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DIGITAL LIFELONG PREVENTION
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Spoke 2 Deliverable
SP2.D6.1 Plan for enhanced educational programming

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SP2.D6.1 Plan for Enhanced Educational Programming

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1. Publishable Summary

The document outlines the initiatives undertaken within the DARE (Digital Lifelong Prevention) project, specifically focusing on SP2 (Community-Based Digital Primary Prevention) within the Working Package 6 (WP6) entitled "Education, training, and career paths.

The primary aim of WP6 is to bridge the gap in digital knowledge and skills essential for primary prevention in healthcare, targeting graduates, postgraduates, and professionals working with real-world data in research settings.

These initiatives encompass various educational programs, including PhD courses, Master of Science (M.Sc.) degrees, and advanced learning courses. It has been emphasized the enhancing of digital and computational skills in healthcare, aligning with One Health and Planetary Health approaches.

To promote digital health culture, the program offers advanced learning opportunities to the public, focusing on health data science, medical statistics, community health research methodology, and more.

Special training pathways are designed for the current DARE workforce and newly hired personnel, such as a Summer School on Digital Prevention and courses on evolutionary algorithms for machine learning.

Utilizing a dedicated learning environment called "LearningFlix" and supported by IT infrastructure, the programs offer certifications via the ECTS system, micro-credentials, and open badges for shorter courses.

SP2 through WP6 represents a crucial effort to combat the global shortage of healthcare professionals with digital skills. Collaboration among esteemed institutions underscores the collective push to improve digital competencies in epidemiological surveillance, health promotion, and primary prevention.

2. Introduction

Within the DARE (Digital Lifelong Prevention) project, for the SPOKE 2 (SP2) "Community-Based Digital Primary Prevention" focusing on primary prevention, the Working Package 6 (WP6), entitled "Education, training and career paths", aims to address the lack of qualified personnel and to improve the level of digital knowledge and skills in support of primary prevention.

WP6 leader was identified with University of Palermo (UNIPA), while the other partners of the WP are University of Bologna (UNIBO), University Cattolica del Sacro Cuore (UCSC), University of Padova (UNIPD), University Kore of Enna (UKE), University Of Pittsburgh Medical Center Italy (UPMCI), GIMBE and Azienda Ospedaliera Universitaria Policlinico di Catania (AOUPCT).

The WP6 consists of 3 Task (Task 6.1, Task 6.2, Task 6.3). In particular, Task 6.1 refers to the educational domain as it focuses on establishing education, research and career pathways and on the enhancement of university post-graduate courses and PhD programs focusing on essential and advanced digital and computational skills in healthcare, with a particular regard to primary prevention, health promotion, and epidemiological surveillance, following the One Health and the Planetary Health approaches. The target groups include graduates, postgraduates, the current workforce, and those working in the research setting of real-world data and their applications.

Prioritizing ongoing education holds significance in fostering career opportunities, facilitating the adoption of technologies, and bridging the digital gap between generations and user categories. The sustainability of the initiative hinges on impact analysis and policy evaluation, enabling the adaptation of actions and solutions to emerging needs and requirements. This, in turn, establishes the initiative as essential for formulating comprehensive, multi-level prevention policies.

The lack of professionals with the competencies to support the digital revolution in the healthcare sector is a full-blown global crisis. Higher education training therefore represents a key strategic asset.

This deliverable, identified for WP6, refers to the plan for an enhanced educational and training program related to SP2.

3. Consortium educational and training competences

The partners belonging to the DARE Consortium, taken altogether, present a relevant portfolio of educational and learning programs, which will be enriched, updated, and expanded, according to the SP2 digital activities, and following a census of the educational and training demand and needs.

The ongoing PhD programs that are relevant for DARE's are 3 from UNIBO (Health and Technologies, Data Science and Computation, and Statistical Sciences), one from UNIPD (Information Engineering, with two curricula: ICT and Bioengineering), 8 from UNIPA (ranging from Mathematics and Computational sciences, ICT and System dynamics to Biomedicine and advanced diagnostics, Health promotion, Biomolecular Sciences, and Technologies for Human Health), and 1 from UKE (Intelligent Systems for Engineering Applications, with a curriculum concerning Deep Modelling, Machine Learning, and AI for Health).

A new PhD program on topics dealing with digitalized Public Health will be activated at UNIPA to train new researchers investigating the impact of health policies, health promotion and prevention, Global Health, One Health, and Planetary Health, including the complex interactions between health, environment, and climate changes.

Educational activities will also be carried out through the activation of Master of Sciences (M.Sc.) Degrees. The M.Sc. degree in Biomedical Engineering by UNIBO will be enriched with a new curriculum focused on digital health and exploiting DARE's results and methodologies. DARE activities in SP2 will also allow to update and expand the educational contents of the Statistical Science M.Sc. degree from UNIBO (with two relevant curricula: Data Science and Health and population analytics), of two master's degrees from UNIPD (Bioengineering and Computer Engineering), and of a post-graduate master from UNIPD (Machine Learning e Big Data).

A second level Master course will be activated at UNIPA to train experts in the management of events of Public Health interest or concern.

GIMBE foundation currently provides three relevant courses on evidence-based practice. GIMBE Foundation will contribute to develop educational programs for healthcare professionals and the public based on digital lifelong prevention and on its methodological and technological features developed and deployed in SP2.

4. Advanced education

All the educational and training activities related to the SP2 of the DARE project will be realised within the WP6. Moreover, these activities developed within SP2 will be coordinated with the WP6 activities of Spokes 1 and 3.

The aims are to enhance postgraduate university courses and doctoral programmes focusing on essential and advanced digital and computational skills in health prevention and promotion, to train research personnel recruited in SP2 and to address the lack of qualified personnel with adequate levels of digital skills in the context of digital primary prevention, which employers and employees require.

The target group includes master's students from the contributing beneficiaries of SP 1-2-3, the current project workforce, and newly hired ones, and those working in the research setting of real-world data and their applications.

The educational plan is developed dynamically, and other learning pathways may be added in response to special needs that may arise in the course of SP2 DARE's planned activities.

The contents of the newly developed educational and training activities are planned by a Scientific committee whose task is to propose a detailed syllabus and to identify the lecturers.

4.1. Learning activities open to external participants

In order to promote the diffusion of a culture centred on digital health for primary prevention, a series of activities targeted to the general public wishing to improve its competencies in the field will be proposed. Some of them are already part of the educational and training catalogue of the partner universities, but they will be re-adapted to the context of Digital Prevention.

The proposed advanced learning programmes are:

- **Lifelong Learning Certificate "From data to decision"** an international course promoted by the Una Europa Alliance (to which UNIBO belongs) that will introduce professionals to fundamentals of data science in a non-technical way, providing them with the skills to understand the importance of data-driven decision making and

interact with technical data science teams in their organizations. The 2024-25 edition will be focused on health data science.

- **Advanced Learning Course in Medical Statistics and Epidemiology** aiming to introduce the basic concepts of statistical analysis in the sciences of the medical and health care area and aims to train medical and health care personnel involved in clinical and epidemiological research and to improve their statistical skills, also with a view to promoting the scientific publication of research results.
- **Advanced Learning Course in Community Health Research Methodology** aiming to provide the skills to actively participate in community health research, disseminate its results and apply them in professional practice.

Besides programs that can be framed in the context of advanced education, we will work to offer new courses at the MSc and at the PhD level:

- **Master's degree in Applied Data Science** promoted by Una Europa Alliance (under Una.Futura funding) will provide students' knowledge and practical skills to apply data science to different domains with a specialized track on Health data science offered by UNIBO. The course is under development and is expected to start in the a.y. 2025-26.

Moreover, a feasibility study will be conducted for a **Joint PhD in Digital Prevention** involving a plurality of DARE partners.

The following pathways will be offered by university partners who will make some of the master's degree modules available in asynchronous mode:

- **Master's Degree Course in Health policies and community-based prevention programs related to digital transformation** provided by UNIBO aims at providing students with the conceptual and analytical tools necessary to understand the implications of health policies and community-based prevention programs arising from the increasing availability of large databases and sophisticated tools for their analysis, as well as the growing spread of digital technology tools also available to citizens and other stakeholders.

- **Master's Degree Course in Biomedical Engineering**, provided by UniPA, with the aim of offering multidisciplinary skills in industrial engineering, information engineering and bio-medical engineering applied to community-based prevention.
- **Master's Degree Course in Medicine, Surgery and Applied Technology (MED-IT)**, provided by UniPA, aims to train students with a clear awareness and vision of the potential offered to the medical field by technological advances and the correct use of the most advanced and innovative technologies in the medical field, from prevention to diagnosis, treatment, and rehabilitation.
- **Master's Degree Course in Health care and environmental protection techniques (preventive class),** provided by UniPA, aims to train health professionals with the scientific and technical knowledge required for the profession of prevention technician.

The following pathways will be also offered by university partners who will make some of the Master of Science (M.Sc.) modules available in asynchronous mode:

- **Master of Science Degree Course in Organisation and management of health care facilities and services**, provided by UNIPA, aiming to train professionals capable of carrying out care, management, training and research processes in the relevant field of the completion of prevention activities dedicated to the individual and the environment in an increasingly One-Health approach in line with the directives of the World Health Organisation.
- **M.Sc. degree in Biomedical Engineering**, provided by UNIBO, including a new curriculum focused on digital health and exploiting DARE's results and methodologies.
- **M.Sc. degree in Statistical Science**, provided by UNIBO, including two relevant curricula: Data Science and Health and population analytics.
- **M.Sc. degree in Machine Learning and Big Data**, provided by UNIPD, to train experts in the application of AI and Machine Learning in the field of prevention.
- **M.Sc. degree in Public Health**, provided by UNIPA, to train experts in the management of events of Public Health interest or concern.

4.2.Learning activities for DARE workforce and newly hired personnel

Other pathways that will be part of the training offer dedicated to DARE current workforce and newly hired personnel are listed as follows:

- **Summer School on Digital Prevention** aimed at providing in-depth knowledge of digital prevention in healthcare with an interdisciplinary approach.
- **Alphabetization Course on Evolutionary algorithms for machine learning in the health field** intends to introduce the main variants of EC algorithms (risk factors algorithms, including genetics and genomics applied to Public Health, and social, health and environmental determinants) by showing some application examples, including predictive models. In particular, problems encountered in machine learning applications will be considered, thus proposing EA as an alternative to these techniques.

The final educational output of DARE will be:

- **Online School on Digital Prevention.** It will be publicly available and will be aimed at providing an in-depth knowledge of digital prevention in healthcare, borrowing from the DARE experience. The partners will contribute with recorded classes that together will provide a guideline for people interested in improving their competence in the DARE topic.

4.3. Educational platform and certifications

The design and the implementation of the education, research, and career pathways, will take into account the solid IT and knowledge management infrastructure provided by GIMBE Foundation and the blended delivery systems through a specific learning environment called "LearningFlix", provided by partner BI-REX.

Specific didactic multimedia approaches dedicated to adult education will be adopted that will include innovative teaching strategies involving collaborative learning, for example, debates, case studies, simulations and live interaction with learners.

These pathways will be certified through the ECTS system and also micro-credentials and open badges for shorter courses that can be shared, portable and combined into larger credentials.

ECTS credits will be provided where appropriate.

5. Conclusions

In conclusion, SP2 through WP6 represents a significant stride in addressing the global crisis of a shortage of professionals with digital competencies in the healthcare and prevention sectors. Through its three tasks, particularly Task 6.1 centred on education, the initiative strategically targets ongoing and future learning programs, advanced education, and learning activities open to external participants. The collaboration among various esteemed institutions within the consortium, including UNIBO, UCSC, UNIPD, UKE, UPMCI, GIMBE, and AOUPCT, highlights the collective effort to enhance digital skills in epidemiological surveillance, health promotion, and primary prevention.