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Note from the
League of European
Research Universities

14 December 2020

Implementing Open Science

Challenges and Opportunities for research-intensive universities in LERU

Ad Hoc Group on the Implementation of the LERU Open Science Roadmap

Open Science as part of the 'new normal'

LERU and Open Science

Long before the outbreak of the covid-19 pandemic in spring 2020 LERU, the League of European Research Universities, had studied how Open Science practice could be embedded at university level. The work produced a number of Advice Papers on aspects of Open Science.[1] Going forward, what LERU wanted to do was to use the insights of its policy and thematic groups to consider the challenges and opportunities that Open Science brings to the 23 research-intensive universities in LERU. The covid-19 outbreak then sharpened our wish to investigate whether or not Open Science is indeed part of the 'new normal' and, if so, what its implications would be.

LERU has therefore looked afresh at the eight pillars of Open Science as defined by the European Commission and examined them in detail from a university's perspective. LERU has looked at the challenges and opportunities of Open Science practice at this level. This examination has been undertaken by experts in each of the eight areas of Open Science activity, supported by expert legal advice on copyright, licensing, IPR, and national/European legislative frameworks. The result is a serious analysis of the strengths, opportunities and challenges that Open Science brings for universities. Some areas of activity are clearly more advanced than others. Open Science activity often starts with the issue of Open Access to publications, and this pillar of Open Science is often led institutionally by university libraries. On the other hand, other areas such as Citizen Science are not yet

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1   LERU: The LERU Roadmap towards Open Access (2018), available at https://www.leru.org/publications/the-leru-roadmap-towards-open-access; last accessed 14 December 2020. Also, LERU: LERU Roadmap for Research Data (2013), available at https://www.leru.org/publications/leru-roadmap-for-research-data; last accessed 14 December 2020. See also Open Science and its role in universities: a Roadmap for cultural change (2018), available at https://www.leru.org/publications/open-science-and-its-role-in-universities-a-roadmap-for-cultural-change; last accessed 14 December 2020.

generally embedded in university activity, although LERU has member institutions who, individually, are well advanced in this work.

The ongoing LERU work, we hope, is reflective, analytical and supportive. We have suggested actions which universities can choose to adopt if they wish to advance along the road to Open Science. There remains a significant amount of work to be done across all eight pillars, if universities wish to follow Open Science activity. The LERU policy and thematic groups have identified work which they would wish to take forward to demonstrate how research-intensive universities can be confident in the approach they wish to take when embracing Open Science policy and practice.

LERU has initiated an informed approach to all eight pillars of Open Science as they are adopted by universities across Europe. Cultural change is necessary for Open Science to succeed. That is a process, not an event, and one which will take many years to accomplish. That being said, Open Science itself is a contribution to the work of defining a 'new normal' for research-intensive universities at a time when all university activity is being examined afresh.

The eight pillars of Open Science – challenges and benefits

Open Science is an agenda which presents both challenges and benefits to the global academic community. LERU has examined each of the eight pillars of Open Science, as defined by the European Commission and the Open Science Policy Platform. More importantly, it has looked at the research cultures and insights of each of the 23 members of LERU and drawn conclusions as to the possible adoption of Open Science activities, or not, in research-intensive universities. Each university moves at its own pace and not all universities yet feel the need to adopt Open Science practices in all areas, especially where adoption in the rest of world is slow or even non-existent.

LERU does not stipulate a 'one size fits all' approach to Open Science for its members, nor indeed for the wider global family of research universities. There are both challenges and opportunities in the adoption of Open Science solutions. Perhaps the biggest challenge is the need for underlying cultural change in each institution to enable Open Science solutions to be adopted. Cultural change does not happen overnight. It is a process, not an event, one which the LERU Rectors have identified as a vital ingredient in the delivery of change.

That being said, LERU certainly recognizes a significant number of benefits which Open Science brings. The Ebola crisis of 2014-16 offers a stark warning for what can happen under the current 'closed' system of undertaking research and publishing results. At the launch of the Sorbonne Declaration[2] on research data management, Dr Simon Hodson Executive Director of CODATA pointed out that 65% of the data produced regarding the Ebola crisis was not shared, nor made available. Most of this data cannot be accessed directly at the record level. There is a lack of metadata (descriptive data about data) which allows research data to be discovered, aggregated

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2   Sorbonne Declaration: https://www.ucl.ac.uk/global/news/2020/feb/ucl-leads-launch-sorbonne-declaration-data-rights; last accessed 9 November 2020.

and integrated. Such an approach to research is disastrous, since it makes sharing, collaboration, or the pooling of resources impossible. It is unthinkable that, in the current covid-19 pandemic, the same mistakes should be made. The sharing of research data, findings and outputs is essential for society if a global solution is to be found. Open Data and FAIR data are the ideal mechanisms to achieve this objective.

High-level overview of the eight pillars in LERU universities

LERU has identified different challenges and benefits under each of the eight pillars. In terms of the future of scholarly publishing, there is little doubt but that this is the area of Open Science which is more developed than others in universities. Partly, this is because it has been driven by funder mandates like Plan S. However, it has also been encouraged by the positive experiences of Open Access Presses, established in some universities, and the impact of having their published outputs free at point of use.

High Level Messages (1)

- LERU members are committed to the vision of Open Science as part of the 'new normal'
- LERU members wish to speed up the transformation to Open Science, while concentrating on their priorities and needs. There is no 'one size fits all'
- Most LERU members have started their work in the area of scholarly publishing and can thus build on this experience to tackle other pillars of Open Science
- There are many benefits and challenges in adopting Open Science practices

In the area of FAIR and Open Data, progress is slowly building. There are clear benefits in sharing data, particularly in the time of the current covid-19 pandemic. Yet challenges remain. It is a significant culture change to move from the current landscape, where the sharing of data is not universally the norm, to one where it is. Reward and promotion schemes in universities need to change, if such Open Science approaches are to become the norm. Generally speaking, many funders recommend that research data should be FAIR and Open, but they do not yet mandate it. As for the European Open Science Cloud (EOSC), a tremendous amount of work remains to be done culturally and practically to enable the EOSC to engage with individual research-intensive universities. LERU has agreed to become an observer in the new EOSC Association, to help guide the future development of this ambitious project. This is crucial if the EOSC is going to serve the role of supporting global research to which it aspires.

In terms of skills development, LERU has assessed current skills training amongst its members, finding that while there is a strong offering from some universities there remains a great deal to do. Early Career Researchers are open to change and new ways of doing things, but the benefits of that change are not always obvious. The first Report on the formation of the EOSC underlined the need for half a million core data experts to deliver the vision of FAIR and Open Data.[3] That represents a sizeable investment in data skills, but the benefits of Europe doing so would help deliver a web of inter-linked Open Data available to all.

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3   EOSC: https://op.europa.eu/en/publication-detail/-/publication/2ec2eced-9ac5-11e6-868c-01aa75ed71a1, p. 12; last accessed 9 November 2020.

High Level Messages (2)

- Individual LERU members have models of best practice and have started to work on several areas of Open Science, e.g. scholarly publishing, Citizen Science
- Other areas are being addressed, but pose challenges in delivering benefits. e.g. Open Data, FAIR data, EOSC
- Further areas are beginning to be mapped and addressed in LERU institutions, e.g. Skills development, Rewards and Incentives
- Other areas have potential for further development, e.g. Research Integrity, Next-Generation Metrics

In terms of Research Integrity, the situation is more varied amongst the LERU universities. 9 of the 23 LERU institutions have a policy and appropriate training courses that relate specifically to research integrity with guidelines on Good Research Practice. In one institution, the guidelines are further developed into a Research Integrity and Good Research practice checklist. Online research integrity courses mandatory for first-year PhD students exist in 6 universities. These courses usually include research data management. Face-to-face research integrity training is often available centrally but with limited numbers of places available. This is often devolved to Departments or Institutes which offer bespoke training particularly for doctoral candidates. The LERU Advice Paper *Towards a Research Integrity Culture at Universities: From Recommendations to Implementation*[4] was published in January 2020 and has been endorsed by LERU. In particular, chapter 4 on Transparency is relevant for the issues of Open Science.

Rewards and evaluation are identified as key issues in the ability and wish of universities to move to adopt Open Science practice. Redefining criteria for academic assessment is not a simple top-down process. Involvement and support of the Faculty and the research community is essential. It is also important to note the differences between scientific domains in terms of very different traditions and cultures, e.g. in publishing. Universities have to decide what dimensions in the assessment are essential/common/required and what dimensions are optional. Broadening the assessment framework intends to acknowledge a diversity of contributions to research. Rewards and evaluation can be a national and a European issue. Differentiation and specialization is becoming even more important today in a context of community-based and team science and must be incorporated in a modern assessment framework. Individual research remains important in the areas of Social Sciences and the Humanities, being well embedded in relevant subject communities. It is important to understand the diversity here. Early Career Researchers understand that one of the outcomes of implementing Open Science approaches is 'better' – more robust, more transparent, reproducible – research which is grounded in openness and transparency. They are often interested in new modes of evaluation, but they are aware that many universities do not currently use such new forms of evaluation. Hiring committees may still focus on publication impact factors when filling Faculty positions. Research funders such as the Wellcome Trust are supporting this development by requiring institutional alignment with DORA as a condition of funding.[5] Next-Generation Metrics have a role

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4   LERU: *Towards a Research Integrity Culture at Universities: From Recommendations to Implementation* (2020), available at https://www.leru.org/publications/towards-a-research-integrity-culture-at-universities-from-recommendations-to-implementation; last accessed 9 November 2020.

5   Wellcome Trust: https://wellcome.org/grant-funding/guidance/research-organisations-how-implement-responsible-and-fair-approaches-research; last accessed 9 November 2020.

to play here and LERU universities are experimenting with new methods of evaluation based on DORA and the Leiden Manifesto.[6] By way of example in a wider context, the French CNRS bases its annual evaluation only on the publications available in Open Access in the national HaL archive. Nonetheless, the three areas of Rewards, Incentives and Next-Generation Metrics are issues which require very significant work and development in the Open Science landscape, if they are to become part of the 'new normal'.

The final pillar is Citizen Science. In some universities, Citizen Science is a new phenomenon. It presents both a series of challenges and opportunities in the Open Science landscape. There are similarities between Public Engagement and Citizen Science, but the two are not the same. Citizen Science is more directly focused on the lay citizen and civic organisations, and has a particular interest in research activity, not only informing but also empowering the lay citizen to work alongside professional researchers in projects which will benefit society as a whole. If Citizen Science is practiced in this way, universities have a significant opportunity to engage with society and to underline their value to the lay citizen.

High Level Messages from the LERU Rectors Assembly (3)

- LERU Rectors Assembly in November 2020 recognized the ongoing work as a 'milestone for LERU'
- Open Science is to be part of the 'new normal' going forward
- Activities should be prioritised and future work begin in the opportunities and challenges identified
- LERU members are transitioning from advocacy to the implementation of Open Science practices

Going forward

Going forward, the focus of the implementation process has moved to the local institutions and grassroot activities, dealing with prioritization and implementation activities[7]. A new Ad Hoc Open Science Ambassadors Group is the way to take this work forward. Each Ambassador will consider the needs of their university and the difference between the disciplines, urging for flexibility since one size does not fit all.

The Open Science Ambassadors are being appointed by their institutions to work with their university communities – researchers, staff, students, and policy makers – to advance work on Open Science in LERU. Each institution participating in the new Ad Hoc Group will autonomously decide on the structure, their way of working and the pace of implementation. The Open Science Ambassadors will work with their Rectors and operate as the contact between the institution and the Ambassadors' Ad Hoc Group in LERU. The LERU policy groups will continue to work on the details within their areas of expertise in conjunction with the Open Science Ambassadors. The latter will set up a roadmap to address the actions to be pursued.

LERU's journey to Open Science has thus entered a new phase and is being pursued in earnest.

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6   Leiden Manifesto: http://www.leidenmanifesto.org/; last accessed 9 November 2020.
7   Possible courses of action identified by LERU are summarised in the appendix.

Appendix - Possible courses of actions

Leadership

1. Lobby governments to make changes in university financing. Make changes to internal financial allocation models and develop long term strategies, and change HR systems accordingly

2. Appoint a senior manager to lead Open Science approaches across all eight pillars of the Open Science debate identified by the European Commission

3. Develop a programme of cultural change, which is necessary to support the changes in principle and practice which Open Science brings

4. Establish advocacy programmes, which should identify the benefits of Open Science approaches, whilst being realistic about the challenges

5. Draw up communication strategies for differing research communities which enable 2-way communication, sharing and the co-creation of agreed messages

Future of Scholarly Publishing

6. Review activity in delivering Open Access publishing options

7. Monitor implementation of Plan S in institutions

8. In the wake of Plan S, engage with academics to promote transition to OA

9. Advocate to decision makers and research funders the best approaches to delivering 100% immediate OA

10. Implement ways to advocate for and deliver Diamond Open Access

11. Show how open source software and related outputs complement Open Access publications and FAIR data

12. Set up an 'overarching' or 'umbrella' Open Access platform that essentially connects the individual repository archives by enabling users (essentially, all Internet users of the world) to search through institutional archives through a single search

FAIR data and EOSC and legal issues

13. Review activity in engagement with national implementing policies for Open Data Directive and Digital Single Market Directive (TDM aspect)

14. Collect and share best practice advocacy around implementing policies

15. Identify easy to use frameworks for assessing lock-in risks & toolbox for preventive measures

16. Review impact of DSM Directive on TDM practices; where necessary formulate and advocate improvements for 2026 EC review

17. Review impact of Open Data Directive on research sharing practices; where necessary formulate and advocate improvements for 2025 EC review

18. Use Dutch examples as a model for introducing Data Stewardship support services at institutional level, ushering in FAIR practice

19. Undertake a study on the (free) use of Open Data in universities by industry (and the possible commercialization of such data), including the original costs to universities of producing such data

Education & Skills

20. Raise awareness of Open Science policies and issues by Early Career Researchers

21. Establish a Research Ethics Officer

22. Review research ethics policies to ensure Open Science issues such as transparency and reproducibility are addressed and explained to Early Career Researchers

Rewards and Incentives

23. Review academic systems and models of financing and identify how Open Science and Next-Generation Metrics can use quantitative and qualitative approaches to monitor and project scenarios at all levels of the academic system
24. Review assessment framework in universities
25. Undertake work on the assessment of researchers
26. Reflect on Open Science change processes and incentivization
27. Review experience of changing assessment framework

Next-Generation Metrics

28. Survey use of bibliometrics as part of assessment practice in universities
29. Identify university policy positions on use of bibliometrics as part of assessment practices
30. Formulate advice paper/statement on the role/non-role of alternative metrics to guide best practice

Research Integrity

31. Map out and identify all areas of Research Integrity and how Open Science impacts on them
32. FAIR data principles imply that raw data, on which conclusions are based, should be made available to other researchers. Work should be done to advise on why this is important from the perspective of research integrity, and also the challenges in doing so. This work should include quality processes for accessing and exchanging research data
33. Define as clearly as possible in which cases limitations on sharing raw data are justified and how to prevent confidential data from being made public
34. Open Science case studies (dilemmas) could be collected in which integrity issues are at stake. When described and analysed, these could deliver important information for further developing Open Science policies
35. Identify how Open Science could help stop unethical behaviours in areas such as ghost authorship, omitting authors from research outputs despite their substantial contributions, unethical peer review behaviours, plagiarism and theft of ideas
36. Universities should provide guidance on the (free) use of research data in OA produced in universities by industry (and their possible commercialization) and the generated costs for universities

Citizen Science

37. Embed Citizen Science into institutional strategies
38. Adapt appointments, promotion and reward criteria to embrace Citizen Science activities
39. Appoint a Single Point of Contact for Citizen Science at a senior university level
40. Assess how citizen scientists can receive training/use university platforms to pursue Citizen Science activity
41. Identify progress at institutional level to track the pace of the cultural change necessary to deliver Citizen Science

About LERU

LERU was founded in 2002 as an association of research-intensive universities sharing the values of high-quality teaching in an environment of internationally competitive research. The League is committed to: education through an awareness of the frontiers of human understanding; the creation of new knowledge through basic research, which is the ultimate source of innovation in society; the promotion of research across a broad front, which creates a unique capacity to reconfigure activities in response to new opportunities and problems. The purpose of the League is to advocate these values, to influence policy in Europe and to develop best practice through mutual exchange of experience.

LERU publications

LERU publishes its views on research and higher education in several types of publications, including position papers, advice papers, briefing papers and notes. LERU notes are short, timely statements providing concise analysis and specific advice in response to a pressing issue related to European research and higher education policies. They are often a product of LERU's standing engagement with certain issues and a result of intensive consultation among experts from the LERU universities.

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