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Open Research Case Studies: Interdisciplinary Research Centres

Table of Contents

Open Research Case Studies – The Astbury Centre for Structural Molecular Biology with Charlie Scarff

Can you tell me about the research at the <u>Astbury Centre</u>?

The Astbury Centre is fantastic because it brings together people from all different disciplines, such as chemistry, biology, medicine, and physics, who are all interested in understanding the molecules of life. My research embodies Astbury because I look at the molecules of life, using various techniques. We are working out the structural basis of inherited heart disease. For example, you may inherit a faulty copy of a protein that forms part of your heart muscle, and this leads to the development of disease. We try to understand why and how. We want to know what's going wrong with the protein, its structure, and its function. We use the Astbury Biostructure Laboratory and the Mass Spectrometry Facilities in FBS and take advantage of the excellent collaborative opportunities that the Astbury Centre provides.

What does open research mean to you?

Open research means that research is available and transparent to all, including the members of the public and scientists alike, and anyone can access what we are doing and review it.

How does research use open research practices?

I'm a structural biologist, and we do a lot of electron microscopy and upload all data to a central database. Once we publish it, it is accessible to everyone to manipulate it how they like. Similarly, we do mass spectrometry research as well. I've shared data and will continue to do so on appropriate data depositories.

How do you deposit your work?

I use Symplectic, ORCID, ResearchGate, and LinkedIn, and I ensure all manuscripts I can are uploaded as PDF files. I also check Twitter for new research, which is posted there immediately.

In your field, have you found it difficult or easy to identify other people's open research practices?

We discuss open research practices: it has come up in reviewing things before and has led to recent changes in the field because cryogenic electron microscopy is a fast-growing area, and the depositing methods have grown. In the past, there wasn't a process or ability when you submit a paper to supply all data so that the reviewers could see it.

Now, there's an emphasis on the field being as open as possible and uploading all information to a shared site, so you can access and see all that went into producing the research. When you only have snapshot views of figures and not the actual raw data, you cannot adequately review a publication. There has been a move in the field to change the depository process, and journals are asking for more and more information to be uploaded, so it's very transparent, which is very good for everyone.

Charlie Scarff on Google Scholars

How does open research inform your teaching?

I use open-access articles, open data, and preprints also for teaching.

Do you use preprints?

I'm a new group leader and haven't gotten to the point of depositing my own preprints yet, but I intend to. I have done it in collaboration with people in the past, and I think it's good. I read them too.

Do you have concerns about preprints?

I'm a new group leader and haven't gotten to the point of depositing my own preprints yet, but I intend to. I have done it in collaboration with people in the past, and I think it's good. I read them too.

Has your attitude toward open access changed in recent years?

I don't think so; I'm a strong believer that the more you share, the more you learn.

Have you had open-access work published?

I had both gold and green open-access articles, and I want to publish as openly as possible.

In your opinion, what is the current state of open access in your field?

It is very forward-looking; there are a lot of preprints on bioRxiv, and the idea of open access is very important. Although most research is UKRI-funded, so it has to be open access.

Are there any negative attitudes toward open access you have come across?

The only issue is the costs: the journals are charging large amounts of money to make publications open-access when we are submitting the works for review.

What does data mean in your field?

Data is anything obtained following a scientific method.

How do you manage your data?

Most of our data is stored on secure University servers, which we pay for out of our grant income. It's challenging since we are generating large amounts of data, which is getting more costly, and the University systems aren't necessarily set up to cope with that.

Do you use open data?

I have used open data in the past, I downloaded it and then looked at it to compare it with some of our data and see what differences there are.

Have you deposited datasets with Leeds's data repository or elsewhere?

Yes, I have deposited datasets in [EMDB](#) – the electron microscopy data bank. I haven't used the Research Data Leeds Repository yet. In line with my data management plan, I will upload my data to a suitable public repository following publication, and if there isn't one, it will go to Leeds's Repository.

What resources do you require for implementing a data management plan?

I used the funder's guidelines as well as resources from the Leeds research data management team. First, I made it myself, and then I checked it with the RDM team who confirmed that it met all funder's requirements.

What kinds of software do you use for your research?

I use mass spectrometry software for interpreting and processing data and electron microscopy software, most of which is open source. I use Python for coding and data visualisation packages, like Chimera and Prism - GraphPad. I also use lots of specialist software like Adobe Illustrator for making figures.

Have you encountered any licensing issues or obstacles when adopting software developed by the private sector (non-academic)?

I've had to obtain licenses, but I haven't had any problems. Much commercial software has an academic licence or a trial, which is fantastic for us.

Do you use open codes?

We don't write our own codes but might use somebody else's and adapt them, so we certainly use GitHub to download codes and use them and maybe adapt them for our purpose.

Open Research Case Studies – Bragg Centre for Materials Research with Christopher Marrows

Can you tell me about the research at the Bragg Centre?

In my group, in both the School of Physics & Astronomy and the Bragg Centre, we are interested in spintronics, which is using magnetic materials to create all kinds of new microelectronics. Both the School of Physics and Bragg Centre are very diverse, and so, I wouldn't like to think that what we do represents all of the activity in either of these organisations because people are working on many different material systems or even approaches to our topic. We are a Physics group doing quite discovery-based research. My colleague next door is a computational physicist, and he has a very different approach to code and data.

What does open research mean to you?

In the last ten to fifteen years, open access publishing, then in the last five years or so, open datasets became a requirement by funders. These are now mandated by pretty much all our funders and the University. If we don't publish in an open-access journal, we have to use the University's White Rose repository to put manuscripts there. We have put our data in the data repository as well. In the physics community, we have used arXiv.org for quite a long time, even before these requirements came along. We often put our manuscripts on the arXiv; that's almost become another journal.

How do you deposit your work?

I'd say we very often use arXiv, and then we use Symplectic because that's what the University makes us do.
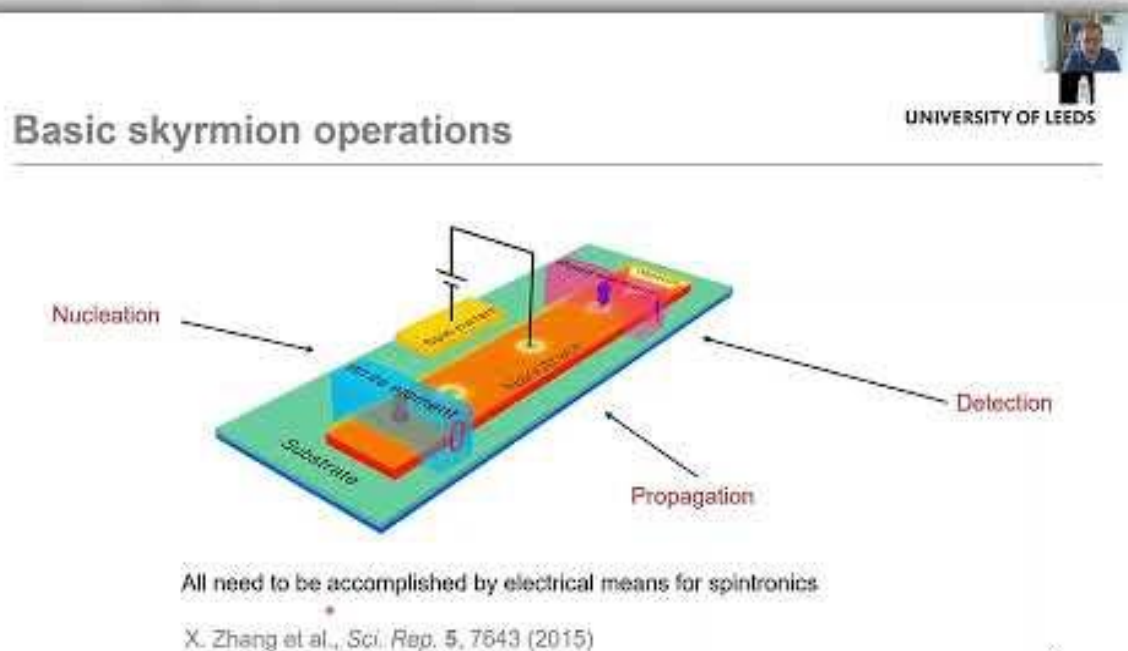
In your field, have you found it difficult or easy to identify other people's open research practices?

Most people in our field are used to the arXiv because it's been around for fifteen to twenty years. When you have a funded project (at the moment, I am in a few funded projects), the funders have stipulations about the way you have to make your research open. I thought because UK funders mandated it, at the University of Leeds, we were well ahead of the curve in terms of having repositories set up to use. We were in these consortia, and they were saying we have to make all our data open.

How does open research inform your teaching?

I'm not sure if it informs it any differently than any other kind of research.

Christopher Marrows, University of Leeds, United Kingdom - TMAG2020- AD-04

Basic skyrmion operations

All need to be accomplished by electrical means for spintronics

X. Zhang et al., Sci. Rep. 5, 7643 (2015)

Do you use preprints?

It's very common in our field to use the arXiv, where we often put our research because we want our colleagues to see it, and it creates priority: if you get something on there, you get a date when you did that. It's also where you naturally go to find out what's going on: it's common to go to conferences and see talks, and people will say you can read this manuscript on the arXiv.

In a very hot field, preprints were appearing almost day by day, and it was almost like reading a newspaper. That's where you would find what the latest thing was in those fields. I think we are very used to using arXiv now, and that is how you communicate with your peers.

Do you have concerns about preprints?

Not too many. I have colleagues who don't like to put things there until it's been accepted for publication, but I know other colleagues think we need to get something on arXiv straight away to get priority. I probably lean a bit more towards that. Once you put something on there, it's public, you have to make sure it's ready for that, but otherwise not so much concern.

Has your attitude toward open access changed in the recent years?

I don't think I haven't completely digested it. It's hard to argue against the idea that publicly-funded research should be publicly accessible. In our field, people want to be in the most famous journals, so they tend to be well-established journals; they often have traditional subscription models. There are a few high-profile open-access journals like Nature Communications, which is an obvious one, and New Journal of Physics (published by the

Institute of Physics), and the American Physical Society's journal [Physical Review X](); they are well-respected.

There is a bit of a concern that there is a large number of low-quality predatory open-access journals, and they tarnish the idea of open access a little bit because unless you are in the field, you will not know what's reliable. The general public, who open access is meant to be for, will find it hard to discriminate, so that is a bit of a worry. I know which journals and which groups have a good reputation. But if you were outside the field, particularly if you haven't got a scientific background, it's hard to tell.

"I have colleagues who don't like to put things there until it's been accepted for publication, but I know other colleagues think we need to get something on arXiv straight away. I probably lean a bit more towards that. Once you put something on there, it's public, and you have to make sure it's ready for that, but otherwise not so much concern."

In your opinion, what is the current state of open access in your field?

I think people tend to first try and go for the famous journals so that their results will be visible, then worry about whether it's open access or gold open access or not later because we have to do either gold or green. After all, that's what our funders make us do. It doesn't seem to have been a problem with paying the access charges, you write to the library, and they say they will cover it. They've never refused us when we have gone for open access.

But I think in our field, most people want to be in a well-known journal that we know our colleagues read, and if it's gold open access, that's fine, and if it's not, we go for the green route. As I say, in our field we use arXiv very frequently, so which open access route is used by the journal the publication lands in, in the end, is perhaps not that big a concern.

Are there any negative attitudes toward open access you have come across?

When I came of age as a scientist, open access was just starting to get going. People who are older than me tend to be a bit more suspicious of it: there is this idea of your pay-to-publish, sort of vanity publishing. I think for people who are starting their careers now, open access is just the natural order of things.

What does data mean in your field?

In our lab, data is what comes out of an instrument where we've measured something.

How do you manage your data?

We have a group server, and we insist that all our students and postdoctoral researchers keep a primary copy of the data on that server because we know it's backed up and well-managed. They can take a copy on their laptop if they want to work on it, but we have had cases where the student hasn't got a copy on the server and their laptop breaks, then it would be a problem. I mean, that's the main way we do it: we have our server and we insist that there is a copy of everything on there.

Do you use open data?

Well, we do because we have to; funders mandate it. When we publish something, we have to put the dataset into the University's repository. I have no idea if anybody ever looks at it, but we have to do it. I have never had a need to use other people's datasets, so it is only the open data we generate.

Have you written a data management plan?

I don't know beyond saying, this is what we have to do. We have followed them when we've been inside an EU consortium; it has to be part of the proposed project. We don't handle sensitive data, certainly not personal data, because we study little bits of metal, and they don't have any rights. Occasionally, we do commercially confidential research, but most of it's not.

It's more about making sure you can access the data when someone leaves the University and have all the metadata that goes with it. It's difficult to do because when you have a dataset from some of a lab, you need so much metadata and often tacit knowledge to understand it.

What restrictions did you have in working with commercially sensitive data?

We'd have to have agreed that we'd all gone public with it and make the data open. If we didn't publish, then that would be an issue, which doesn't arise until you are at the publishing stage because our server is a private server that only our group can see, probably some people in IT.

There is nothing really different at that point, only when you decide to publish a paper or make a conference presentation, and you have to make sure everyone is happy with what is in it before you go public.

What kinds of software do you use for research?

Lots of different ones. Some of our instruments have proprietary software that comes from the vendor. We have a big base of lab code that we run our instruments on, but that's going to have to end because of what's happening with the price of LabView licenses.

It is common to use OriginLab for standard graph plotting, and we have a large base for scientific Python for more advanced analysis and visualisation. Then, lots of little fiddly tools, which you just downloaded from some lab.

Do you use open-sourced tools?

One of the attractions of Python is that it is open-source, and there are lots of libraries where you can download tools and software for free.

Open Research Case Studies – Centre for HealthTech Innovation with Rory O'Connor

Can you tell me about the research at the Centre for HealthTech Innovation?

I am on the Committee for the CfHTI, and all of our work will be open access. It acts as another opportunity to advertise the research that we are doing through the Centre's network, particularly as our links with the healthcare technology industry are going to be very important. Unlike the pharmaceutical industry, which has a narrow way of bringing a new pharmaceutical product to market, the routes to market for healthcare technology are broader and require a range of evidence. So, the work that my colleagues in the Centre Alejandro Frangi and David Jayne are doing in improving the design, evaluation and assessment of healthcare technology is very important, and open research underpins all of that.

What does open research mean to you?

It's a combination of things: open and accessible research findings but also transparency about how research is conducted. We see an increase in protocols published in open-access journals. That's quite important because when it comes to analysing the final results, I'll go back to see what the published protocol is like and try to identify any discrepancies between what was said and done. Since it was publicly funded research, it's necessary to bring these discrepancies to light. However, openness can be tricky: there is still a tendency in the academic community to worry that somebody else might take your idea and use it in a project before you if you make it open. I think it's rare, but it's a real risk that open research needs to address.

How does your research use open research practices?

We publish protocols of our research and then the results of our research always in open-access journals. We go for green open access, and we've always used the White Rose Repository. If the journal we are using doesn't have immediate open access, we share our data when colleagues request, for example, data for meta-analysis. We have requested other people's data, and people in very generous with their data too. I feel that patient and public engagement and participation are also highly important. It's not only open in the more academic aspect, but it is opening it to people who will ultimately be the end users of that research.

How do you deposit your work?

I have Symplectic, ORCID, and White Rose accounts, which I have to update often. Some of them are starting to talk to each other now, but I might get an email that they have updated my ORCID based on my Symplectic account. When we were doing the REF two years ago, we asked people individually because there are easily searchable research outputs like research papers, but there are other important activities for open research, such as engagement with the public and policymakers. This was a very laborious process because you spend a lot of time duplicating information. We're also engaging with NHS England, the

Department of Health and Social Care with the NICE (The National Institute for Health and Care Excellence), and European and international collaborations.
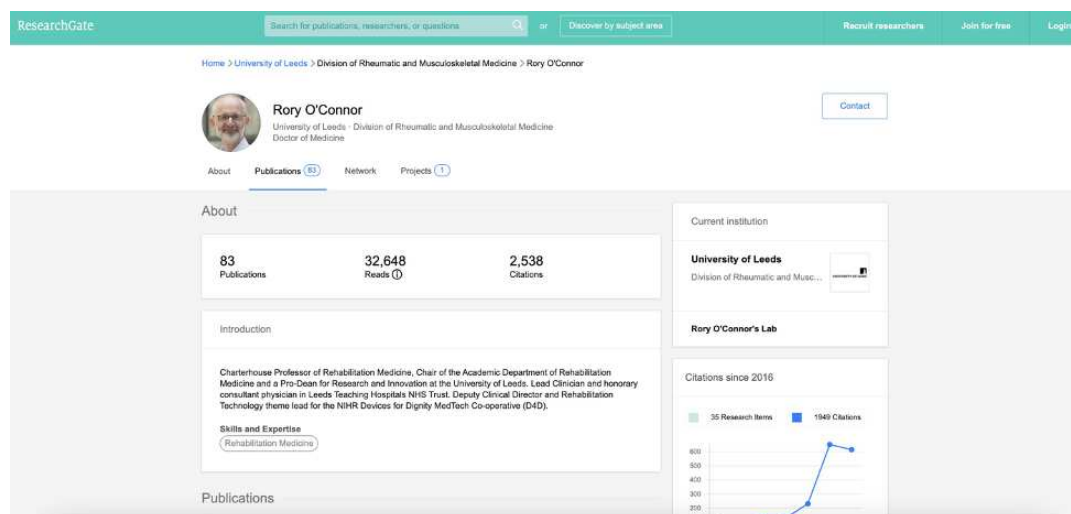
Rory O'Connor's ResearchGate profile

In your field, have you found it difficult or easy to identify other people's open research practices?

We practise open research within my group and do this within the School of Medicine. I'm the Director of Research and Innovation at the Leeds Institute of Rheumatic and Musculoskeletal Medicine, and we engage with open research practices more widely.

How does open research inform your teaching?

The outputs of our student activities, such as research publications and conference presentations, are part of our research culture. I might be talking with undergraduates who are searching for literature, and I will always make sure I direct them towards open-access sources. Sometimes the article they want to read is behind a paywall, and I ask them to look at the quality of what it is they're looking for, and invariably the quality of the open-access work is much higher than the work for which you would have to pay. I tell them to correspond with authors and look at people's websites where - hopefully - they would have their outputs openly available. I always encourage people to do that.

Do you use preprints?

Yes, preprints are increasingly common in my field. Over the last two and half years during the pandemic, there was an increase in the number of papers both because of COVID-19 and its impact and because people were unable to do other forms of work in universities, so they pivoted to writing up papers.

In what ways do you deposit the preprint of your work?

Most preprints I've published have gone to medRxiv.

Do you have concerns about preprints?

I'm a bit sceptical about preprints: as soon as you think you've finished writing something, you can put it out there, and people can look at it. For example, some journalists took preprinted articles as finished pieces, but peer review can modify and develop a research paper. I'm an associate editor for the Journal Rehabilitation Medicine, so I work with many journal submissions and revisions. I see first-hand in my work as an editor and author what difference peer review can make when done correctly. Preprints are interesting phenomena, but they should come with a health warning.

Have you had open-access work published?

A lot of our research is funded by NIHR (National Institute for Health and Care Research), and they have their ways of paying for our publishing than UKRI, so we generally can't tap into the UKRI fund within the University. About a third of our research is funded by UKRI (through Medical Research Council and Engineering and Physical Sciences Research Council), so we use the open access funds for those papers. However, for charity-funded research, we can't, so we generally go for green open access.

Has your attitude toward open access changed in recent years?

No, I've always been a proponent and advocate of open research because now there are more opportunities, and it is thankfully higher up the agenda.

Are there any negative attitudes towards open access you have come across?

One of my NHS trainees felt that an open-access paper was less worthy. They don't have an academic background, so I had to explain to the person how open access works and that this was a very high-quality paper. The fact that it was published in an open-access journal was even more beneficial meant we could discuss it in our journal club.

Sadly, the cost of publishing open access is enormous: the profits that journal publishing houses make are excessive. I'm an associate editor for an open-access journal published by a not-for-profit publisher in Sweden: any money made is ploughed back into the journal to make the websites better and support publications from countries or research groups, which are low- or middle-income. I do quite a bit of work with colleagues in Nepal, Sri Lanka, and Madagascar; their work is published for free in those journals.

What does data mean in your field?

Most of our projects use mixed methodology: we've got a big project right now, which looks at rehabilitation following a long-COVID funded by NIHR. We use a series of qualitative interviews and quantitative data generated from wearable sensors, and we bring those together to get the whole experience of people living with long-COVID.

How do you manage your data?

We have all the criteria we have to use for studies within the NHS, so it's at a higher security level than the standard University of Leeds policies and procedures. We have to ensure that the principles are applied to all our medical research, from physical security of any written information like a signed consent form and then for all electronically stored data with policies for the safe destruction of data after the appropriate period.

Do you use open data?

Yes, I've many projects running that use open databases of data collected by other researchers to inform some work we're doing ourselves. We will subsequently make our data available for other researchers too.

Have you written a data management plan?

Yes, I have written many.

Are you aware of your institution's resources on data management plan?

I am, and we have mainly used the University of Leeds's guidelines. Although the last one we did was in conjunction with a colleague at the Imperial College who works in data science, and simply because he was leading that particular work package, we used the Imperial College guideline; it was more convenient.

How important have ethical considerations been in devising your data management plan?

It was core to it because we can't get a project off the ground unless we have full NHS ethical approval and orphan MHR approval.

What kinds of software do you use for your research?

Unfortunately, we still use licenced software for our quantitative and qualitative research, like SPSS and NVivo. We're also using a licenced statistical package for our outcome-measurement data. However, we are moving more towards using open-sourced packages like NNR. We recently were doing some qualitative data analysis, which previously I would have

done in NVivo. Since the research is with a broader group of people, including members of the public who wouldn't be able to access licenced software, we've had to go back to doing qualitative research the way we did twenty years ago. We used MS Word, printing it out on paper, then highlighting and cutting them manually.

Have you encountered any licensing issues or obstacles when adopting software developed by the private sector?

Only in the sense that colleagues from the NHS cannot access the software I use in my academic role, so there's a disparity among a group of researchers.

Have you preregistered research before?

Yes, you can't get NHS ethical approval unless you're pre-registered. At the moment, I've got to register trials on clinicaltrials.gov., but other works that we've done, like the mentioned long-COVID study, were pre-registered on both clinical trials and ISRCTN.

What benefits preregistration has?

It makes the protocol available for reviewers to look at when they are reviewing the final output in a journal. It also helps to advertise a study: we frequently get enquiries from members of the public who want to be part of our research because they have seen it on a register of studies.

What happened when you found a discrepancy between the pre-registered protocol and the research output?

I was asked to review a paper by NICE: I identified a discrepancy between the research output and the preregistered protocol, so I contacted the editor to make them aware of that. The author sent me a complaint, but if it had all gone quiet and nothing had happened, I would have thought it had been covered up.

Open Research Case Studies – Cultural Institute with Merrick Burrow from the University of Huddersfield

The Cottingley Fairies: A Study in Deception exhibition description:

Just over one hundred years ago Sir Arthur Conan Doyle published the Cottingley fairies photographs in "The Strand Magazine". But how did the literary genius behind the detective mastermind Sherlock Holmes get fooled by fake fairies? You can discover the secrets behind the greatest hoax of the twentieth century in person or online! Treasures of the Brotherton Gallery to explore items from the University of Leeds Special Collections, which holds nearly all of the most important documents and artefacts relating to the Cottingley fairies. Or experience the magic from your own home and view the online exhibition here. Want more? Why not listen to guest curator Dr Merrick Burrow as he gives an insight into how two young girls from Yorkshire fooled the world.

The Cottingley Fairies: A Study in Deception
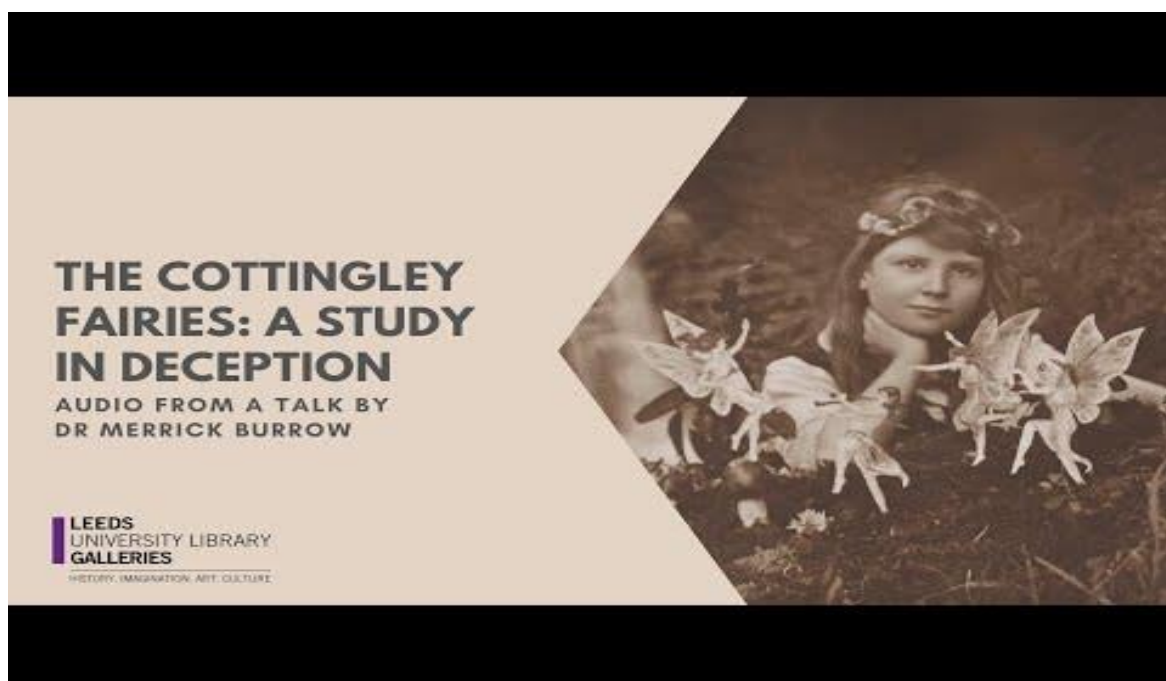
What does open research mean to you?

In the broader sense, open research is when the outcome and outputs of research would be accessible to anybody who wants to look at them without a paywall or some other form of restriction. Open-access journal articles are something we have been familiar with for a while, and then potentially open access to monographs. But it also includes things like an exhibition that, in principle, anybody can visit or the Google Arts and Culture virtual exhibition, which anybody can have a look at.

How do you see the exhibition being part of open research practices?

It was part of the digital strategy and evolved partly as a productive necessity because the physical space was not accessible. It was not something that was on my mind at the start. I was thinking very much about a physical exhibition putting things into one space and for people to be able to come and visit them. I always had the intention of writing some publications about it, but the Google Arts and Culture website and the videos available on YouTube were proxies for the fact that the exhibition was not accessible physically during lockdowns.

Have you received any feedback about the exhibition from the visitors?

There was feedback from people who watched the virtual exhibition and the curator's talk I did when we launched it, which is on the exhibition's website. I have had feedback from students and other people who have been in touch about the exhibition, and there are some comments on the YouTube video. Brotherton Library also has some data about the number of visits. From May 2021-June 2022, the in-gallery visitors were 3778. Though the galleries operated on very reduced hours between May-December 2021 and did not fully re-open until January 2022. From April 2021-June 2022, the number of digital 'visitors' were 2159.

Who was your main target audience?

One of the things that I was particularly interested in from the start was the idea of putting as much material as I could realistically include in an exhibition about the Cottingley Fairies and putting it into the public domain in a way that had not been done before. We were able to liaise with the National Science and Photography Museum to borrow a couple of the cameras: it was the first time the negatives of the photographs, the correspondence, and the cameras had been put on public display. A historical motivation for being able to do that is to mark its centenary.

I was approaching the exhibition from the point of view of it being something of interest to a broad audience because of the popularity of the photographs as well as connections to people with an interest in fairies and folklore and Conan Doyle. The Special Collections team at the Brotherton Library had their brief about their target audiences, and we ended up, to some extent, going with that. However, at least in principle, I always thought the exhibition would appeal to a broad audience. The three main groups of audiences were passers-by who in the area would drop in, families, people at the university and members of the university community.

"The Cottingley Fairies is one of those stories which has been a perennial popular interest. There seems to be a lot of misunderstanding associated with the story, and the exhibition aimed to establish a slightly clearer public understanding of it."

How the Cottingley Fairies Photographs Were Made

Francis and Elsie positioned the fairies on the bank using hat pins.

Did you have a different target audience for the virtual and in-person exhibitions?

They were quite different: most of the work went into the in-person exhibition; the text I wrote for it is displayed in the physical space where I conceived the structure of the display and the kind of story it was trying to tell. The Google Arts and Culture virtual exhibition was an attempt to encapsulate the main story. We had to boil down the narrative to extremely concise descriptions, and there were also copyright constraints on which images and objects we could use. Google Arts and Culture platform has its restrictions, for example, how many things you can include and what you can do with them. It does seem to have reached different audiences. There are people who have been interested in the exhibition but have not been to the Brotherton Library Treasures Gallery to look at it but have looked at the online version. When I was thinking about curating the exhibition, it was a secondary product where the option arose, and it made sense to try and do that.

The Cottingley Fairies: A Study In Deception

Exploring two girls from West Yorkshire and one of the greatest hoaxes of the twentieth century.

Google Arts and Culture virtual exhibition

Why did you choose Google Arts and Cultures as a platform for the virtual exhibition?

The platform was suggested by the University of Leeds Library team. They have used it before to display virtual exhibitions. Due to the pandemic, we ended up having an online launch on Zoom, and many materials shifted to the virtual space. I also did a couple of videos for the National Science Museum about the Cottingley Fairies, which have been very popular on their YouTube channel. It formed part of a digital strategy that emerged in real-time when we were figuring out ways to make this exhibition accessible.

Has there been a plan to preserve the virtual exhibition long-term, for example, with a DOI link?

There is not a clear strategy for the long-term preservation of the exhibition. I have been speaking to the Dean of my School of Arts and Humanities at the University of Huddersfield about transforming the exhibition into a 3D virtual gallery.

It seems like a fascinating possibility. However, there is copyright complication regarding the documents and images, which makes preservation quite challenging. It is not something you could easily capture and put into the public domain. It would be nice to preserve the exhibition and to have a DOI link for REF purposes.

Have you curated other exhibitions or done similar forms of cultural dissemination?

Not on this scale before. I have done numerous public talks and panels at festivals about the Cottingley Fairies and other related subjects. It is part of our public engagement with my Department, but I have not done an exhibition like this before.

Apart from the copyright restrictions, have you come across challenges during the different stages of the exhibition?

Yes, but in a good way. For me, it was a learning process about how to put an exhibition together and the principles of selecting material – because there was a vast amount that we could have included. It was about choosing the right materials to tell the story in the most impactful way and about how you write the narrative. Rhiannon from the Special Collections was the main person who helped me with that; she was helpful in guiding me through that process. It was challenging in the sense that it was unfamiliar, but I felt very well supported.

Do you have any other dissemination plans regarding the Cottingley Fairies?

There is a lot of interest in Japan in fairies, the only other place where there is an equivalent number of materials to the Brotherton is the Utsunomiya Fairy Museum just outside Tokyo. I

have written [an essay](#) in a Japanese publication about the Cottingley Fairies and Edward Gardner's briefcase, which was bought at an auction in the late 1990s by a Japanese academic. My essay about the Cottingley Fairies mentions the exhibition and the Brotherton Library. I am also writing a monograph about the history of deception, which has a key chapter about the Cottingley Fairies.

"The exhibition triggered certain aspects of archival preservation because some documents were on the verge of disintegration."

Preservation facilitates ongoing accessibility: one of the aims of the exhibition was to highlight the fact that these archives are at the Brotherton Library. Anybody can go and look at them; it promotes open access to archival resources and helps to contribute to their preservation of them.

Open Research Case Studies – Energy with Mark Davis

Pioneering bond enables net-zero project description:

Local authorities in the UK are on the frontline of big issues like decarbonisation, but finding the money and time for such schemes against a backdrop of austerity – and the ongoing COVID-19 pandemic – is a major challenge. Research funded by the Place-Based Climate Action Network (PCAN), which has a team based at the University of Leeds, found that residents want their local authorities to act on sustainable energy and were also attracted by the prospect of being part of a collective solution. Now, a new model of financing devised by the University of Leeds is helping to bring the two together. Co-created with industry and public sector partners via research led by Professor Mark Davis, Chair in Economic Sociology, Community Municipal Investments encourage residents to fund local projects that help to tackle climate change. Individuals can invest as little as £5 in a council-issued bond that supports a specific infrastructure project. The bonds are administered by ethical finance group Abundance, and give savers more appealing interest rates than standard savings accounts.

What does open research mean to you?

Open research is about challenging that outdated idea that what we do in the Academy is just talk to ourselves, that the work we produce is only for the benefit of other academics and our students. That's obviously a core part of our work, but when we talk about the research we do as having to have a "real world impact" it's as if we are almost accepting the idea that the university exists in a "non-real" world, which is a slightly strange separation for me.

The purpose of the research that we do is to benefit society, the economy, or the environment and how we do that best is to ensure that there is a strong and ongoing dialogue with the public and other stakeholders, as a way of helping to define the problems we need to research most urgently to help improve their circumstances.

How does this project use open research practices?

The Community Municipal Investments project is embedded in open research practices. In designing the project, we used the grant to create a 'pilot fund' to which public sector bodies could apply. Through three rounds of competition, we selected the six case studies that were the evidence-based bedrock for what was Financing for Society. This was a great way of building the project since the case study partners had the paid-for time to tell us what problems they are facing, what net-zero project pipelines they have, and where they think crowdfunding might be able to play a role.

So, not only were we able to get a sense early on of what research challenges they faced, but we could then also run the project in a way that allowed them through the pilot fund to dedicate some time to working with us openly and collaboratively. I think this approach allowed us to share knowledge, address problems, and find solutions in a far more open and collaborative way than we often get in academic work. So, the project used open research principles to run workshops, focus groups and interviews with various stakeholders, working together with policymakers, and legal and professional services firms, and focusing on public engagement.

Have you received any feedback from the stakeholders?

There are testimonials in the original Financing for Society report from the six case studies on the way in which the University, operating through me and my team, was a great way for them to learn and build capacity in terms of knowing what was happening, being kept abreast of research findings, and translating that into different formats internally. I think this is what helped to achieve a change to their practices on financing net-zero projects, which was the objective of the project.

Since the report came out in 2019, I have done probably close to a hundred ten-to-fifteen minutes summary presentations on the CMI model and Local Climate Bond concept to the industry, third-party sector organisations like Friends Provident Foundation, the Green Finance Institute and various community groups, policymakers, and particularly the climate and environment teams or finance and treasury teams within UK local authorities.

In terms of engagement, we put together a short animation with a local company to explain what the CMI model is, how it works, and what the benefits might be. The 3-minute-long film helped to solicit national interest in the research project. Since it is a short video, it raises questions and solicited opportunities for them to contact me directly to find out more.

Crowdfunding and the Democratization of Finance: Live Webinar

In your field, have you found it difficult or easy to identify other people's open research practices?

I have certainly learned from colleagues what has worked and what has not worked for them. The more we can share best practices around open research and the more support there is for it within the University, the better the research impact of projects will be. Open research should be embedded in the way we conceive a project from the start. I have learned a lot in the last five years, and am happy to share those lessons with colleagues, either formally or informally.

How do you deposit your work?

I don't know how prevalent open access is in my discipline; however, journals in the Environmental Sciences that I've published in seem further on with this. In social sciences, most journals now have 'online first' copies, which is a fantastic opportunity since the issues that an article is addressing may change quite rapidly and substantially during the six to nine months waiting for it to appear in the journal, especially in terms of social or energy policies.

Has your attitude towards open access changed in the recent years?

I have certainly become more aware of it. Not that I doubted it was important before, but it is something that is far more prevalent in my mind now. For example, I was successful with colleagues here in the Faculty of Environment in securing a large Horizon 2020 grant back in 2018, and we had a dedicated budget line to make sure all the outputs from the project would be gold open access.

Have you come across any negative attitudes towards open access?

The only negative perception I have ever heard about open access is the substantial cost. It can be a real financial barrier for colleagues to make their work open access. I work interdisciplinary, across different fields; I would say open access is less prevalent within sociology and more within environment and energy-facing research. There is more that could

be done in both, but I think environmental sciences are slightly further on, and my perception is that there is a greater recognition of the need for a budget to make that happen.

"Without a research grant, how else do you publish open access?"

What does data mean in your field?

It depends on what you mean by 'data'. For example, the project we've been talking about around the development, creation and delivery of the Local Climate Bond could not have been done without the gathering and analysis of qualitative data. We had some quantitative data, on different investment levels and how much money would need to be raised for certain types of net-zero projects. But this was mostly a qualitative data-driven project. With the two projects I am currently running, the team is now doing various interviews and stakeholder engagement activities, and data is needed there to understand the opportunities and barriers and come up with financing and delivery solutions for residential retrofit measures and reshaping local government procurement processes for net-zero projects.

How do you manage your data?

From an open research perspective, there are many structures to help with protecting and storing data. I think the University of Leeds does this very well, but more broadly the Academy would do well to recognise the significance of preserving and using existing 'secondary' data to understand broader and longitudinal societal, economic and environmental trends. At times, I think there is still a fetishisation of the need to acquire new data to make a project 'valid'. Sometimes there are existing data sets that can be incredibly valuable through secondary analysis or synthesis work – with the Timescapes project at Leeds being a shining example.

Priestley Centre for Climate Futures
@PriestleyCentre

Action area 1 – Decarbonise the energy supply

Work by Prof Mark Davis (@_ProfMarkDavis) of @SSPLeeds has enabled communities across the UK to invest in local renewable energy projects.

leeds.ac.uk
Pioneering bond enables solar panel project
Pioneering bond enables solar panel project

11:11 AM · Jul 8, 2022

Have you written a data management plan?

Yes, I have. I find the process very difficult since there is an anticipatory nature when you are putting together a data management plan of what you expect to be doing. A live research project can be a little more ad-hoc and respond to events and opportunities in the field. I find DMPs useful in getting me to think about data security, storage, privacy, and compliance with various rules and processes. I've certainly benefitted from the support of Nick Sheppard and the wider research data management team. I have written three or four of them, maybe even a few more now, but they don't get any easier! I do recognise their importance, however, and I am always grateful for the prompt and offer of support.

How important have ethical considerations been for this project?

Although I tend not to work with what we would consider to be vulnerable or marginal groups – You know, under-16-year-olds, or those who have experienced known harm – I have never doubted that the ethical review process is very important. I have had ethical clearance for all the projects I have run, particularly around the Local Climate Bond research, which was more complicated since we offered a competitive 'pilot fund' and there were just so many external partners involved. I had to make sure that the university had a clear sight of the process to ensure the research complied with ethical standards.

"We had a hypothesis that crowdfunding could work. Only through securing the participation of all the different actors through the pilot fund, we could develop a co-productive approach to the research problem."

What benefits did working with participants had on this project?

From the case study perspective, it was a huge benefit to understand the challenges our partners faced. We were able to establish early on that existing alternative finance models are something that public sector bodies simply do not have any existing knowledge of and also have no additional capacity to find anything out about them. This is one example of how academic research can address that knowledge and capacity gap for public and private sector partners.

One of the things I have been told is that without the involvement of myself and the research team at Leeds, it simply wouldn't have been possible to create something like the CMI model behind Local Climate Bonds, which by the end of summer 2022 have raised nearly £5 million for local net-zero projects. The two principal partners were Abundance Investment and Local Partnerships, with whom we were able to provide crowdfunding solutions from an industry and public sector perspective. So, right across the board, the participation of all the partners was vital.

Have you had any greater logistical hurdles for conducting PAR?

There were some local challenges; for example, HR had some concerns about the legality of the pilot fund and various hurdles that we had to jump through. If you want to do research with partners, you are signing up for a lot of relationship management, not just online but in person, by phone, and by making sure your partners are happy and informed of the research process. It can be very ad-hoc; you can get phone calls at different times of the day demanding different things. Logistically, the relationship management side of the participatory project with multiple partners puts pressure on the research team. In this case, the research team was me as the PI and one part-time research assistant, so we did an awful lot as a small team.

Local Climate Bonds

How does your podcast fit into your engagement with open research?

The podcast is actually linked to a different project, The Cultural Life of Money and Finance, which is run with colleagues through the Leeds Arts and Humanities Research Institute. We were going to run a Sadler seminar series, but then the pandemic hit.

As we couldn't deliver the work the same way, we decided to shift it online. We ran a series of podcast episodes, which is a great opportunity to meet some of your heroes by inviting them to come and speak to you about how your work connects. We use Audible as the platform for the podcast, which is quite good at tracking the number of downloads and where people are engaging geographically. The podcast is a good platform for dissemination and also profile-raising for projects. But I've found that they are not great for a two-way open research dialogue around the issues we've been raising, and I think there are now better formats for that kind of knowledge exchange.

Open Research Case Studies – Global Food and Environment Institute (GFEI) with Laura Carter

Contaminants of emerging concern in agricultural systems project description:

In order to sustainably secure global food for a growing population, it is critical that crop dependence on chemical-based fertilisers (e.g. nitrogen, phosphorus, potassium) is reduced and alternative water supplies identified which address water scarcity issues. Agriculture is the largest consumer of available freshwater (70%) with demand expected to increase by a further 19% by 2050. The depletion of global phosphorus and potassium reserves within 100 years also pose major threats to future fertiliser supply and our ability to grow enough food.

One of the most promising options to secure future agricultural productivity is the use of wastewater treatment by-products, including sludges and Treated Wastewater (TWW). However, chemicals used in our everyday lives, including pharmaceuticals (e.g. prescription and non-prescription), personal care products (e.g. soaps, disinfectants) and fibres (e.g. plastics) can pass through wastewater treatment plants and contaminate the TWW and sludges. These pollutants are referred to collectively as "contaminants of Emerging Concern" (ECs). Our ability to boost yields and nutritional content of food to meet future demand may be impacted by the presence of ECs in soil-plant systems. Pharmaceuticals, in particular, are biologically active chemicals and their presence in agricultural systems could result in undesired toxic effects for plant, soil and human health. Pharmaceuticals are now ubiquitous global contaminants; however, our scientific understanding of potential ecosystem risks posed by these pollutants is scarce, especially in agricultural systems.

What does open research mean to you?

To me, open research means the ability to pick up a paper and can easily replicate the methods and generate the same result. For example, if you use models, whether they are freely available and have some supporting texts to help you use them, which I have come across, is not always the case. It is not good enough to just put the model in the SI. You have to have some help or some accompanying documentation to enable you to use it in the first place.

How does this project use open research practices?

Most of my projects involve analysing environmental samples for the presence of emerging contaminants, and the way that we do this, is we analyse them on something called Liquid Chromatography tandem mass spectrometry. It produces quite a lot of data as an output, and when we are summarising the results in a paper, we tend to put an average in a figure that you can't translate to exact numbers.

For example, you can't look at the individual data to see how that numbers come about, so for me, open research means we have to put the raw data either in a standalone database or in an accompanying data file with the published output. It is not necessarily the raw output from the instrument, but the data that the individual data points create the numbers that you are presenting.

Winner of Rising Star - Agriculture and Environment - Laura Carter

How do you deposit your work?

I used Symplectic for my papers. I haven't been very good at keeping it up to date the past year, but most of them are on ResearchGate as well and everything is linked to my ORCID. I also use the White Rose Repository.

In your field, have you found it difficult or easy to identify other people's open research practices?

Not everybody in my research area publishes supporting raw data to justify their findings or detailed methods. Or the paper isn't open access in the first place, which is quite a barrier if you don't subscribe to the journal. It hasn't been that much of an issue for me because most of the content that I need the University subscribes to, but I know collaborators in countries, such as India, who could not access papers and I have had to access those for them. We talk with my colleagues in group projects about the need to publish the data in the most accessible format.

Stakeholder engagement is key to the delivery of some of my projects and working with them we can make sure the results are in an accessible format to enable wider use, for example in helping develop or refine chemical policy. We probably do not discuss questions, such as barriers, or best practices, as much as we should, but it is talked about at a higher project level.

How does open research inform your teaching?

I haven't done any teaching this past year, but when I did teach, we had workshops that required the students to find papers and present them in a seminar. We ensured that all the papers we were directing the students to were open-access. I also supervise master's and

PhD projects, and when we talk about the discussion in the results and how the current findings relate to the broader research landscape, we have to talk about open data.

One of the hardest things students find is when they want to compare their results to another study, but they struggle to access the data required for that type of discussion. We have talked about emailing the corresponding authors directly, and many have gotten back with the data we needed.

Do you use preprints?

Preprints are not common in my field, and it is probably a combination of factors why they are not. You always want your work to be novel and push scientific boundaries which means that you may use new methods or a different approach to analysing your data, so it is important to have this critiqued by experts. In my experience, the peer review process has improved the quality of our papers, so I think it is an important step.

"If I was to read any preprint, I don't think I would cite or reference it unless it has been subsequently published."

Has your attitude toward open access changed in the recent years?

No, my attitude towards open access hasn't changed. When I was publishing for my PhD, I ensured all the raw data, the methods, and the papers were open access. As my research career has progressed, I have started to work across different research disciplines, it is interesting when you have conversations about what people consider to be open access. This can also be challenging when opinions diverge in terms of the type and quantity of data you want to publish.

In your opinion, what is the current state of open access in your field?

In general, I think the current state of open access is good but dependent on the institution and country from which the paper is being published. We have had collaborators who have struggled to publish their work open access due to funding issues, so it is important to make sure funding has been allocated to support open-access publications. But for me, because of the University of Leeds's support to open access, it is not something I have struggled with before.

Are there any negative perceptions about open access you have come across?

No, not directly. There are just passing comments that it is a bit more work to create the data to put it in the supporting information. I don't think that is a negative attitude per se. It is more that we are not ready to submit because we have to compile the supporting information.

Will the outputs from this research project be published open access?

I think it will aim for gold open access since it should be some impactful work and because of the nature of the funding as well.

What does data mean in your field?

Data is all the results, mainly quantitative data, so numbers and figures. We manage data on big spreadsheets and all the data is stored on OneDrive. There is probably a more efficient way of doing it, but that is the way we do it.

Do you use open data?

Yes, I have looked at the NERC repository for open data but at the moment they do not have data that is particularly relevant to the projects I am working on. The Environment Agency have large open datasets and I have also found the UKWIR chemicals monitoring programme database useful in terms of supporting our research if I am trying to find specific data I sometimes look to the supporting information in papers.

What kind of software do you use for your research?

We use SigmaPlot for figure creation, SPSS for statistical analysis, and MS Excel for reading the data.

Have you written a data management plan?

Yes, I have written a data management plan at the beginning of the project. I have used the guidance from the UKRI funding that supported the project.

How important have ethical considerations been in devising your data management plan?

It was not something I had to consider until recently. When we started collecting soils from all over the country, we needed to contact the farmers and keep their phone numbers and email addresses securely stored. That was the first time I had to have any ethical considerations for a project.

"The University of Leeds provides a license for everything that we use. The only thing I have had to pay for is the chemical computation software, which we need to get chemical properties for data and predict, and the University doesn't support or have a license for it."

Open Research Case Studies – Leeds Institute of Data Analytics (LIDA) and School of Medicine with Peter WG Tennant

What does open research mean to you?

Open research is the broad practice of making all aspects of your research more open, accessible and transparent through the initial research plan of sharing preprints to pre-registering your ideas. Later down the stages of research, there is open peer-review, so that everyone can see how the material adapted and changed through the peer-review process, then having an open access manuscript with ideally transparent data or code, but often that is not possible in my field.

How do you use open research practices?

I think my research could use more open research practices; some of the things we do are share the preprint of our papers to obtain additional pre-publication comments and feedback. I am very much in favour of open peer review and a completely open peer review process, but often it is just determined by the journal. When I write my reviewer comments, I always sign them because I believe it is important for the scientific record.

We are encouraged and mandated to go toward open-access publication of our research and something I have always approved of. Another thing we do with all our work is sharing our code via either supplementary material or GitHub.

You can see the analytical code at least where possible we share the data, but I think I am not sure this is a principle in practice. I don't think I have ever worked on data where it has been possible to share since I work in Health Science, so it always has some heavy ethical restrictions.

Have you received any feedback on these open research practices?

There were two particularly successful experiences. One of them is where we shared a preprint online and then on social media platforms where I explicitly said we were looking for feedback. We got some helpful comments that we then incorporated into the submission for the next journal, and we put in our cover letter that we have had this feedback on the preprint and how we adopted the manuscript to respond to them. The other case was a paper in which we provided our code, and somebody was invited to write an editorial for our paper. They adapted our code to add some additional analysis.

"In a sense, this is the dream: you have provided something that people have then actually used."

How do you deposit your work?

We deposit our prepublication manuscripts where we are allowed to into the White Rose repository. The vast majority of my publications are gold open access since they are UKRI-funded projects. So, they will be automatically deposited in the relevant databases. I have an

ORCID account, but I probably do not check it for every publication, maybe three or four times a year.

Peter WG Tennant on Google Scholar

In your field, have you found it difficult or easy to identify other people's open research practices?

If you are interested in the topic and realise there is no code, data, or preprints, you can see that someone does very close research. These situations stand out. Open research might stand out less because that is what you expect, perhaps because we are encouraged. I have never looked for individuals and thought: I want to see if there are research practices that are open or not. It is not a judgment I would make about somebody.

How does open research inform your teaching practices?

In my teaching, I encourage my students to follow an open research strategy. I urge them to be as transparent throughout the whole process. If I have good examples of my practices, I will deliberately share those to show them the real benefits.

Do you use preprints?

I am an interdisciplinary researcher. The repositories I use for my applied discipline, such as arXiv, medRxiv, and MetaArXiv. I am also likely to pick them up through social media rather than the White Rose repository. I would only end up there if I didn't find a paper anywhere.

I am an epidemiologist, and the pandemic has been a very challenging time for preprints in the Health Sciences. There was a lot of media reporting on preprints in the early days of the pandemic. Many of these didn't get to be published and had serious flaws. My confidence and faith in preprints, particularly in the applied aspect of my work, were damaged by that experience.

I was involved in research studying the effects of lockdown timing on the size of the COVID wave and how many people died due to lockdown decision-making. We decided not to send the preprint out at any point. We knew that if we published it, it would be all over the media,

but we didn't want that message to be out until it had been rubber-stamped with a journal with peer review and all the rest of it.

Gestational diabetes and the risk of stillbirth

"By the time the paper came out, it was about 18 months later. I don't know if we made the right decision, but you can see why both perspectives didn't work."

Has your attitude toward open access changed in the recent years?

The new UKRI open access policy makes it easier in many situations that money has been available for us to go for the gold route. I think that is a real positive change. It is frustrating when you don't have UKRI funding and have to find money to make it gold open access. I would rather make everything open access.

In your opinion, what is the current state of open access in your field?

It is improving, but there is a long way to go. There are still a lot of subscription journals that are charging a lot of money.

Have you come across any negative perceptions about open access?

Yes, the criticism is if we don't have funding, it is potentially more expensive to publish or not possible to publish in an open-access journal than in a subscription journal. Some people have said they could not afford to submit to this journal because they do not have the money.

What does data mean in your field?

My field is between epidemiology and data science, so data is any structured information that I am storing about people, whether that's sensitive or not. It is always quantitative data.

How do you manage your data?

I work with simulated data, and there are no ethical restrictions. It does not need storing because you can simulate the data each time you need it. The other data I work with is sensitive data, but it is stored externally in a data haven. I would never be storing anything on OneDrive because it's never my actual data.

What kind of software do you use?

We exclusively use the R statistical package, which is open software. I retrained myself in it, and I use it precisely because all the code that I shared I knew that anyone in the world could access without needing to pay.

Have you encountered any licensing issues when adapting to new software?

When I first came to the University of Leeds, I used a different software called Stata. One of the reasons I stopped using this was the difficulty of renewing the license and getting someone to pay you for it. Now, I use R, and there are no issues at all with licensing.

Which platform do you use to share codes?

We use GitHub. Code sharing is a good idea and something we should all be doing routinely.

Open Research Case Studies – Leeds Institute of Data Analytics (LIDA) with Greta Timaite and James Hulse

Open access data for transport research: tools, modelling and simulation project description:

Investment in active travel modes contributes to tackling climate, health, and cost-of-living crises. New policies, investment programs, and government agencies demand high-quality, geographically specific data to ensure effective resource allocation. The OpenInfra project explores the potential of open data sources to meet this demand. Specifically, OpenStreetMap (OSM), a free, open, crowdsourced map of the entire planet, is explored. We hypothesise that OSM data can support local decision-making processes and the prioritisation of new active travel infrastructure.

What does open research mean to you?

G.T.: Open research is mostly about transparency: making all aspects of research, such as data, code, and analysis available, and giving as much documentation of your research process as possible. It is also about publishing open-access journals so everyone can read your research.

J. H.: I echo a lot of what Greta's just said. Being open and transparent about your research is one of the most important aspects of open research for me, whether it is qualitative or quantitative work. Open research should also be reproducible by anybody, anywhere in the world, and they should be able to come to the same conclusions and results as you. You can build trust through openness, transparency, and reproducibility, which validates your research.

G.T: It is also about the culture of openness that also communicate failed research since often what gets published are success stories. If you talk about what has failed, for example, this method is inadequate for my data, it might help save time for early career researchers too.

How does your research use open research practices?

J. H.: Our project concerns the use of OpenStreetMap, an open data source and a collaborative map of the world. So, everything we do is open: we download our data from the open-source database. We have our reproducible code uploaded on GitHub so people can see exactly how we have obtained this data and how it was processed. We have reproducible documentation, including a recorded workshop we have done recently in Florence, at State of The Map 2022.

How do you deposit your work?

G.T.: I have an ORCID account and recently created a Google Scholar account, which links all my papers.

J.H.: It is specific to the field of data science and data analysis: we use GitHub for this project. We had all our codes and documentation published there. Anybody can download the code to see what we have done.
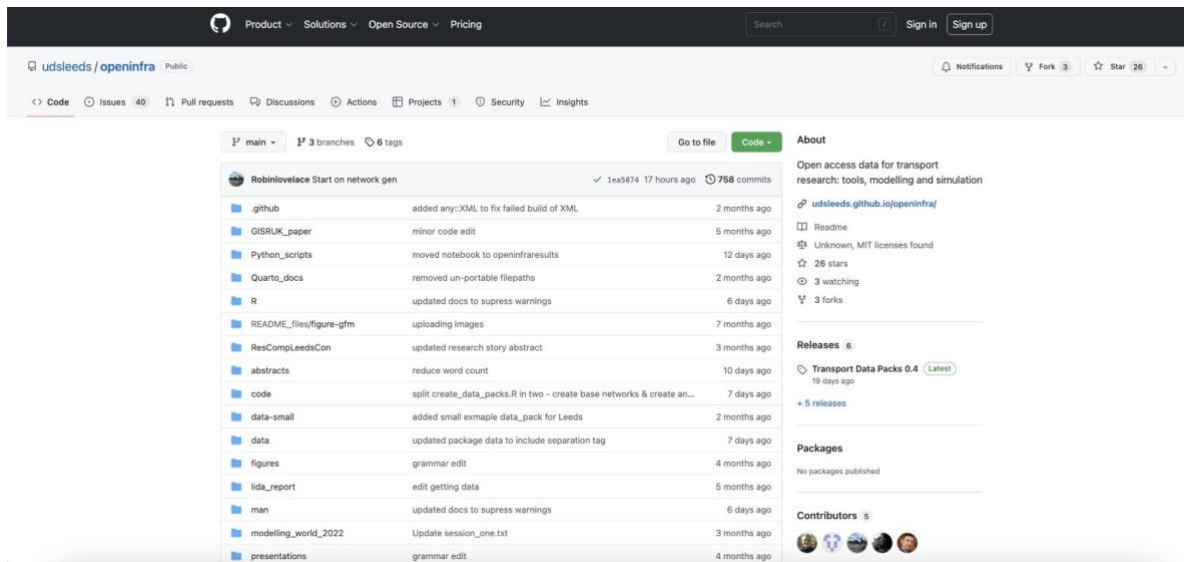
GitHub: Open access data for transport research: tools, modelling and simulation

In your field, have you found it difficult or easy to identify other people's open research practices?

G. T.: When we joined the project, our lead supervisor Robin Lovelace advocated for open research, and we immersed ourselves in the open science community. But when we went to a few conferences, especially with people from the industry, we saw that open research is not widely discussed: from the commercial perspective, it might not be profitable to make your codes openly accessible.

J. H.: Since our lead supervisor has been engaged in the open source and open access community, he got us involved in open networks from the get-go, which benefited us. I must also say, I think without the intervention from all the supervisors, I would have found that much harder to find these networks. In the larger research community, open research is still a taboo or a niche subject, but it is growing.

G. T.: It can be intimidating to go out there and talk to people about opening up research because it might expose you because you are subject to criticism, especially when you put a lot of work into documenting what you have done. Fingers crossed that in the upcoming years, it will be odd not to talk about open research.
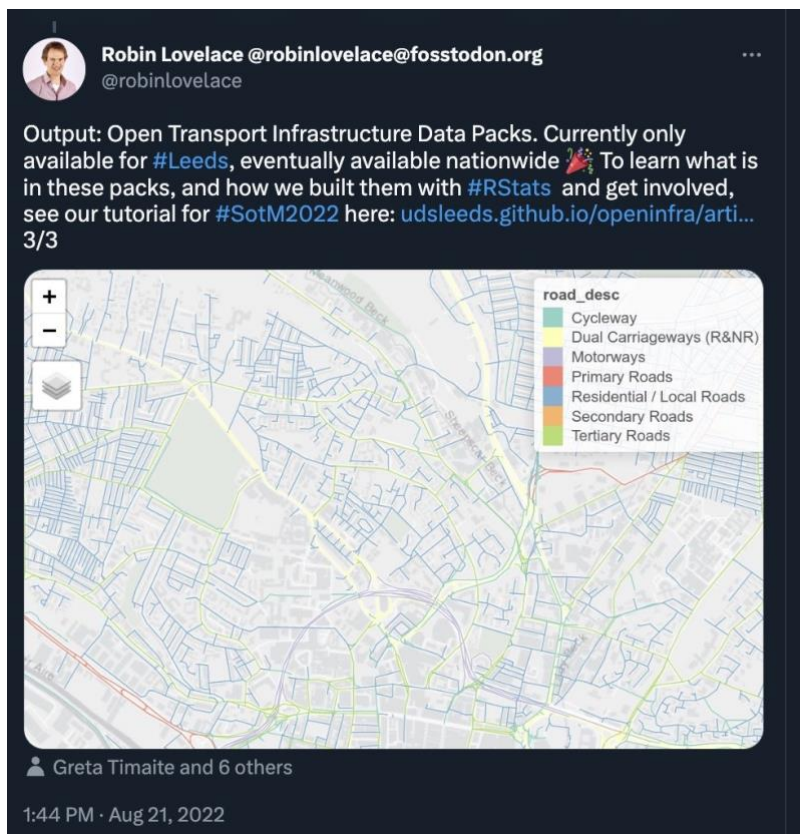
Do you use preprints?

G. T.: [Zenodo](#) is a repository where our abstracts are published, and that is where I upload my slides from the conferences. It is a good way of keeping track of what I am doing. There are preprints there, which people use to publish their drafts, and they might be using them to get feedback, or maybe a manuscript was not accepted by a journal, but they still think it is valuable.

J.H.: I have also would put up some material on Zenodo. I have only done some brief exploring there, and as Greta said, it seems to be a repository for computer science or other quantitative research.
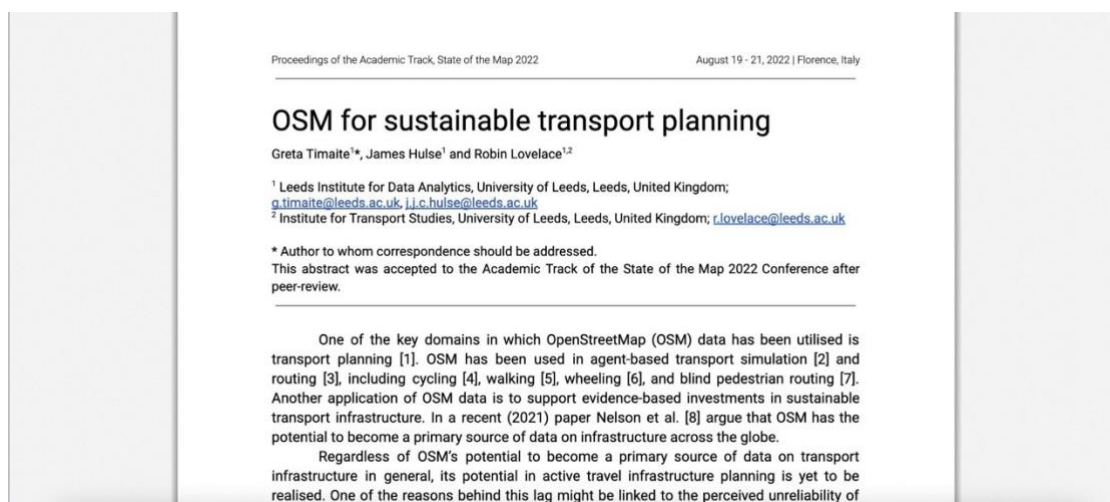
OSM for sustainable transport planning

Do you have concerns about preprints?

J.H.: A potential problem could be if preprints are being taken on by others. However, at the same time, a preprint is also a way to publish; it is dated and has different versions, so you can keep it accountable. I can't think of any concerns apart from that. I think the issue addresses itself by having these repositories, which keep track of ownership.

G. T.: It might be a question for people from science and technology studies and social scientists. It is necessary to engage with preprints, but I don't think they replaced academic journals because, in preprints, there is no peer review. However, peer review has also been criticised due to its lack of transparency; it is not the gold standard either.

G. T.: "I think academic papers are not the only valid research outputs, but there are data, tools, and other artefacts others can use."

How do you manage your data?

J. H.: We are in a unique position in how we use our data in this project. The street maps are an always-evolving open database: they are constantly adding features and editing tags, and so how we manage our data is essentially we take snapshots of this global database that anyone can access and download data from it. It is more version controlled and reproducible, so what parameters were used to acquire this data and, more importantly, what is the exact date of acquisition.

What does data mean in your field?

G. T.: I have an interdisciplinary background, so in the context of the current project, which is in transport research and active travel planning specifically, we use data to help inform and help to support decision-making on behalf of the transport planets. Data is also something that helps to understand what exists in our world. For example, do we have sidewalks, or do we have curbs and all these other elements of infrastructure? I think it is a common way of understanding data in many fields.

J. H.: Even if I had two weeks to prepare to answer, I still wouldn't know what to say. Data for us has the potential through analysis to improve the quality of life for several people. The outcome of the data analysis means better active travel infrastructures, even if it is just a 5% uptake of people cycling or walking in a local area.

G. T.: We use the same approach when we publish anything, for example, abstracts or conference papers. We have codes and data readily available, such as codes that can be easily reproduced. I want to reiterate the importance of documentation: we put a lot of emphasis on it, and it is very time-consuming, especially when you are writing code and you have to remind yourself to do it in the future.
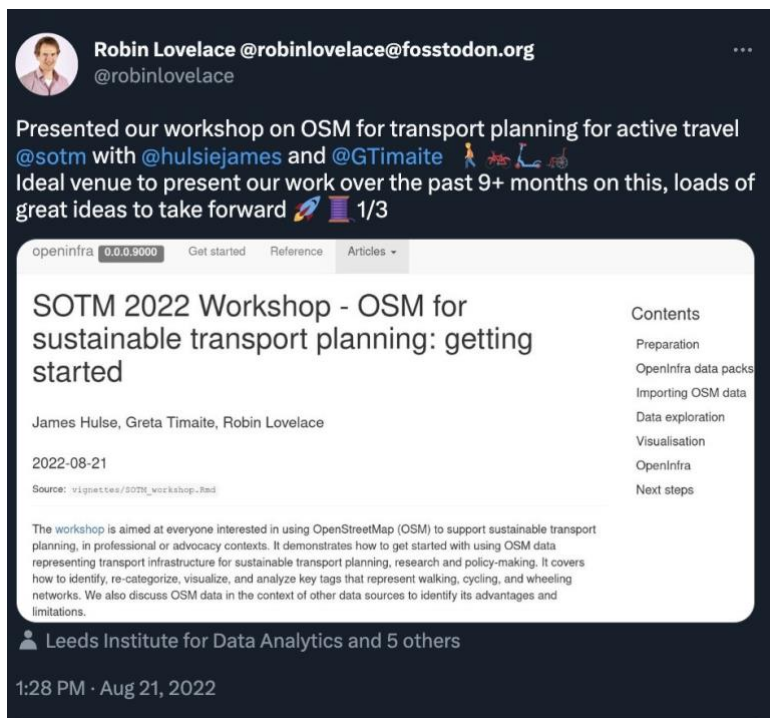
Have you written a data management plan?

G. T.: Since we are using open data, there is no sensitive information. We are fortunate not to have to deal with it. Based on my communication with other researchers, data scientists who work with proprietary data do a lot of data management.

J. H.: There are no essential constraints or management requirements for the data we use; the only restriction is that it cannot be used for profit. One thing that is quite important about the database is that it has gone through a lot of effort to make sure there is no identifiable information about the people who use and create the maps.

What kinds of software do you use for your research?

J.H.: We use R studio, R being the underlying language and R studio being the interactive development environment, which allows you to integrate with it. It also has a GitHub repository, which you can download from, and it is open source, which might be a reason when we joined the project, the lead supervisor, Robin wanted to use it since he is a big R advocate. I believe all our codes are open and allowed to be reused by others.

J.H.: "I feel if you are working in an open source and open environment, it encourages the sharing of information and building of capacity within an institution, be that a corporate or a research institution."

Do you have any other thoughts on open research?

J.H.: Something me and Greta talk about a lot is that there is not much point in duplicating work. Why reinvent the wheel if it's already, you know, sort of made? I feel one of the main benefits is that you can pick up open-source projects and tools that people have been working on previously and have naturally come to an end because their idea and goal for the project were over, and we have been able to pick it up and move forward with it. There are many research outputs that are proprietary, but they are hidden because people think they will not make money. It is just good at building capacity and education within institutions.

G. T.: I think open research, like GitHub, is such a great way to learn, for example, how others wrote a piece of code that does something. It might be hard to learn how to do it and process that information; that is a challenge. Once you know how to navigate open research, it can be rewarding. Yet, we have talked positively about it, but I also understand that it might not always be feasible when we deal with sensitive data.

Open Research Case Studies – Leeds Arts and Humanities Research Institute (LAHRI) with James Stark

Can you tell me about the work you do at LAHRI?

As Director of LAHRI, I support researchers across the full range of arts and humanities disciplines. As an institute, we have a broad constituency of researchers who we serve, and our role is to help them develop large-scale and interdisciplinary research projects. We serve a large community of researchers not all of whom are necessarily directly affiliated with LAHRI: we work with anyone interested in working with arts and humanities research and researchers, and our goal is to enable people to do work which is transformative for them and the field but also makes a real difference in the world, and to enable collaborations which wouldn't otherwise be possible.

For example, we make connections between researchers in the arts and humanities, social scientists, and people working in the physical and biological sciences as well, and our focus is always on thinking about what the added value is for an external perspective on someone else's work. We work with researchers from the very incipient stage of research plans to refining project through open ideas and questions which are already quite advanced. It's a stimulating role to have, and I'm very fortunate to encounter colleagues who work in a range of methodological spaces, and with different partners and external audiences. For me, the question around open research is not something I look at from a single disciplinary perspective; it has different consequences depending on the research area.

What does open research mean to you?

In my field, open research is about making research data and primary materials transparent, and the results as widely and freely available as possible. So, it's about ensuring transparency in the research process but also making sure that the research is accessible to the broadest range of audiences.

How does your research use open research practices?

I always look for the most barrier-free forms of dissemination: I tend to favour journals with a positive and inclusive open-access policy. Though it won't be the overriding consideration and thinking about where to publish, that's very important to the way I'd like to make my work accessible and available to people.

I'd like to think more about how the research data I use and generate could be made more widely available. Generally speaking, data sharing is not a strong feature of arts and humanities research, and most people in my field tend not to think of it as data but as primary material. Open research is, though, increasingly at the forefront of my mind when I think about how research findings will be taken up and disseminated to have the broadest impact and reach within the field.

How do you deposit your work?

I have an ORCID account and used other open repositories like ResearchGate and Academia.edu in the past, but given the move towards depositing within the White Rose repository, I tend to use that more. I'm happy to respond to queries on ResearchGate, but part of the challenge is to maintain all those different repositories. White Rose has been helpful for

me in thinking about the ways my research functions as a portfolio, directing people not just towards individual papers but toward a collection of work. Whereas if you publish via individual journals, it's more difficult to generate interest in your research as a whole.
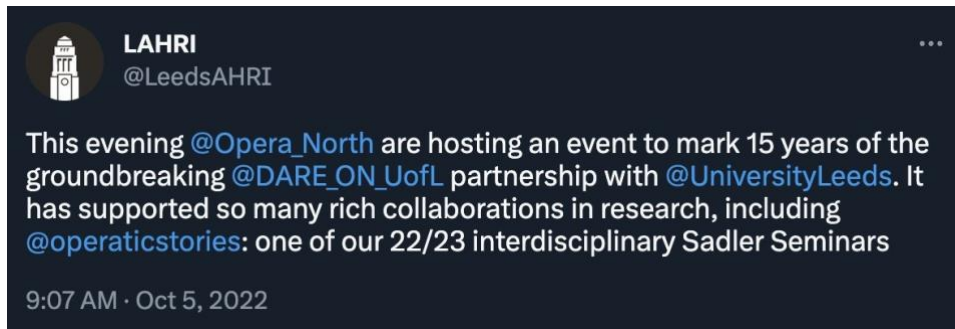
In your field, have you found it difficult or easy to identify other people's open research practices?
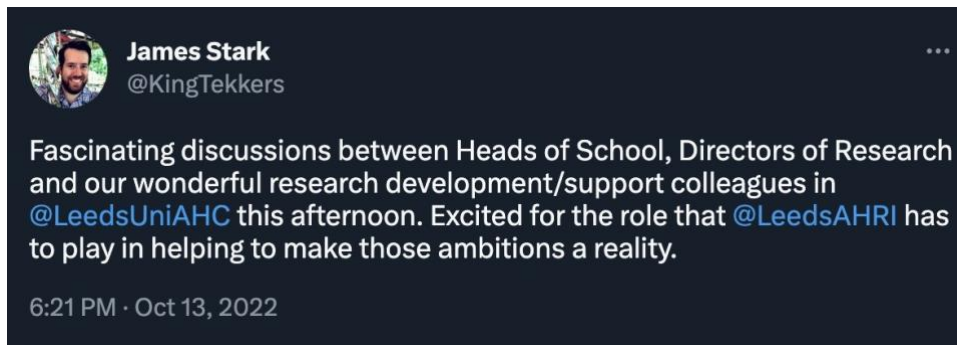
Until recently, open research has not been something researchers in my field have been talking about as a collective. I think that has changed quite markedly: people are much more interested in finding out how others do open research practices, particularly for early career researchers there is a real value in ensuring your research is maximally visible to the field. The fact that people are discussing it is a positive move, but it's still hard to find out what people's approaches to open research are.

Some people are very active in disseminating their work through open-access repositories, but I think there are also some significant barriers to that because gold open access requires you to have access to funding or particular support through an institution. There can be a very uneven distribution of the accessibility of those routes, which people often look for in making their research widely available. There's work to be done in making that more equitable across colleagues at different career stages and institutions and in various geographical locations.

How does open research inform your teaching?

In compiling reading lists, I pay due attention to including work which is easy to access. That makes a big difference for undergraduates and taught postgraduates but for research students too.

To some extent, open research influences decisions about which work I use in reading lists, but it's more of a secondary consideration. There are some barriers, which exist already around institutions' subscriptions to journals, and so on. I'm conscious about not prioritising a particular set of scholars who might be more easily able to take advantage of the benefits of open research than those who might not know how it can facilitate their work.

James Stark
@KingTekkers

Fascinating discussions between Heads of School, Directors of Research and our wonderful research development/support colleagues in @LeedsUniAHC this afternoon. Excited for the role that @LeedsAHRI has to play in helping to make those ambitions a reality.

6:21 PM · Oct 13, 2022

Do you use preprints?

I think the debate around that is in its infancy within the arts and humanities, and there is a tradition of final author-accepted post-review work only becoming visible within the field, so preprint is not something I use. I did, though, have a great experience of going through a much more transparent review and publishing process recently when writing an online bibliography in the history of science for the journal IsisCB.

They published reviews along with the first-author final versions. I overcame my initial scepticism about exposing the reviews, which made me think about what I was trying to do as an author of one of those pieces and as a reviewer responding to the process. Looking back through some of the publications, you can see how they're genuinely collaborative pieces between the reviewer and the author. There's quite a lot to be gained in arts and humanities disciplines by engaging more in open practices and recognising that there are multiple ways to verify something's scholarly worth, rather than presenting everything as a polished work, which in many cases is down to significant inputs from the peer review process.

In your field, what are the advantages and disadvantages of the different repositories?

One of the key advantages is being able to think about your work as a portfolio, particularly if you can deposit copies of your work freely. One of the disadvantages is the fragmented use of some repositories. For example, White Rose is limited to those who can access and make use of the articles. Similarly, for places like ResearchGate, the usage is very different: some people choose to make their work available there, and some don't. I think the major risk is further fragmentation in scholarly publications.

It can be slightly more challenging to maintain familiarity with the work of people who aren't using those repositories, but I think there are trade-offs in making it more expensive than if you benefit from the accessibility of work. It also means that you have other avenues to explore in accessing material rather than just through academic journals, your networks, or University profiles.

Do you have concerns about preprints?

Preprints are so well-established in other academic fields that we should see what benefits we could gain in arts and humanities from adopting some aspects of that model of making our research more available and visible. However, I want to see that done as responsibly as

possible, and I want researchers to be able to retain control of their work. I don't have any objections in principle to preprinting, though the value in arts and humanities remains uncertain.

Has your attitude toward open access changed in recent years?

As an early career researcher, I took a fairly haphazard approach to open access, and since the tools weren't necessarily available to make your work visible, I found it was quite a challenge to know what strategy to take: how should you talk about yourself, should you wait until the publication has come out, be doing engagement or promotional work for your research-in-progress?

There are now many more robust and trustworthy avenues to make your work visible. When I approach a new publication, one of my first considerations is where I will publish and what steps I will take in gathering research data. My work often involves going to archives, taking notes and images, and then writing up those for publication. When you're working across different disciplines and institutions, it is important to understand what you want to achieve through your work and how you will make that process transparent and open. That's when conversations around open access become very important.

What is the state of open access in your field?

In historical studies, it's still somewhat in its infancy: there are some significant barriers and uncertainties, for example, the impact of open-access research on different forms of research. Monographs present a distinctive challenge in open accessibility because there is an interface between funder requirements, conventional academic publishing avenues, and publishing houses. They have different requirements for open access and long-established traditions on how monographs and other larger-scale pieces are made available. They don't fit neatly with the kinds of approaches which have been used in academic journals, and it's still a hot topic of discussion in relation to REF.

I still think many discussions need to happen before we see significant culture change. In arts and humanities, the monograph is still viewed as the gold standard, and in many disciplines, this will likely remain. At the level of journals, the uptake and adoption of open research are happening much more rapidly. It has accelerated quite notably in the last three or four years, and there are institutional requirements for REF submission, which increased people's awareness of the significance of open access, not only in terms of ensuring that your work is eligible but thinking about how that might function to enhance the quality and visibility of that work too.

Are there any negative attitudes toward open access you have come across?

There is some concern about how open access might skew publication practices or decisions about where to publish. There are some concerns it might disrupt certain aspects of publishing large-scale original work, especially monographs. The principal anxiety is around gold open access that has the potential to create something around a hierarchy of visibility of academic research, depending on your funding, your institution, and what their policy is towards that.

What does data mean in your field?

The research data I work with is primary archive materials, such as correspondence, published materials, and visual materials, including film, photographs, and cartoons, but I would never classify them as data. I see research data as the material I generate from my engagement with those. For example, I will go into the archives and take images, and record extensive notes: sometimes direct transcription, but more often paraphrasing. I see the data as being my first-hand take from those materials. I've generated some research data in the past, for example, transcriptions of interviews and videographic evidence, but mainly, it tends to be conventional personal note-taking based on readings of other texts and viewings of images. The challenge for open access is thinking about the nature and status of that material concerning the original manuscript correspondence I used. Research data is the notes I would take when I go to archives.

How do you manage your data?

I tend to store my data on my OneDrive. I have thought about how bibliographies might also function as a form of research data, but that is still in its infancy in my field. Historically, collections of biographies were very often published and made available, and they are undoubtedly valuable scholarly resources, but it isn't something I would necessarily construct in that form for myself as part of the research process. It's research data which I would have to go out and proactively generate with a view to it being made more accessible.

Have you written a data management plan?

Yes, many.

What resources do you require for implementing your data management plan?

I've used a combination of different sources of information. The research data management team at the University of Leeds have been incredibly helpful in putting together draft material for funding applications, which has been based on suggested template text for managing image files and textual files and so on. Funders are transparent in what they are asking for in a data management plan, and I found the Leeds colleagues who work in this area tremendously helpful and knowledgeable about what to include.

"As Director of the Leeds Arts and Humanities Research Institute, I want to emphasise that research data management is not a last-minute add-on but fundamental to the research process. It might shape your approach to broader questions around research questions and methods, ethics and privacy around research data. I used to approach this with trepidation, but there's been a lot of demythologising of what a data management plan is and why it matters in research."

How do you benefit from digitised archives?

Lots of the material I use is out of copyright, and quite a lot of the material I use, for example, at the Wellcome Library, is already digitised. That's a tremendous resource to have available as a historian. The Leeds Special Collections team have undertaken a lot of on-demand digitisation and response to queries over the last couple of years. It takes a great deal of capacity to do that, and I appreciate it because it is a fantastic service to offer and very valuable for researchers, particularly those without the resources to consult material in person.

There are multiple approaches to digitisation: some institutions tend to be a little bit haphazard in which materials they choose to digitise and for whom – mainly due to funding restrictions – and that can create challenges as a researcher. If you're using archive material, you need to make a judgement whether the digitised material is genuinely representative of collections. As researchers, we have incredible allies in the library and archive sector because the people who have the custodianship of these collections are often incredibly knowledgeable about the extent to which materials are or are not available digitally.

The one consideration which is becoming increasingly visible is digital inaccessibility: it's easy to think that by having something available digitally, it's automatically more accessible, but there is a large number of researchers and groups who might have much less access to digital infrastructure and computing technology, for example, which we might for granted. There are questions about what exactly you're changing when you make things available digitally and for whom.

"I see access to digital records as being incredibly important, [and] as researchers we have incredible allies in the library and archive sector."

Open Research Case Studies – water@Leeds with Gabriela Lopez-Gonzalez

PeatDataHub project description:

[PeatDataHub](#) is a research hub for communicating peatland science and managing peatland monitoring data. The aims of PeatDataHub are:

1. Bring together data and create a community of people working on peatland sites around the world ensuring the long-term scientific resilience of peatland study sites
2. Efficiently capture the data from both short and long-term peatland studies
3. Answer key research and management questions related to peatland processes and environmental change, and to build upon existing data to identify research gaps, new projects, and improved methods.
4. Engage with both governmental and non-governmental bodies to influence management practice and policy and to secure funding for peatland monitoring and research. Recent Publications from PeatDataHub partners
1. [Overriding water table control on managed peatland greenhouse gas emissions](#). Evans *et al*. Nature (2021)
2. [The effects of ditch dams on water-level dynamics in tropical peatlands](#). Putra *et al*., Hydrological Processes (2021)

If you would like to find out more about PeatDataHub and/or would like a demo of the database functionality, please contact admin@peatdatahub.net

What does open research mean to you?

To me, open research means research studies where the information is accessible openly, not only to the research community but to other people who might want to use it, like policymakers and NGOs.

How does your research use open research practices?

I'm the [water@Leeds](#) coordinator, so I try to share best practices with all the people involved in our research centre. I have a particular project where I work in partnership with the International Union for Conservation of Nature ([IUCN](#)) peatland in the UK. It's a project that involves long-term monitoring of peatland sites with volunteers. We want data to be uploaded in standardised ways and made openly available after quality control, so people interested in peatlands, such as practitioners and policymakers, can make use of the information.

Does this project engage with citizen science?

This project was a trial, so we didn't know too much at the start, but it's getting there; it is a learning curve. I have learned that in open science and data monitoring, you have different practices when you do research alone than when you do research with a group of volunteers,

so we are still tweaking it. It is interesting to see how different groups manage data and, in general, open research.

How do you deposit your work?

I use ORCID, Symplectic. In my previous job, I was the database manager for a research platform called ForestPlots.net. I work closely with the Library at Leeds so that the datasets produced can have DOIs and be maintained.

Again, with the peatland project, I'm working with the Library to find a way to maintain the datasets. One of the things that I am keen on is to make sure that the data is open, and it also can be citable because there's lots of effort to collect the data, and it's sad when the people do it, don't get recognised.

Dr Gabriela Lopez-Gonzalez's Google Scholar profile

In your field, have you found it difficult or easy to identify other people's open research practices?

I would say it's the most difficult. I don't think there is a standard way of doing open research in ecology. I think we're all just doing it as we learn, and the people I try to collaborate with are the ones who try to embed open research in their practice.

How does your open research inform your teaching?

I don't teach, but I've done lots of training for all levels on how to use protocols for long-term monitoring. I always tell people that they have to consider the full research cycle, including the research data management because I think that is something people often forget.

When you start your research, you think about it in a way that is for you, for example, to get your thesis done, and you don't think about what's going to happen when you finish it. In the training, I try to embed that, to think about what happens to the data once they stop doing that project or thesis. It has to be deposited somewhere where it can be easily accessible and reproducible.

Do you use preprints?

I haven't used preprints. However, if I publish in a journal where everything is under embargo, we will put the manuscript in the White Rose repository when we are allowed.

Water Woman Presentation for Women at Leeds Network (WaLN)

Do you have concerns about preprints?

No, I don't think so.

Has your attitude toward open access changed in the recent years?

I've been for open access; I think all publications should be open access.

Have you had a green or gold open-access work published?

I think both, and it depends on the funding from the Library.

In your opinion, what is the current state of open access in your field?

That's hard to know. I think people try to get things published open access, but it will depend on the funding.

Are there any negative attitudes toward open access you have come across?

No, not really. The cost is something people talk about, but it depends on the funding.

What does data mean in your field?

Data is all the information we collect. I think data is very valuable. I mainly work with quantitative data, but recently we had a paper where all the data was qualitative.

How do you manage your data, particularly citizen science data?

We have a database called Big Data Hub, and that's where we store the data. In quality control, we look for outliers. For example, we have identified things that cannot possibly happen in the field. So, we have implemented a system that says your data is outside the bounds, and then you have to confirm if it is alright. Then, of course, we will always go back and check if there might be an error with the sensor when people enter the data.

Do you use open data?

I don't use it, but I tried to generate it.

Have you deposited dataset with the Leeds Data Repository or elsewhere?

Yes, I've deposited the University of Leeds's data repository. Before the Library had the repository, we used to deposit in Dryad.

Have you written a data management plan?

I've done a data management plan for projects, and we have our version of the data management plan for the current research project.

Are you aware of your institution's resources on data management plan?

Yes, and I have been using those resources.

How important have ethical considerations been in devising your data management plan?

Recently, not much because most of the data is not about humans. Although there is an ethical consideration for some of the data we collected on the tropical forest: it was on species that were of scientific interest or on the Red List. Sometimes you don't want to give the full details of what you've collected because you might endanger those species.

What kinds of software do you use for your research?

I use the platforms that we have developed: I was a co-developer of two platforms, one is ForestPlots.net, and the other one is Big Data Hub. Those are the ones I use the most, but I also use Excel and R quite a lot.

Do you use open software?

Yes, I try to use open-sourced tools whenever I can, like R. Many of my collaborators are outside academia or the UK, so we have to consider what's available if I want somebody in Peru or Brazil to be able to use the data. They need to have access to software that is freely available.

Open Research Case Studies – Priestley International Centre for Climate with Douglas Parker

What does open research mean to you?

In terms of the technical side of the research, it means that research is testable and repeatable by other researchers, using the same methods, often the same data. That's become increasingly important because of the complexity of the data that we use. In our field of climate science, we use models which are unique and very complicated and require a lot of specialists. A climate model has hundreds of people making it work: somebody who's not part of that group can't run that model easily, and we can't reproduce your results. I think the availability of the data that you do your studies on is an important principle. Then there's the part related to the communication of research: who can see the results, what they have to pay to see the results, and how that funding is allocated - because there's a cost to dissemination. I really want to see everything on the web; therefore, the costs have to be restructured. These are the main things that I associate with open research.

How does your research use open research practices?

We are required now by UKRI to make our data available when we publish things. NERC also has a policy on the availability of the data. We have the British Atmospheric Data Centre, which is part of the Centre for Environmental Data Analysis (CEDA), and we're required to put our data on that unless there are exceptional circumstances with third parties. That's been going on for a while, and it's just increasing in complexity. In terms of publication, we'll always try to make everything as open as we can, but the real challenge is funding: it's becoming a real problem. We always want to publish open access, but getting funding is becoming very difficult.

How do you deposit your work?

I have an ORCID account, so I presume people can find things from there, and I put it on the White Rose repository as we are expected to do that; I get everything on it immediately. I haven't done anything else apart from the White Rose repository. I've thought about using arXiv, the repository physicists use, but I haven't done it yet.

In your field, have you found it difficult or easy to identify other people's open research practices?

I'm part of the executive group, of the National Centre for Atmospheric Science, which is a large UK Institute Centre employing a lot of people. As part of that executive group, we share experiences since we have people working in very different areas of science. We have computer specialists, laboratory scientists, field specialists, and theoreticians; they have their own challenges.

How does open research inform your teaching?

The ability for students to have free access to papers is a good thing. I use data from papers, particularly for student projects. Within a module, I have an exercise for students to look at a paper we've published and get the data from it. If it's something students can tackle, I get the data into a form they can easily open and reproduce it. I commonly do that; I haven't looked at it in the context of open research, but certainly, it facilitates that.

Do you use preprints?

I haven't done it; it's not common in my field. I work a lot on projects with the developing world, since it's hard for my colleagues in Africa and elsewhere to get hold of papers, we would usually have a project repository for papers. They'll be password protected because of copyright issues, but the partners in Africa appreciate that because they can get papers early. They often struggle to get them at all.

Do you have concerns about preprints?

I do have concerns. Preprints haven't been quality-controlled effectively, so there is a risk around the diffusion of versions of a paper which may propagate errors. But some journals have an open peer-review process, and I'm quite cautious about that because people get a DOI for their submission before it's reviewed. I've interviewed people for academic posts, and they're using these preprints in their publication list. If somebody's not knowledgeable about the details of the journal, then they don't know this isn't a peer-reviewed paper. It's got a DOI; therefore, they think it's a peer-reviewed paper, but it's not. There are some ethical and quality issues around that.

Has your attitude toward open access changed in the recent years?

Yes, it has, I've discovered a lot in terms of the feasibility to publish things like policy briefs and code and data. The ability to get DOIs for that is a step forward. We want to get them out there for a wider use but also that we get the credit for it for doing something original. It takes ages to publish in a peer-reviewed journal, and you can't include all the good things you do there. But the open access channels, such as the White Rose repository, where you can get things on repositories like data reports, have opened my eyes in the past few years. I see the real benefits of it.

Have you had open-access publications?

If we can get gold open access, we will do that, but we are limited by funding, and that's a real problem. Some of our publications are green open access. Again, I work with colleagues in the developing world, where they have problems getting things if they aren't gold open access. They can get things green on the Internet after the embargo, or they read drafts of your papers before it's out.

Meteorology: Climate trends, coverage bias and rainfall
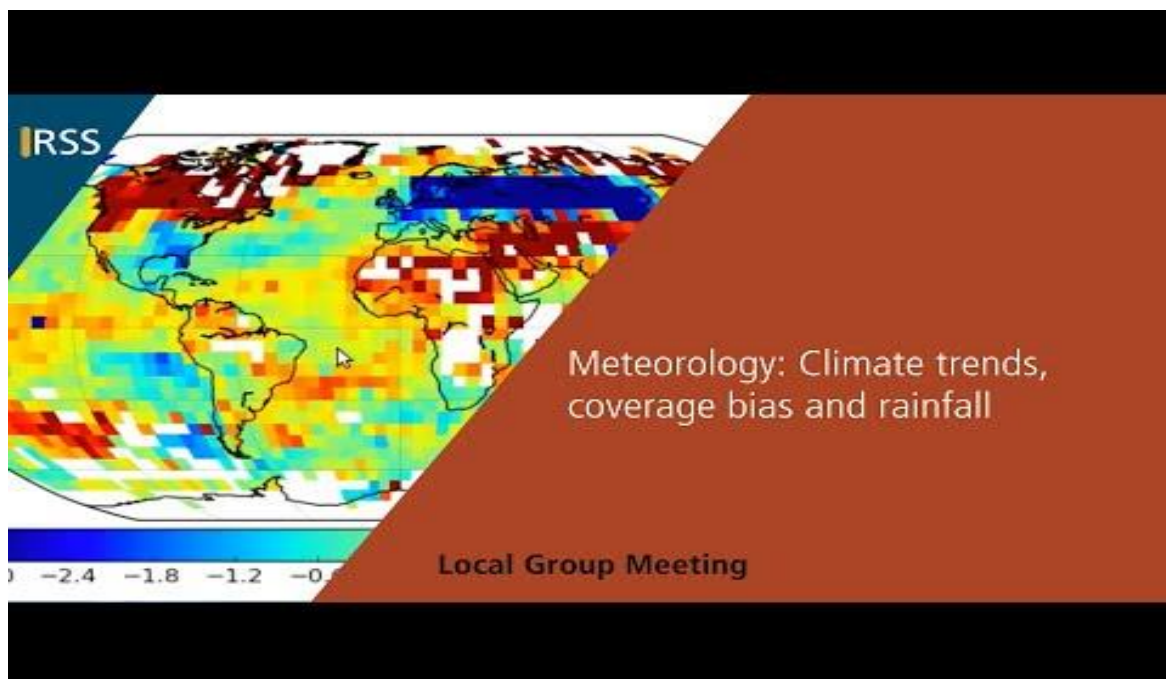
In your opinion, what is the current state of open access in your field?

The majority of things we do are published open access, but we have quite a lot of funding, UKRI or otherwise. Recently that's enabled everybody to publish open access because we

have a block grant, but it is running out now. So, it's becoming not sufficient. I don't know what will happen; we are in a kind of crisis now.

Have you ever developed a means to 'bypass' restricted content?

If people request copies of papers, we send them. We've had project repositories for preprints; it is mainly for colleagues in the developing world. I didn't have to do it myself.

Are there any negative attitudes toward open access you have come across?

I am ambivalent about it: there is a massive push in favour of open-access publishing, but it brings its own problems. The biggest problem I see is the proliferation of low-quality journals, which are driven by financial goals. It's getting much harder to filter out good and bad work. On the other hand, the author pays to publish, and the driver is no longer quality but money.

Before open access, libraries were the gatekeepers, so if libraries decided a journal was not good quality or the academics in the university said this journal isn't well reviewed, the library stopped taking it. There was pressure on journals to maintain quality, and a journal, which didn't do that would die out. Whereas now, there isn't any pressure to maintain quality since many people pay to publish their work.

The good thing about open access for the developing world is that everybody can get access if they have the Internet. But there are so many journals, and if you are not in the field, you will have no idea if they are good or bad. If they often haven't got money to publish open access. Somebody has to pay along the line but moving it to the author brings some different problems.

What does data mean in your field?

Data means numbers in computers usually; they come from observations and measurements or from computational models. It also means case studies and narratives of examples or case studies of stories about things that have happened or people's experiences.

How do you manage your data?

Most of our work is UKRI-funded, so we are required to keep it on CEDA. Within the University, we have huge amounts of data. We are approaching petabyte amounts; one petabyte is a thousand terabytes. We have it on backed-up discs here in the University, but it's becoming a problem with the new centralised IT regime because data handling is getting very expensive. If we have a project, we want your terabytes backed up, and we want it to be maintained long-term, at least 10 or 20 years in an archive. When the grant finishes, you have no money to pay these high costs.

We used to have systems where you paid up-front for your maintenance, and you were guaranteed that it would be kept on a read-only tape indefinitely. Now, it is getting too expensive. There is a tension between the demand for open access and the cost of it.

Have you written a data management plan?

Yes, lots of times. We've made them up ourselves; we have copied them from other projects.

What kinds of open software do you use for your research?

Lots of tools and bespoke software: our codes are written in FORTRAN, or these days, in Python. We use IDL and MATLAB, and for some of these, we have institutional licences, but certainly, Python and Fortran are open-source tools.

It's one thing to make the data available, but then the skills and technical requirements are needed to access it.

In some of our projects, we have a cost in terms of staff time, so if we have a project where we want our African groups to be able to access the data on an equal footing with us, we have to spend a lot of time training them just in getting access. We use the JASMIN server centrally in the UK, and the idea is the data stays on JASMIN, and you do your processing locally. Our African colleagues have access to JASMIN, but even, getting an account and getting it to work there is technically beyond most people. So, we have to hold workshops and training: it isn't enough to put it there and assume your job is done. There's a cost around this: it's expensive to have the data there and maintain it.

It's very naive to think that just because you've done that, you've made it available because you haven't made it available if people can't open and access it. We are quite good at that in our field because we are very data-heavy. We share a lot of data in climate science; it's a global field. The issue is we can make the data available and then wash our hands of it, and say we've done our job and it's not available because people in some parts of the world haven't got the facilities to access it.