How to be an open scientist

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This is a collaborative project developed by doctoral candidates of the University of Camerino in the context of the Transferable Skills Training Week under the guidance of Dr. Karen Vandevelde.
Outline

1. What is Open Science?
2. Managing your data as an Open Scientist
3. Opening your source code when you develop software as an Open Scientist
4. Involving the general public as an Open Scientist
5. Collaborating with other researchers as an Open Scientist
6. Sharing your research results with the general public as an Open Scientist
7. Sharing your research results with scientific colleagues as an Open Scientist
8. Finding help and inspiration as an Open Scientist
**What is Open Science**

*Open Science* is an academic movement to make scientific research projects, data, and results freely accessible to all levels of society, amateur or professional.

For centuries, scientists have collaborated, shared source material, and communicated results. The internet and new business models for the dissemination of scientific results have created new opportunities but also new challenges.
Under Carlos Moedas, European Commissioner for Science and Innovation, Open Science has become a policy priority in the organization and funding of scientific research.
Managing your data as an Open Scientist

Are there advantages?

- Real-time contribution of anyone involved in relative research development
- Immediate availability of results and innovations
- Sharing of knowledge beyond small research groups
- Promotion of collaborations
- Avoidance of useless replications of work
Managing your data as an Open Scientist

How can we do it?

- Data management protocols
- Data repositories
- Intelligent access and interoperability
Managing your data as an Open Scientist

What tools do we need?

A document organized to help researchers understand and solve open data issues makes data more discoverable and open to all readers.

Examples include:

- A Data Management Plan (DMP) template from “Horizon 2020”

- EOSC (European Open Science Cloud)

- Figshare
Managing your data as an Open Scientist

Example of active open scientists:

EEE Monitor-DQM

- Special research activity collaborating with CERN, INFN, and MUIR

- Researching the origin of cosmic rays
Managing your data as an Open Scientist

**Disadvantages**

- Industry stipulations
- Highly sensitive data
- Military data, religious or political preferences, and medical conditions
- Researchers must respect the privacy of individuals
Opening your source code

In the current internet age there is a greater need to be connected with scientific collaborators to

- *Increase the development-time*
- *Utilities, applications, and programs.*

The aim of this increased connectivity is to provide easy collaboration in order to share research methods, data and results.
Opening your source code

Why should you?

- Personal interests
- Community contribution and research work
- Agile development (quick software development using source code template)
- Benefit for society, developing countries, NGOs
- Evaluation of particular technologies, concepts, programs, behaviours, before trying/promoting them in real environments
- Commercial reasons
- Inspiration and Community support
- Multi and interdisciplinary research
Opening your source code

How can we do it?

- Community of practice and networks
- Define role and access
- Define the licenses for sharing the source code
- Validation of source code
- Define the right methodology for sharing code
- Provide data for testing source code.
Opening your source code

What tools can we use?

Now there are a lot of tools and platforms for sharing codes, even if they are just basic repositories and not semantic repositories

- Github
- Jupyter
Opening your source code

Example of open source codes:

1. Apache License 2.0
2. BSD 3-Clause "New" or "Revised" license
3. BSD 2-Clause "Simplified" or "FreeBSD" license
4. GNU General Public License (GPL)
5. GNU Library or "Lesser" General Public License (LGPL)
6. MIT license
7. Mozilla Public License 2.0
8. Common Development and Distribution License
9. Eclipse Public License
Opening your source code

**Disadvantages**

- Maintaining source code
  
  *Answer community questions and fixing bugs*

- Security and safety responsibilities
  
  *Who takes the responsibility?*
  
  *How are virus attacks dealt with?*

- Commercial issues
  
  *How can everyone access and benefit?*

- Lawfulness and specific country regulations
Involving the general public

**Benefits**

There are many interested members of the public sphere

“Citizen Science” represent an often unconsidered resource

Data can be generated on a much larger scale
Involving the general public

How can you do this?

- **Traditional media** (tv, radio, newspapers, magazines)
- **Science communication** (conferences, scientific “cafès”, events in science centres, etc)
- **Science education** (for teachers and students of any age)
- **Social media** (including blogs, apps websites, web radio, etc)
- **Citizen Science** (involving the general public in collecting data, interpreting results, etc)
- **Stakeholder engagement** (involving key stakeholders such as patients and users throughout the research process)
Involving the general public

Some tools and good practices to get inspired:

- Open Air Laboratories (OPAL), [http://www.opalexplornature.org/](http://www.opalexplornature.org/)
- Citizen Scientist Salford, [http://www.citizenscientist.org.uk](http://www.citizenscientist.org.uk)
Involving the general public

Any reason why not?

- Have more data of lower quality
- Increasing the scale of science will make verification of any discovery more difficult
Collaborating with other researchers

“Two heads are better than one”

The leading idea that pushes researchers to collaborate for their projects
Collaborating with other researchers

How can you do this?

1. Defining the common field of the research. A group must discover what they have in common: Problems, Methodology applied to different topics, Subjects etc.

2. Each member has to show their competences about the topic and allow others to have access to skills.

3. Members should give their availability to ease the interdisciplinary analysis of the various aspects of work through a continuous dialogue among them.

4. The research team has to choose the language of the activities; to define the topic of work, the deadline of publication, the way of monitoring the phases of work through the suitable tools (like sharing software).
Collaborating with other researchers

What tools can you use to do this effectively?

- Google Drive
- Dropbox
- EOSC Pilot
- LOOMIO
- Collabtive
Collaborating with other researchers

Interdisciplinarity: related aspects and problems

Interdisciplinary work consists in the contribution of different disciplines. Therefore it is necessary, within a collaborative relationship, to develop guidelines that can act as a catalyst for structuring the various contributions within a unitary discourse.

Problems:

- *Failure to harmonize specific disciplinary languages.*
- *Possible lack of interaction between researchers from different fields who deal with the same problem.*
- *Possible competition for the acquisition of professional and economic advantages.*
Collaborating with other researchers

Any reasons why not?

We all know good ideas are hard to come by, making them an attractive target for poachers. Maybe other researchers will capitalize on your ideas, while you work hard to collect the data?

We encourage everyone to share ideas freely. But in some cases, theft of academic ownership does occur.

In general, it is necessary to follow these ways to choose collaborators:

1. Find trusted people you can work with
2. Work together to establish shared goals and develop routes to achieve them
3. Have the difficult conversations early (i.e.: Authorship, Roles, Outcomes)
Sharing research results with the general public

Sharing research results is critical to inform the general public of ongoing scientific research in order to:

- Justify the importance to fund general research with public money.
- Communicating with the public sphere helps increase opportunities for policy makers to support general science
- Engage with young people to foster interest in Science
- Maintain public trust and to avoid misunderstandings.
Sharing research results with the general public

How can you do this?

In order to do this our method should fulfil the triple A rule: Availability, Attractiveness, and Application.

- Involve as many people as possible we should use freely available communication tools and media.
- Make the subject of the research attractive for a general public, far from the research field. To do that, explanations should be simple and intuitive.
- Apply appropriate language, avoiding difficult scientific terms and keeping in mind that your target may be a novice.
Sharing research results with the general public

Any reasons why not?

- Widespread access to social media is not always used in good faith. Often used as a tool to spread sensationalism rather than accurate information.
Sharing research results with the general public

What tools can you use to do this efficiently?

Digital Media
- Social Media Sites
- Scientific blogs and websites

Local Exhibitions
- Science nights at museums
- Science Caffes
- Leading workshops

Traditional Media
- Newspaper
- Magazines
Sharing research results with the scientific colleagues

Why?

“Open Science is changing certain aspects of scientific publication practices to become more open, inclusive and interdisciplinary. Ensuring Europe is at the forefront of Open Science means promoting open access to scientific data and publications alongside the highest standards of research integrity” (Wilsdon et al., 2017)
Sharing research results with scientific colleagues

How can you do this?

The traditional journal publishing model is very powerful. However, things are changing in the world of scientific peer-reviewed articles; so, we need to follow digital methods like:

- **GREEN ROAD TO OPEN ACCESS = “self archiving”:** Scientists publish in a traditional journal but archives (opens) a publication in an openly available repository.

- **GOLD ROAD TO OPEN ACCESS = Scientists publish in an Open Access Journal, a freely available electronic journal. Sometimes there is a publishing fee.**

**HYBRID ROAD:** pay the APC (Article Processing Charge) to open an article in a subscription journal.
Sharing research results with the scientific colleagues

What tools can you use to do this effectively?

Designing institutional policies to:
Create awareness options for publishing
Promoting the advantages of open science
Rewarding to incentivize inclusivity
Some good practices to get inspired by:

-Demanio Marittimo: http://www.mappelab.it/demanio-marittimo-km-278/
A 12-hour marathon - from sunset to dawn - devoted to contemporary architecture and art on Marzocca beach (Senigallia) open to everyone. A night of talks, debates and performances by prominent architects and artists.

-PhDCup: http://www.phdcup.be/publieksprijs
A competition among PhD candidates aimed at sharing their research with the general public.

-TED talks: https://www.ted.com/
Influential videos from expert speakers on education, business, science, tech and creativity, with subtitles in 100+ languages.

-OMT travelling exposition: www.omt-etn.net
Travelling exposition: build a device (videogame for example), that everybody can use.

-Serpentine Pavilion: http://www.serpentinegalleries.org/explore/pavilion
The Serpentine Gallery in Kensington Gardens (London) commissions a temporary pavilion by a leading architect.
Sharing research results with the scientific colleagues

Any reasons why not?

**Plagiarism** can occur in many different forms: copying totally or partially papers or publications without declaration of the sources information origin; appropriating colleagues’ results, graphics, figures or tables; “paraphrasing” sentences or parts of other works without acknowledgement.

Falsification of data cannot be justified because the researcher must always be unbiased and true with data.
Finding help and inspiration as an Open Scientist

When you are part of a new movement, it can be difficult. Sometimes you feel as though you are swimming against the stream. Few people recognize the value of what you are doing, or you might want to take a particular approach and don’t quite know how to do it. There are many people, documents and websites that can help you - inside and outside the University of Camerino!