

Deliverable D2.1 Report on identified training needs and a timeline for training courses

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Reviewers:	ELIXIR-CONVERGE Management Board (MB) members.		

Log of changes

DATE	Mvm	Who	Description
30/03/2021	0v1	Alexia Cardona (UCAM)	Initial version
20/05/2021	0v2	Alexia Cardona (UCAM)	Sent to PMU after incorporating internal WP feedback
20/05/2021	0v3	Nikki Couttts (ELIXIR Hub)	Circulated to the MB for final review before submission
27/05/2021	0v4	Alexia Cardona (UCAM)	MB comments addressed
02/06/2021	1v0	Nikki Coutts (ELIXIR Hub)	Final version to be uploaded into EC Portal

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1. Executive Summary

The scope of this deliverable is to report on the identified Data Management (DM) training needs across ELIXIR Nodes and present the initial plans and activities of ELIXIR-CONVERGE WP2 to address these needs. This report thus provides an overview of the initial version of the ELIXIR-CONVERGE roadmap for Data Management training and capacity building. The roadmap builds on existing work done in ELIXIR^{1,2,3} and aims to bring together Data Management (DM) and Data Stewardship (DS) training efforts across the different Nodes. It also presents a plan for the training courses to be developed during this project based on the training inventory results collected across the participating Nodes. This work will be the foundations for the ELIXIR Data Management Training Programme that will be published in TeSS at the end of the project. Finally, this work has been carried out in close alignment with the three other WP2 tasks, focused on Developing materials

¹ [Towards Data Stewardship in ELIXIR: training and portal](#)

² [ELIXIR Training Platform Gap Analysis survey 2020](#)

³ [Learning Paths Implementation Study](#)



(T2.2), Capacity Building (T2.3) and Outreach (T2.4) that will work together towards the harmonisation and compilation of DM training in ELIXIR.

The presented plan is designed to allow participating Nodes, stakeholders and other interested parties to join this effort in harmonising the ongoing DM training effort and develop new training towards establishing an ELIXIR DM Training Programme in synergy with the existing ELIXIR Training Platform efforts. All training materials developed will be published on TeSS - the ELIXIR Training portal. The ultimate vision is to have the training materials follow FAIR⁴ principles setting a blueprint for other training projects to follow.

2. Contribution toward project objectives

With this deliverable, the project has reached or the deliverable has contributed to the following objectives/key results:

Objective no. / Key Result no. Description	Contributed to:
Objective 1: Develop a sustainable and scalable operating model for transnational life-science data management support by leveraging national capabilities (WP1, WP5)	
Key Result 1.1: Established European expert network of data stewards that connect national data centres and similar infrastructures and drive the development of interoperable solutions following international best practice, including national interpretations of the General Data Protection Regulation (GDPR)	No
Key Result 1.2: Development of joint guidelines and common toolkit that are adopted into funder recommendations, with support available nationally and in local languages	Yes
Key Result 1.3: The catalogue of successful national business models incorporated into national strategies	No
Key Result 1.4: The developed “sustainable and scalable operating model for transnational life-science data management support” is adopted into national ELIXIR Node	No
Objective 2: Strengthen Europe’s data management capacity through a comprehensive training programme delivered throughout the European Research Area (WP2, WP6)	

⁴ Garcia L, Batut B, Burke ML, Kuzak M, Psomopoulos F, et al. (2020) Ten simple rules for making training materials FAIR. PLOS Computational Biology 16(5): e1007854. <https://doi.org/10.1371/journal.pcbi.1007854>



<p>Key Result 2.1: A comprehensive ELIXIR Training and Capacity building programme in Data Management, directed at both data managers and ELIXIR users, and connected to the national training programmes in Data Management in the ELIXIR Nodes and prospective ELIXIR Member countries.</p>	<p>Yes</p>
<p>Key Result 2.2: Development of a collective group of trainers that support scalable deployment of Data Management training across ELIXIR Nodes.</p>	<p>Yes</p>
<p>Key Result 2.3: A substantial cohort of data managers, Node coordinators and researchers with specific data management skills, business planning and knowledge of transnational operations across the ELIXIR Nodes</p>	<p>Yes</p>
<p>Objective 3: Align national data management standards and services through a sustainable, scalable and cost-effective data management toolkit (WP2, WP3, WP5)</p>	
<p>Key Result 3.1: Assemble a full-stack harmonised common toolkit comprising all aspects of data management: from data capture, annotation, and sharing; to integration with analysis platforms and making the data publicly available according to international standards.</p>	<p>Yes</p>
<p>Key Result 3.2: Provide exemplar toolkit configurations for prioritised demonstrators to serve as templates for future use.</p>	<p>No</p>
<p>Key Result 3.3: Establish national capacity in using as well as updating, extending and sustaining the toolkit across the ERA.</p>	<p>No</p>
<p>Key Result 3.4: Enable 'FAIR at source' practice for data generation, and analytical process pipeline implementation by flexible deployment of the toolkit in national operations</p>	<p>No</p>
<p>Objective 4: Align national investments to drive local impact and global influence of ELIXIR (WP4,WP6)</p>	
<p>Key Result 4.1: Development of a Node Impact Assessment Toolkit based on RI-PATHS methodology.</p>	<p>No</p>
<p>Key Result 4.2: Adoption of Impact assessment in ELIXIR Nodes, supported by Node coordinators network and feedback on applicability from dialogues with national funders.</p>	<p>No</p>
<p>Key Result 4.3: Creation of national public-private partnerships and industry outreach where open life-science data and services stimulate local bioeconomy</p>	<p>No</p>
<p>Key Result 4.4: Growth in reach, impact and engagement of stakeholder communication assessed by established ELIXIR Communications metrics</p>	<p>No</p>
<p>Key Result 4.5: Initiating and advancing discussions on Membership (EU and international) or strategic partnerships (international countries) following ELIXIR-CONVERGE workshops.</p>	<p>No</p>

3. Introduction

There is a clear need for training of researchers on research data management skills. ELIXIR-CONVERGE is set to strengthen Europe's data management capacity through a comprehensive training programme delivered throughout the European Research Area. The gap in training in research data management has been widely acknowledged, including in ongoing and previous ELIXIR studies:

- ELIXIR Training Gap Analysis 2020 Survey (DM Training was identified as a gap in the Training Platform gap analysis)
- ELIXIR Implementation Study: Towards Data Stewardship in ELIXIR: Training & Portal.

The overall objective of CONVERGE-WP2 is to build a comprehensive, interconnected and sustainable ELIXIR Training and Capacity building programme in Data Management. This is in line with Objective 2 (Strengthen Europe's data management capacity through a comprehensive training programme delivered throughout the European Research Area) of ELIXIR-CONVERGE by working towards:

1. A comprehensive ELIXIR Training and Capacity building programme in Data Management, directed at both data managers and ELIXIR users, and connected to national training programmes in Data Management in the ELIXIR Nodes and prospective ELIXIR Member countries.
2. Development of a collective group of trainers that support scalable deployment of Data Management training across ELIXIR Nodes.

The main target audiences are researchers and data stewards across all ELIXIR Nodes. We aim to develop and deliver a set of foundational ELIXIR Data Management courses. These courses will form part of the ELIXIR Data Management Training Programme. To harmonize the different ongoing training efforts, the courses developed and work done in WP2 will be in synergy with the existing ELIXIR Training Platform efforts and will make use of the Training Toolkit the ELIXIR Training Metrics Database and the Quality & Impact strategy and TeSS (see Figure 2). Furthermore, the aim is to have all training materials developed in WP2 as FAIR⁵ as possible to act as a blueprint for future sustainable courses developed in the ELIXIR Training Platform.

Relationship with other WPs

ELIXIR-CONVERGE aims to connect the distributed local support for data management across Europe, using international standards and best practices. The three main resources that will bring all this together are the people - the network of life science data management professionals (WP1), the shared toolkit - this will bring together the different tools and best practices under on shared

⁵ Garcia L, Batut B, Burke ML, Kuzak M, Psomopoulos F, et al. (2020) Ten simple rules for making training materials FAIR. PLOS Computational Biology 16(5): e1007854. <https://doi.org/10.1371/journal.pcbi.1007854>



toolkit (WP3), and the skills and training (WP2) - this will be driver for enabling the education and awareness about data management skills via the DM Training Programme that will be set up in WP2 (see Figure 1).

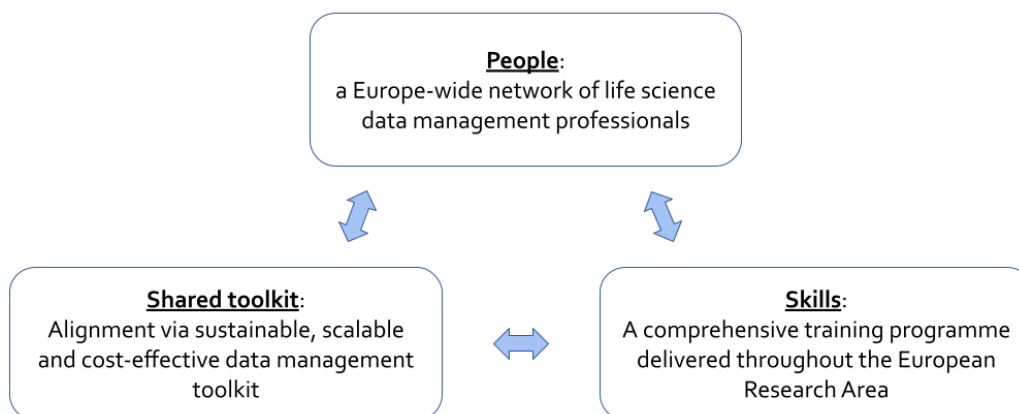


Figure 1: ELIXIR-CONVERGE resources network for data management

The WP2 training and capacity building enables the different WPs to translate their efforts into training activities that will enhance both the end-product and the capacity of their expertise.

Specifically:

- WP2 has worked with the **WP1** Data Management Experts network to analyse the training inventory and identify gaps in training.
- WP2 has worked with T3.4 (lead by Pinar Alper, ELIXIR-LU) to align the training work related to the RDMKit. WP2 participated in **WP3** contentathons and established the training links and data steward roles in the RDMkit.
- WP2 has assisted **WP4** in training events and WP4 will be working with WP2 to establish dissemination materials.
- WP2 is assisting **WP5** to establish use-case training.
- WP2 is working with **WP6** regarding the definition of the ELIXIR Node Coordinators Curriculum⁶.

The collaborations extend beyond ELIXIR-CONVERGE to bring in the expertise and existing work and knowledge in the domain to support this project and ensure sustainability beyond ELIXIR-CONVERGE. Figure 2 shows the different stakeholders and collaborators involved in the ELIXIR-CONVERGE WP2 Training and Capacity building project and how WP2 is bringing all this together through its training efforts.

⁶https://docs.google.com/presentation/d/1GgYvauqqrTkEpoBk0fNyflhrBCbsvviMC9kvJj38yQc/edit#slide=id.g85c4ea0064_0_0

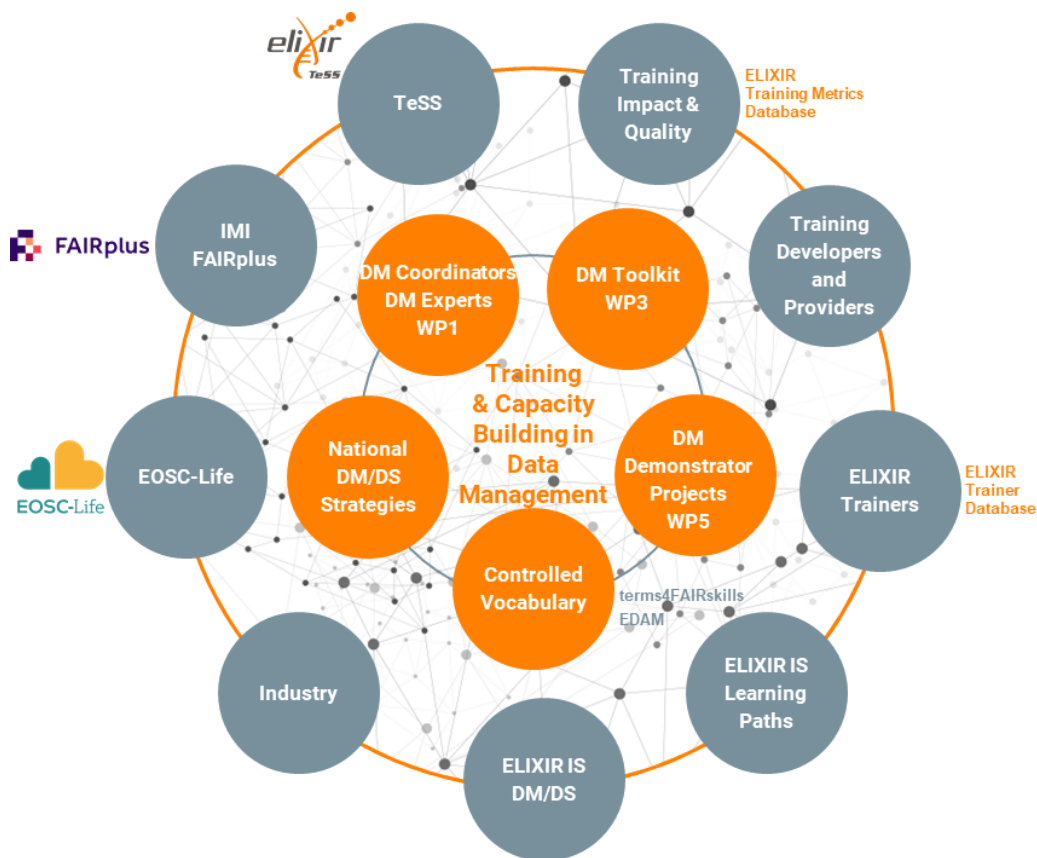


Figure 2: Stakeholders and Collaborators with ELIXIR-CONVERGE WP2 - Training and Capacity Building

4. Description of work accomplished

In order to establish a roadmap for training in research data management, we set to work on:

1. Identifying existing data management and data stewardship training across all Nodes.
2. Identifying DM/DS National Strategies⁷ across participating Nodes.
3. Identifying training gaps and training needs in data management and data stewardship.
4. Planning development and delivery of the Data Management Training Programme.

⁷https://docs.google.com/spreadsheets/d/1jf57v-zaVPzUBF6h1GD5tmUaF_1U9BRQtQekm0IUmdA/edit?usp=sharing

4.1 Identifying existing training

In the first phase of the CONVERGE project, there was a concentrated effort to the creation of the Training Inventory for Data Management. The scope behind the training inventory is to identify existing training amongst the different Nodes. This would allow the analysis of the DM training market across Europe and enable the identification of what DM training is missing. To accomplish this, we identified:

1. Training events in DM organised by the different Nodes. This was done by surveying the different Nodes as part of the DM Training Inventory.
2. Existing Training materials across the different Nodes. This was done by building on the existing inventory compiled by the Implementation Study of Data Management and Data Stewardship and extending it in this study.

Having a training strategy that is complementary to the existing effort in CONVERGE and in ELIXIR’s other platforms, in particular the Training Platform, is important as this enables the creation of a coherent training programme. We set out to achieve this by engaging with the different WPs and making sure a consistent approach and methodology is used towards training with the aim of having a sustainable training programme that goes beyond CONVERGE. One approach was to categorise existing DM training using categories from the Research Data Lifecycle as explained below.

Research Data Lifecycle

Training in WP2 is classified over the different Research Data Lifecycle stages as defined by the UK Data Service⁸. These categories were discussed during the CONVERGE General Assembly WP2 workshop in June 2020⁹. These categories are in line with the training inventory categories done in the Implementation Study of Data Management and Data Stewardship and also the categories used for the RDM Toolkit conducted by CONVERGE-WP3. Table 1 shows the different categories in the heading of the table together with the different processes included in each category.

Table 1: Research Data Lifecycle categories adapted for the Training Inventory.

Planning Research	Collecting Data	Processing data	Analysing data	Publishing and sharing data	Preserving data	Re-using data
Design research	Collect data	Enter, digitize, transcribe and translate data	Analyse and Interpret data	Establish copyright	Migrate data to best format/media	Conduct secondary analysis

⁸<https://www.ukdataservice.ac.uk/manage-data/lifecycle>

⁹<https://docs.google.com/presentation/d/1Va3YMRUdv7CaA8UEwGKIG4SRA0I0MV7713UgZKlqL5Y/edit?usp=sharing>



plan data management	Capture data with metadata	Check, validate, clean, anonymize	Produce research outputs	Create user documentation	Store and backup data	Undertake follow-up research
plan consent for sharing	Acquire existing third party data	Derive data		Create discovery metadata	Create preservation documentation	Conduct research reviews
Plan data collecting, processing, protocols and templates		Describe and document data		Select appropriate access to data	Preserve and curate data	Scrutinize findings
Explore existing data resources		Manage and store data		Publish/share data		Use data for teaching and learning
				Promote data		

4.2 Identifying training gaps and needs

While the compilation of existing DM training events and materials gives us an overview on the existing training landscape in the subject, it does not provide information on the training needs of the different Institutes and Nodes. We thus set out to identify training gaps and needs by:

1. Identifying DM Training gaps across the different Nodes. This was done as part of the initial training inventory survey¹⁰ done with the aim of understanding what training topics in DM each Node is lacking. A WP1 collaboration with the Data Management Experts Network analysed the results from the training inventory to identify the main topics listed in the training results suggested by the different Nodes. The results of this analysis are described in [Section 5.1](#).
2. Establishing a Learning Path in Data Stewardship, Management and Analysis. This was done as part of the Biohackathon 2020¹¹. The project saw more than 20 participants working together to identify more than 400 KSAs, 12 topics and 39 subtopics¹² for each one of the topic areas for Data Science, Data Management and Data Stewardship. The

¹⁰<https://docs.google.com/spreadsheets/d/1Vu-qzbJZOhsKSJeUhzF4NDIUSDzZY7FPO8y2zDs-oDP4/edit?usp=sharing>

¹¹<https://docs.google.com/document/d/1oUzNpU3Ogg9NmzCbRBSHd-dmuS-D39UHhJQFB49Tc/edit?usp=sharing>

¹²<https://docs.google.com/presentation/d/1UtTEhEmcfTztZUAC01EXyGg4In1Kdof3iYLRSox9eFI/edit?usp=sharing>



community built during the Biohackathon are still meeting regularly to continue working on this work together.

- Building upon the Training Gap Analysis done by the ELIXIR Training Platform where Data Management was highlighted as a gap in the training provision of participating Nodes. (see Figure 3).

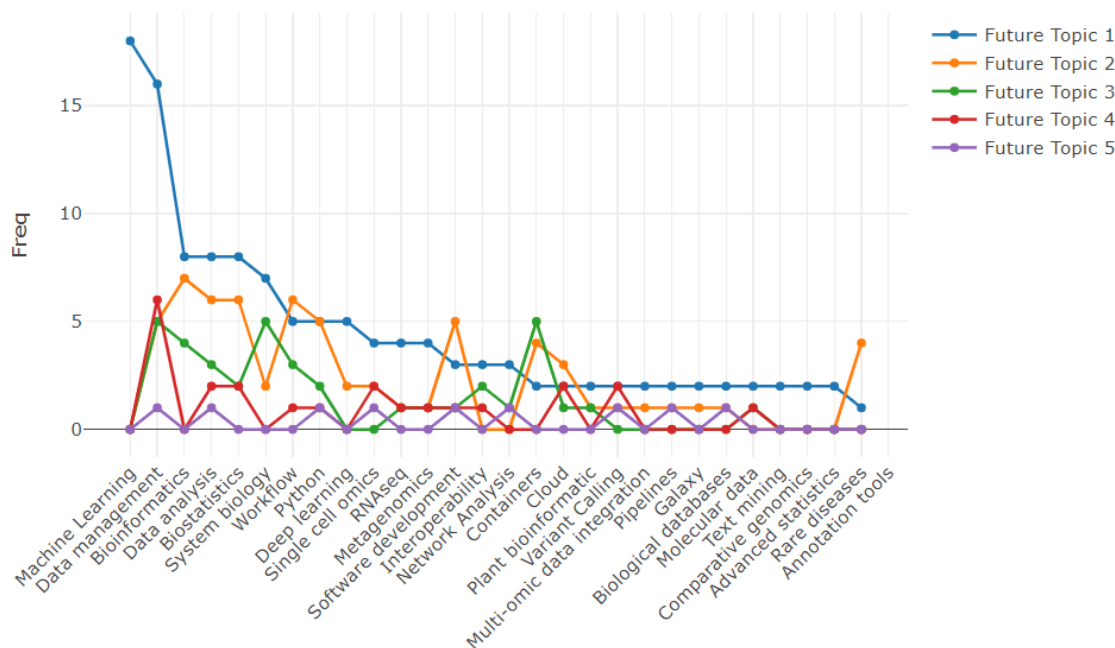


Figure 3: Data Management was the second most needed topic in the ELIXIR Training Platform survey¹³ (Image from Training Platform D2.1.1).

4.3 Planning training and building the Roadmap

The identification of the existing training landscape in DM and the identification of training gaps and needs across the different ELIXIR Nodes helped pave the way for a roadmap for a DM Training Programme. This was reinforced by also identifying the Node plans¹⁴ for DM training together with the respective national strategies such that training developed and delivered will take both into consideration and allows convergence and alignment of plans. This will allow collaboration amongst the different stakeholders and secures sustainability for the DM training that will be produced throughout this project .

The timeline below in Figure 4 shows the different stages for Task 2.1 that leads to the setting up of a training roadmap for the project which is described further in [section 5.3](#).

¹³<https://docs.google.com/document/d/1znskAgdeomayYkyMEqCDI-apDUhCuo7NUY2KfkoS2T0/edit?usp=sharing>

¹⁴https://docs.google.com/presentation/d/1PEHGF_fAP67xL_us9ddlI4VQUJwKrWNYPAKbg6oUlrQ/edit#slide=id.p1



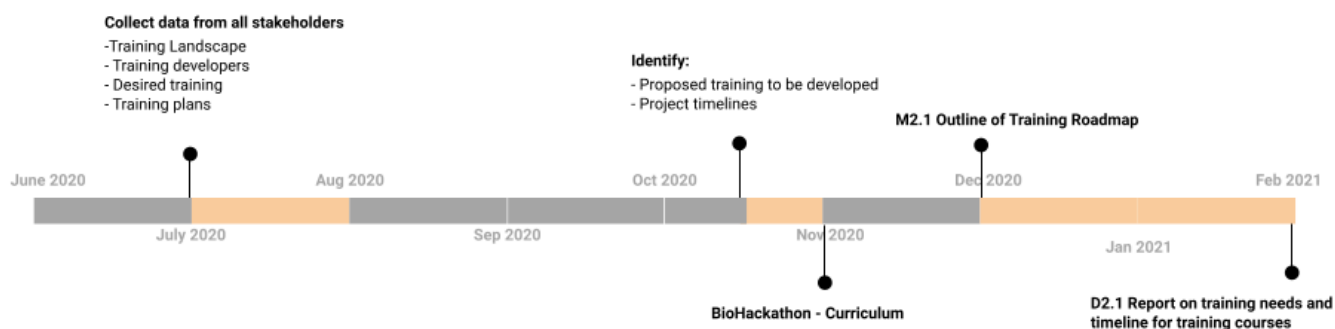


Figure 4: ELIXIR-CONVERGE WP2 timeline for Task 2.1 (the timeline was delayed by 3 months (see also section 9))

5. Results

5.1 Training Gap analysis

In the first phase of this project (2020), there has been a joint effort to enhance Data Management training across ELIXIR Nodes as indicated by the results of the training inventory conducted in this WP (see Figure 5). However, results¹⁵ also indicate that while there is a rich supply of Data Management Planning training, there is a lack of training covering other DM topics which are in demand.

In collaboration with the WP1 DM Experts network, we have identified 14 categories of training gap topics¹⁶ by analysing the gaps put forward by the different Nodes specified in the Training Inventory. The list of categories is shown in Table 2. Each category contains a list of proposed training which will undergo review in Task 2.2.

¹⁵<https://docs.google.com/spreadsheets/d/1Vu-qzbJZOhKSJeUhzF4NDIUSDzZY7FPO8y2zDs-oDP4/edit?usp=sharing>

¹⁶https://docs.google.com/spreadsheets/d/1HXcDG1kMY3jOPalm_nAbNC5RK3Vvc4GZu8DcrdDuRdg/edit?usp=sharing

Table 2: Categories of topics in DM identified in the training gap analysis

Data Management and Stewardship	ELIXIR Data Management Toolkit	Reproducibility
Data Management Plans	Policies	Ethics
Capturing/collecting/creating data	Finding data/Data discovery (Reusing existing data)	infrastructure for storing and sharing data
Documenting & Organizing data	Processing, analysing data	FAIR
Meta-data	Publishing, sharing data & archiving data	

5.2 Data Management Training

Data collected from the training inventory¹⁷ indicates that there have been 23 training events on data management from the start of this project till January 2021 which were organised by 10 countries. The plans from the different Nodes indicate that this number is set to increase as more training materials become available and as Nodes are dedicating their effort in organising more training events on data management as part of the CONVERGE project (see Figure 5).

¹⁷<https://docs.google.com/spreadsheets/u/1/d/1Vu-qzbJZOhKSJeUhzF4NDIUSDzZY7FPO8y2zDs-oDP4/edit>





Figure 5: Number of ELIXIR-CONVERGE related Training events and Training Materials across ELIXIR Nodes since the start of the project to Jan 2021

5.3 Roadmap for ELIXIR-CONVERGE DM Training

In coherence to the objectives of the ELIXIR-CONVERGE project, WP2 will build upon existing DM training with the aim to increase the provision of DM training across European life-science institutes by building a comprehensive, interconnected ELIXIR training and Capacity building programme in data management and stewardship targeting data managers and researchers. This will address the need for data management expertise by developing skills in data management practices and policies. Specifically, Objective 2 (Strengthen Europe’s data management capacity through a comprehensive training programme delivered throughout the European Research Area) of ELIXIR-CONVERGE will be addressed in WP2 by working towards:

3. A comprehensive ELIXIR Training and Capacity building programme in Data Management, directed at both data managers and ELIXIR users, and connected to national training programmes in Data Management in the ELIXIR Nodes and prospective ELIXIR Member countries.
4. Development of a collective group of trainers that support scalable deployment of Data Management training across ELIXIR Nodes.

We plan to use this project as a case study to create a collection of training materials that will be available in TeSS and in-line with FAIR¹⁸ practices so that they are reusable for future use. WP2 will work with the different CONVERGE WPs and beyond with experts from different Nodes to develop and deliver DM training.

¹⁸ Garcia L, Batut B, Burke ML, Kuzak M, Psomopoulos F, et al. (2020) Ten simple rules for making training materials FAIR. PLOS Computational Biology 16(5): e1007854. <https://doi.org/10.1371/journal.pcbi.1007854>

DATA MANAGEMENT TRAINING AND CAPACITY BUILDING ROADMAP



Figure 6: Roadmap for the ELIXIR-CONVERGE DM Training and Capacity Building

The DM Training roadmap highlights a plan for building a comprehensive, interconnected and sustainable ELIXIR Training and Capacity building programme in Data Management across all Nodes. The roadmap will implement the stages highlighted in Figure 6 :

- Landscape:** *Identify existing training and training needs across all Nodes.* This is the work done in Task 2.1 described in [section 4](#).
- Plan:** *Identify training to be developed.* After looking at the DM training landscape across all Nodes and identifying training needs and plans from the different Nodes, 14 DM topics have been identified in the training gap analysis conducted in Task 2.1.
- Develop:** *Setup training development teams for the new courses* (Task 2.2). This is the main focus of Task 2.2. Training materials will be built, based on the Training gap analysis conducted in Task 2.1. DM experts, training experts and stakeholders will be brought together to collaboratively develop training material. This will be done in dedicated training material development hackathons. Training will be modular, facilitating its reuse and roll-out across all Nodes, thus ensuring long-term sustainability. Several Nodes have already Data Management training in place, thus training development at the Node level as part of WP2 will also result in further training materials.
- Roll out:** *Deliver training across all Nodes* (Task 2.3). Existing training together with the new training developed in WP2 will be delivered across the different participating Nodes. The training will consist of training courses or workshops, with hands-on activities.
- Capacity Building:** *Train trainers to teach Data Management courses* (Task 2.2 and Task 2.3). New trainers in data management and stewardship will also need to be trained to upskill the competencies in their Node and increase adoption of the DM toolkit across ELIXIR.
- Training Programme:** *Publish the new Data Management Training Programme.* The ELIXIR-CONVERGE DM training will be published and launched in TeSS. This will allow training to be accessible and visible on ELIXIR's training platform for widespread dissemination. The DM Training Programme will link to the different participating institutions

that will be delivering the training providing the opportunity for participants to register for training in their institution of choice.

7. **Outreach:** *Dissemination and outreach of new Data Management Training Programme across Nodes, and countries which are not part of ELIXIR nor Europe (Task 2.4).* In order to help new countries and communities in the onboarding process in joining ELIXIR, a set of tailored outreach activities will be developed in collaboration with WP4 to disseminate information about DM training.

6. Conclusions

In this deliverable we have documented the status of the ELIXIR-CONVERGE Training and Capacity building programme. Input on the status of DM training from participating Nodes have been collected in a Training Inventory which helped us understand better the training landscape across the Nodes. Data collected from the different Nodes have also brought to light the gaps that exist that this WP will address by developing training materials collaboratively via hackathons. Trainers will be trained via the DM TtT programme that will be set up specifically to train trainers in the DM area. This is part of the plan to address skills shortages in the area in line with the ELIXIR-CONVERGE objective.

The ultimate aim of WP2 is to educate and increase awareness of RDM practices and how these can be implemented into the different work and projects involved to improve research. The ELIXIR-CONVERGE WP2 Roadmap summarised in this report provides a training strategy on how this will be achieved in this project. The main strength of our approach is by using training as a binding agent across the different WPs in CONVERGE and beyond with the identified stakeholders of this project. In this way we can ensure a strong end-product and sustainability of the project beyond ELIXIR-CONVERGE.

7. Impact

The Training and Capacity building work package in CONVERGE has brought together and enabled synergies between the different work packages in CONVERGE and beyond (see Figure 1). Though the project is not complete, impact from the training and capability building programme can already be seen both at the Node level where delivery of training is underway (see Figure 5) and within CONVERGE where the WP2 team has been engaged with the different work packages to align and link training. We envisage that the numbers highlighted in Figure 5 will increase steadily throughout the project. In particular at the end of the project, when the DM training Training Programme and the DM Capacity Building programme are in place.



The effectiveness of the the training and capacity building programme will be measured using a number of target indicators:

- Number of DM training events organised
- Number of countries where training is organised
- Number of participants receiving training
- Number of trainers trained via the DM training TtT programme.

Furthermore, the DM Training Training Programme will enable a structured and cohesive approach to training in the area linking and sign-posting training across the participating institutions. This will enable a stronger end-product at the end of the project. Similarly a programme for trainers to be trained to deliver the ELIXIR DM training will be in place to address the skills gap in this area.

8. Next Steps

As indicated in the Training Roadmap (see Section 5), the next steps of the project is to consolidate and start the development of training materials for the gaps identified in Task 2.1 of this project. This would involve bringing together experts in the respective areas identified in the gap analysis to form development teams which will work together to develop the content of the training via dedicated hackathons. It will also bring people involved in existing DM training from the 10 Nodes highlighted in Figure 5 to provide their expertise and insight to the content of the training materials.

Parallel to this is also ongoing work for Capacity Building, the creation of a DM TtT programme that would train new trainers to teach the DM Training Training Programme, dissemination of training and collaborations with the other WPs in CONVERGE as previously discussed. All this will ultimately converge to the establishment of the DM Training Training Programme and its rollout that will enable adoption of DM practices amongst research communities.

9. Deviation from Description of Action

This deliverable was originally due in February 2021. A minor delay of 3 months was requested. The minor delay should not affect the overall target of the project which was extended by a further 6-months due to the COVID-19 outbreak.

