank van der Hoeven, OSP Manager.

Open Science Programme office

Frank van der Hoeven (Faculty BK), OSP Manager (start February 2021)

Anke Versteeg (Lib), Executive Secretary

Emmy Tsang (Lib), Community Engagement Manager

Martha Otte (Faculty 3ME), Secretary support

Marieke Roggeveen (Com) (start February, end August 2021), Communication

Marieke Hopley (Com) (start October 2021), Communication

Open Education

Nicole Will (Lib), Project Lead

Michiel de Jong (Lib), Co-Lead (start May 2021)

Bea de los Arcos (ESA) Co-lead (end February 2021)

Open Access

Just de Leeuwe (Lib), Project Lead

Open Publishing

Alenka Prinčič (Lib), Project Lead

Frederique Belliard (Lib), Publishing Officer

FAIR data

Marta Teperek (Lib/ 4TU.ResearchData), Project Lead

Amir Ebrahimi Fard (ICT), Data Manager (end August 2021)

Aleksandra Wilczynska (ICT), Data Manager, (start December 2021)

Ashley Cryan (ICT), Data Manager

Paula Martinez Lavanchy (Lib), Training Lead

FAIR software

Meta Keijzer-de Ruijter (ICT), Project Lead

Jose Carlos Urra Llanusa (ICT), Research Software Engineer

Manuel Garcia Alvarez (ICT), Research Software Engineer

Maurits Kok (ICT), Research Software Engineer

Niket Agrawal (ICT), Research Software Engineer

Citizen Science

Sabine Kunst (Lib), Project Lead

Marit Bogert (Science Center)

Nicoleta Nastase (Lib)

Open Hardware

Santosh Ilamparuthi (Faculty EEMCS), Project Lead

Jerry de Vos (Faculty EEMCS), Research Hardware Engineer (start November 2021)

Rewards & Recognition

Ingrid Vos (HR), Project Lead

Stas Mironov (student assistant)

Najiba Abdellaoui (Com)

Fruitful Collaboration

Rianne van den Bogerd (LS), Project Lead

Derya Ada (LS)

Skills

Nicole Will (Lib), Project Lead

Pim van Schöll (Lib)

Liaison to EB/ SD, Lotte Melenhorst

Liaison to Innovation & Impact Center, Adriaan van Noord

Liaison to Integrity Office, Cath Cotton

Open Education Advisory Board:

Remon Rooij (Faculty ABE)

Joris Melkert (Faculty AE)
Willem van Valkenburg (Extension School)
Marcus Specht (Faculty EEMCS)
Annoesjka Cabo (Teaching Academy)

Annex 2. Historical background

In the business case of the *TU Delft Strategic Plan Open Science 2020-2024* an indicative budget for the four year lifespan of the programme was presented. This indicative budget contained both project costs and programme management costs. Project costs are costs made in delivering the enabling outputs. Programme management costs are costs for managing the programme, and may include entries like programme roles, communication activities, or a contingency budget for dealing with risk and change. Costs that are typically associated with realizing the change in the existing organization (staff or infrastructure in the faculties and university services) are not part of the budget and will remain implicit. The table below from the *TU Delft Strategic Plan Open Science 2020-2024* contains the indicative budget for the period 2020-2023, resulting in an overall estimation of **€3M**.

	2020	2021	2022	2023	Total in K euro
Total in K euro	600	800	800	800	3000

To prevent the Open Science Programme from being perceived as a Library project, it became part of the UD agenda. Initially, **600K** was budgeted for 2020, and **800K** for each remaining year. At the request of Rob Mudde, portfolio holder Open Science in the Executive Board, 2 scenarios have been explored (a light version and a more ambitious one). By the end of 2019, the Executive Board opted for the more ambitious one, and as a consequence a budget of **957K** has been requested, instead of the original **600K**. With an overall budget of 3M, this means there is **681K** available per year for the period 2021-2023.

	2020	2021	2022	2023	Total in K euro
Total in K euro	957	681	681	681	3000

The budgeting process of the UD agenda 2020 was not finished until spring 2020. Then the Executive Board gave permission to activate a quarter of the requested budget, $957K \rightarrow 1M:4 = 250K$. The current estimated realization is **227K**. This means that there is an underspending of **730K**. The available budget for 2021 is then **730K** (underspending 2020) + **681K** (budget for 2021) = **1411K**. A budget of **1430K** was submitted for 2021. At the request of Finance, it was explored whether 20% of the original 2021 budget could be transferred to 2022. This means a budget of **1144K** for 2021 and a transfer of **286K** to 2022. After consultation with all the project leaders, it seems feasible to move **180K** to 2022, which leaves a budget request of **1250K** for 2021.

	2020	2021	2022	2023	Total in K euro
Total in K euro	227	1250	842	681	3000

The work plan 2021 contained three new initiatives, and the intention was to see whether the programme can absorb these initiatives within the total amount of 3M. Facing another year of underspending, it became clear that sustained support for Citizen Science and Open Hardware is possible.

The programme may have been too optimistic that in year 1 it could ramp up to the size of almost a million. Clearly it requires some steps to scale-up. The approach for 2022 is to ensure that in the budget there is a two-third component directed at staff-time so that work can be done and other expenses will be made.

To provide more flexibility in 2022 we use five 'boxes' in the budget in which projects are combined. The total sum of the activities proposed by the projects may be larger than the available budget in the boxes when the spending in the past two years was significantly lower than the allocation.

	2020	2021	2022	2023	Total in K euro
Total in K euro	227	700	1025	1048	3000