



Roadmap
for Open Science
of University of Lille

WHAT IS OPEN SCIENCE?

Open Science is a global movement that aims to make the results (publications) and output (research data and intermediary production) of scientific research, whether public or private, accessible by opening up scientific processes to all.

In concrete terms, its goal is to open up scientific knowledge and make it accessible to everyone – researchers, companies and citizens – without any barriers, immediately and free of charge. It is also about ensuring that the results of research funded primarily by public money must be made as widely available to the public as possible.

Open Science builds on the opportunity of the digital transition to develop open access to scientific knowledge: publications and – wherever possible – research data.

Why open up science?

Academic knowledge is made to be shared, which means disseminating the content produced in a way that is simple, fast and as broad as possible. There are still too many obstacles to access, making it impossible for readers – human or machine – to access research publications, primarily because of the dominant model in scientific publishing around the world, which requires the academic community to pay to read what it has itself produced.

Making publications openly available empowers researchers and helps effectively combat the rising costs of acquiring academic docu-

mentation, largely brought about by the monopoly of private publishers. The universal dissemination of knowledge contributes to more efficient scientific research as it is more widely shared and therefore less redundant.

There is agreement in the university environment that we need to change the way we evaluate research, as the biases, limitations and perverse effects of the current model are well known and documented : academic overproduction, heightened competition, higher ratings for positive publications, reluctance to take risks, etc. By opening up science, we can make these processes more virtuous with the ultimate aim of basing evaluations not on the reputation of the publisher – journal impact factors for example – but on

the quality of the research alone.

TRANSVERSALITY AND INTERDISCIPLINARITY

Academic research must draw on innovation processes that are more emulative, inclusive and collaborative, and therefore more open. It has become essential in a growing number of disciplines to share knowledge as it is being produced across continent-wide and even global communities, but this imperative has little compatibility with an ecosystem that is “siloe” and therefore closed.

Today academic research is increasingly inter- and cross-disciplinary, a trend that is embodied in major universities that cover all fields, where we are seeing greater crosso-

ver between disciplines, enabling diverse areas of expertise to address shared research challenges. This new way of doing research involves the use of new tools – artificial intelligence – and new techniques – text and data mining – whose effectiveness largely depends on our capacity to explore large corpora that are widely accessible, and therefore open.

By striving for transparency, Open Science favours ever-more demanding and high-quality research and is a powerful vector for scientific integrity. This is reflected in particular in the goal of generating research that is reproducible. This means that the experiment underpinning a publication must be documented as systematically as possible so that, where possible, other scientists can reproduce and thereby (in)validate

the conclusions initially reached. It is a requirement also reflected in the assertion that science progresses as much if not more through its errors than its successes : in this respect, the publication of failures both in terms of results and processes is essential.

A VECTOR FOR THE DEMOCRATIZATION OF KNOWLEDGE

Lastly, the academic community aims to – and must – be open to the world with which it is expected to maintain a rich and enriching dialogue. Trust in science and in what scientists have to say is neither straightforward nor a given; indeed it is fragile and regularly contested. In response, opening up science is a remarkable way to democratise knowledge across society and a

unique opportunity to reunite two worlds that have long coexisted in the absence of any dialogue. It is a way to nurture trust in scientists and in science.

The actions of the University of Lille in relation to Open Science are taken against the backdrop of a robust national and European context.

THE INTERNATIONAL AND EUROPEAN CONTEXT

UNESCO addressed the question of Open Science in 2019 with the aim of issuing a recommendation to be adopted at the General Assembly in November 2021. While such a recommendation is not binding, it can nonetheless serve as a tool of influence for the development of national legislation and practices and offer a useful (worldwide) framework, particularly for dialogue between the global north and south.

Over the last 10 years, the European Union has developed an ambitious policy to support Open Science. Its Horizon 2020 (2014–2020) plan brought initial impetus by making funding conditional on the open access of publications. Now, the Horizon Europe (2021–2027) plan goes one step further, making open access mandatory and strongly incentivising the dissemination of data based on the FAIR principles (findability, accessibility, interoperability and reusability), with the formal implementation of an associated data management plan.

This policy is closely linked to cOAlition S, which involves several European research funding agencies and is part of the Plan S initiative to lay down the principle of free and immediate dissemination of research funded by national and European organisations, in journals, open access platforms or open archives.

THE NATIONAL CONTEXT

France has been a key contributor to open access since the early 2000s, with the creation of the HAL archives by the CNRS and the forward-looking work of the COUPERIN consortium on open archives. In 2016, a “Law for a digital Republic” was adopted to offer an innovative legal framework granting new rights and freedoms to researchers for the open access dissemination of their work. Publicly funded researchers can now deposit their publications and make them accessible free of charge in an open archive for a period of 6 to 12 months after initial publication.

France’s National Open Science Plan (PNSO, 2018) lays the groundwork for a proactive and coordinated national strategy to support players like universities, schools and research bodies. It is built on three core pillars:

- the widespread rollout of open access publications, in particular by making it mandatory for publicly funded research to be openly available, by creating a national fund to support the development of Open Science, and finally by offering greater support for depositing in open archives ;
- the preservation and open access of public research data, systematisation of data management plans, and compliance with the FAIR principles ;
- contribution to a sustainable, European and international dynamic, supporting the development of Open Science skills and structural initiatives relating to pu-

blications and data in the national and international legal systems, accompanying universities and other organisations keen to develop an Open Science policy, and helping to structure the different networks and communities.





OPEN SCIENCE AT THE UNIVERSITY OF LILLE

There are five pillars underpinning the University of Lille's commitment to Open Science: the first two (open access to scientific publications and data) are the very foundations of Open Science. The next two (open access to scientific publishing and participatory research) reflect the University's close engagement with practices associated with Open Science. The final pillar confirms its commitment to the ecosystem of Open Science as a whole.

The gradual development of a virtuous culture and practices to open up academic publications and data has many beneficial consequences for our university community:

- By making the academic output of university researchers and lecturers accessible, it increases the visibility of this research throughout the academic world;
- By offering open and free access to scientific output, it meets the requirements now included in national (Agence Nationale de la Recherche) and European projects (Horizon Europe);
- By actively contributing to national and European initiatives, it asserts our ambition and our place within a wider movement of scientific openness driven by the major universities and research bodies;
- And lastly, by extending beyond the university community to civil society as a whole, it confirms our leading role in the dissemination of knowledge across a range of territories.

The University of Lille is the heir to the three universities from which it emerged, which, separately or jointly, had also taken significant initiatives on Open Science. This policy was then taken over and amplified from the early days of the University of Lille: Open Science was one of the priorities of the research policy adopted by the board of trustees in January 2018 and has featured in all

of the policies adopted since: library resources strategy (2018), editorial policy and digital policy (2020).

In particular through the actions of its libraries (SCD), the University of Lille has played a pre-eminent role in the national and international Open Science ecosystem, with participation in the National Open Science Committee, the ORCID France executive committee, the COUPERIN consortium Open Science working group, LIBER (Association of European Research Libraries), Open AIRE (Open Access Infrastructure for Research in Europe) and COAR (Confederation of Open Access Repositories). Finally, the University of Lille made a commitment back in 2018 by signing up to the Jussieu Call for Open Science and Biodiversity.

Concrete initiatives have already been taken, in particular through the SCD and the Department of Research & Valorisation. An open institutional archive known as LILLOA, which is connected to the national HAL archive, was launched in 2018, demonstrating that the University of Lille aimed to position itself from the outset as a proactive contributor to Open Science. This aim is reflected in the charter for open archive submissions drawn up in 2019. The University has also taken steps to support laboratories with the management of their research data and training for doctoral students and researchers, as well as offering support to journals in the transition

towards Open Science as part of its editorial policy. Finally, its scientific policy now includes participatory research, opening up research to society as a whole through the joint development of shared projects. These combined initiatives are one of the items listed in the University of Lille's Research Charter, which is common to all research units and is the subject of an annual discussion with the Vice-President as part of the ongoing management dialogue.

MOTIVATIONS AND MEANS UNDERPINNING THE OPEN SCIENCE ROADMAP

This roadmap has several objectives : disseminate and promote work already completed ; evaluate past actions; identify areas to improve; set out future directions; schedule future initiatives; and monitor their progress.

To implement this Open Science roadmap, the University of Lille undertakes to:

- Better inform academic communities about the objectives and key aspects of Open Science (licences, legislative framework, rights and obligations, mechanisms that can be deployed, etc.);
- Roll out a multi-target and ambitious training plan to include decision makers, researchers, doctoral students and librarians;
- Develop a coherent general policy on data repositories and users in the long term, both at an individual (researcher) and structural level (laboratories, establishments);
- Roll out its Open Science policy across the different fields in a way that accounts for the characteristics and wishes of each community;
- Put in place Open Science oversight tools by drawing on existing tools or those being developed (improved bibliometric tools, creation of a local Open Science barometer);

- Develop a financial incentivisation policy to support initiatives, in particular by setting up an Open Science fund;

- Support the capabilities of those already engaged, in particular through dialogue with management.

Implementation of an Open Science roadmap requires the mobilisation and coordination of a network of actors. First among them is the department responsible for the University's libraries. The Department of Research & Valorisation is also closely involved. Others will actively contribute to the rollout of this policy, including the Department of Digital Technology. Representatives must be found across all research units to ensure this momentum towards Open Science, which as things stand has not been embraced to the same extent throughout the university community, can gather pace and be widely implemented.

The following governance structure has been put in place to pilot the Open Science strategy and follow up on actions taken:

- Strategic committee : the Open Science policy falls under the responsibility of the statutory Vice-President of Research, who relies on a strategic oversight committee that includes the deputy Vice-Presidents of research from the different fields, the heads of Valorisation and Digital Technology, as well as the Director of university library services and the deputy Director General of Research and

Valorisation.

- Five operational groups that bring together the parties involved in support of the University Libraries and the deputy Director General of Research and Valorisation:

- Open access to scientific publications (University Libraries),
- Open access to scientific data (University Libraries),
- Open access to scientific publishing (deputy Director General of Research and Valorisation),
- Participatory research (deputy Director General of Research and Valorisation),
- Support for initiatives and participation in the Open Science ecosystem (University Libraries).

- A network of representatives across all research units, who support the shift towards Open Science and meet once a year or more often if necessary to discuss specific issues

PILLAR 1

OPEN ACCESS TO SCIENTIFIC PUBLICATIONS

Goal. Make publications by Lille researchers accessible to all, accompany the different academic communities through this transition and support innovative initiatives.

ACTION 1 Ensure systematic submission of scientific output to open archives.

The University of Lille runs an institutional open archive known as LIL-IOA, which is linked to the national archive HAL. The University intends to use this system first of all to ensure that eventually all references relating to publications based on research conducted in its laboratories are uploaded, and secondly that the number of fully open access articles deposited increases gradually but significantly. Across our research units, support initiatives are being taken such as training users how to submit to open archives, and these initiatives will continue. Because this aspect of the policy will be evaluated by HCERES, it will be included in the Research Charter to ensure annual monitoring in collaboration with the different research units.

ACTION 2 Establish a policy to support open access publications with improved management of publication costs.

The University will be putting in place a fund and management structure for article processing charges (APCs) and book processing charges (BPCs). An increasing number of open access publications produced by researchers at the University are currently subject to the upfront payment of publication costs. This "author pays" model aims to support the transition of journals and book collections towards open access dissemination, guaranteeing publishers who choose this model a financial return on their contribution. It nonetheless carries certain risks of abuse (overcharging, duplicated payments, etc.), which is why the University of Lille intends to put in place a fund to be allocated based on certain criteria to support a proactive and virtuous policy of open access journals and book collections.

ACTION 3 Awareness-raising and support for open access publications.

Publication methods have become increasingly diversified in recent years: alongside the traditional model of going through a publisher, other alternative paths have emerged. Researchers will be accompanied in the process to choose the most suitable publication option (traditional, "gold", "diamond"). The aim will also be to help researchers identify "predatory" journals that charge publication fees without any guarantee of editorial quality or peer review.

ACTION 4 Offer doctoral students training in open access publications.

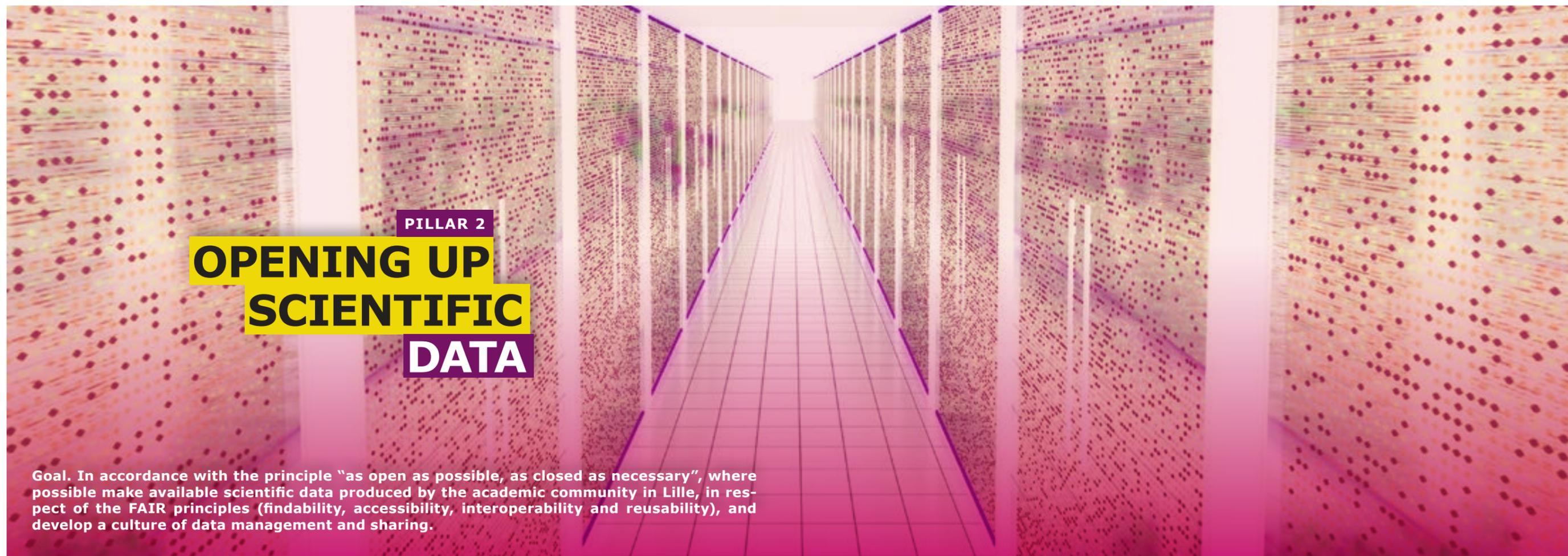
The need to systematically train doctoral students is identified in the National Open Science Plan. The University of Lille is putting in place a range of Open Science training courses within its Doctoral College. This initiative will continue to gather pace to ensure that this academic community has the fundamental skills needed for successful open access publications.

ACTION 5 Ensure a lasting connection between each publication and its external dataset.

Publications increasingly rely on datasets that are of more value if they are made accessible and reusable wherever possible, in the interests of transparency and scientific reproducibility. The University of Lille has established a Zenodo community to serve as a repository for its researchers' datasets. It provides support to these users in describing their datasets and makes them aware of the importance of linking their data and publications. The University will intensify these efforts, in particular by establishing a lasting connection between each publication deposited in the archive and the dataset stored elsewhere, whatever the location.

ACTION 6 Support open and innovative publishing models.

We are seeing the emergence of new publishing models under the influence of academic communities and actors from the world of scientific and technical information, models based on crowdfunding and collaborative approaches. The University of Lille intends to support such initiatives, which over time could represent a credible alternative to the traditional publishing models, in particular by taking part in open digital manual projects like the prototype in the field of history funded by the French education ministry – **Digital pedagogy mission for higher education** –, the University of Paris Saclay and COUPERIN in 2020, by supporting initiatives like Knowledge Unlatched, or by accompanying any academics for whom it would make sense to publish in preprint in order to speed up the dissemination of scientific findings while going through the validation process involving journal reviewers.



PILLAR 2

OPENING UP SCIENTIFIC DATA

Goal. In accordance with the principle “as open as possible, as closed as necessary”, where possible make available scientific data produced by the academic community in Lille, in respect of the FAIR principles (findability, accessibility, interoperability and reusability), and develop a culture of data management and sharing.

ACTION 7 Training and awareness-raising for doctoral students, researchers and support staff, and the promotion of virtuous (open) data practices.

While knowledge of open access publishing is improving in research communities, the same is not necessarily true of data. There is a need over the years to come to develop a strong policy of awareness-raising and training, in particular to avoid the very high cost, both in financial and academic terms, of poorly managing the data generated. The University of Lille will strengthen its training initiatives, notably by developing and expanding its awareness-raising scheme known as the “Fabrique de la Science Ouverte”. It will reach out both to individuals and groups – research teams/units – to support the development of the necessary data skills, including legal and ethical dimensions and scientific integrity.

ACTION 8 Accompany project leaders in drawing up a data management plan and more generally dealing with the expectations of Open Science.

It is increasingly systematic for calls for projects, whether internal, national or European, to require the drafting and subsequent implementation of a data management plan. Beyond regulatory requirements, formally establishing such a plan enables a careful approach to the use, exploitation, retention and possible open access of data generated. The University of Lille will intensify its efforts to inform project leaders about the key aspects of data management plans and support them in drafting one.

ACTION 9 Accompany successful project submissions in implementing a data management plan and managing the life cycle of data generated.

The life cycle of data – creation, processing, analysis, retention, access, preservation and reuse – is a key dimension of any research project. The University of Lille will be developing a data curation support mechanism for laboratories, both for data intended to be openly available and with restricted access.

ACTION 10 Establish and implement a data storage policy.

Data-sharing is a widespread but disparate practice in the academic world: while some disciplines have been sharing data for decades, others do not yet have adequate shared infrastructure for the storage, retention and presentation of data. The question of data storage is still only being developed in France, at both local and national levels: few universities have engaged in a structured process of reflection on data storage, and the State itself only recently took an interest. However, the landscape is changing rapidly, with the rollout of a national strategy, currently being drafted and due in late 2021. The University of Lille will initiate its own strategy, in line with the national policy of course, so as to meet the necessarily disparate needs of each community, particularly those who do not yet have adequate storage facilities for their specific discipline.

ACTION 11 Accompany, support and advise researchers on emerging practices.

For a few years now, the world of data has seen the emergence of new practices that need to be supported: dissemination of data underpinning published articles, or data papers, peer-reviewed publications that describe accessible datasets to ensure they can be (re) used for research purposes. These open practices are promising but in their early stages, and will be supported by the University.

ACTION 12 Promote the FAIR principles and support their application to databases produced within the University.

Data that is poorly referenced, poorly described and poorly presented will generally end up being lost as it is unknown and inaccessible for most of the communities who would find it useful. With the increasing masses of data generated throughout the research process, it is now critical to ensure rigorous management of the entire life cycle of data. Since 2019, the University of Lille has been experimenting with a range of services for researchers to manage databases, backed up by a partnership with Inist-CNRS on the attribution of Digital Object Identifiers (DOIs). Going forward, the University intends to help researchers improve the compliance of their databases with the FAIR principles (findability, accessibility, interoperability and reusability), thereby reinforcing the visibility and reuse of the data generated in a way that respects the culture and practices of each discipline.

PILLAR 3

OPEN SCIENTIFIC PUBLISHING

Goal. Back in 2020, the University of Lille set out and adopted a policy in support of journals, and various actions were taken. Part of that policy relates to the way the University helps beneficiary journals complete the transition towards respecting the principles of Open Science and the implementation of an open dissemination platform.

ACTION 13 Supporting journals in the move to Open Science.

The transition towards an open access publishing model is both a complex and sensitive process for journals, who need support. The University does this in four ways :

- assisting the open access publication of articles,
- making the publishing processes transparent,
- enabling interoperability with other tools,
- and facilitating the reuse of published articles in other dissemination formats.

ACTION 14 Design and deploy a dissemination tool for journals that have signed a contract or agreement with the University.

This platform, part of a project supported by the State and financed under the National Open Science Plan, offers a solution for dissemination at a local level in compliance with the contemporary standards of publishing and Open Science. It can be transitional, whereby the publication is eventually disseminated on an open access platform, or definitive in the case of journals whose publications are not intended for dissemination on national or international platforms.

PARTICIPATORY RESEARCH

PILLAR 4

Goal. The University of Lille has written participatory research into its scientific policy. This research is based on contributions to academic research from citizens and therefore implicitly falls within the scope of Open Science. The actions already taken, in particular via the Boutique des Sciences, which is now part of the Department of Valorisation, have involved encouraging, supporting and financing the development of participatory research projects.

ACTION 15 Develop partnerships with national and regional stakeholders.

Participatory research, part of Open Science, will be developed in partnership with public authorities and other stakeholders in the region. Encouraging lecturers and researchers to take an interest in and adhere to the participatory approach will only be effective if regional stakeholders are involved in the process. The University will therefore seek to develop its partnerships with the Métropole Européenne de Lille (MEL), local authorities, regional bodies, etc.

ACTION 16 Increase awareness of the societal dimensions of European programmes and the role of participatory research.

Many lecturers and researchers still have little knowledge of participatory research, and there is a need to raise awareness. Efforts to better inform people fall under two aspects: improve knowledge about participatory research, which is where the Boutique des Sciences comes in; and increase awareness of the role and importance of research in European programmes, which is the European mission undertaken by the deputy Director General of Research and Valorisation.

PILLAR 5

SUPPORT OPEN SCIENCE INITIATIVES AND PARTICIPATION IN ITS ECOSYSTEM

Goal. The University of Lille intends to confirm its commitment to the development of Open Science through proactive involvement in the ecosystem underpinning it by supporting virtuous initiatives and taking part in local, national and global collective efforts to advance Open Science.

ACTION 17 Support the pillars, infrastructure, platforms, services and actors who promote, make possible and implement Open Science.

The ecosystem that underpins Open Science and makes it possible is very fragile. First because it largely depends on volunteers or financially precarious initiatives, and secondly because several key mechanisms are funded and therefore oriented by private publishers whose ultimate interests tend to diverge from those of the academic community. The University of Lille will play an active role in the long-term life of this ecosystem by offering support through both financial and human resources, as it has done with the creation of a Passport for Open Science Open Science for all French doctoral students. The University managed this project under the responsibility of the National Open Science Committee.

ACTION 18 Active and robust contributions to organisations and other structures that have an impact on Open Science.

Today Open Science draws on a community that is gradually finding its structure both nationally and globally. Within this community there can be contrasting needs and wishes between Europe and other continents, within Europe itself or even at a national level. It is therefore important for the University of Lille to make sure its voice is heard in the different structures, bodies and organisations that influence and steer Open Science or make key decisions. The University already has a presence in many key locations and intends to strengthen its presence wherever Open Science is being discussed, planned, decided and implemented, and will support the right initiatives to this end.

ACTION 19 Develop digital corpora and promote open access resources.

The University of Lille has for almost two decades been pursuing an active policy of digitisation, making valuable resources available online to serve the academic community and the wider public, in collaboration and partnership with the Bibliothèque Nationale de France and its digital library Gallica. The University's library services also promote a significant body of scientific resources freely available online but with inadequate visibility and therefore underused by the relevant communities. This policy, designed to further knowledge diffusion, is set to be reinforced.

ACTION 20 Develop a "virtuous" library resources policy that is consistent with our stated ambition for Open Science.

In order to be effective, the local, national and international measures taken to support Open Science must be backed up by an equivalent policy to support the acquisition of electronic resources and databases. Through the actions of its libraries, the University of Lille actively participates in the COUPERIN consortium, which, in its negotiations with publishers, promotes models that comply with the principles of Open Science, such as mandatory "transformative" agreements or support for bibliodiversity. The University now intends to go even further, making compliance with these principles a condition for the renewal of subscriptions to its electronic resources and databases.

ACTION 21 Develop the capacity to respond to calls for national and European projects relating specifically to Open Science.

For a few years now, we have been seeing calls for projects specifically related to Open Science, whether at a national level via the Agence Nationale de la Recherche, or at a European level as part of the Horizon Europe programme. Responding to these calls is a key objective for the University of Lille, first of all because they are an important source of funding for the implementation of this roadmap, and secondly because they are an opportunity for our staff to develop their skills and play an effective role in structuring the national and European ecosystem of Open Science. The University, which already made a successful submission to a call for projects by the Fonds National pour la Science Ouverte in 2020 for its online journals platform, will be pursuing a balanced policy to make both individual and group submissions in response to future calls.

ACTION 22 Support content exploration and exploitation practices, in particular text and data mining.

The volume of data being generated is exponentially increasing, producing a new "black gold" for both the public and private sectors. The exploration and analysis of this material (content mining) will be a key component of research, requiring the development and rollout of technologies that are still in their infancy but are extremely promising in terms of producing new knowledge. The University of Lille intends to develop its skills and expertise in these new ways of "reading" the content available.



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