

ERA-CAPS's **FREIA VAN HEE,¹ PAUL WILEY,² VASCO VAZ³ AND PAUL BECKERS⁴**
 OUTLINE HOW DATA SHARING CAN HELP PUBLIC FUNDING FOR MOLECULAR
 PLANT SCIENCE ACHIEVE A GREATER IMPACT

Data sharing for greater impact

The ERA-Net for Co-ordinating Action in Plant Sciences (ERA-CAPS) is funded through the European Commission's Seventh Framework Programme. It comprises 18 partners and seven observers made up of research councils, funding agencies and ministries responsible for plant science. Since its onset in 2012, the ERA-CAPS network has set itself the ambitious goal of making significant progress towards identifying and adopting common principles of data sharing and Open Access in molecular plant science.

In March 2014, a major milestone towards this objective was achieved when a data sharing policy common to all ERA-CAPS funding partners was adopted. From that point on, the policy was incorporated into the conditions of grants awarded through the ERA-CAPS joint programme and applied to the data generated by the funded research projects. The sharing of raw data and associated metadata facilitates the reuse, reintegration and repurposing of these data.

As such, the ERA-CAPS network of funding bodies wants to encourage the development of new knowledge and research directions in molecular plant science and ensure that maximum impact is achieved from the grants provided by its partners (which are public funding bodies from Europe as well as from the USA, New Zealand and Israel).⁵

Common principles and best practices

The acceptance of a data sharing policy among the ERA-CAPS partners did not come about in one day and was preceded by a process of information exchange and a mapping exercise of existing policies in order to reach a common understanding of what data sharing entails and how it is best implemented.

A first finding of the mapping exercise was that a significant number of policies on the sharing of research data already exists at the institutional, national and international levels. These have been issued by research funders, ministries and agencies across the European Research Area (ERA) and beyond. Even when there was no implemented policy, the issue was well acknowledged in the majority of partners, and some were in the process of designing or implementing future policies.

The aim of ERA-CAPS was not to replicate such policies, but rather to consolidate and identify best practice from these policies while still looking for underlying common principles that could be used to frame ERA-CAPS's own policy. The ERA-CAPS partners were therefore surveyed about their relevant policies, which resulted in a wide range of practices

and solutions. When existent, the policies reflected the environment for which they were designed, often containing very specific recommendations or constraints which could not simply be translated into general terms.

A very small (but increasing) group of ERA-CAPS partners already had well-developed data sharing and/or management policies in place, with very specific requirements such as the obligation to deposit research data and its associated metadata in a given repository within a given timeframe. There were even identified cases of organisations and countries that either provided or indicated a suitable infrastructure to enable researchers to comply with data sharing requirements.

Other partners published less specific data sharing requirements, usually consisting of the presentation of a simple data management plan with no predetermined format, giving researchers some leeway in the best methods or procedures to share their data while allowing them more time to develop a sharing culture.

It was found that a considerable group of partners still didn't have, and sometimes didn't

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even expect to have in the foreseeable future, any kind of requirement concerning the management of data resulting from the research projects they fund. This showed that the sense of urgency towards this subject varies greatly among the different ERA-CAPS players.

Nonetheless, a few common principles have surfaced, such as the view that publicly funded research data are a public good and should be openly available, the importance of interoperability, the need to respect subject-specific standards, and the need to abide by ethical and legal standards.

The policy that was finally adopted by all ERA-CAPS partners was not the 'common denominator' of practices among all identified policies, but rather a 'best of', whilst also incorporating the common principles of the individual policies to the maximum possible extent.

Data sharing policy

The ERA-CAPS data sharing policy requires that researchers applying for funding to the ERA-CAPS joint calls provide a data sharing and management plan (DMP) alongside their application.⁶ The quality of the plan is taken into account during the review process.

Once the collaborative research project has started, a data officer is designated to oversee the execution of and compliance to the DMP. If the DMP foresees self-archiving of the project's data in an online repository, then this must be publicly maintained and conform to the OpenAIRE Guidelines for Data Archives in order to address questions of long term preservation and data quality assurance.⁷

The DMP should address several topics, including the volume, type and content of data that will be generated; the standards and methodologies that will be adopted for data collection; information on ethical issues and intellectual property and access rights, as well as managerial aspects such as whether/how the data will be exploited or made accessible for verification and reuse, and how they will be curated and preserved.

ERA-CAPS acknowledges that molecular plant science includes many different research subareas with specific associated methods, techniques and traditions. Therefore, there is also a wide variety of data, data types and handling methods. This is why the ERA-CAPS data sharing policy is purposely flexible and not overly prescriptive so as to embrace this complex and multifaceted reality, which is further complicated by the fact that participants are operating within an international setting, subject to different legal constraints from country to country.

Finally, the ERA-CAPS network provides a set of guidelines based on general best practices that should be observed by the scientists when elaborating the DMP. To further encourage the spirit of openness and sharing of research outputs, ERA-CAPS-funded researchers are recommended to publish their research results in an Open Access format, either by directly publishing in an Open Access journal or by depositing the research article in an Open Access public repository. Here, the different existing rules at national/regional level in terms of open access to publications must again be respected.

H2020 open data pilot

The ERA-CAPS data sharing policy is very much in line with the guidelines on data management in Horizon 2020. Proposals submitted to the competitive calls for collaborative research and innovation projects in H2020 are invited to include a section on research data management, if relevant for their planned research, which is evaluated under the criterion 'Impact'.⁸ In this respect, the European Commission provides applicants with a DMP template as well as additional guidance. Although the provision of a DMP is highly recommended, it is not mandatory under H2020, as opposed to the ERA-CAPS policy, where the provision and compliance to a DMP are mandatory, as elaborated above.

When it comes to open access to research data, the Horizon 2020 programme is somewhat more ambitious; it launches a limited pilot action which aims to improve and maximise access to, and reuse of, research data generated by projects. The so-called 'Pilot on Open Research Data' will be monitored throughout Horizon 2020 with a view to further developing EC policy on open research and applies to about 20% of the overall H2020 budget in 2014 and 2015.⁹

Next steps

The open sharing of research data between plant scientists (and, indeed, all researchers) requires data to be in a format that makes them easily accessible and reusable by others. This is facilitated by the use of data standards; however, the existence and maturity of such standards in different areas of molecular plant science vary considerably. In some areas, such as genomics, standards have existed for many years and are widely accepted and used by the research community. Newer areas of plant science, such as phenomics, are developing faster than the standards that might be applied to the data generated by these emerging fields.

Data standards have been identified as an area that ERA-CAPS can begin to address. To this end, ERA-CAPS has established an expert working group of plant scientists to identify the major data issues that face the different plant science communities and to develop a roadmap giving possible solutions to the problems that could be taken forward by funders at the national, European and international level.

The data sharing and management plans that have been received as part of ERA-CAPS's second call contain an interesting sample of the current best practices and variety in the management of relevant data areas, types and quantities. The content of the DMPs will provide useful input to the roadmap in the context of a consultation of the plant research community that is scheduled for winter 2014. The publication of the roadmap is envisaged in spring 2015.

Second call

Other than the progress on common principles of data sharing and Open Access in molecular plant science, the ERA-CAPS network is looking forward to the outcome of the second ERA-CAPS call. The call was launched earlier in 2014 and was an overwhelming success in terms of applications and geographical coverage: 142 pre-proposals were submitted by more than 600 research groups from 29 different countries – mostly from Europe but also including New Zealand, Israel, USA, China, Saudi Arabia, Australia and Chile. This constitutes a token of the attractiveness of the ERA-CAPS programme in support of high quality collaborative transnational research in fundamental molecular plant science.

A recent highlight was the grant holders' workshop in June 2014 at which scientists funded through the first ERA-CAPS call presented their research projects publicly for the first time. At this occasion, Professor Wilhelm Grissem, president of the Global Plant Council and member of the ERA-CAPS scientific advisory body, stressed the need to organise the scientific community towards adhering to the same standards for data collection, storage and exchange.

The Global Plant Council defined the management of knowledge data and resources as one of the main global challenges that lies ahead of us in view of tackling the societal problems that we are currently facing in feeding a growing population, mitigating the effects of climate change and reducing our reliance on fossil fuels.¹⁰ Ensuring that all individuals, scientists, policy makers and farmers are able to make decisions based on the most up-to-date evidence and information will require the establishment of appropriate digital and physical infrastructures to promote the exchange of knowledge, ideas, data resources and best practice in person and online.

Other on-going activities of the ERA-CAPS network include the establishment of an online plant science database containing information on research programmes, institutions, infrastructure and individual researchers in the field per country.

Last but not least, the sustainability of the ERA-CAPS programme beyond May 2015 (the end of FP7 funding for ERA-CAPS) is high on the network members' agendas.

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⁵ ERA-CAPS's view on research data is informed by the overarching principles declared by the OECD in its 2007 publication 'Principles and Guidelines for Access to Research Data from Public Funding', available at: <http://www.oecd.org/sti/sci-tech/38500813.pdf>

⁶ The full text of the ERA-CAPS data sharing policy can be viewed at: <http://www.eracaps.org/news/era-caps-network-adopts-common-data-sharing-policy>

⁷ For more information, please refer to: https://guidelines.openaire.eu/wiki/OpenAIRE_Guidelines:_For_Data_Archives

⁸ See the 'Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020': http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf

⁹ Idem.

¹⁰ The views of the Global Plant Council on knowledge data and resources are also available at: <http://globalplantcouncil.org/challenges/knowledge-data-and-resources>



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