Deliverable 3.5
Implementing specialised training courses update (WP3)

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Abstract

The development of the PREDIS training program is the third task of the Knowledge Management Work Package (WP3, Task 3.3). The aim of this task is to organise training activities to transfer the present knowledge on pre-disposal activities to the next generation of engineers and scientists. The training program consists of five types of activities: public webinars, topical tailored courses, student workshops, roadmap for pre-disposal activities, domain insights (written documents) that populate the roadmap with complementary DI-lectures and e-learning self-study materials.

This deliverable focuses on describing the methodology followed for the implementation of specialised training actions in the PREDIS project.

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1 Introduction

Work Package (WP) 3 Knowledge Management (KM) in PREDIS includes different activities, resources and tools, all dedicated to allocating, developing and transferring of knowledge bases, focused on pre-disposal. One of the key activities to be delivered by WP3 is training. The importance of this activity is supported by the feedback received during the December 2021 PREDIS Consortium meeting (Figure 1). This deliverable (D3.5) is focused on presenting the actions related to the implementation of specialised training.

Figure 1. *Feedback from the PREDIS Consortium meeting held on 3rd December 2021. Question answered by 13 attendees: "What do you expect from WP3 & KM?"*

The planning for KM activities were defined in Deliverable 3.4 [1] and the resulting schedule is shown in Figure 2. The figure shows the preliminary schedule that was expected for all activities in 2022, with a similar schedule anticipated for each year of the project, keeping in mind that it could be adjusted based on partners' feedback.

- 5 webinars were to be organised during the year.
- 4 topics were to be covered in both on-site and virtual courses.
- Students were planned to meet three times per year to share their experiences, increase networking and gain knowledge.
- 6 domain insight documents within Theme 2 and the associated lectures were to be produced.
- 4 lectures on topics of interest for the project were to be prepared.

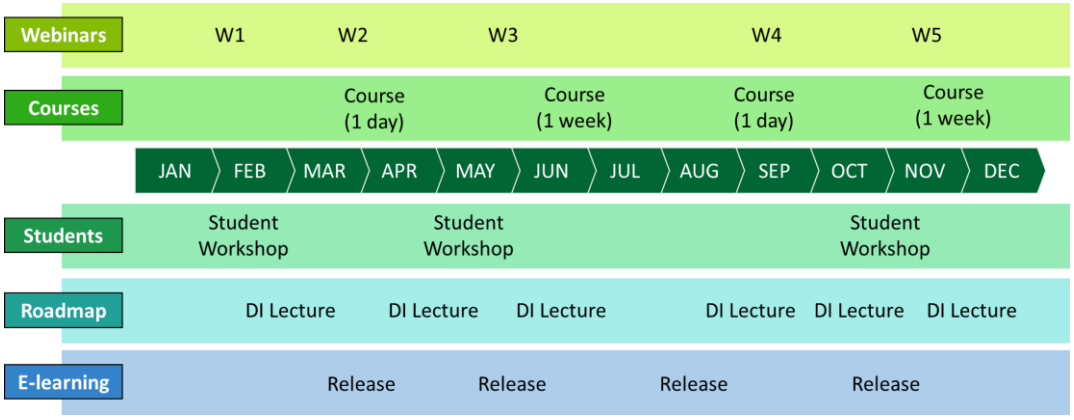

Figure 2. *Preliminary schedule for all training activities.*

This deliverable is focused on the arranged training courses. It is divided into two different sections; the first part (Section 3) is dedicated to explaining the process developed to organise the training courses and the criteria for approving the themes, participants, etc. The second part (Section 4) describes the training courses organised.

2 Summary of previous activities

During the first year of PREDIS different activities were undertaken to design the PREDIS training program. These activities are explained in a previous deliverable [1] and were presented to the PREDIS community at several events (webinar and project workshops), as well as international conferences [2, 3].

- Identification of training needs of the PREDIS community: two surveys and interaction with attendees during the PREDIS consortium meeting held virtually in May 2021 provided information on the topics identified and asked for by the community, as well as the type of training they would prefer (virtual, face-to-face, duration, target audience…).

- Mapping of existing courses: in collaboration with EURAD, a review was done to identify courses that were held during the last 5 years on subjects related to predisposal activities. About 70 courses organised for different education levels were identified and mapped by theme.

3 Training course implementation

The organisation of a training course is a process that starts with the selection of the topic and the organisers and finalises with the analysis course performance, once it has been completed. The following parts explain the methodology that was followed in PREDIS to implement training courses, with a summary in Figure 3.

Figure 3. *Training implementation methodology.*

It is important to highlight that it is a “living” methodology, so that it can be modified if required after analysing the performance of the course and the received feedback.

3.1 Topic and organisers

During the first year of the project, we focused on mapping the existing courses and identifying the need of the PREDIS partners and stakeholders. That outcome was used by the PREDIS Management Team to decide upon the next course topics to be organised by PREDIS.

Once the topic was selected, Management Team members discussed and identified the best candidates to organise the course due to their experience in the field. WP3 leaders contacted the selected individuals or organisations, and the course was organised (see next section).

A second option to develop a course was that a partner or end-user organisation offers themselves to organise a course. In that case, the Management Team decided whether the topic addresses one of the PREDIS community training needs.

3.2 Design of the course

The design of the course is conducted by the host organisation with the support of the WP3 leaders. During this stage, answers to the following questions should be discussed:

- **Training objective:** the topic the course will be dealing with which should be aligned with the training needs and be in alignment with the PREDIS Roadmap

- **Format of the course:** duration and location of the course as well as type of lectures or practical sessions that should be organised to fulfil the objectives and provide a good training to the participants. It will also include the maximum number of participants the course can held.
- **Type of audience:** to define to whom the course is addressed and if there are any pre-requisites on background knowledge and/or skills necessary to follow the course.
- **Training contents:** detailed program of the contents that will be included in the course.
- **Schedule:** dates when the course will be announced, the registration opened and closed, and the training delivered etc.
- **Budged:** estimation of the cost that should be covered by the project.

Once the abovementioned information is discussed and decided upon, a document is created and is sent by WP3 leaders to the course organisers, containing the following information:

- Title of the course
- Date
- Location (in case of face-to-face courses)
- Audience
- Objective of the course
- Cost
- Registration details
- Contact
- Format of the course
- Preliminary agenda/schedule
- Important dates

3.3 Application & Selections of participants

The registration period is announced via email, social media and the PREDIS webpage. A registration form is prepared by VTT and the link included both in the document prepared in the previous step and on the webpage. The registration period should be, at least, one month.

Once the registration period ends, the list of applicants is checked. If the number of applicants exceed the maximum participants the training can held, the selection is based on the target audience, both the background knowledge requirements and the category of applicants. If no specifications are included, the following priority is considered by default:

i. PREDIS Students
ii. PREDIS Partners
iii. PREDIS Stakeholders
iv. EURAD Students

In the case that there are too few applicants registered to the course during the registration period, reminders are sent. If the minimum number of course applicants is not reached, the training is cancelled.

3.4 Development of training materials

Each organisation prepares and develops the training materials needed to conduct the training course. They can ask WP3 for support.

3.5 Performance of the course

The following actions are taken during the performance of the course:

- Few days before the course starts, the organiser or WP3 inform selected participants about practicalities.

- The last session of the course is devoted to test the knowledge of participants and to discuss the topics taught during the course.
- After the course, a questionnaire (see next chapter) is sent to obtain feedback of the performance of the course. The feedback form is developed by VTT, with the input of WP3.

3.6 Feedback

A generic questionnaire has been prepared with the following aspects that should be scored between 1-5, being 1 poor and 5 excellent.

- Communication before and during the training course
- Lectures, practical sessions. Each session is evaluated separately, in terms of topics selection, length of the lectures and overall punctuation on each lecture.
- Site visits. Each visit is evaluated separately, in terms of site selection, length of the visit and overall score on each visit.
- Overall performance of the course:
  - Did the training course increased your knowledge in *the course topic*?
  - Was the training useful for your work in PREDIS?
  - Did the training course fulfilled your expectations?
  - Overall evaluation of the training course
  - Would you recommend this course to your colleagues?
- At the end, a section for comments is included.

3.7 Reporting

Before the start of a course, a template document is sent to the course organizers by WP3 to be filled in with details of the course as well as the budget. At the end of the course, a report summarising the organisation, performance and evaluation of the training course is prepared, including the final budget that will be charged to the PREDIS project.

The report includes, besides the information provided in the document prepared in the training design phase, the information below:

- Description of the training
- Short outcome explaining the training performance
- Photos
- Summary of the feedback received (direct feedback & answers to the questionnaire)
- Budget

4 Training courses

Training courses identified as crucial for the pre-disposal community and that are not given by any organisation in Europe were organised by WP3. Each organised training course is briefly described in this chapter.

4.1 Introduction course

The first course organised in PREDIS was focused on providing an overview of the activities performed in the project. It was held online, 9-10th June 2022, 9-12h.

The course was targeted for anybody in the community interested in pre-disposal activities. The course was attended by 81 participants.

The main objective of this course was to provide an overview of the work being undertaken in the European Commission (EC) PREDIS project, providing insights on the advances reached in each work package. It was a good event to understand, discuss and participate in the activities that were developed in the frame of pre-disposal of radioactive wastes.

The feedback rate was low from this course, only 7 participants answering the questionnaire sent to all participants. Figure 4 shows the scoring received by each session as well as the communication with the participants before the training. All session received a score above 4 out of 5. Low scores were received related to the communication before the course. The questionnaire included some open questions such as the best session, the level of detailed information during the course, how to improve the course performance and the participants future training needs. All answers were very positive and provided good feedback. As main topic to be covered in future course, the participants wished for a course that was related to geopolymers preparation/behaviour under different conditions.

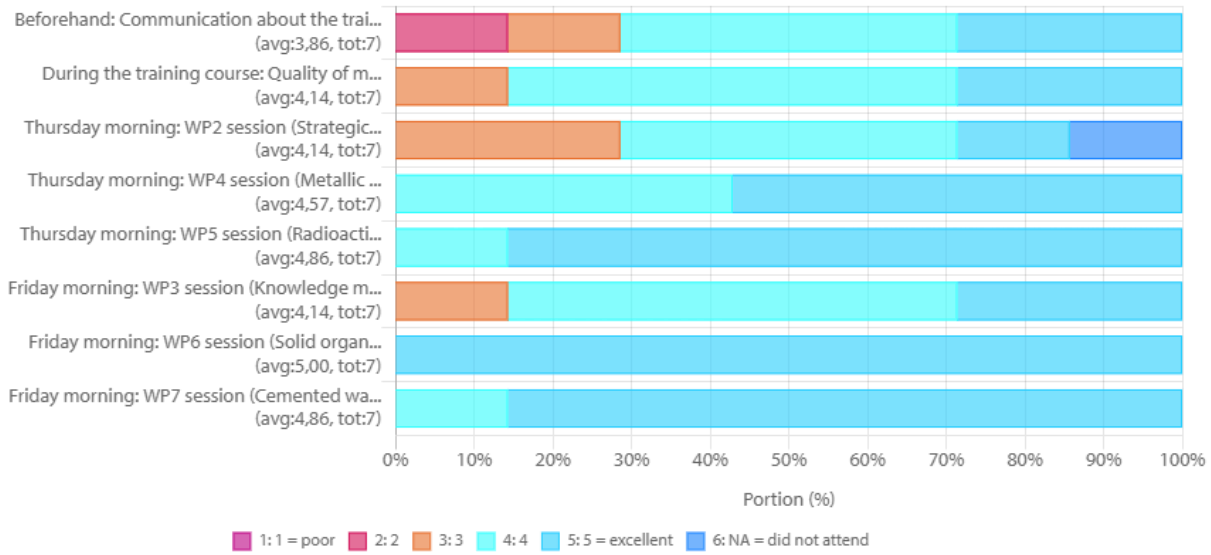

Figure 4. *Scoring of the questions related to the training sessions.*

4.2 LLW/ILW management

UJV organised the first face-to-face PREDIS course on the management of low and intermediate level wastes. The course was held on UJV premises (Husinec, Czech Republic) on 7-9th September 2022, and it was attended by 21 students (Figure 5).

The course aimed at presenting a general overview of radioactive waste management to the young specialists, just entering the field. It intended also to provide entrance to some of the facilities, dedicated to radioactive waste management, such as the UJV waste management centre and Laboratories of Fuel Cycle Chemistry, supporting research for disposal of radioactive waste for both LLW/ILW repositories. UJV specialists with extensive experience in RW management gave the training.

Figure 5. *Group photo of participants, organisers and lecturers.*

17 participants provided their feedback after the course and the score to all questions were over 4 out of 5, with the exception of the communication before the training course that obtained a score of 3.7 out of 5. Figure 6 shows the scoring received on training satisfaction and on the overall performance of the training course.

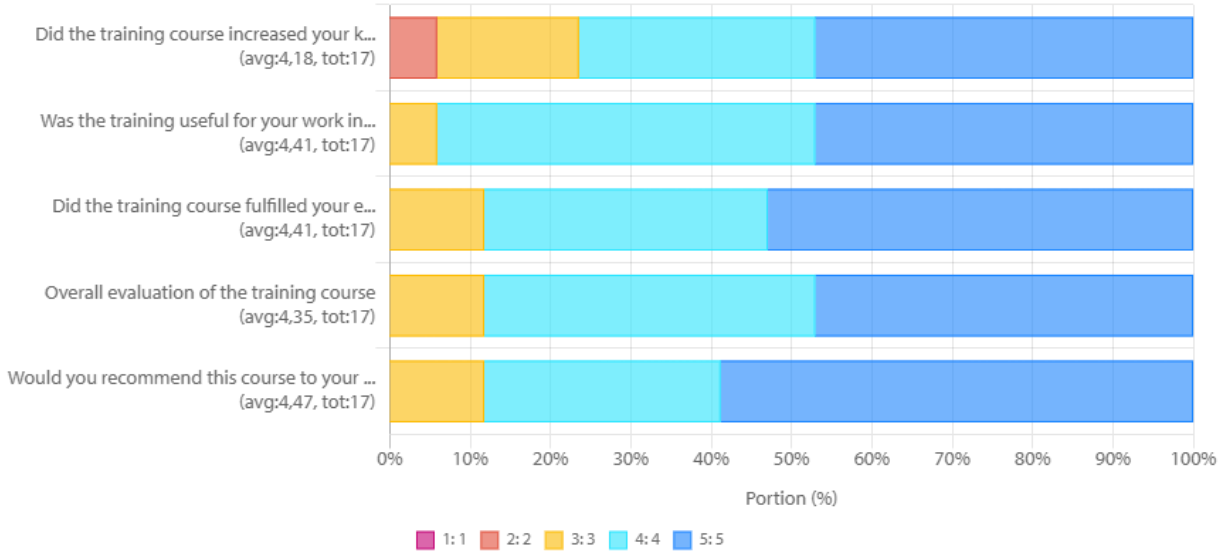

Figure 6. *Scoring of the questions related with the overall performance of the course on LLW/ILW management.*

4.3 Radwaste characterisation

ENRESA organised a course on Waste Characterisation entitled “Practical-theoretical training session on GENIE 2k & ISOCS for waste characterisation” at the José Cabrera nuclear power plant, held on 21-24th November, 2022. A total of 9 participants attended the course, which was also the maximum allowed number of participants for this training. The participants were a mix of PREDS and EURAD students as well as PREDIS partners and EUGs or stakeholders, see Figure 7.

Figure 7. *Photo of participants during course.*

The main goal of the course was learning on the use of the Genie2K software for the management of ISOCS device. It is based on the gamma spectrometry for the characterisation of waste packages, large items, walls, soils, etc. The course dealt with following topics: gamma acquisition analysis, interactive peak location and area analysis, energy and efficiency calibration, minimum detectable activity, decision threshold, resolution, detector characterization, multi efficiency, Geometry Composer, uncertainties, quality control, case studies and real waste measurements.

Participants were asked to provide feedback on their experience of the course where 6 out of 9 participants answered the survey. Figure 8 shows the results of the feedback, where the average score is above 4 out of 5. The lowest score was received for the questions “Did the training course fulfilled your expectations?” with a scoring of 4.33.

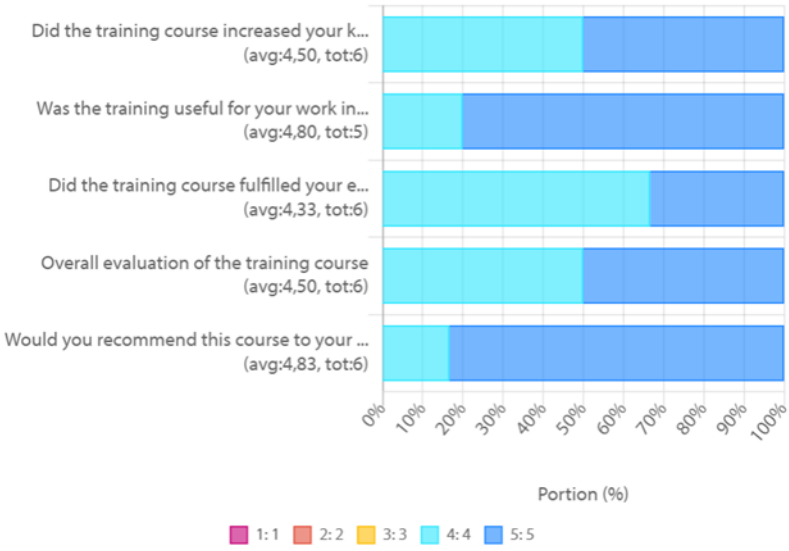

Figure 8. *Scoring of the questions related with the overall performance of the course on Practical-theoretical training session on GENIE 2k & ISOCS for waste characterisation.*

4.4 PREDIS fundamentals

In conjunction with the third PREDIS annual meeting the course “PREDIS fundamentals” was held, during the 22nd of May 2023. The course was held in hybrid form and was organised by Galson Sciences Ltd, with Amphos 21 providing organisational support. A total of 26 participants attended the course, 9 of which attended online.

The course was intended to improve participants’ understanding of the technical background for each WP to support their engagement in the project, including understanding of the presentations and active participation in workshop discussions at the Annual Meeting.

A total of 14 out of the 26 participants answered the feedback survey, see Figure 9, where the average score received was 4.4.

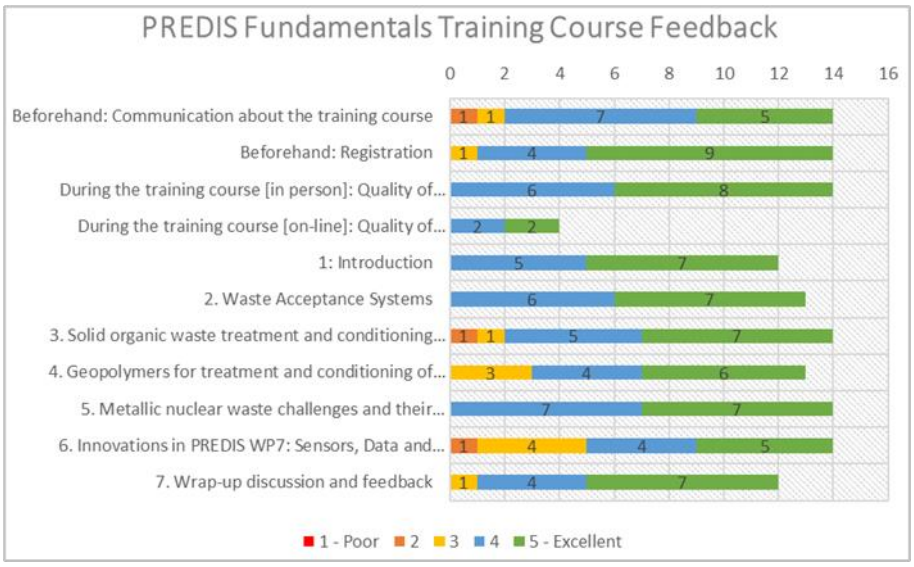

Figure 9. *Scoring of the questions related with the overall performance of the course on PREDIS fundamentals.*

4.5 Waste Acceptance Criteria Summer School (WAC SS)

A Summer school on “Waste Acceptance System, a Tool to Facilitate the Safe Storage, Transport, Packaging and Disposal of Radioactive Waste” was organised in collaboration between PREDIS and EURAD on the 4-8 September 2023, in the Czech Republic.

The aim of the course was to give an overview of the Waste Acceptance System (WAS) development and implementation through 19 presentations delivered by 12 lecturers, an excursion to waste processing facilities and to a near surface repository, and an exercise to revise gained knowledge.

The presentations aimed to explain WAS fundamentals, its linkage to radioactive waste management lifecycle, and principles of its creation and use. The theoretical lectures were supported by the description of WAS application in 7 countries with established waste acceptance system. The exercise consisted of three tasks allocated to separate groups of participants aiming to produce a proposal of WAS for very low-level waste, legacy waste, and new waste type (geopolymer). Each group presented outcome of their proposals, and they were discussed in the final plenary session.

A total of 39 participants attended the course, where the group of participants was a mix of PREDIS and EURAD partners, students and stakeholders, see Figure 10.

Figure 10. *Group photo of participants, organisers and lecturers.*

After the course, participants were asked for their feedback and the outcome can be seen in Figure 10.

Figure 11. *Scoring of the questions related with the overall performance of the WAC SS.*

4.6 Radioactive Waste Management Operations

On the 20-23rd of November 2024 a training on Radioactive Waste Management operations, from retrieval to conditioning was organised by Orano, with the support of Amphos21. The training was held in La Hague, France at the Orano facilities. A total of 18 participants representing both PREDIS and EURAD, predominantly consisting of students, but also partners and stakeholders attended the course. A picture of the participants can be seen in Figure 12.

The aim of the training sessions was to give a general overview of radioactive waste management to the young specialists involved in PREDIS. This training consisted of 4 days of lessons and visits to learn about the La Hague reprocessing plant, LLW and ILW management operations, as well as Orano's container solutions and one of its container manufacturing plants.

Figure 12. *Group photo of participants and organisers.*

After the course, participants were asked to provide feedback. A total of 12 out of 18 participants answered the feedback survey, see Figure 13. The average scoring was above 4.5. The lowest score was obtained for the question “Did the trainings course increase your knowledge in LLW/ILW management?” with a score of 4.58.

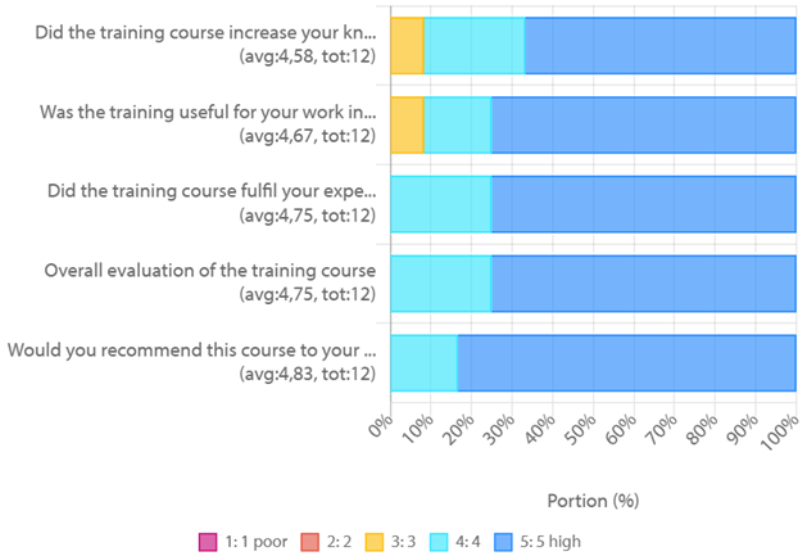

Figure 13. *Scoring of the questions related with the overall performance of the Orano La Hague training.*

4.7 LCA/LCC

A hybrid training on LCA/LCC was organised by the University of Manchester, with the support of Amphos21, on the 15-16th of May 2024. The training was held at the University of Manchester where a total of 5 participants attended the course on-site and 15 participants attended online, see Figure 14.

The objectives were to train attendees in the overarching methods of LCA and LCC, demonstrate the benefits and weaknesses of these approaches, and clarify how they can be used to improve the sustainability of process development and decision-making. The workshop included taught content (e.g. lectures) as well as opportunities for hands-on practice. This course was organised as part of PREDIS WP2 Strategic implementation, Task 2.5 Cross work package strategic assessment.

Figure 14. *Group photo of some of the participants and organisers.*

The feedback received at the end of the course can be seen in Figure 15. A total of 8 participants answered the feedback survey where the average scoring is above 3.8. The lowest scoring belongs to the question “Was the training useful for your work in PREDIS?” with a score of 3.88 out of 5.

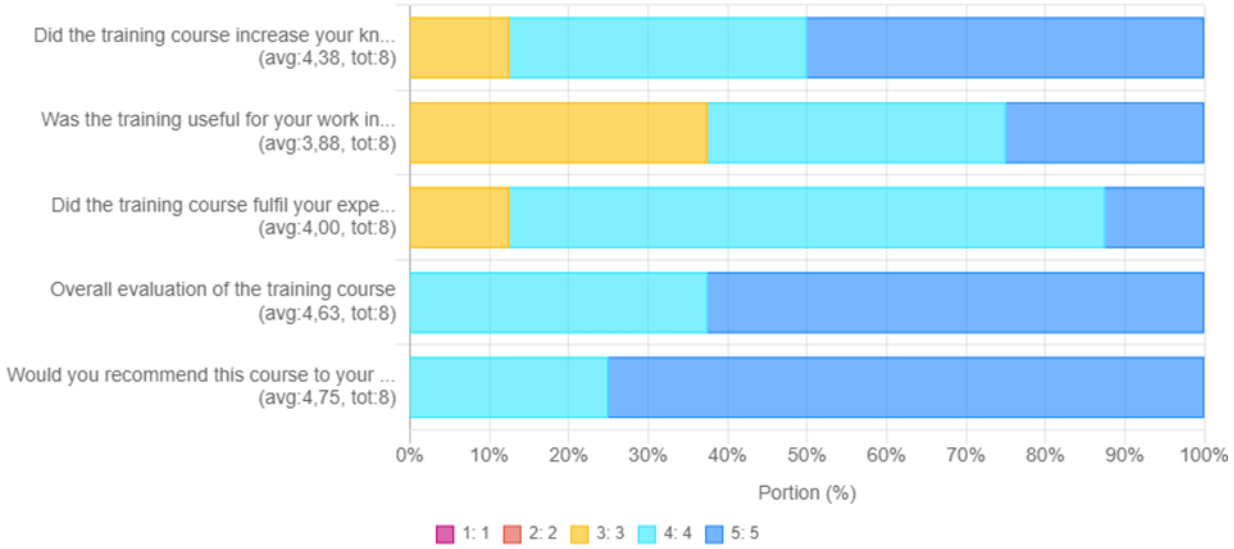

Figure 15. *Scoring of the questions related with the overall performance of the LCA/LCC training.*

4.8 Domain Insights

On the 20th, 22nd and 24th May 2024 Amphos21 organised an online training on all State-of-Knowledge Domain Insights (DI) of the PREDIS project, where the authors of each DI presented the content, the present status of the topic and answered questions from the audience. A total of 38-42 participants attended the training each day.

The training aimed to share knowledge summarised by the author in each domain insight with project partners, EUGs, Students and other persons interested in pre-disposal activities. Within the PREDIS project there are 12 DIs that are written documents containing contextual information about how activities and knowledge associated with a domain contribute towards achieving generic safety and implementation goals during implementation of radioactive disposal, including pre-disposal activities.

The feedback received from the course attendees can be seen in Figure 16. A total of 16 participants answered the feedback survey out of 42 course participants. The average scoring of the feedback was above 4.2 out of 5, where the question that received the lowest score was “Was the training useful to your work in PREDIS?”.

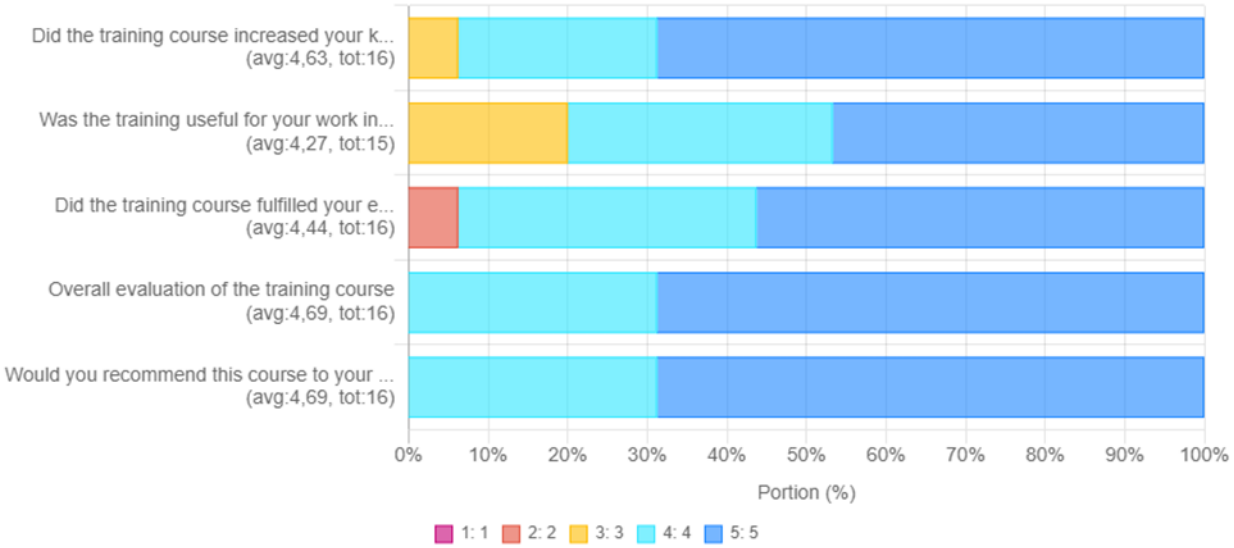

Figure 16. *Scoring of the questions related to the overall performance of the DI training.*

5 Summary and conclusions

As earlier mentioned, the initial plan at the beginning of the project was to organise 4 courses each year (Figure 2). However, it was decided to reduce this number to 2-3 courses per year reflecting the request from PREDIS participants that too many activities (webinars, WP workshops, project meetings, courses, etc.) were organised, thus the participants did not have sufficient time dedicated to experimental PREDIS activities.

Figure 17. *Flowchart showing the trainings held, when, the topic and the duration of each training.*

Based on that feedback, the PREDIS Management Team planned to prepare two training courses in 2023 and one in 2024. In the end, three courses were held in 2023 and two in 2022 due to high demand on specific topics by the PREDIS partners, as shown in Figure 17. The topics selected were decided by the Management Team in December 2022 in order to be able to plan the trainings in advance and announce them in time to all parties. It is important to highlight that the team took into consideration both the feedback and the existing courses, organised by other projects or organisations such as EURAD or IAEA.

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