Welcome back everyone to this video where we'll discuss the next T. Trace your steps. We're referring to the practise of keeping a tight record of all things related to your research. So that includes anything from the idea formation stage, to minutes from your meetings with supervisors or collaborators, change to your analysis plan, which of course is very important also with regards to the previous video. Also records on your data and any written sections that you have for either a paper or a thesis work or anything of that kind. And it basically refers to the overall practice of recording all the changes to the research project or the recipe if you like. And also recording everything about the outcomes. So just keeping a tight note of everything really. And why would you bother with this? Well, first of all, some selfish reasons for future you. If you have a clear record of everything that happened throughout your project, why you made certain decisions, which files are containing which information. You are, first of all less likely to make mistakes and for instance to use the wrong data file in your analysis. It is easier for you to remember your decisions and just go and execute them. If you've got the clear recipe, you don't have to go and start. I think every time, oh, why did I do this? Isn't there a better way of doing this? No, you've got it all your recipe and you can just follow that. And also when you get to the write-up stage, it will be a lot easier for you to find what you did, which versions you used for certain softwares, for instance, or any kind of analytical decisions you made along the way. It's gonna be a lot easier if you have that on record than having to go through your memories and think why did we do this again in this way. Then of course you do this work typically within a research group. And I think your colleagues will also very much appreciate if you keep a clear note, a clear record of all the decisions you made along your project's lifespan. Because it could avoid them duplicating parts of your work, for instance, which of course, costs a lot of time. And if you've already done certain work or you made it clear why you didn't do a certain analysis, for instance, they are aware that they don't have to go and do that as well. So that can avoid duplicating work and finding things out. And also for them, it's useful to know where the most recent versions of your data and your analyses are in case they want to help maybe check or build upon them. And also new students and new colleagues, they can learn from your project, from your progress and your project because they can see a clear lifespan of the idea formation to the end product and everything that's happened in between. And that's a very useful way of learning more about research and particularly your research. So that's very useful for the people in your group. And then also the wider field can really benefit from you making sure you have all these details recorded somewhere. Because transparent research is a lot easier to understand and evaluate. Papers that have very unclear methodology sections, they are typically a lot harder to first of all, understand. And then also, it's hard- a lot more difficult to guess how valuable the results perhaps are, how much you should trust those results if you don't know exactly how those results were derived and decide whether or not you should build upon those results or not. So that's good for the field if you have that very clear. And also when you get to the part where you get some feedback perhaps on your work. Hopefully, providing that level of detail for people will invite more specific and more useful feedback. Rather than, um, can you clarify this or this, or this? And maybe there are interesting methodological discussions that can arise from this in the field. So, but that can only happen if people are transparent about what they are doing. And again, others reading your work can learn from your steps. It's always great when a paper has a very clear methodological section so that you can really understand what has happened and how you could reproduce that work or maybe apply similar analysis pipelines to your own work. So that's very useful for you. Also if you're reading other people's work like that, and also you can give something back to the field if you can do that yourself as well. So these are some reasons why it's important to work. Why it's important to keep a tight record of your details so that you can then make your research more transparent. So how can you keep such a tight record and a clear overview of your research? We're going to discuss two pretty basic steps. And there are different levels of how complicated you can

make this or how simple you want to keep things. Again, this also very much depends on the type of research you do and the kind of circumstances you're in. So, we're just going to discuss some some very basic concepts, but also some, some tools that you might want to consider using. So first of all about keeping notes. In the perhaps simplest version of this, you can just keep a Word document, maybe a bit like diary, where you put in entries whenever you have something, some ideas, some thoughts, some discussions, some notes on your supervisory meetings, but anything related to your project, you just note it down. You could keep separate documents, of course, for different aspects of your projects. But in the very simplest form, keeping a diary on things and decisions. In even a Word document is a very useful way for you to keep a record of everything that's occurred in your project. There are also some slightly more fancy ways or different ways. Well, some people might prefer pen and paper. That's very much up to you and your personal decision. Some labs also encourage a more structured way of doing this and a way that facilitates also sharing notes between people in the lab. So platforms for this could for instance be a Jupyter notebook or a Research Space notebook, or they're both types of electronic lab notebooks. And you can also typically incorporate code or other very project specific documents on these kinds of platforms. So they can be very useful for sharing notes and for instance, sharing protocols or other kinds of things. In addition to maybe you keeping notes for yourself also, but you could also maybe use these to keep all your notes in. And another program you might want to use is Notion Niamh and I, we both use this ourselves. And it's just quite a nice. It has some cool templates. You can just create a free account and you can put in text, you can put in pages, you can put in a timelines. And there are some, yeah, some tutorials here on if you make new account, this is what you see, some getting started materials. For instance, you could keep a journal and you just put in your entry. You can make page or you can use another kind of template, you can link to other sources. And even for this whole structure, there are certain templates. You could use, for instance, a roadmap can be quite useful even if you want to use this with other people. You can share certain pages with other people and maybe put a project overview in this kind of format. Or if you're a student, you might want to, for instance, look at the template for thesis planning. You have for instance here a timeline and in this kind of way you can add documents, you can label entries. You can also look at different views. So for instance, in a calendar view, So that can be a very nice resource as well for keeping some notes. So that's everything on keeping notes, some suggestions. But it doesn't really matter what platform you use or what framework you use. As long as you do it consistently. And you are able to find back your notes when you need them. Use some kind of tags or keywords, always, consistently. So that's even in your Word document, you could find just, Ctrl+F and search for the words and find easily what you did and why you made certain decisions and those kinds of things. So moving on to organising your files. So this is a very typical, I would say, project folder. If you are still quite new to doing projects, I've definitely had a lot of folders that look like this. And I've always regretted it when I got to the end of something. Because it's very difficult to get a clear overview of this in a, in a flash. So you have to search, you have to make sure that you're really using the right version. For someone else coming in and looking at this folder, it's gonna be very difficult for them to see which ones they need to use which ones are the right versions. So would not recommend going this route if you can avoid it. And there are some strategies you could use to avoid this. So first of all, location, location, location. Always make sure you put the same files or versions of the same kind of file in the same location. Don't switch between computers and the like You can of course, make a backup somewhere else, but make sure that you always put your updates in one location if you can for each file. And also make sure you designate certain spaces for certain parts of your project. So you might want to store your data in a slightly different folder then maybe your writing because then it's a bit easier to, to look for the right file if it's not an endless list of files. Also, be consistent in the way you name your files. And related to that, it's a good idea to incorporate the essential info in your

filenames. And I would also suggest you would put those in the actual file so that even if your file is open, you can quickly see, oh yeah, this is this and this version. And that could include, first of all, a brief overview of what's in the file. So introduction or chapter x or data from this project. A version number can be useful sometimes or at least a date on which it was last updated. Because from that you can sometimes also refer back to which version that was. So this is again, kind of a simple way. If you're just storing files on your computer. But if you are, if you're not using any fancy tools for it, and you're just using files on your computer and maybe in a shared space with other people. It is useful to think about these things. And if you make sure that it's understandable for others to figure out your files. You'll know that you yourself later can also understand your files if you come back to your, your project after maybe having a pause for a while. Because people forget is a very normal thing. It's a human thing, but just help yourself and others. So one very basic structure you could think of is separating the different parts for your project in different folders using the structured file naming. And so for instance data_version1 and the date. And also importantly, it can be very useful to add a README file to your folders. So if you're not familiar with this concept, it's a very basic overview typically of what's in the folder. It can be as detailed as you want or as is necessary for other people to understand what's in your files. But it's just a basic text file which should at least include some information about which project this is about. Ideally also a date on which it was last updated. The read me file and by whom? And a contact for if there are any further questions, maybe some contact details would also be useful. And a brief description of what is in each of these files, and especially when you have edited some of this data. So for instance, when you have cleaned a data file, you would want to maybe include some details on how you've cleaned your data file. And so that other people know exactly what happened to it before using this data And they can also then put that in their methods, for instance. So that's a very useful thing to include in your folder structure, especially if you're thinking other people are going to be using those files as well. but just do it anyways, whether they do or don't So that's just within a computer folder structure. But they're also more elaborate tools we've already covered two briefly Jupyter notebooks and Research Space. And there are also other tools, for instance, protocols.io where you can upload and use also protocols. Those are shared I think publicly also. Benchling seems to be quite a nice tool also. I think that's more commonly used for lab-based research, but I might be wrong. That's another one to consider. And I want to highlight two: the Open Science Framework And GitHub The Open Science Framework is basically a place where you can store a bunch of documents for a project and everything you upload there gets a timestamp. So essentially version controls it because you can see when certain documents were added. So for instance, we've got a couple of versions. This is for my own thesis project. We are doing a clinical trial on this. And we have, for instance, a couple of the versions of the protocol uploaded. And I've tried to do that as the project went along, but you know sometimes things happen But at least there's some visibility on which versions happened - were created when. And you get a timestamp here if you upload a new document and it's also recommended to keep a transparent changes folders. Or for instance, we had some changes to some of our documents after a pause during the pandemic. So there's a Word document I just made with a list of changes that happened during the project's lifespan. And that's something you could consider. And you can keep this also embargoed for some time so that it's still private, but then you can open it up later and you can refer to it with a DOI for instance. So this is a way to keep some files relevant for your project together and also in a kind of version-controlled or at least time-stamped way. What's also really cool about the OSF is that you can add registrations. So for instance, pre-registration documents are some standard templates for this. And you can have a look at this and if you're interested in more of this, so a way to keep notes of your, your research project. And then the other thing I wanted to point out, if your project contains some coding, you might want to consider using GitHub, which is a very popular tool for version control of coding in particular. But you can also

use it for written documents, but it's a very useful way to track changes. And other people can also work on your project if it's open or you've got collaborators added to your project if it's still in the private space. But I'm not going to go into a lot of details now, but there's on this main page There are some links to some materials to get you started. But I also wanted to point out this very useful resource, Our Coding Club, which was originated by a group of ecology and environmental science students and researchers from the University of Edinburgh. And they have some really good tutorials on different coding related matters. But also they have this introduction to GitHub for version control. So they do a very good job at explaining things in a very understandable way. So if you are interested in this, I would maybe suggest looking at this as a way to get you started on GitHub. Then as a last note Also, if you want to use any of these Research Space, Jupyter, protocols.io for instance the University might have licences for some of these tools. Some of these tools are, they have to be paid for. So if you want to use any of these tools, if you're, for instance a PI, then you could ask the Research Data Support team for some assistance in maybe figuring out which tool is most useful for you and your lab. And also how to do it with the licences and everything. So hopefully that was useful. And I'll see you in the next video on transparency.