ANNEX N. 1A

PHD COURSE IN:

"*DIGITAL TRANFORMATION*"
PhD course coordinator: Prof. Pierpaolo Limone

Course Duration: 3 years

Total Competitive Places: n. 40

Places with fellowship: no. 30
Of which DM 117: no. 19
Of which DM 118: no. 10
Granted institution's own funds: n.1
Places without fellowship: n. 10

With regard to the number of scholarship places, given the possibility granted by the MUR, with reference to DM 117 of 2023, to expand the number of scholarships scheduled until the date of October 31, 2023 subject to the identification of additional financing companies, it is specified that the aforementioned expansion may be a maximum of no. 20 scholarships, for a total, evidently, of no. 50 scholarships put up for competition. Notice of the aforementioned possible expansion of the total number of scholarships put up for competition, compared to the initial No. 30 scholarships, will be given at the time of the approval of the final merit list with the relative and consequent allocation of the scholarships exceeding the aforementioned initial No. 30 scholarships.

PROJECT DESCRIPTION:
The Doctoral Program in Digital Transformation is designed to promote research on the processes that hinder or facilitate the adoption of enabling technologies in different contexts and services in order to promote the common good, health, quality of life, and objective and perceived well-being among individuals, groups, and organizations.
There is a need to develop paths of high research and training to train future researchers, real Digital Scientists (Digital Transformation - White Paper Engineering SpA, 2021), in order to develop, validate and measure according to scientific criteria the application and adoption of ICT infrastructures in business and PA contexts, in line with the Digital Compass posed by the European Community in order to achieve a real digital transition by 2030 (Europe's Digital Decade, 2021). The proposed PhD course captures all 4 objectives, but in particular collaborates to train "a skilled digital population and highly qualified digital professionals"
Future researchers will represent the bridge between the academic and industrial sectors, as active players in scientific development in line with the investments and reforms envisaged in the National Recovery and Resilience Plan that wants to put Italy in the leading group in Europe by 2026 in terms of digital transition, capable of leading the change with a scientifically oriented view of its processes and effects.

The Digital Scientist becomes the academic figure capable of governing and coordinating the process of digital transition at every level. The goal is to provide the new key skills to successfully influence and lead change in order to enable doctoral candidates by having direct access to cutting-edge research in a range of fields such as Data Science, IoT, new energy, artificial intelligence (AI), biomedical engineering, blockchain, etc.

The Ph.D. course aims to train future researchers in academia and able to collaborate fruitfully and actively with the business world in order to seize the opportunities offered by new technologies that will enable new cognitive, economic and social paradigms; through systematic study with a high scientific profile.

COURSE OBJECTIVES:
In other words, the goal of the Doctorate of Digital Transformation course is twofold:

1. To analyze the contexts of technology implementation and user needs in order to provide operational guidance for the design and adoption of the technologies themselves;

2. To study the effects of technology implementation and use, identifying possible risks to health and well-being and/or new opportunities for the design, prototyping, and testing of even more advanced solutions.

The PhD course intends to support the achievement of objectives with respect to the 5 indicators to bring Italy into the leading group of the national strategy Italia digitale 2026 (Digital Italy 2026, 2021). Special attention will be given to issues related to inclusivity-a cross-cutting theme of the NRP-by addressing from the development stages of research activities the risks of the digital divide (meaning unequal access to technologies and/or benefits obtainable through their use) related to social class, sex and gender, ethnic and cultural affiliations, and forms of disability. Similar relevance will be given to legal profiles concerning data management and privacy protection and to the perspective of gender, equity and well-being in the relationship between individuals and within organizations.

In the context of the Doctoral Program in Digital Transformation, doctoral students will be accompanied in the acquisition of multidisciplinary skills involving STEM fields, from engineering, to computer science; and those centered on human capital that will promote the acquisition of the main methodologies for social, psychological, pedagogical research from both quantitative and qualitative perspectives.

The doctoral program will focus on acquiring knowledge and mastery of the main theories related to the adoption and implementation of technologies as well as their prescriptions at the operational level; tools for guiding (not just evaluative) research of technology development from a human-centered design perspective.

INTENDED EMPLOYMENT AND PROFESSIONAL OUTLETS:
Upon completion of the doctoral program, thanks in part to the variety of curricula offered such as:

➢ Health: the curriculum will develop experts with high scientific skills on big data, analytics, data protection systems, information law, security, network regulation applied to the health sector, able to have professional outlets as researchers on the development of technologies in the health sector in IRCCS, public and/or private entities; experts for health care companies, for industries in the pharmaceutical and biomedical sector, with skills in the management of production chains for quality management and project management.

➢ Education: the curriculum will enable at the end of the doctoral program to know how to integrate technologies in the field of education, supporting learning, inclusion and assistive technologies, disciplinary technologies and didactics. big data, analytics, data protection

systems, information law, security, network regulation, in training experts in Educational AI: intelligent systems, social and educational robotics, machine learning, bots and personal digital assistants" and "Gaming: video & serious games, exergames for rehabilitation and adaptation, e-sports, gamification and playful learning," students will have a plurality of professional outlets. Among these, the main ones include:

o research in education, training and technology in public and private entities;

o product development in educational companies, creative industry and edutainment; - Instructional Designer in industrial settings and in public and private settings;

o Leadership as teachers, researchers in universities and companies, designers and evaluators of formal and informal learning environments, and in learning technology decision-making

➢ Industry & Green Management: The aim is to develop expendable skills in the coordination and management of research and R&D activities, which can support large companies, SMEs, public and private entities in managing experimental and industrial research projects and defining innovation strategies from the four dimensions of digital transformation: the use of technologies, changes in value creation, structural changes and financial aspects (Matt et al., 2018).

➢ Human Centred technology & Well being: The Curriculum aims to train professionals in psychosocial research focusing on the effects of new and commonly used technologies on users, as well as the opportunities for their use in promoting well-being and empowerment of cognitive and social skills in healthy populations. Research projects carried out by doctoral students in the context of the Curriculum will aim to provide theoretical and practical tools for improving quality of life through new technologies.

COHERENCE WITH THE OBJECTIVES OF THE PNRR:

Programmatic Reference Lines of the NRP

● Mission: 1 - Digitalization, innovation, competitiveness, culture and tourism / Component: 2 - Digitalization, innovation and competitiveness in the production system

● Investment 1: Transition 4.0.

● Mission: 4 - Education and research / Component: 2 - From research to enterprise Investment: 2.2 - PNRR - Partnerships for research and innovation" Horizon Europe

● Mission 6 Health / Component: 1 - Neighborhood networks, facilities and telemedicine for territorial health care.

● Mission 6 Health / Component: 2 - Innovation, research and digitization of the national health service.

● National Digital Italy Strategy 2026

The PhD course intends to support the achievement of objectives with respect to the 5 indicators to bring Italy into the leading group of the national strategy Italia digitale 2026 (Digital Italy 2026, 2021).

Particular attention will be given to issues related to inclusivity - a transversal theme of the PNRR - addressing from the development stages of research activities the risks of digital divide (meaning the inequality of access to technologies and/or benefits obtainable through their use)related to social class, sex and gender, ethnic and cultural affiliations and forms of disability. Similar relevance will be given to legal profiles concerning data management and privacy protection and to the perspective of gender, equity and well-being in the relationship between individuals and within organizations.

The Ph.D. in "Digital Transformation" is consistent with "M4C1.4 REFORM AND STRENGTHENING OF DOCTORATES," with particular regard to Investment 4.1: "Expansion of the number of PhDs and innovative PhDs for Public Administration and Cultural Heritage" and Investment 3.3: "Introduction of innovative PhDs that respond to the innovation needs of enterprises and promote the recruitment of researchers from enterprises." Consistency is especially expressed in the promotion of new professional figures from high-profile skills required in the labor market. The proposed doctoral pathway goes to promote innovative and frontier figures with the ability to actively collaborate with specialists from different fields through high-profile knowledge of different subjects. The background and focus remains especially learning improvement, with specialists able to design, implement and evaluate innovative learning and teaching environments, using new technologies in a coherent and conscious process from well-situated methodologies.

Compared to the NRP measure recalled in the paragraph, the proposal sharply captures one of the "Key Enabling Technologies," specifically Artificial Intelligence (AI). This KET falls across all curricula as it is applied to medicine (Health curriculum), to the education sector with intelligent systems, social and educational robotics, machine learning, bots and personal digital assistants (Education curriculum), robotic applications in industry (Industry & Green Management curriculum) and finally to new technologies for psychological well-being (Human-centered technology and well being curriculum).

As mentioned at the beginning of the paragraph, the doctoral pathway goes to implement various actions of the NRP and, from a cross-cutting point of view, perfectly captures the investment 1 called "Transition 4.0" of Mission 1 called "Digitalization, Innovation, Competitiveness, Culture and Tourism/Component: 2 - Digitalization, Innovation and Competitiveness in the Production System." In addition to the specification to the call's precipitous investment, the PhD can have cross-cutting impact on Mission 4 of the NRP "Education and Research." The Ph.D. will go on to train new employees capable of designing, managing, updating and evaluating the shortcomings of learning environments particularly with regard to the application of digital technologies, bridging existing gaps and applying sustainable solutions.

The topic areas relevant to the drafting of the research project under the Doctoral Program in Digital transformation are as follows:

Subject Area 1 _DT	Digital transformation and Digital Health	Places with fellowship	Places without fellowship

		6	2
Brief description of educational and research activity	Digital technologies are becoming a key component for Health Systems and businesses that work closely with health care, from the drug world to the medical device world. Digital solutions, pertaining to the sphere of digital health, for the purpose of promoting the common good, health, quality of life, and objective and perceived well-being among individuals, groups, and organizations, are continuously growing. It is necessary to develop paths of high research and training to train future researchers, real "Digital Scientists," in order to develop, validate and measure according to scientific criteria the application and adoption of digital solutions to the health context.		
Research activities to be carried out at company/research center	Optional research or educational activities to be agreed with the mentor based on the specific project proposed by the doctoral student.		
Length of stay in the company/research center research/doctoral student (min 6 - max 12)	6/12 months optional		
Research activities to be carried out abroad or at institutions	Optional research or educational activities to be agreed with the mentor based on the specific project proposed by the doctoral student.		
Length of stay (min 6 - max 12 months within the three-year period, including non continuous)	6/12 months optional		
Name of host institution	International research institutes/institutions that have entered into or will enter into the agreement with the PhD course in Digital transformation.		

Subject Area 2 _DT	Digital transformation and education	Places with fellowship	Places without fellowship
Brief description of educational and research activity	Digitization in education is a challenge without borders: educational offerings and customized services globally involve the entire academic system. Online education makes the market for universities and education in general extremely competitive: academic courses from foreign institutions are made available through digital platforms. Students have almost limitless educational offerings, which means that academic institutions that want to attract new talent and ensure a high level of quality from the perspective of digitization of activities must optimize digital architectures. The Ph.D. course aims to train future researchers in academia and able to collaborate fruitfully and actively with the business world in order to seize the opportunities offered by new technologies that will enable new cognitive, economic and social paradigms.	6	2
Research activities to be carried out at company/research center	Optional research or educational activities to be agreed with the mentor based on the specific project proposed by the doctoral student.		
Length of stay in the company/research center research/doctoral student (min 6 - max 12)	6/12 months optional		
Research activities to be carried out abroad or at institutions	Optional research or educational activities to be agreed with the mentor based on the specific project proposed by the doctoral student.		

Length of stay (min 6 - max 12 months within the three-year period, including non continuous)	6/12 months optional		
Name of host institution	International research institutes/institutions that have entered into or will enter into the agreement with the PhD course in Digital transformation.		

Subject Area 3 _DT	Digital transformation, Industry & Green management	Places with fellowship	Places without fellowship
Brief description of educational and research activity	Society is currently experiencing a transition in the Digital and Green Economy area. It is revolutionizing business models, innovation and use of technologies, consumption and application delivery, and knowledge sharing involving both human and machine spheres. Digital transformation, by integrating digital technology into all areas of a business, will bring about fundamental changes in the way businesses operate and how they deliver value to customers, while increasing the competitiveness of industries, impacting not only the private sector but also the public sector, including organizations, large corporations and academic institutions. The objective of the doctoral program is to promote the development of digital technologies, products and applications targeted by the European Green Deal, with a specific focus on the development of innovative products/processes/services from an energy and environmental sustainability perspective.	**12**	**4**
Research activities to be carried out at company/research center	Optional research or educational activities to be agreed with the mentor based on the specific project proposed by the doctoral student.		
Length of stay in the company/research center research/doctoral student (min 6 - max 12)	6/12 months optional		
Research activities to be carried out abroad or at institutions	Optional research or educational activities to be agreed with the mentor based on the specific project proposed by the doctoral student.		

Length of stay (min 6 - max 12 months within the three-year period, including non continuous)	6/12 months optional		
Name of host institution	International research institutes/institutions that have entered into or will enter into the agreement with the PhD course in Digital transformation.		

Subject Area 4 _DT	Digital transformation, Human-centered technology & well being	Places with fellowship	Places without fellowship
Brief description of educational and research activity	By definition, a digital transformation project has technology as its output, but the goal is optimization of the process supported by the technology. The doctoral track will focus on acquiring knowledge and mastery of the main theories related to the adoption and implementation of technologies as well as their prescriptions at the operational level; of the tools for guiding (not just evaluative) research of technology development from a human-centered design perspective.	6	2
Research activities to be carried out at company/research center	Optional research or educational activities to be agreed with the mentor based on the specific project proposed by the doctoral student.		
Length of stay in the company/research center research/doctoral student (min 6 - max 12)	6/12 months optional		
Research activities to be carried out abroad or at institutions	Optional research or educational activities to be agreed with the mentor based on the specific project proposed by the doctoral student.		
Length of stay (min 6 - max 12 months within the three-year period, including non continuous)	6/12 months optional		
Name of host institution	International research institutes/institutions that have entered into or will enter into the agreement with the PhD course in Digital transformation.		

In connection with the aforementioned expansion of the number of scholarship places by a maximum of No. 20 scholarships, for a total of No. 50 scholarships, any additional scholarships will be distributed as follows:

- No. 4 fellowships for the subject area "Digital transformation and Digital Health";
- No. 4 fellowships for the subject area "Digital transformation and education";
- No. 4 fellowships for the thematic area "Digital transformation, Human-centered technology & well being";
- No. 8 fellowships for the thematic area "Digital transformation, Industry & Green management".