Bringing synergy to better data management and research in Europe

Lesson 1: What is Open Science?

Introduction

Pedro works as a researcher in Spain. For years he has been investigating the effects of artificial intelligence on human beings. On the other side of the continent, Anna, a Polish researcher is developing a new software to detect and treat human viruses.

Just like most researchers, Pedro and Anna create and use numerous data by conducting lab experiments, doing surveys, and observing people. Together, they are investing a lot of time and energy in pursuit of scientific research. Their findings have the potential to improve and save thousands of people's lives and make new discoveries.

However, do other researchers and the public really know of the valuable work Pedro and Anna are doing? And are these two researchers being recognized for their hard work? And are Pedro and Anna making the most of the resources out there? Let's explore these issues deeper by discussing Open Science and why it is relevant for researchers like Petro and Anna, and you.

What is Open Science?

We can define Open Science as a movement to make scientific processes more transparent and results more accessible. But how do we get there? Building a more replicable and robust science requires researchers to share their code, data, and research papers with the rest of the world. In other words, Open Science is about 'openly creating, sharing and assessing research, wherever this is viable' (Kramer & Bosman 2018), and it can be done prior, during and after research.

The origins behind the movement reach back to the 17th century with the first publication of academic journals. Ever since there has been a growing drive to share scholarly resources across different research disciplines, and an increased transparency for greater efficiency, rigour, accountability, sustainability for future generations, and reproducibility of research (https://book.fosteropenscience.eu).

Beginning around 2010, a number of ethical cases emerged on the surface questioning the integrity of scientific practices among researchers (Spellman, Gilbert & Corker 2017). Unsettling concerns about fraud, data manipulation, and selective reporting of results have led to the formation of the current Open Science movement.

As a result of the growing pressure for transparency, many research academies and governments now require publicly-funded research to be shared more openly, for instance via open access. In addition, a significant number of scholarly journals also require or reward some Open Science practices such as pre-registration, providing full materials, and posting data etc. (Spellman, Gilbert & Corker 2017).

So why should Pedro and Anna care about Open Science? And why should you? Let's look closer.

There is solid research evidence showing numerous benefits for researchers of making their data open and sharing it with others, such as:

● Increased citation rates and getting noticed (McKieranan et al 2018)
● Better publication productivity (McKieranan et al 2018)
● Higher impact of scholarly articles (Tennant et al 2016)

- Fewer errors in final articles (Tennant et al 2016)
- New opportunities to connect with others (McKieranan et al 2018)
- New research questions arise that can only be answered by combining different datasets (Tennant et al 2016)
- Better documentation and reproducibility, especially when data are stored in trustworthy digital repositories (McKieranan et al 2018)
- Lower costs of performing research as open data allows researchers to better estimate what is happening in their fields (Tennant et al 2016).
- Meeting funders' requirements (McKieranan et al 2018)

In addition to helping researchers do better research and be more transparent, another well-established Open Science practice called open access. Open access, as defined in the Berlin Declaration, means unrestricted, online access to peer-reviewed, scholarly research papers for reading and productive re-use, not impeded by any financial, organisational, legal or technical barriers. Ideally, the only restriction on use is an obligation to attribute the work to the author (WhiteRoseBrussels 2018).

There are a number of wider academic, economic, and societal benefits of open access. Some of these benefits are (Tennant et al 2016):

- Research articles are covered in news media and social media
- Open research articles help entrepreneurs and small businesses boost innovation
- Open access supports lifelong learning making research material accessible to anyone with the Internet connection
- Open access levels the playing field between Global North and Global South, and increases fair competition and the scientific potential of the Global South
- Open data potentially has a great economic value by creating new jobs for analysis and re-use of these data

So, what's next? Join the movement, and engage in Open Science practices now! How can you do that? Follow the tips below: (McKieran et al 2018: 12; Masuzzo & Martens 2017)

- When possible, use and cite existing public data.
- Whenever feasible, share your research data through trusted repositories.
- If you use software code as part of your research cycle, release the code and the environment needed to run in.
- Post free copies of your research articles online.
- Post pre-prints of your research manuscripts in publicly accessible trusted repositories.
- Publish in open access venues whenever possible.