

BioNT - Network for Training

Deliverable 1.4 | Open and FAIR principles, data management



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Project partners

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2. BIOBYTE SOLUTIONS GMBH (BIOBYTE)
3. HPC NOW CONSULTING SL (HPCNOW)
4. UNIVERSITETET I OSLO (UO)
5. UNIVERSITAT DE BARCELONA (UB)
6. INFORMATION CENTRE FOR LIFE SCIENCE (ZBMED)
7. SIMULA CONSULTING (SIMULA)
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Project overview

The BioNT consortium is dedicated to providing a comprehensive training program and fostering a community for digital skills relevant to the biotechnology industry and biomedical sector. With a curriculum tailored for both beginners and advanced professionals, BioNT aims to equip individuals with the necessary expertise in handling, processing, and visualising biological data, as well as utilising computational biology tools. Leveraging the consortium's strong background in digital literacy training and extensive network of collaborations, BioNT is poised to professionalise life sciences data management, processing, and analysis skills.

Fourth training workshop report in summary

BioNT delivered its fourth training workshop in March 2024. This document reports about this workshop regarding its organisation, the applicants and participants, as well as their feedback about it. The report also touches on the different advertising channels used to reach the project's target audience, as well as on the methods used for developing and delivering BioNT's training workshops.

Open and FAIR principles, data management

BioNT conducted its fourth training workshop, Open and FAIR principles, data management, from the 5th to the 6th of March 2024. The workshop titled “Awareness in Data Management and Analysis for Industry and Research” was offered free of charge to the participants and took place fully online.

This hands-on workshop outlined key concepts of data management processes and activities in academia and industry, including how to make data FAIR (Findable, Accessible, Interoperable, and Reusable), how to organise data, and good research practices. It also covered topics such as Common European Data Spaces, data management and governance in industry, and the development of data management plans.

The training materials were based on those from the [FAIRsFAIR Adoption Handbook](#), and adapted training materials from [ZB MED](#), The Carpentries and Code Refinery. [FAIRsFAIR - Fostering Fair Data Practices in Europe](#) aims to provide practical solutions for the implementation of the FAIR Data Principles. [ZB MED - Information Centre for Life Sciences](#) is an infrastructure and research centre for information and data in the life sciences. ZB MED aims to ensure the national provision of information and literature in the life sciences for practical applications, teaching and research.

A section on Research Data Management was adapted from an existing slide deck by [ZB MED](#). The slides covering European data spaces were sourced from [NFDI4Health](#) (a slide deck focused on privacy issues, which itself draws from material by ZB MED and Aalto University). The section on good enough practices used content from a lesson in [The Carpentries](#) incubator. The following section on Data Management & Data Governance in the Industry was created specifically for this workshop, drawing from the FAIRsFAIR Adoption Handbook Lesson Plan 16 "Data Management and Governance in Industry and Research" and the [DAMA DMBOK 2ed](#) (Data Management Association - Guide to the Data Management Body of Knowledge 2ed). The training materials about FAIR were generated using the [Library Carpentry: FAIR Data and Software](#) from The Carpentries, albeit in its early phase of development (Pre-Alpha version), necessitating extensive adaptation. The last part of the workshop on reproducible research and how to prepare code to be usable by you and others in the future was derived from the CodeRefinery [lesson](#). The [CodeRefinery](#) provides training and infrastructure for researchers to make their research more reproducible and transparent, furthering the goals of open science and FAIR data management.

The use of ZB MED teaching materials proved to be beneficial as they are the result of an extensive development process (based on FAIRsFAIR teaching materials, [fdm.nrw train-the-trainer workshop](#), [DAMA DMBOK 2ed](#) and previous workshops) and have been improved and validated through workshop evaluation. All the training materials and slides used for this workshop have been deposited in [Zenodo](#) and have been downloaded more than 180 times already.

Organisation of the workshop

This workshop ran for 2 days, from the 5th to the 6th of March 2024. The entire event was conducted virtually with no cost to participants. On both days the session was delivered from 09:00 to 16:00 CET.

Webpage and registrations

The CECAM event management platform, provided by the EPFL, was used to create a dedicated webpage for the workshop, which included the workshop description, learning objectives, requirements, program (Figure 1), and any further information relevant to potential participants. The webpage is accessible at <https://www.cecama.org/workshop-details/-1349>.

Tuesday March 5th 2024 - Day 1

Welcome + Ice-breaker (09:00 to 09:20)

Research Data Management (RDM) (09:20 to 10:35)

Break (10:35 to 10:45)

Common European Data Spaces (10:45 to 12:00)

Lunch Break (12:00 to 13:00)

Data Management & Data Governance in the Industry (13:00 to 14:15)

Break (14:15 to 14:25)

Data Management Plans (DMPs) (14:25 to 15:50)

Summary + Feedback (15:50 to 16:00)

Wednesday March 6th 2024 - Day 2

Welcome + Summary (09:00 to 09:10)

Data Organisation (09:10 to 10:10)

Break (10:10 to 10:20)

FAIR Data Principles (10:20 to 12:00)

Lunch Break (12:00 to 13:00)

Electronic Lab Notebooks (ELNs) (13:00 to 14:00)

Break (14:00 to 14:10)

Reproducible Data Analysis (14:10 to 15:50)

Summary + Feedback (15:50 to 16:00)

Figure 1 - Workshop program as displayed on the [event page](#) at the CECAM platform.

For registration, the CECAM platform was used to manage the applicant's information and communication. In parallel, the EMBL servers were used to collect pre- and post-workshop information through pseudo-anonymised surveys. The survey data was linked to the applicant's data only via a unique identifier, provided in the CECAM registration process, as well as in the EMBL-based survey. This ensured that only the workshop organisers

accessed the applicants' personal data while still collecting information relevant to the workshop separately. To register, applicants had to: (i) register on the CECAM platform, (ii) complete and submit the pre-workshop survey, and finally (iii) complete the application on the CECAM platform using the unique identifier provided in the pre-workshop survey.

Applications were reviewed based on answers in the pre-workshop survey (containing no personal information). Applicants working in small and medium enterprises (SMEs) or who identified themselves as job seekers would have been prioritised if needed, but after a thorough assessment of technical and personnel capacity, all 68 applicants were accepted. The communication of the application outcome to all participants, as well as any additional communication, was performed via the CECAM platform.

Advertisement

The workshop was advertised via social media, several websites, mailing lists or Slack spaces of networks and communities (ELIXIR, NFDI4Microbiota and de.NBI). For the advertising of this workshop, a tailored image was generated, which included a QR code to facilitate access to the registration platform.



📢 UPDATE: Fantastic News! We have decided to extend the registration deadline for the fourth #BioNT workshop titled: "Awareness in Data Management and Analysis for Industry and Research"!

📅 Save the Dates: March 5-6, 2024

🕒 Workshop Schedule: 09:00 - 16:00

📅 New Registration Deadline: February 25, 2024

Everyone manages their data, but the question is, how well? In this two-day workshop, you will learn how to manage your data properly to make it reusable in the long term, to make your analyses reproducible, and to make your processes transparent. You will learn the basic concepts of research data management, including the FAIR Data Principles. You will also learn about relevant policies, draft a data management plan and learn about the use and benefits of electronic lab notebooks. By the end of this workshop, you will also be able to make your computational results trustworthy and reproducible

We look forward to receiving your applications for this training workshop, which is based on the [ZB MED - Informationszentrum Lebenswissenschaften](#), [The Carpentries](#) and [CodeRefinery](#) material and supported by [ELIXIR](#)

Visit our event webpage to discover the program details, meet the organising team, and submit your application. Remember, participation in the workshop is completely free



ONLINE WORKSHOP

AWARENESS IN DATA MANAGEMENT AND ANALYSIS FOR INDUSTRY AND RESEARCH

Dates: March 5-6

Location: online

Cost: free



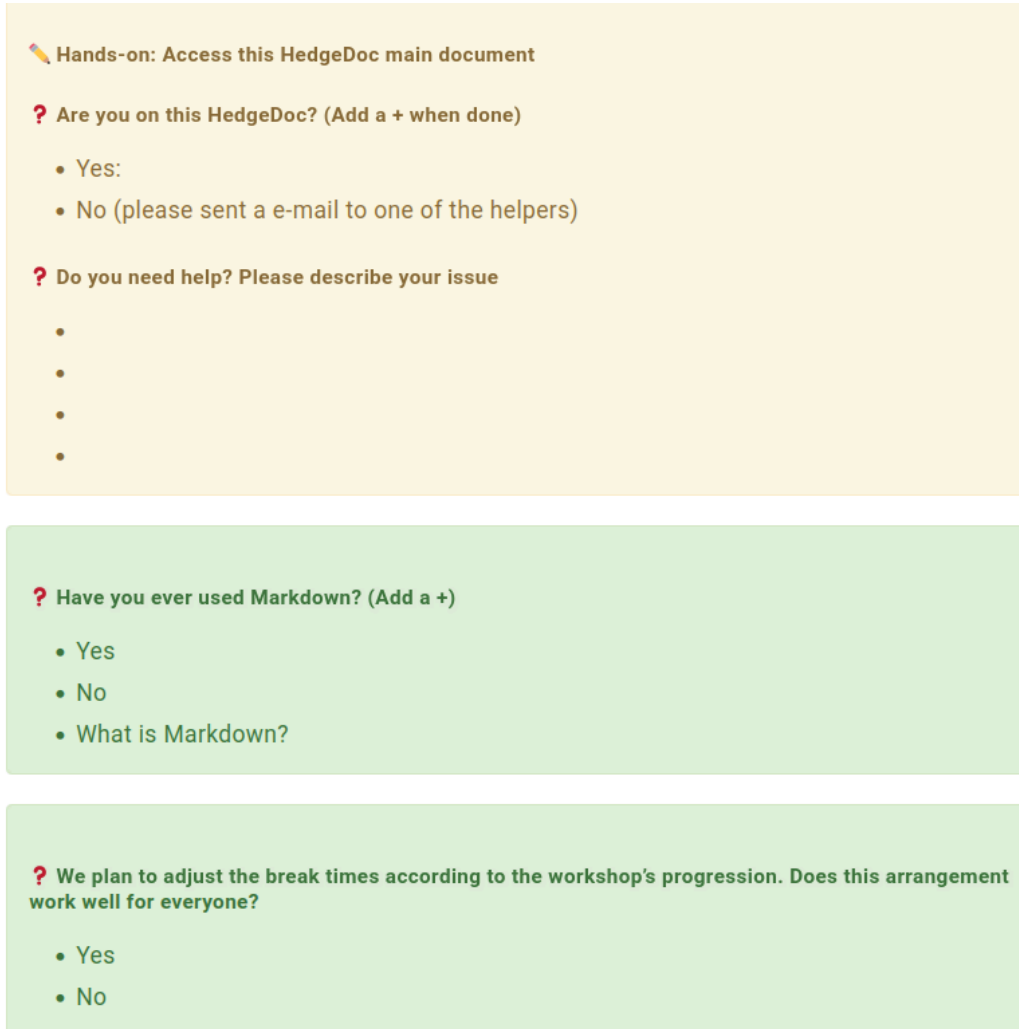
Figure 2 - Examples of workshop advertisement (top - LinkedIn post, bottom - advertisement image).

Infrastructure for the workshop

The workshop was delivered in a Zoom webinar format, with participants' visibility disabled to preserve their privacy. Participants were able to see and learn from the trainers but direct interactions (e.g. chat or voice) were not possible within Zoom during the sessions. All direct interaction took place in written form via a collaborative document, where anonymous participation was possible. To serve the collaborative documents, a [HedgeDoc](#) collaborative space was set up by BIOBYTE, and was hosted on their server.

A **Main** collaborative document, set up by the instructors and organisers, was shared with the participants before the workshop. Each section of the workshop had dedicated *Hands-on*

boxes to report on the task status, ask questions or raise issues. Helpers engaged and assisted participants by answering the questions and issues directly in this document. This Main document was updated live during the workshop. Separate boxes to answer questions were used to improve participant engagement and as an indirect learning assessment (Figure 3).



✏ Hands-on: Access this HedgeDoc main document

? Are you on this HedgeDoc? (Add a + when done)

- Yes:
- No (please sent a e-mail to one of the helpers)

? Do you need help? Please describe your issue

-
-
-
-

? Have you ever used Markdown? (Add a +)

- Yes
- No
- What is Markdown?

? We plan to adjust the break times according to the workshop's progression. Does this arrangement work well for everyone?

- Yes
- No

Figure 3 - Example of question and hands-on boxes in the collaborative document.

To help with the organisation, four HedgeDoc documents were used: (i) a [Template](#) with all instructions and boxes for hands-on, questions, etc; (ii) the [Main](#) document with the information for the participants during the workshop, filled with boxes related to the section covered by the instructor to help with the navigation and cleaned during each break to avoid an overcrowded document; and (iii) a [History](#) document collecting all the content from the Main document. This document was shared with participants during the workshop, to grant them access to all prior conversations. In addition, (iv) a [document](#) for Helpers & Instructors was created providing the workshop setup, interactions and explaining tasks of the helpers and instructors.

To enhance the structure of the workshops, an improved version of the document for Helpers & Instructors was used: The roles of the Helpers were clearly defined, including step-by-step information for their tasks before, during, and after the workshops.

Due to the higher number of participants, the document and the instructions have been further updated with clear rules and a better definition that helped the participants to actively interact during the Workshop.

The teaching materials used during this workshop (Table 1) were slides developed by ZB MED and teaching partners from previous workshops, [FAIRsFAIR teaching materials](#), [fdm.nrw train-the-trainer workshop materials](#) and the [DAMA-DMBOK 2ed](#). The ZB MED research data management teaching team (10 people) has delivered more than 40 workshops in Germany since December 2019, with 11 in 2023 alone.

Day	Topic	Tutorial
Day 1 morning	Research Data Management (RDM) Common European Data Spaces Good enough practices	1. Research Data Management (RDM) 2. Common European Data Spaces
Day 1 afternoon	Data Management & Data Governance in the Industry Data Management Plans (DMPs)	1. Data Management & Data Governance in the Industry 2. Data Management Plans (DMPs)
Day 2 morning	Data organisation FAIR principle	1. Data organisation 2. FAIR Data and Software
Day 2 afternoon	ELN Reproducible data analysis	1. ELN Introduction and example of implementation 2. Reproducible data analysis

Table 1 - Program and training material per day.

Certificates

Certificates (Figure 4) will be provided to those participants who explicitly requested them and fulfilled these criteria: (i) they joined at least one session on Zoom or notified the organisers that they could not attend, (ii) they provided a Template of a Data Management Plan they created during the workshop and (iii) they completed the post-workshop survey.



Figure 4 - Template used to generate certificates.

Outcomes of the workshop

Applications and pre-workshop survey

60 applicants completed the pre-workshop survey and 68 submitted their application forms via the CECAM platform. These 60 survey answers are therefore analysed and shown in the following sections. The pre-workshop survey comprised 10 questions covering skills, demographics, and miscellaneous topics. The majority of questions were optional for the successful completion and submission of the survey.

General information

Of the 55 applicants, 55% were male, 44% female and 1% preferred not to say. They were from and were working in different countries (Table 2), and described themselves as 58% White, 19% Asian, 2% Black or African American, 2% Hispanic or Latino(a), 15% preferred not to say and 4% Others.

Country	Nationality	Employment
Austria		1
Bangladesh	1	1

Croatia	1	1
Cuba	1	
Czechia	1	
Estonia	2	2
Finland	1	
Germany	17	39
Greece	1	
Hungary	1	
Iceland		1
India	7	1
Ireland		1
Iran	4	2
Kazakhstan	1	
Kenya	1	1
Italy	5	2
Madagascar	1	
Nepal	1	
Netherlands (the)	4	4
Nigeria	1	
Norway		1
Pakistan	1	
Romania	1	1
Spain	2	
Tunisia	1	1
Turkey	1	
Ukraine	1	
United States of America	1	1
Vietnam	1	

Table 2 - Workshop applicants' nationality and country of employment from the pre-workshop survey.

Most applicants worked or studied in the fields of Biomedical and Health Sciences followed by Genetics, Genomics and Bioinformatics (data not shown) and were academic employees (Figure 5-A) in the category of graduate students (29%) or research staff (43%) (Figure 5-B).

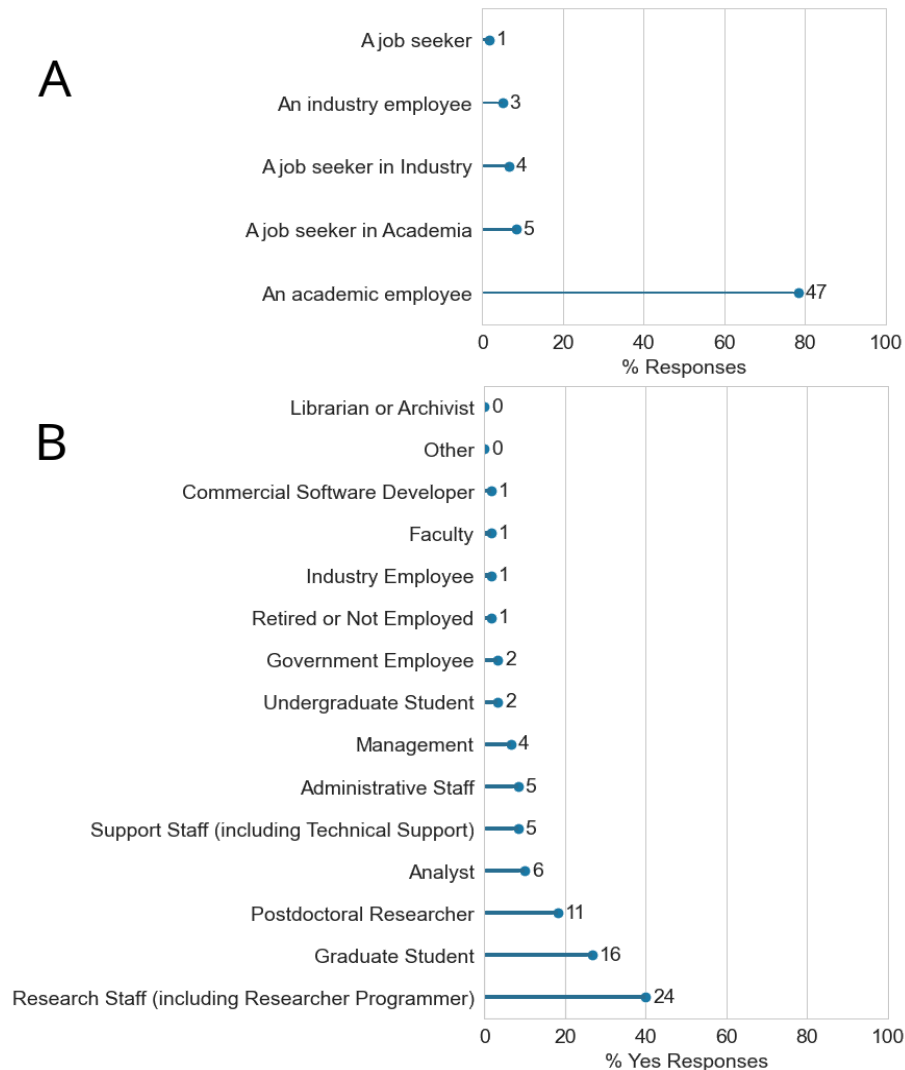


Figure 5 - The current job definition of the applicants (**A**) for n = 60, and the current occupation/career stage (**B**) for n = 56, according to the pre-workshop survey.

Additionally, 3 applicants were industry employees and 10 were job seekers (with 5 in Academia, 4 in Industry and 1 either in academia or in industry). Regarding the connections with SMEs, 8 mentioned to be working in an SME, 15 collaborating with SME and 17 aiming to work in an SME (data not shown).

Applicants found information about the workshop through various channels, as illustrated in Figure 6, with the majority learning about it via social media or receiving direct recommendations from friends or colleagues. Additionally, 8 applicants reported becoming aware of the workshop in a newsletter or on a university website.

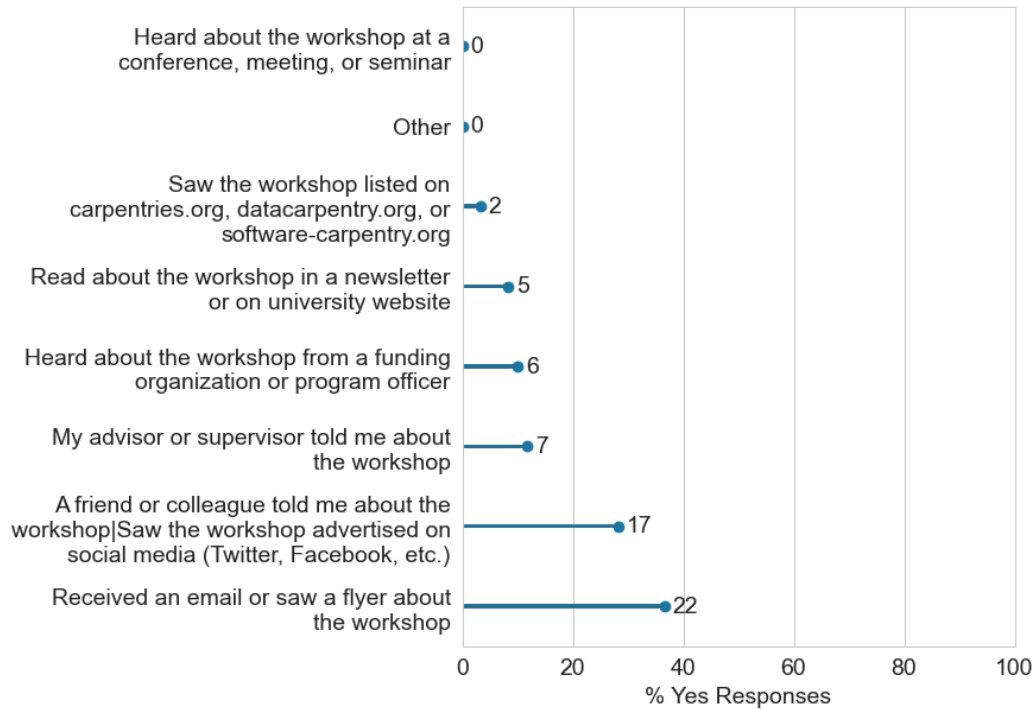


Figure 6 - Answers to the question: “How did you find out about this workshop?” (n = 52).

Background information

When asked about how often they use different programming languages (such as R, Python, C++, etc.), 42% answered “Daily”, 19% “Less than once per year”, 14% “Several times per year”, and 12% “Weekly” (Figure 7).

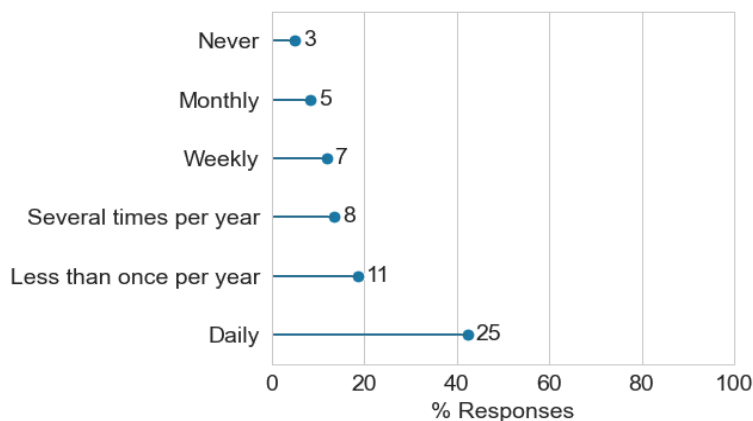
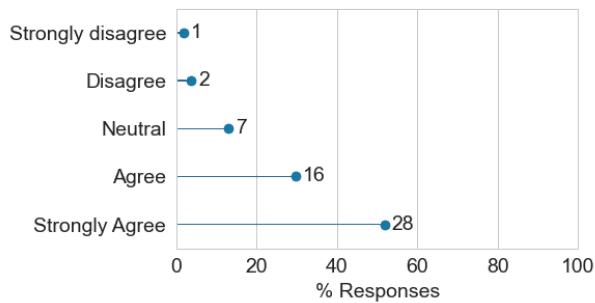


Figure 7 - Answers to the question: “How often do you currently use programming languages: R, Python, C++, etc?” (n = 59).

Most applicants (95%) agreed with the importance of having access to the original, raw data to be able to repeat an analysis (data not shown). The majority agreed that using a programming language can make their analyses easier to reproduce (Figure 8-A), and 25% of applicants were not satisfied with their current data management and analysis workflow (Figure 8-B).

A



B

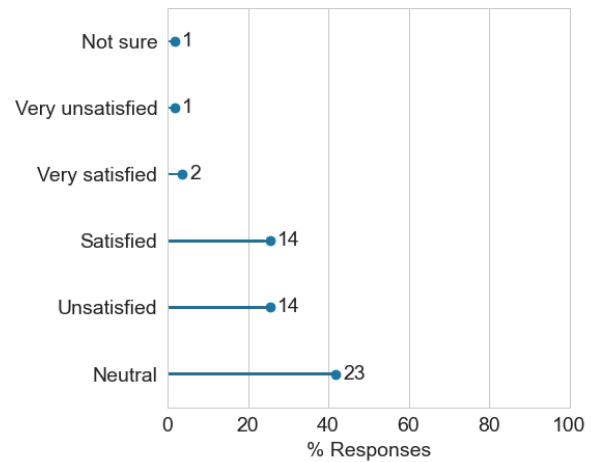


Figure 8 - Answers to the questions: A; “Using a programming language (like R or Python) can make my analysis easier to reproduce” (n = 54). B; “Please rate your level of satisfaction with your current data management and analysis workflow (i.e. how you collect, organise, store and analyse your data)” (n = 55).

Expectations

Most participants were keen on acquiring new skills, with some specifically interested in learning those applicable to current or future occupations. Additionally, 17 participants expressed their intention to leverage the acquired skills either to secure a promotion within their current job or to pursue new employment opportunities (Figure 9).

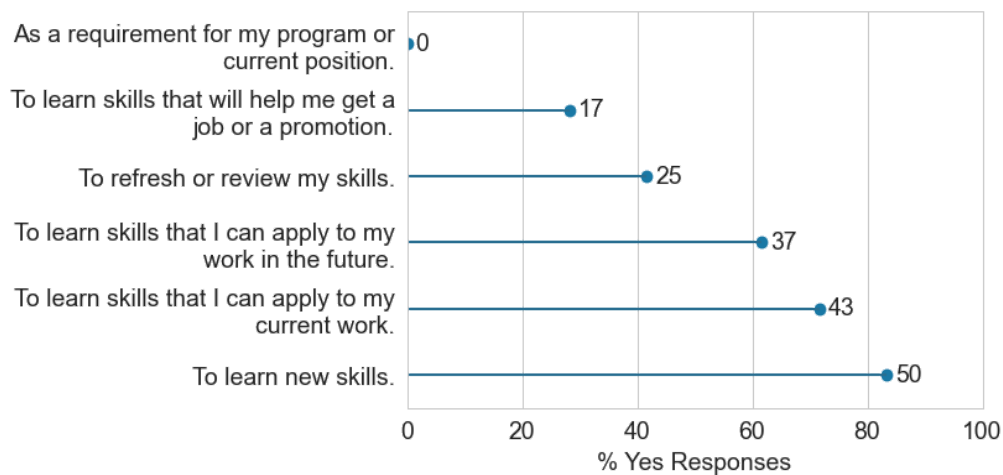


Figure 9 - Answers to the question: “Why are you participating in this workshop?” (n = 60).

Participation

All 68 applicants who submitted their complete application were chosen to take part in the workshop. Of these 68 applicants, a total of 53 participants attended the workshop live, although not all of them stayed for the entire duration (Table 3). All 68 received the self-learning materials for them to consult at any time.

Day	Participants	Instructors	Helpers
1	53	2	4
2	53	3	4

Table 3 - Number of participants, instructors and helpers per day. The number of participants was obtained from the participant login information captured by Zoom.

After the workshop, 28 participants requested a certificate. The certificate will be provided to those participants who attended the Zoom live session at least once, completed the post-workshop survey and carried out a substantial portion of the exercises on the Data Management Plan.

Daily feedback

At the end of each day, participants were asked for feedback on the following three points:

- Please share one thing that was good about today
- Please share one thing that could be improved about today
- Do you have any other comments?

The daily feedback is summarised in the following Table 4.

Day	Good about today	To improve	Any other comments?
1	<p>I found useful information about the contents of DMP, their structure, and templates.</p> <p>The whole structure, the overview I found good.</p> <p>The section on GDPR and the DNP HedgeDoc</p> <p>Nice overview and good starting point</p> <p>Well structured, nice pace easy to follow</p> <p>I like the HedgeDoc format for interactivity and anonymity</p> <p>The session was helpful to understand the basic of RDM</p> <p>My first time using HedgeDoc. I will certainly recommend it to our team</p> <p>Nice overview, I like HedgeDoc. Good structure, really relevant and often a</p>	<p>I find it very challenging using the pad with so many participants, often the exercises are flooded so quickly with answers that I don't know what is the original text of the exercise anymore</p> <p>A bit clearer definition how you expect the answers</p> <p>The questions were not clear at times. Use codes for some questions so we do not type too much</p> <p>A few more hands on would be nice, we would be more involved</p> <p>The hands on task could have been more clearly, how to answer, it was confusing sometimes but I liked the participative part</p>	<p>This is a nice bit of information to digest. Thank you for assembling it. You did a nice job.</p> <p>Wondering why we shall not be able to download or share the video. Is it for training purposes</p> <p>It will be great to have some practical tools to work with the data or some exercises. Not only to speak about</p> <p>The section on industry was a bit boring and very long</p> <p>It would be good to have the opportunity to look some things up; what was said in the last slide</p>

	<p>bit overlooked topic.</p> <p>Nice overview, and I like that is so interactive</p> <p>I like the well structured and informative slides as well as the possibility to interact via the HedgeDoc</p> <p>Well structured, interactive</p> <p>Competence of the speakers</p> <p>Technical very well structured and also the presentations were very clear; thank you!-</p> <p>Very detailed session, a lot of new information</p> <p>Presentation was very good</p> <p>I like the fast response to questions too, including the links. I cannot wait to have them</p>	<p>Some concepts are very similar to a naïve hearer and seem to at least partially overlap. To what degree this is a problem remains unclear.</p> <p>I think the resources should be shared in the same moment (of course, after the workshop will be fine), but sometimes, in the moment is when it is better to see it quickly.</p> <p>The material showed contain many links, it would be nice to be able to explore them on the same day, otherwise I might end up never having the time to go through them again</p> <p>The tasks do not work well on the HedgeDoc, maybe due to the number of participants?</p> <p>It would be nice to have the slides beforehand in order to be able to go back</p> <p>The poll or multiple choice questions might be less challenging than this platform for answering questions</p> <p>Some tasks could have been optimised for the HedgeDoc (e.g. with numbers or letters) the make the answering less complicated and less confusion with so many people editing the same document</p> <p>It was really hard for me to write the answers; sometimes the answers were mixed with others. Also, I would like to save my responses in order to check whether I responded correctly or</p>	<p>etcetera..</p> <p>I find this webinar really useful. I suggest preparing more in depth webinars on some of the topics.</p> <p>Maybe changing to three days with 5 hours instead of two full days would be better.</p> <p>- no way my boss would have given me three days off my other work ;-))me too hahaha</p>
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		<p>not, but I couldn't follow what I replied.</p> <p>Maybe add a small help on how to use HedgeDoc in this special case effectively, e.g. add a new line at the end of the block and start typing for yourself, etc.</p>	
2	<p>Well structured and the interaction with HedgeDoc was better today</p> <p>Very good webinar, complete and clear in general. I also enjoy the active interaction via HedgeDoc</p> <p>Good overview of presented topics</p> <p>Very nice to see that independently from your personal preference you always tried to give us the widest perspective possible on every topic</p> <p>Well structured</p> <p>Great interactive workshop Enjoyed the new layout of the hedgeDoc. was clear to follow</p> <p>Generally the speakers were well prepared</p>	<p>The FAIR section was a little repetitive since we did kind of the same yesterday</p> <p>The Reproducible Data Analysis part was hard to follow as someone who does not work with python or any similar languages. But maybe I wasn't the right audience.. The reproducible Data Analysis section was a bit complex</p> <p>Too much mix of wet lab and bioinfo. The section on analysis was very understandable to me because I am a bioinformatician, but I struggled to understand the lab notebook stuff because I am not wet-lab.</p> <p>Section on analysis was complicated</p>	<p>It would be nice to get a short demo of 1 or 2 ELN(s).</p> <p>Hope you will propose additional in depth webinar on specific topics</p> <p>The slides with links might be reasonable to have to hand during sessions</p>

Table 4 - Daily feedback collected in the HedgeDoc document.

Post-workshop survey

At the end of the workshop, participants were asked to complete the post-workshop survey consisting of 20 questions, 19 of them optional. In total, 44 participants completed this survey.

Regarding the workshop environment and the possibility of interacting with the trainer and helpers, the answers were overall positive. (Figure 11 A-B). A significant number of participants perceived the instructors as enthusiastic about the workshop and knowledgeable about the material being taught (Figure 11 C-D). Except for one participant, all others could get clear answers to their questions from the instructors (Figure 11-E). 80% of the participants expressed confidence in their ability to immediately apply what they learned at the workshop (Figure 11-F). When asked about accessibility requirements, 6 participants replied "Yes", but none included further explanations about their requirements,

therefore no actions were taken. One participant answered "No" to this accessibility question but indicated "Yes" to the question "Were there any accessibility issues that affected your ability to participate in this workshop?". They included a comment regarding the poor quality of one of the trainers' microphones.

Participants mostly viewed the interaction with the HedgeDoc document and the questions answered on the fly by the helpers as positive and helpful for their learning experience. Not only the assistance of the helpers but also the support from the instructors in addressing individual issues and the repetition of exercises were positively received. The possibility to access the overall discussion within the shared document, during and after the workshop, seemed to have improved the participant's learning experience, as indicated by their feedback.

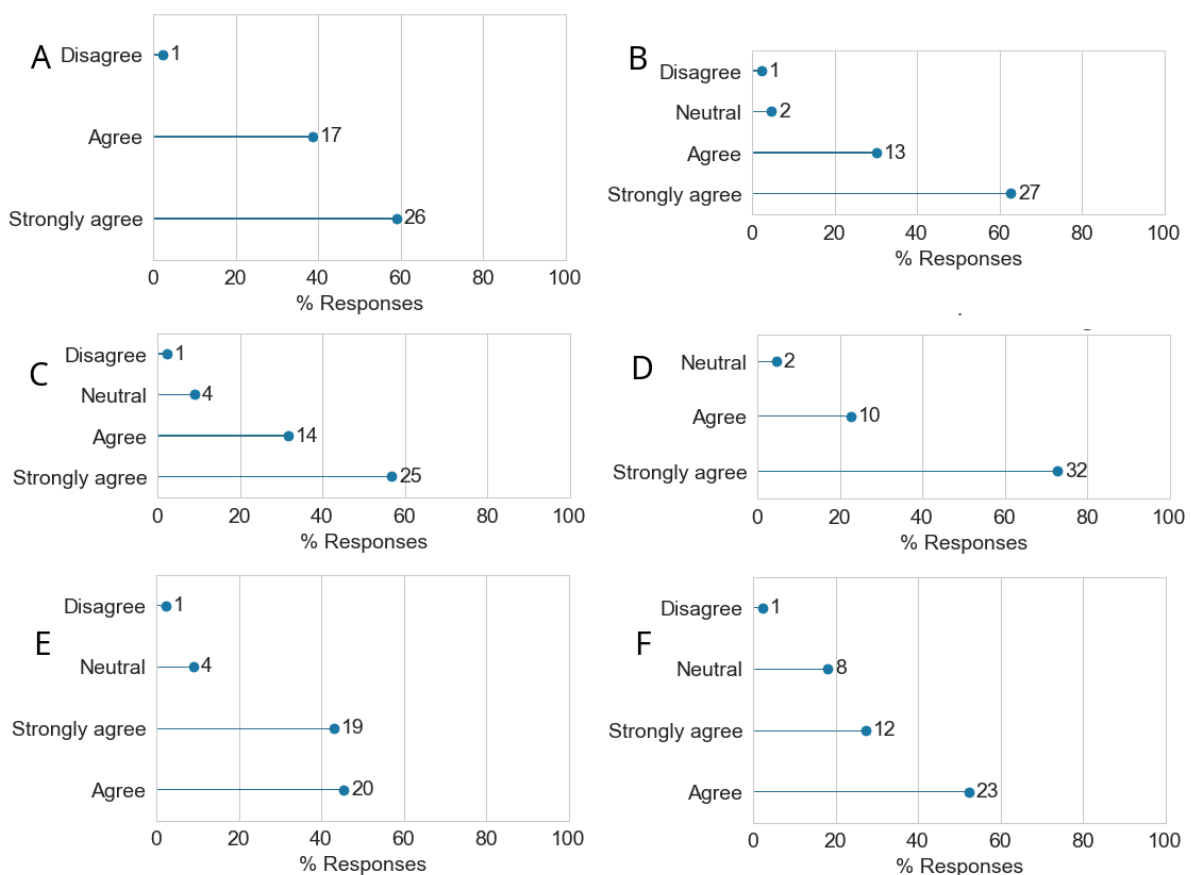


Figure 11 - Rating of participant's agreement with the following statements: **A** - I felt comfortable learning in this workshop environment; **B** - I felt comfortable interacting with the instructors; **C** - The instructors were enthusiastic about the workshop; **D** - The instructors were knowledgeable about the material being taught; **E** - I was able to get clear answers to my questions from the instructors; **F** - I can immediately apply what I learned at this workshop (n = 44).

Participants were also asked about strengths and ways to improve the workshop. All answers are reported in the following Table 5.

Major strengths of this workshop	Ways the workshop could be improved
Well organised, good summary provided about the key topics	The data analysis part focuses a bit too much on non-sustainable virtual environments and containers, though people writing software should provide executable programs to those not knowing scripts, and light weights scripts to those who know. (This is only a private opinion) It may be helpful to describe what to do with software tools like ImageJ often used in other fields, like microscopy analysis
Excellent workshop, complete and clear in general, and very interactive	I have no suggestion
Well organised and really important topic	I feel some of the sessions were more wet lab and some more bioinformatics. I think that an audience that is interested in both at the same time is rare. I would like it if it was separated.
Well structured, well presented, a lot of information	Maybe some more interactive could be helpful
Questions were answered quite fast by the "helpers". Even though interaction was only possible through the HedgeDoc it felt more interactive than some other workshops where it was possible to speak	Set strict/clear rules for the interaction with the HedgeDoc and design the questions so people can't mess with the document so easily. Avoid too many questions that are just answered with +/- . As a participant you don't get the chance to think about the question without already seeing the answers of other people (+/- is very hard to overread...)
Very thorough overview of the proposed topics. The instructors were always super available in answering every question/curiosity	I was hoping for a more hands on experience for the DMP part, instead I have the feeling I have been provided with a lot of info (and a lot more are in the slides) but I will have to find then even more time to dedicate to this topic before being able to use it in my daily work. In general I have the feeling this was more of a quick showcase of many best practices rather than a way to learn how to put them in practice. For the future, please consider improving the HedgeDoc experience, with this amount of participants it was always very messy and sometimes it discouraged me from writing anything at all in the pad.
Very good technical flow and preparation; clear presentations and all questions were answered	It was all well structured, despite the last presentation being confusing for me; a basic overview would have been nice; there were many skills /knowledge assumed.

<p>I really like that the instructors made us feel super comfortable.</p> <p>The interactive platform (I never used this before) is super cool.</p> <p>I like that it was shared among several instructors therefore they always had their energy until the very end.</p> <p>I also like the material, and how they were presented. Thank you so much!</p>	
<p>Very good webinar, complete and clear in general. I also enjoy the active interaction via HedgeDoc</p>	<p>Sub-divide the workshop in more days with 2-3 hours sections.</p>
<p>I really liked that the workshop was interactive, so we could participate even if we were anonymous.</p>	<p>I liked the HedgeDoc document, but it was a bit of a problem with a lot of people trying to write into it at the same time.</p>
<p>Broad overview, repetitions</p>	
<p>Presentation materials, speakers, content and line up</p>	<p>Perhaps workshop can start at 11 am for ET residents to attend at a more convenient time</p>
<p>The critical information about RDM was highlighted during the workshop. The timing was great</p>	<p>The presentation slides could be improved and be more attractive</p>
<p>Extremely useful resources were shared. Highly interactive and encourages future participation and involvement</p>	
<p>Good, well structured and clear overview about different topics relevant in data management</p> <p>Nice interactive tasks that were repeating the presented topics</p> <p>Importance for proper data management and analysis was highlighted</p> <p>I got new ideas how to improve my own data management</p> <p>Completely anonymized participation and interaction</p> <p>Low need in technical requirements for the webinar (just a computer and internet connection, no special programs or equipment)</p>	<p>Interaction via HedgeDoc could be improved for some tasks or another tool could be used for polls, because sometimes it got really crowded in the document and I for some questions/tasks I would have wished to first solve it completely alone before seeing already the right/possible answers</p> <p>Workshop part about FAIR principles was a bit repetitive and long</p> <p>Workshop part about industry could also have been shortened a bit</p> <p>Interactive tasks/polls could be even more included because it deepens the understanding of a topic even more</p>

<p>Well structured Organized Interactive Efficient</p>	<p>Try to have the tasks and assignments well suited for the HedgeDoc document</p>
<p>The use of the HedgeDoc application was great for making an online workshop very participative</p> <p>Exercises at the end of each lesson were very helpful for applying the theory</p> <p>Also, the final task for creating our own DMP is a major strength for retaining what we learned</p>	<p>In my opinion, the FAIR topics can be taught together rather than in two separate days. It was a little tiring hearing the same content twice</p>
<p>In depth content Use of HedgeDoc was a plus for interactions enough time for participants to digest and ask questions</p>	<p>Make it specific for a group of participants. The data analysis section was too complex</p>
<p>Clear communications and good pace</p>	<p>Some slides were very text heavy</p>
<p>Good mixture of interaction and presentation</p> <p>The content was conveyed in an understandable way</p> <p>We were able to ask specific questions and the instructor team answered them all</p>	<p>Working with HedgeDoc was a nice way to communicate but sometimes, it was too crowded and confusing when too many people entered things at the same time</p> <p>Some points were repetitive, esp. on day 2</p> <p>I would have liked a little bit more about the ELN, this section could be enlarged with more information, examples, etc from my perspective. In contrast to this, the data analysis part was difficult for me to understand as I have never used a programming language. However, participants that focus on bioinformatics might see this differently</p>
	<p>Each instructor repeats about what are FAIR data principles - many repeats of the same information</p> <p>More practical skills will be better</p> <p>If it is possible to make the workshop more practical, e.g. "One day from data steward responsibilities". To prepare example of scientific data to become FAIR</p>
<p>The workshop was very well organised. The HedgeDoc platform was a really convenient</p>	<p>Some of the things were not as informative for me as I thought (but that's really individual,</p>

<p>tool for such a large group of people and I really enjoyed it. I appreciate we were able to ask something all the time and that there were so many exercises to keep the participants active all the time</p>	<p>based on each person's knowledge, approach and experience), but overall I gained new knowledge and advice on how to manage my data which I am grateful for</p>
<p>Good balance between overview and details of the topics covered</p>	<p>The HedgeDoc tasks did not work very well. The instrument as well as the tasks should be improved. The instructors should get feedback from people teaching at universities or in school to check for the quality of the tasks set</p>
<p>Completely online and interactive, wide range of topics so something useful for everyone</p>	<p>Perhaps separately suited for people working in the lab / only computational with huge amounts of data generated. Now the e-lab book part for example was totally useless. Also some things felt really like too basic knowledge for me as a computational researcher, regarding terminal, folder structures, scripting etc.</p>
<p>Expert insights into a highly relevant topic, a very nice overview that provides good starting points to delve deeper.</p>	<p>Not applicable</p>
<p>A very low entry level</p>	<p>Show more depth and practical examples (ELN in practice), coordinate the individual presentations more closely and reduce redundancy</p>
	<p>Share the resources during the workshop, no after</p>
<p>Collaborative/interactive working via pad</p>	<p>Perhaps could improve how many of us can write in the pad at the same time without confusing the writers and readers as well</p>
<p>I like the interactive board and the trainers are very enthusiastic.</p>	<p>Maybe there will be a workshop more dedicated for the Academic part. I did not enjoy the industry part on the first day of the workshop.</p>
<p>Exercises were not too difficult and helpful</p> <p>A lot of links to source material and further reading were given</p> <p>Broad topics were discussed in a short timeframe</p>	<p>More practical approach</p> <p>Sometimes instructors only read what was written on the slides</p>
<p>Everything was explained in great detail</p>	<p>It was strange not to see participants, and only the talker</p>
<p>Participating in a virtual interactional</p>	<p>In my opinion, the virtual workshop could be</p>

workshop, where the questions raised by the participants were not constantly popping up on the slides, thus allowing for uninterrupted concentration, was a very interesting experience for me. Furthermore, the raised questions by the participants were checked and responded to quickly	scheduled for three days, with each day lasting 5 hours, rather than two days lasting 7 hours each
Interactivity	More illustration, less text
The detailed overview of data management Practical guides on how to implement a DMP Live questions and answers environment	Maybe more hands-on demos like the one about reproducible data analysis but using also R not only Python. Overall the workshop was very good
The instructors came well-prepared, drawing from their personal experiences in applying data management and analysis in their respective workplaces	Since there were a large number of participants, I think that the workshop was held excellently
The workshop deals with a great variety of topics concerning research data	
Nice overview	The practical obstacles of implementing FAIR could be discussed. Making rules is the easy part. If it is so simple why are many organisations struggling and NOT yet fair?

Table 5 - Strengths and possible improvements for this workshop, as suggested by participants in the post-workshop survey.

The feedback on the post-workshop survey was positive and participants were likely to recommend this workshop to a friend or colleague (Figure 12).

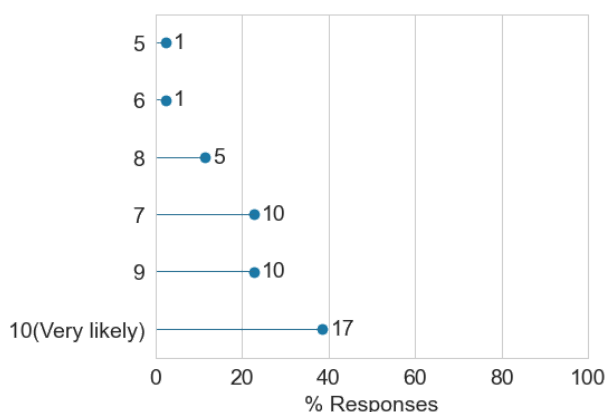


Figure 12 - Answers to the question: How likely would participants recommend this workshop to a friend or colleague? (n = 44). The answers from “0 - Very unlikely” to 4 are not shown as no responses were given in this range.

Conclusion

The fourth BioNT workshop, “Awareness in Data Management and Analysis for Industry and Research”, was successfully held on March 5th - 6th of 2024, online and cost-free for participants.

The setup for the fourth workshop benefited from the experience gathered during the first three BioNT workshops. In particular, the general approach to interaction with the participants was appreciated. Successful participation in the training required no installation of any software but the use of a dual-screen setup was recommended.

Compared to previous BioNT courses, the fourth workshop counted with remarkable levels of engagement from registration through the entirety of the workshops. This heightened interest, as evidenced by registration numbers, can be attributed to more extensive advertising efforts, highlighting the effectiveness of increased partner engagement in promotional activities. Additionally, the workshop's topic, appealing to individuals conducting experiments, bioinformaticians, job seekers and professionals in the academic and industrial sectors, likely contributed to the elevated engagement observed during the event.

One distinguishing factor of this workshop was the creation of specific training materials designed for its objectives. The pace of the workshop was notably more favourable compared to previous ones, allowing trainers time to interact with participants, address issues, and maintain engaging discussions throughout the session via the HedgeDoc document.

One significant challenge for this course stemmed from the high number of participants. Generally, the usage of the HedgeDoc document was perceived positively by participants; however, in some cases, it was considered chaotic and lacking in structure. This problem was partially rectified on the second day when clear explanations and rules were provided to the participants. The consortium will take the improvements and the individual challenges of the fourth workshop into consideration to further enhance the training provided by BioNT, especially regarding the upcoming fifth workshop scheduled for June 2024, the first one in the advanced curriculum. Overall, the BioNT consortium concludes that the workshop successfully achieved its goals.