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Intermediate update on the educational and training plans

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SP3.D6.3 Intermediate update on the educational and training plans

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Publishable summary

WP6 “Education, Training and Career Pathways” coordinates all training and retraining activities of the DARE project. The activities developed within Spoke 3 have been coordinated with the WP6 activities of Spokes 1 and 2.

The main aim is to address the lack of qualified personnel and improve the level of digital skills in the context of health prevention, which employers and employees require.

1. Enhancing and supporting human resources

Task 6.3, “*Enhancing and Supporting Human Resources*,” is being developed with the objective of implementing advanced training initiatives as defined in Task 6.1, “*Establishing Education, Research and Career Pathways*,” and Task 6.2, “*Professional Retraining and Advanced Training Courses*.” These initiatives are specifically designed to support newly recruited personnel and the existing DARE workforce involved in secondary and tertiary prevention. Within this framework, the following activities are planned:

- Summer School on Digital Prevention;
- Seminars on Artificial Intelligence, Big Data, Deep Learning, Data management applied to bioimaging;

1.1. Summer School on Digital Prevention

The first DARE Online Summer School, titled “*Co-design of Digital Preventive Technologies*”, was conducted virtually from July 29th to 31st, 2024, via the LearnFlix platform. The event attracted approximately 60 participants and featured contributions from 20 speakers affiliated with Spokes 1, 2, and 3. The Summer School integrated the themes of digital technologies and preventive healthcare, with the aim of enhancing disease prevention, improving intervention monitoring, and promoting personalized care—thereby contributing to the broader transition toward sustainable healthcare systems. The programme covered the following core topics:

- Focus areas of Spokes 1, 2, and 3;
- Needs and challenges associated with primary and secondary prevention;
- Data-driven approaches and data management in healthcare;
- Focus on radiomics
- Interdisciplinary discussions on legal and ethical considerations, certification of medical device software, and the clinical translation of emerging technologies.

The Summer School was structured as follows:

- Morning sessions (9:00–12:30), consisting of thematic lectures delivered by principal investigators and subject-matter experts, aimed at informing and educating participants—particularly those involved in the DARE project—on the key topics detailed in the attached programme;

- Afternoon sessions (14:00–16:00), featuring the “*Health Challengers*” Hackathon, a group-based activity targeted at young researchers and PhD students engaged in DARE. Participants collaborated to identify potential technological solutions to critical issues emerging from the pilot projects.

In recognition of their contributions, participants were awarded an Open Badge certified by *My Open Badge*.

More information and the full programme are available at:
<https://www.fondazionedare.it/it/programma-dare-summer-school-2024/>

In recent months, the programme of the forthcoming DARE Summer School is currently being finalized. The School will primarily address topics such as digital competencies, bioimaging, big data analysis, and radiomics, with a particular focus on their application in the fields of primary and secondary prevention. The initiative will be organized and delivered by UNIROMA2 in an online format to maximize accessibility and participation.

1.2.Seminars on Artificial Intellingence, Big Data, Deep Learning, Data management applied to to bioimaging;

The 15-hour course “Intelligenza Artificiale e Deep Learning - Esempi e applicazioni in Fisica Medica”, delivered in March 2025 by UNIROMA 2, offered a comprehensive and up-to-date overview of artificial intelligence and deep learning methodologies, with a particular focus on the development and deployment of deep neural networks for complex data processing. Core application domains include biomedical imaging, signal analysis, textual data, and advanced healthcare technologies such as radiotherapy and nuclear medicine. Participants acquired high-level competencies in programming and applied mathematics, with relevance to physics and biomedical research. The curriculum addressed key AI concepts, including machine learning paradigms (supervised and unsupervised), neural architectures, data preprocessing, and cutting-edge approaches such as reinforcement learning and spiking neural networks. This course supports PNRR objectives by enhancing digital and scientific skills in strategic technological areas. This course, delivered in Italian, was composed of 6 different sessions in blended mode and reached 426 participants.

<https://www.fondazionedare.it/it/ai-machine-learning-deep-learning-fisica-medica/>

From April to June 2025 UNIPD delivered two advanced training module (“Healthcare data management and analytics” and “Deep Learning for Biomedical Images”) to address critical aspects of biomedical data and

image analysis. The first course focused on the practical challenges of healthcare data management and analytics, adopting a hands-on approach with Python programming. Topics included data preprocessing (e.g., missing data imputation), database interaction, integration with R for biostatistics, implementation of machine learning models for classification/regression, and statistical evaluation of model performance—all tailored to biomedical applications. The second course addressed recent advances in deep learning for medical imaging, with a focus on CNNs, DNNs, and Transformer architectures. Students were trained on Pytorch and MONAI frameworks, with practical sessions covering image preprocessing, data augmentation, and case studies on classification, segmentation, and reconstruction. Techniques such as transfer learning, fine-tuning, and attention mechanisms were applied to real-world biomedical imaging tasks. These activities contribute to strengthening digital skills and AI competencies in line with the PNRR goals for innovation in healthcare and research. The courses were delivered in English and reached 28 students.

UNIPR will plan two distinct seminars (total duration: 4 hours) from September / October 2025 providing an overview of key artificial intelligence applications in radiology, with a particular focus on screening programs. The seminars will cover common AI tasks such as automated detection and diagnosis, image segmentation, and workflow optimization. A specific focus will be placed on the integration of radiomics into machine learning models to support the prediction and classification of clinical conditions, enhancing diagnostic precision and enabling personalized treatment strategies. These activities align with the goals of technological innovation and digital transformation in healthcare, as promoted by the PNRR framework.

UNIBA will provide a 4-hour course on “Innovazioni e sfide nella gestione del Mieloma Multiplo” from September 2025; this comprehensive understanding of Multiple Myeloma — from its epidemiology, pathogenesis, and clinical manifestations (including rare associations and complications) to current treatment strategies — is essential for identifying risk factors and developing predictive tools for disease progression. Machine learning techniques play a key role in analyzing large datasets and identifying meaningful risk factor associations. In this context, the UNIBA research group organized a series of online lectures aimed at distance education. The following topics and lecturers will be included:

- *Epidemiology of Multiple Myeloma*
- *Clinical Features of Multiple Myeloma with a Focus on Secondary Amyloidosis*
- *Biology of Multiple Myeloma*
- *Bispecific Antibodies in Multiple Myeloma*
- *Machine Learning Applications in Multiple Myeloma*
- *Gaucher Disease and Multiple Myeloma*

These initiatives support knowledge advancement and innovation in precision medicine and biomedical research, in line with PNRR objectives.

2. Educational platform and certifications

Within WP6 of SP3, a blended learning approach has been implemented through the integration of the “LearningFlix” platform, provided by project partner BI-REX even though other approach were used by UNIROMA2. This digital environment enables the delivery of structured educational and training pathways through innovative, multimedia-based methodologies, specifically designed to support adult and advanced education. The adopted pedagogical strategies focus on collaborative learning formats, including debates, case studies, simulations, and real-time learner interaction.

The training offer includes both certified courses and seminars, also aligned with the European Credit Transfer and Accumulation System (ECTS), allowing for the allocation of academic credits where appropriate. Recorded sessions and supplementary didactic materials will be made available

Courses and seminars delivered have been recorded and didactic materials will be available in the private area of the DARE website that is being designed.