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Organization of a program of training for teachers and staff

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History of revisions

Rev N	Description	Author	Review	Date
0	Draft	POLITO	Draft creation	09/04/2020
1	Draft	POLIMI	Added introduction and training modules organization	19/06/2020
2	Draft	POLIMI	Expanded sections related to selection of trainers and trainees	25/06/2020
3	Review	POLITO	Review	30/06/2020
4	Review	POLIMI	Added learning modules offered through open knowledge platforms	31/07/2020
5	Review	POLIMI	Added training program schedule and expanded all sections	27/12/20
6	Review	POLIMI	Finished internal review	27/01/21
7	Review	POLITO	Final Version	30/01/21

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Executive summary

The D 5.1 deals with the organization of the training program for teachers and staff on the contents developed in previous Work Packages, namely WP1, WP2 and WP3. The purpose of the staff training program is to support the exchange of ideas and methodologies that will facilitate the creation and design of teaching materials and the development of research activities in line with the Master Degree at ENIT and of the single courses at ISGIS, FSJEGJ and ENIGA that will be activated thanks to the project and that are dedicated to the Next Production Revolution, namely: Industry 4.0, Renewable Energy, and Innovation & Entrepreneurship. The purpose of the staff training is also to provide some examples of experiences on which Tunisian institutions may be inspired to set fruitful collaborations and partnerships with other private and public entities in order to create valuable socio-economic ecosystems.

Originally the training program was intended to take place in Milan during one week of an intensive "in-presence" session; however, in light of the coronavirus outbreak it was decided to adopt a remote training modality to minimize the impact of delays and to help prevent the spread of the virus. The specific format to be adopted for the training program involves synchronous webinars delivered online by appointed trainers. Despite the circumstances that motivated the format change, the new format brings unanticipated benefits including flexibility for both trainers and trainees in terms of location and time, as well as the possibility to reach a larger audience and to count with the presence of a wider array of trainers.

The list of training modules to be included in the program was drafted primarily taking into consideration the contents of WP1, WP2 and especially WP3, which reflects the main educational needs of the Tunisian consortium partners, including the Master Degree to be activated at ENIT as well as the series of single courses planned to be offered during the next years at ENIGA, ISGIS and FSJEGJ. The training modules were delivered by the European partners according to their individual area of expertise in the three disciplines covered by the scope of the project: "Industry 4.0", "Renewable Energy", and "Management of Innovation and Entrepreneurship". Additionally, a number of modules were dedicated to sharing the European partners' perspectives on the development of innovation ecosystem models based on partnerships between universities and the private sector.

Considering this variety of topics, the training modules can be grouped into three main categories:

1) **Curriculum Development modules**, which aim to support directly the preparation of activities and materials for teaching and research;

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2) **General Contents modules**, which provide general contents related to the three main disciplines to be used as reference material; and

3) **Ecosystem Building modules**, which relay the experiences from the European partners in building innovation ecosystems.

4) As a complement to these modules, a number of **massive online open courses (MOOCs)** is also made available to the trainees that wish to enroll and take part. With this structure, the training program is able to address the requirements expressed by the Tunisian consortium partners.

The trainers and trainees were selected following two different procedures. The trainers in charge of the modules were selected among faculty staff and industrial practitioners. The criteria for trainer selection are based on their knowledge and experience related to the three main disciplines related to the project as evidenced by their activities, publications, position, etc. A total of 19 trainers joined the training program. The trainees to benefit from the training program were selected according to their interest and motivation. Given the change of delivery format, a wider group of participants was sought by distributing a survey (Annex 1) to gauge interest in the training program.

The training program was scheduled to take place between October 12th and November 25th, during which the following 24 modules were addressed: 14 for Curriculum Development, 3 for General Contents, and 7 for Ecosystem Building. A total of 13 MOOCs were also offered to participants willing to enroll and benefit from the contents.

1. Introduction

The D 5.1 is the first deliverable of the WP5. The work package is dedicated to the training of the selected staff on the contents developed in the previous work packages WP1, WP2, WP3. The staff training is fundamental for the exchange of ideas and methodologies in order to define the courses' contents, to design research and teaching activities for the laboratories and to prepare appropriate teaching materials. The deliverable D 5.1 presents:

- The format of the training modules in Section 2
- The main contents of the training modules in Section 3
- The selection procedure for trainers and trainer profiles in Section 4
- The selection procedure for trainees in Section 5
- The training program schedule in Section 6
- The detailed training program structure and individual modules in Section 7

2. Format of Training Modules

The milestone for this task was initially defined as a one-week-long presential training in Milan at the Politecnico di Milano facilities. However, due to onset of the COVID-19 emergency, the activities related to the WP5 were carried out in remote mode, at least for the year 2020. The staff training was delivered remotely in the form of webinars during a period of about two months during fall 2020. In addition to avoiding any further delay in the progress of the project and to prevent the diffusion of the virus, the remote modality also provides additional flexibility for trainers and trainees:

- Location flexibility: The participation and execution of the training is not constrained to a geographical location. Moreover, trainers and trainees can participate in the webinar sessions even if they are required to be at a specific place for other duties in other hours of the same day or in the days immediately before/after, provided that they have access to a reliable internet connection.

- Time flexibility: As opposed to condensing all sessions into a one-week-long presential training that requires complete availability from trainees and the scheduling of sessions with a high risk of overlapping activities, the remote modality allows for the spreading of sessions onto a larger time frame, which fits better on the agendas of trainers and trainees.

- Participation flexibility: The remote modality also eliminates all travel expenses to reach the presential training sessions. This enables partners to organize training sessions aimed to a wider audience than originally intended as per the budget plan. Additionally, the remote sessions are better at addressing individual trainees' interests as it allows them to join the sessions that better suit their specific areas of interest.

The platform was selected according to both the trainers and trainees' preferences. The trainers expressed their preference for the platform being used by their respective organizations which is Microsoft Teams. The trainees' preference was assessed by means of a survey (Annex 1) conducted during the organization phase, in which they were asked to state their agreement with choosing Microsoft Teams as the platform for the training. Considering both trainers and trainees' feedback the videoconferencing platform selected for the online webinars is Microsoft Teams.

Finally, in order to mitigate the risks associated with low commitment to the training program which could be further amplified with the remote modality, trainees were advised that certificates of attendance will be provided to those who participate in a number of sessions equal to or above a certain threshold. Considering the number of training modules to be included in the program, this threshold is set as 10.

3. Definition of Training Modules and Contents

The training sessions were organized and prepared through the collaboration between all partners in Europe including POLIMI, POLITO, CS and OBREAL. The organization of the program consists in the definition of the training modules and their contents as well as the selection of trainers and trainees. The training modules topics were divided according to each partner's individual area of expertise in order to maximize the impact and benefits for the trainees. The contents and the type of activities envisioned for each training module eventually determined the duration of the sessions.

The training modules to be included in the program were produced and selected on the basis of the requirements of the Tunisian consortium partners relayed through the draft deliverable D 3.1 "Definition of a Master in the Next Production Revolution" and the list of individual courses to be activated during the year 2021 at ENIGA, FSJEGJ, and ISGIS. A first draft of the list of modules was produced and shared with the Tunisian partners and potential trainees in order to gauge interest in the proposed modules and to search for potential topics to add to the list.

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The training program structure was set to cover the three main disciplines in the scope of the project: "Industry 4.0", "Renewable Energy", and "Management of Innovation and Entrepreneurship". These three disciplines were addressed by the European partners according to their individual area of expertise. Under this consideration, the topic "Renewable Energy" was primarily addressed by POLITO, while the topics "Industry 4.0" and "Management of Innovation and Entrepreneurship" were jointly addressed by POLIMI and OBREAL. This division is intended to ensure that trainees are provided with the appropriate materials developed by capable and experienced trainers. Nonetheless, it is done only in general terms as there are several topics associated to more than one of the three main disciplines, which were addressed following the same expertise-based criterion but at the trainer level.

In addition, the European partners dedicated a number of training modules to provide trainees with new perspectives on the innovation ecosystem model adopted by universities by sharing their experiences on operating laboratories and incubators working in collaboration with industrial partners, industry associations, other academic partners, and public institutions. This partnership between universities and the private sector allows for networking between faculty members, researchers, students, and industrial practitioners which unlocks a series of project opportunities which bring benefits to all stakeholders.

Taking into consideration the different nature of the topics to be included in the training program, the training modules were divided into three main categories:

1. **Curriculum Development**. These modules aim to support the preparation of activities and materials for teaching and research. The contents include basic definitions within the topic, main applications, reference materials, examples of course structure and assessment, etc.
2. **General Contents**. These modules provide contents of general character related to the three main disciplines and are intended to be used as reference during the definition of the Master Program. The contents include presentations of existing Master Programs, teaching laboratories, etc.
3. **Ecosystem building**. These modules relay the experiences from the initiatives of the European Partners to build innovation ecosystems between academic institutions, industrial practitioners, incubators, etc., including partnerships, alliances, and more.

As a complement to the modules delivered by trainers, the European partners also made available to the trainees **a number of MOOCs**. These courses include contents related to the three main disciplines and also to innovation in higher education

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pedagogy. Therefore, they are useful for curriculum development purposes as well as the development of skills in the didactical area.

In this way, the contents of the training modules are able to hit the various specific needs of Tunisian consortium partners, highlighted in the Description of the Project, which are addressed by the NePRev project:

- Creation of curricula able to respond effectively to the expectations of the labor market and to the NPR demand from the industry.
- Creation of connections between the university and its socio-economic environment, especially in the university-industry relationship.
- Set up of partnerships and sharing of best practices of high value-added research projects capable to implement innovations in the industry and producing patentable research outputs.
- Sharing of experiences of innovative and interactive teaching, through the use of laboratories, the competence centers, and the business schools.
- Sharing of project experiences in laboratories and research groups in Europe to stimulate the students' exchanges: international students to Tunisia and Tunisian students to Europe.

4. Selection of Trainers

The trainers in charge of conducting the sessions were selected among faculty staff and industrial stakeholders. Depending on the nature of the modules' contents two different criteria are established, where the relevancy is defined as the degree of relation to the three main disciplines covered by the project, namely "Industry 4.0", "Renewable Energy", and "Management of Innovation and Entrepreneurship":

1. Modules involving presentations for curriculum development:
    a. The trainer should be actively involved in teaching and/or research activities related to the module evidenced by the possession of a teaching or senior position within their organization and/or having relevant publications in the recent years.
    b. The trainer should be an industrial practitioner working in a relevant field.
2. Modules involving presentations about master programs, laboratories, incubators or other facilities:
    a. The trainer should hold a senior position within the organization of the program or facility.
    b. The trainer should belong to the administrative staff in charge of the management of program or facility.

The table below outlines the profiles of the trainers selected from each partner and the module for which they are responsible.

Partner	Trainer Name	Summary of relevant skills and experience
POLITO	Pierluigi Leone	Full professor at the Department of Energy of Politecnico di Torino. Expert in renewable energy. Coordinator of the Task Force "Energy and development - Politecnico di Torino". Coordinator of the Erasmus+ project Enbrain - Building capacity in renewable and sustainable energy for Libya. Coordinator for PoliTO of the African Innovation Leaders project, www.africainlead.net. Coordinator of the MOOC "The strange paradox of the world energy question", PoliMI Open Knowledge. TEDx Speaker at the Innovation Ecosystem 2016
	Romano Borchiellini	Romano Borchiellini is Full Professor at the Department of Energy of Politecnico di Torino. He is an expert on analysis and modelling of thermal systems with more than 150 publications. He is President of the advisory board of the Energy Center Initiative in Torino and project manager of the Energy Center Lab.
	Eleonora Atzeni	Eleonora Atzeni is an Associate Professor of Manufacturing Technologies and Systems at the Department of Management and Production Engineering of Politecnico di Torino. She teaches courses in the BSc and MSc Programme in Mechanical Engineering, as well as at the MSc Programme in Industrial Production and Technological Innovation. She also teaches PhD and Specializing Master courses. Her main research topic is related to Additive Manufacturing technologies, and she has been working in different projects on this theme, at European and national level. She is a research member at the Integrated Additive Manufacturing Interdepartmental Center at Politecnico di Torino (IAM@PoliTo).
	Alessandro Salmi	Alessandro Salmi is Associate Professor of Manufacturing Technologies and Systems at the Department of Management and Production Engineering of Politecnico di Torino where he teaches the courses of Additive Manufacturing Systems and Materials, Integrated Manufacturing Systems and Numerical Methods for Process Design in the MSc Programme in Mechanical Engineering. He has published more than 45 papers in international journals and conference proceedings and one book. He has been working in different projects at European and national level. His research interests are currently focused on Additive Manufacturing processes and design optimization, high speed machining (HSM), and FE process simulation. He was one of the authors who won the Best Young Scientist Award at the 4th International Conference on Additive Technologies (iCAT) in 2012. He is a research member at the Integrated Additive Manufacturing Interdepartmental Center at Politecnico di Torino (IAM@PoliTo).
	Marco Cavana	Marco Cavana is a post-doctoral researcher at the Department of Energy of Politecnico di Torino, Italy. He defended his PhD thesis titled "Gas Network Modelling for a Multi-gas System" in September 2020. During the PhD, he developed a fluid-dynamic model of the gas network implementing transient and multi-component features, in order to perform quality tracking studies and potential assessments in the context of distributed injection of renewable gases (i.e. biomethane and hydrogen) and energy networks integration. During his research activities, he collaborated with Italian gas transmission and distribution system operators in projects about hydrogen injection within the current infrastructure and projects assessing biomethane production and injection potential on a regional basis.
	Andrea Lanzini	Dr. Andrea Lanzini received his M.S. in Energy and Nuclear Engineering in 2007 and his Ph.D. in Energetics in 2011. He is presently Associate Professor at the Energy Department of Politecnico di Torino (Italy) and affiliated with the Energy Center of the same institute. He is author or co-author of more than 100 articles in international journals with peer-review (2008-present) and has an H-index of 33 (source: SCOPUS). Fulbright alumnus as visiting research collaborator in the Princeton Environmental

Partner	Trainer Name	Summary of relevant skills and experience
		Institute during 2010-2011. Visiting PhD student in Imperial College in the Fuel Cell group of Prof. Nigel Brandon in 2010. He conducts research in the field of hydrogen and fuel cells, carbon capture and re-use, energy planning and energy systems analysis. Chair of the course of Renewable Energy. He teaches classes of Polygeneration and Advanced Energy Systems and Thermal Design and Optimization. He is the responsible professor the outgoing mobility program of the Master Program in Energy Engineering at Politecnico di Torino.
POLITO	Daniele Grosso	Dr. Daniele Grosso holds a Master degree in Nuclear Engineering and a Ph.D. in Energetics from Politecnico di Torino. Currently he is employed at Links Foundation and he is Scientific Executive Manager of the Energy Security Transition (EST) Lab @ Energy Center – Politecnico di Torino. His research activity focuses on modelling and scenario analysis of energy systems, with a particular attention devoted to the security aspects of energy infrastructures and to the multi-dimensional impacts of the energy transition strategies. Since 2012, he carried out teaching activity as collaborator in different BSc. and MSc. courses at Politecnico di Torino. He is qualified as reference lecturer for courses of the SSD ING/IND-19 (Nuclear Plants) and he has been co-supervisor of 20 MSc. Thesis.
	Lorenzo Bottaccioli	Lorenzo Bottaccioli class'86 received his M.Sc. in Energetic and Nuclear Engineer-ing with a thesis on energy communities in October 2014. In April 2018 he re-ceived his PhD Cum Laude in Computer Science at Politecnico di Torino. After,has been enrolled as Post doctoral Research Fellow in the EDA Group at Politecnico di Torino. Now is enrolled as Assistant Professor in the Energy Center Lab and at DAUIN department of Politecnico di Torino. He is involved in several European Funded Projects focused on Smart Cities. His main research interests concern the development of co-simulation platform and simulation tools for smart energy systems.
	Sonja Secchi	Sonja Sechi received her M.Sc. in Energy and Buclear Engineering at Politecnico di Torino in 2017 and the started a PhD in Energetics in the same institution. She has been involved in several capacity building programs including the Erasmus plus 2017 Enbrain Project related to the design and implementation of a Master in Renewable Energy in Libya and the Africa Innovation Leaders Program related to promoting education in the Next Production Revolution in Africa; this program was funded by the Italian Agency for Development Cooperation and took place in 2018. Currently she is doing research in energy sustainability for industry.
POLIMI	Andrea Sianesi	President of the board at Fondazione Politecnico di Milano and President of the Board at PoliHUB. Researcher and professor of Operations and Supply Chain Management, author of several books and scientific publications focused on these topics. As professor at the Politecnico di Milano is involved in teaching at the Management Engineering Course (bachelor and Msc). As professor of MIP, the business school of Politecnico di Milano, works to improve the success of any kind of MBA, Executive MBA, Master and Executive program of the school.
	Augusto De Castro	In IBM since 1983 from researcher to Vice President of Business Lines, he has worked on system integration and cloud outsourcing services in various industry sectors. In 2012 he has carried out a professional and entrepreneurial activity, creating a startup for IT services distributed throughout the country. In 2017 in the FNM Group, Lombardia region mobility holding, with responsibility for IT, HR, Purchasing. Since 2018 he has been Managing Director of E-Vai which deals with sustainable mobility in sharing. Since 2019 General Manager of MADE Competence Center, which supports companies in their digital transformation path towards Industry 4.0.
	Emanuela Colombo	Emanuela Colombo is Full Professor in Engineering for Cooperation and Development and Advanced Thermodynamics and Thermoeconomics at the Department of Energy of Politecnico di Milano, where since 2005 she has also been serving as the Rector's Delegate to the themes of Cooperation and Development. In 2012 she was named Chair holder of the UNESCO CHAIR in Energy for Sustainable Development and she is

Partner	Trainer Name	Summary of relevant skills and experience
		the current representative of the Italian academic system within the "National Council for Cooperation and Development", appointed by the Conference of Italian University Rectors (CRUI).
	Sergio Terzi	After a degree in Economics (from University Carlo Cattaneo in Castellanza), Sergio got his PhD in Management Engineering at Politecnico di Milano in 2005, discussing a thesis on Product Lifecycle Management, in co-tutorship with the French University of Lorraine (CRAN Laboratories, from Nancy). Since 2005 till 2014 he served as Researcher at the University of Bergamo, then he moved as Associate Professor in Politecnico in November 2014. Since 2016, at MIP Graduate School of Business he is the Director of the Management Academy, as well as the Director of the Executive Program in Industry 4.0. Within SoM, he is also co-director of the national Observatory Industria 4.0.
	Elisa Negri	Elisa Negri received her PhD in 2016, with a thesis about the role of ontologies for smart manufacturing. She now is Assistant Professor at the Department of Management, Economics and Industrial Engineering of the Politecnico di Milano in industrial, national and European projects on ontology-based engineering, industrial systems modeling, digital twin and Cyber-Physical Systems supporting advanced manufacturing solutions in the frame of Industry 4.0. During her studies and research work, she spent periods at prestigious international institutions, such as EPFL (Lausanne, Switzerland), FIR (Aachen, Germany), Tongji University (Shanghai, China) and Rutgers University (New Brunswick, USA).
POLIMI	Roberto Rocca	Roberto Rocca is Research Fellow in the Manufacturing Group at the Department of Management, Economics and Industrial Engineering of the Politecnico di Milano, where he has been collaborating since 2016. He gained a bachelor degree in Management Engineering, focused on Enterprise Environmental Management at Politecnico di Milano and he obtained a Master of Science in Management Engineering with specialization in Sustainability and Energy Management at Politecnico di Milano. His research interests are focused on sustainable manufacturing paradigm, sustainability assessment, Circular Economy and I4.0 supporting sustainable operations in manufacturing field. He will start his PhD in November 2020, focusing his research activities on sustainability metrics and methodologies enhanced by digital transformation.
	Simone Galparoli	Simone Galparoli is a research fellow at Industry 4.0 Lab at the Department of Management Economics, and Industrial Engineering of Politecnico di Milano. It has a MSc in Automation and Control Engineering at Politecnico di Milano and a background in industrial integration and industrial data acquisition. His research activities are focused on integration of industrial asset for advanced Maintenance and scheduling.
	Brendan Sullivan	Researcher at Politecnico di Milano, Department of Management, Economics and Industrial Engineering. He completed his PhD at Politecnico di Milano in 2020, having previously obtained master's degrees in Industrial Engineering and Political Science from New Mexico State University (USA). Brendan served as a visiting researcher at the University of Arizona in Department of Systems and Industrial Engineering, where he worked on cost modelling and the development of systems thinking skills and competencies for project management. His research includes work in changeable system architectures and the development of cross-disciplinary intelligent systems for control and decision support. He previously worked on the development of novel maritime vessels under the project LINCOLN, a European funded research project to increase the competitiveness of EU shipbuilding. He currently works on EU projects BRIEFING and NePRev contributing in the areas of digitalization through trainings and outreach.

Partner	Trainer Name	Summary of relevant skills and experience
OBREAL	Youhansen Eid	After receiving her B.Sc. in Architectural Engineering, from Ain Shams University (ASU), Dr. Youhansen Eid received her M. Arch. (1986), and her Ph.D. in Urban Planning from the University of Southern California (1992). Since then, she has worked at the Faculty of Engineering ASU, where she has taught several courses in planning theory and practice. She has also been appointed as a Visiting Professor at the American University in Cairo (AUC), the British University in Egypt (BUE) and Misr International University (MIU). In addition she has participated in curriculum development, quality assurance, and educational reform. In 2009 she became a trainer for strategic planning in higher educational institutes. She held the positions of head of the department of Urban Planning (2007-2009), Vice-Dean at the Faculty of Engineering (2009-2011) and head of the board of admission and examination for the joint M.Sc. program Integrated Urbanism and Sustainable Design (ASU and Stuttgart University). Currently she is the head of the National Authority for Quality Assurance and Accreditation of Education in Egypt. Her research interests include the impact of socio-political and technological changes on urban form, planning theory, strategic planning, sustainability and quality assurance in education.
	Francisco Sanz	Data Project Manager with more than 15 years in specific subject of Machine Learning and BI Projects (from a total of 19 years global IT experiences). Originally specialized in DWH and ETL tools, his focus of data expertise is in Data science projects and Machine Learning challenges while staying attentive of data cleaning, load data strategy, reusable components and performance optimizations. With a multicultural background and strong adaptation capabilities, he has worked in Insurance, Bank & Financial, Transport & Distribution, Textile and Telecommunication industries including functional domains such as Marketing, HR, Insurance, Banking account, Telecom Data Warehouses, Quality performance, Sales and Stocks management, Data Governance and e-business web portal.

5. Selection of Trainees

Originally, the training program was meant to have an audience of 20 trainees, 5 from each Tunisian Partner Institution (ENIGA, ENIT, FSJEGJ, ISGIS). The change in modality from presential to remote has allowed for the possibility of reaching a wider group of participants beyond the constraints imposed, albeit unintentionally, by a series of selection criteria. An initial survey (Annex 1) was shared with the key staff from each of the five Tunisian consortium partners involved in the project in order to gauge interest in the training program and individual proposed training modules. The recipients of the survey were asked to complete it and to share it among their professional colleagues who might be willing to benefit from the training program. The survey reached a total of 155 respondents who showed interest in the program. By having access to this variety of respondents, information about the training program reached not only a higher number of potential participants but also a diverse group beyond faculty and administrative staff, including professors and researchers across different academic ranks as well as students holding master, doctoral or post-doctoral academic degrees. The respondents expressing interest in participating in the training program were ultimately contacted and admitted as trainees.

6. Training Schedule

The schedule was based on the availability of trainers and considering the time zones of participants. The training program was scheduled to take place during 7 weeks from October 12th to November 25th. During this period a total of 24 training modules were delivered. In order to accommodate for both trainers and trainees' personal agendas, the training sessions were scheduled between Monday and Thursday avoiding Fridays and local holidays. The starting time for the training sessions was set at 5pm, Tunisian Time. In case the trainers were unable to deliver their respective sessions at this time the necessary arrangements were made and timely communicated to the trainees.

The individual training sessions were expected to have a minimum duration of one hour up to two hours depending on the trainer and the topic addressed as well as the trainees' participation during the session in the form of questions and comments.
As for the MOOCs, trainees were encouraged to enroll and follow the courses at their own pace by accessing the POLIMI Open Knowledge website. Each course has a different duration ranging from 4 to 7 weeks.

Table 1 summarizes the training modules scheduled during the 7 weeks from October 12th to November 25th.

7. Training Program Structure

Tables 2 and 3 provide a summary of the modules composing the training program and the MOOCs made available to trainees. Table 2 contains details about the training modules including their typology, contents, expected duration, appointed trainer, and additional remarks. Table 3 and Table 4 contain details about the MOOCs including their contents, estimated duration, and the link trainees can follow to enroll. Additionally, Table 3 also highlights the rationale behind the addition of these open courses as a complement to the training program, namely, the connection established between every open course, the ENIT new Master Program Structure included in the deliverable D 3.2, and the individual courses to be activated by ENIGA, ISGIS, FSJEGJ.

Table 1. Training modules as scheduled during the period October-November 2020.

OCTOBER			
MONDAY	TUESDAY	WEDNESDAY	THURSDAY
12	13	14	15
Opening Remarks **Elisa N. & Pierluigi L.** Simulation **Elisa Negri** 5pm	Energy systems optimization **Andrea Lanzini** 5pm		Euro-Mediterraen infrastructure application **Marco Cavana** 5pm
19	20	21	22
Simulation & Optimization of advanced manuf. sys. **Elisa Negri** 5pm	Corporate Relations **Pierluigi Leone** 5pm	Circular Economy **Roberto Rocca** 5pm	
26	27	28	29
Research trends in energy in the Euro-Mediterranean Area **Daniele Grosso** 5pm	MADE Competence Center presentation **Augusto De Castro** 6pm	Digital tech. in energy / Demand side mgmt. **Lorenzo Bottaccioli** 5pm	Design Thinking **Brendan Sullivan** 5pm
NOVEMBER			
MONDAY	TUESDAY	WEDNESDAY	THURSDAY
2	3	4	5
	Master Program in Industry 4.0 at POLITO **Eleonora Atzeni** 10am	PoliMI and African partnerships **Emanuela Colombo** 5pm	POLIHUB, the PoliMI Incubator **Andrea Sianesi** 5pm
9	10	11	12
Energy Center at PoliTO **Romano Borchiellini** 5pm	IAM@POLITO Center for Integrated Additive Manuf. **Eleonora Atzeni** 10am	Research trends in additive manufacturing **Alessandro Salmi** 5pm	Business Intelligence **Francisco Sanz** 5pm
16	17	18	19
Industry 4.0 Lab at POLIMI **Elisa Negri** 5pm	Inspiring innovation for professionals **Sergio Terzi** 5pm	Industry 4.0 Technologies **Simone Galparoli** 5pm	Data Science **Francisco Sanz** 5pm
23	24	25	26
Quality Assurance in Higher Education **Youhansen Eid** 5pm		Lean 6 Sigma and Industry 4.0 **Brendan Sullivan** 5pm	Closing Remarks **Elisa N. & Pierluigi L.** Energy Efficiency & Renewable Energy **Sonja Sechi** 5pm

Table 2. Training modules included in the Training Program.

No.	Type of module	Title of Module	Contents	Duration (h)	Trainer	Additional Resources
1	Curriculum Development	Simulation	Definitions, Applications, Techniques, main references, Course examples	1.5	Elisa Negri	
2	Curriculum Development	Energy systems optimization	Modelling, analysis and optimization of numerous types of energy systems in various applications	1.5	Andrea Lanzini	
3	Curriculum Development	Euro-Mediterranean infrastructure application	Methods, tools, applications	1.5	Marco Cavana	
4	Curriculum Development	Simulation & Optimization of advanced manufacturing systems	Definitions, Applications, Techniques, main references, Course examples	1.5	Elisa Negri	
5	Ecosystem Building	Corporate Relations	Experiences with internships and relations with corporate partners in the energy sector	1	Pierluigi Leone	
6	Curriculum Development	Circular Economy	Definitions, Applications, Techniques, main references, Course examples	1.5	Roberto Rocca	
7	Curriculum Development	Research trends in energy in the Euro-Mediterranean Area	Trends in energy in Euro-Mediterranean area	1.5	Daniele Grosso	
8	Ecosystem Building	MADE Competence Center presentation	Presentation of the competence center and its activities in the innovation ecosystem	1.5	Augusto De Castro	https://www.made-cc.eu/

Table 2. Training modules included in the Training Program.

No.	Type of module	Title of Module	Contents	Duration (h)	Trainer	Additional Resources
9	Curriculum Development	Digital technologies in energy & Demand side management	Methods to modify consumer demand behavior	1.5	Lorenzo Bottaccioli	
10	Curriculum Development	Design Thinking	Introduction of design thinking, steps, tools, and use cases	2	Brendan Sullivan	
11	General Contents	Master Program in Industry 4.0 at POLITO	Presentation of the program: study plan, courses description	1	Eleonora Atzeni	https://didattica.polito.it/master/manufacturing_4_0/2018/at_a_glance
12	Ecosystem Building	Politecnico di Milano and African partnerships	Projects and initiatives of Politecnico di Milano and African partners	1	Emanuela Colombo	
13	Ecosystem Building	POLIHUB – the incubator of the Politecnico di Milano	Experiences from the excellence incubator	1	Andrea Sianesi	https://www.polihub.it/en/
14	Ecosystem Building	Energy Center at POLITO	Organizational model, activities, experimental equipment, corporate partnerships	1.5	Romano Borchiellini	http://www.energycenter.polito.it/
15	Ecosystem Building	IAM@POLITO: Center for Integrated Additive Manuf.	Experimental equipment, relations with corporate partners from sectors interested in additive manufacturing	1.5	Eleonora Atzeni	http://iam.polito.it/
16	Curriculum Development	Research trends in additive manufacturing	Trends in additive manufacturing including application areas for Tunisia	1.5	Alessandro Salmi	

17

Table 2. Training modules included in the Training Program.

No.	Type of module	Title of Module	Contents	Duration (h)	Trainer	Additional Resources
17	Curriculum Development	Business Intelligence	Introduction of the business intelligence process, steps, tools, techniques, and more.	1.5	Francisco Sanz	
18	General Contents	Industry 4.0 Lab at POLIMI	Organizational model, activities, experimental equipment, ongoing projects, corporate partnerships	1.5	Elisa Negri	https://www.industry40lab.org/
19	Ecosystem Building	Inspiring innovation for professionals	The experience of the MIP Business School of the PoliMI about the Industry 4.0 training for professionals, students and industrial practitioners (at national and international level)	1.5	Sergio Terzi	https://www.som.polimi.it/en/the-school/about-us/mip/
20	Curriculum Development	Industry 4.0 Technologies	Automation in production systems using industry 4.0 technologies	1.5	Simone Galparoli	
21	Curriculum Development	Data Science	Introduction of data science, applications, techniques, main references, and more.	1.5	Francisco Sanz	
22	General Contents	Quality Assurance in Higher Education	TBA	1.5	Youhansen Eid	
23	Curriculum Development	Energy Efficiency/Renewable Energy	Decarbonization of industrial production	1.5	Sonja Sechi	
24	Curriculum Development	Lean 6 Sigma and Industry 4.0	Introduction of lean six sigma and Industry 4.0, steps, tools, use cases	2	Brendan Sullivan	

Table 3. Curriculum Development MOOCs complementary to the Training Program

No.	Title of Module	Contents	Duration (weeks)	Connection to Master Program at ENIT	Connection to single courses	Link
1	New Business Models and Creative Entrepreneurship in the digital era	Analysis of the main evolutions experienced by different players in the fashion industry due to a series of key technologies as well as strategies and best practices to adapt to this new context.	5	E-business	Entrepreneurship (FSJEGJ)	https://www.pok.polimi.it/courses/course-v1:Polimi+DIGIM01+2020_M3/about
2	Fundamentals of Operations	Key theories, concepts, models, and approaches related to Production and Logistics Systems	5	Operations Management	-	https://www.pok.polimi.it/courses/course-v1:Polimi+OPE101+2020_M5/about
3	Digital Supply Chain Ecosystems for Creative Industries	Most important concepts related to Supply Chain in the fashion industry and illustrate strategies and techniques for effective Supply Chain Management.	4	Supply Chain 4.0	Integrated Logistics & Supply Chain Mgmt. (ISGIS)	https://www.pok.polimi.it/courses/course-v1:Polimi+DIGIM02+2020_M3/about
4	Business for WISEs	Key theories of innovation, models and approaches related to continuous competitive advantage through products, processes, utilizing technologies and through market practices.	3	Digital Marketing	Digital Marketing (FSJEGJ)	https://www.pok.polimi.it/courses/course-v1:Polimi+B4W101+2020_M4/about
5	Data science, visualization and interactive narratives for CCIs	Contents: Cultural and Creative Industries. Data driven methods for informed decision-making, exploiting big data, data science, and machine learning.	4	Data Mining, Machine Learning Seminar II Seminar III	Data Analytics (FSJEGJ) Data Clustering (ENIGA)	https://www.pok.polimi.it/courses/course-v1:Polimi+DIGIM06+2020_M3/about
6	Enabling Infrastructure in Africa for the Next Production Revolution	Smart and integrated infrastructures (concepts and taxonomy), digitalization (Big Data, IoT, machine learning), decarbonization and green infrastructures, smart mobility	2	AI & Machine Learning in Industry, IoT Seminar II Seminar III	AI & Machine Learning (FSJEGJ) AI (ENIGA)	https://www.pok.polimi.it/courses/course-v1:Polimi+NPR103+2019_M9/about
7	Technology clusters for the Next Production Revolution in Africa	Additive manufacturing: key features, technologies, and applications. Agricultural production: smart agriculture, remote sensing, data analysis	4	Seminar II Seminar III	Advanced Manufacturing Technologies (ENIGA)	https://www.pok.polimi.it/courses/course-v1:Polimi+NPR102+2019_M9/about

Table 4. Higher Education Pedagogy Innovation MOOCs complementary to the Training Program

No.	Title of Module	Contents	Duration (weeks)	Link
1	Engaging Students in Active Learning	Addressed to teachers who want to improve their effective support to students and to enhance even further the results of this collaboration.	4	https://www.pok.polimi.it/courses/course-v1:Polimi+AL101+2020_M4/about
2	D-TRANSFORM: University Strategies in the Digital Age	Raising awareness of digital resources, especially OER and MOOCs, as a strategic factor for university transformation, with a special focus on teaching and learning processes.	7	https://www.pok.polimi.it/courses/course-v1:Polimi+DTransform101+2020_M4/about
3	Using Open Educational Resources in Teaching	The basics about Open Educational Resources, different perspectives about key issues, tips to integrate OERs in your course, tools and useful resources shared by other institutions and OERs workforce.	4	https://www.pok.polimi.it/courses/course-v1:Polimi+OER101+2020_M4/about
4	New Assessment Strategies - The magic of feedback	The course explains how to accompany students during their learning path with assessment activities. The aim of these activities is to give frequent feedback, so that it can be easier for students to keep on track and arrive at the final assessment properly prepared.	5	https://www.pok.polimi.it/courses/course-v1:Polimi+ASS101+2020_M4/about
5	Designing Learning Innovation	The course aims to put the designing culture at the service of learning innovation, supporting those who do not have a specific pedagogical background and those who wish to learn the basic tools of a good teaching design then to continue exploring the frontiers of innovation.	6	https://www.pok.polimi.it/courses/course-v1:Polimi+PIDENG101+2020_M9/about
6	To Flip Or Not To Flip - Discover the flipped classroom methodology	The basics about flipped classroom; explore some shared experiences and identify key issues; start thinking about how to try it out in your course, and tools and other useful resources.	4	https://www.pok.polimi.it/courses/course-v1:Polimi+FC101+2020_M4/about

8. Conclusion

The D 5.1 deals with the planning of the training program for teachers and staff with the purpose of supporting the design of teaching materials and activities in line with the Master Degree at ENIT and of the single courses at ISGIS, FSJEGJ and ENIGA that will be activated thanks to the project and that are dedicated to the Next Production Revolution.

Despite the challenges posed by the onset of the COVID-19 emergency, the European partners managed to develop a training program that is able to directly target the needs expressed by the Tunisian partners as addressed by the NePRev project. The organization of the training program is structured so as to ensure that trainers and, especially, trainees are left satisfied with the experience while minimizing any possible disadvantage brought forward by the change of delivery format. The training modules were conceptualized considering not only the contents relevant for the development of academic curricula, but also the experiences that the European partners can share in terms of partnerships and innovation ecosystems. As for the trainers, the European partners established the appropriate criteria in order to ensure that the training program is carried by professionals with experience and expertise on their fields. Additionally, the development of the training materials followed a series of exchanges with the trainers during which the objectives of the project as well as the training program were communicated. Finally, the flexibility unlocked by the choice of an online format allowed the training program to reach a wider audience than originally intended that could benefit from all the knowledge and materials shared.

Annex 1

NePRev Project - Training Modules Survey

This survey has been created to gauge interest on the training modules that will be carried out as part of the NePRev project. Please fill in your personal information and let us know about the training modules in which you would like to participate.

* Required

1. First name *

Your answer

2. Last name *

Your answer

3. Email address *

Your answer

4. Affiliated Institution *

◯ ENIT

◯ ISGIS

◯ FSJEGJ

◯ ENIGA

◯ Other: _____

5. Title *

◯ Professor

◯ Researcher

◯ Other: _____

6. Please indicate your teaching subject

Your answer

7. Please indicate your research area

Your answer

8. Do you agree with using Microsoft Teams as the chosen platform to deliver the training modules? If not, please tell us why and write down your preferred platform(s) *

◯ Yes

◯ Other: _____

9. The training modules will be delivered in one of the three formats below. Please let us know the modules in which you're interested by filling the remaining sections.

Format of Module	Contents
General Contents	Fundamental and basic content including detailed descriptions of laboratories, master programs, etc.
Ecosystem building	Experiences from the initiatives of European Partners to build innovation ecosystem including partnerships, alliances, and more.
Curriculum Development	Support the creation of learning materials with basic definitions and approaches, examples of modules, reference materials and where to find them.

9.1. "GENERAL CONTENTS" modules. Please check all that apply *

	I'm interested in the module	I'm not interested in the module	The format is appropriate for this topic	The format should be a different one
Master Program in Energy Efficiency and Sustainability in the Industry at POLITO. Presentation of the program: study plan, courses description.	☐	☐	☐	☐
Master Program in Industry 4.0 at POLITO. Presentation of the program: study plan, courses description.	☐	☐	☐	☐
Industry 4.0 Lab at POLIMI. Organizational model, activities, experimental equipment, ongoing projects, corporate partnerships	☐	☐	☐	☐
Quality Assurance in Higher Education	☐	☐	☐	☐

9.2. "ECOSYSTEM BUILDING" modules. Please check all that apply *

	I'm interested in the module	I'm not interested in the module	The format is appropriate for this topic	The format should be a different one
Energy Center at POLITO. Organizational model, activities, experimental equipment, corporate partnerships	☐	☐	☐	☐
IAM@POLITO: Center for Integrated Additive Manufacturing. Experimental equipment, relations with corporate partners from sectors interested in additive manufacturing	☐	☐	☐	☐
Corporate Relations. Experiences with internships and relations with corporate partners in the energy sector	☐	☐	☐	☐
MADE Competence Center presentation. Presentation of the competence center and its activities in the innovation ecosystem	☐	☐	☐	☐
Inspiring innovation for professionals. The experience of the MIP Business School about the Industry 4.0 training for professionals, students and industrial practitioners (at national and international level)	☐	☐	☐	☐
POLIHUB – the incubator of the Politecnico di Milano. Experiences from the excellence	☐	☐	☐	☐

incubator

Politecnico di
Milano and
African
partnerships.
Projects and
initiatives of
Politecnico di
Milano and
African partners

☐ ☐ ☑ ☐

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D 5.1
Organization of a program of
training for teachers and staff

NePRev
TOWARDS THE NEXT PRODUCTION REVOLUTION

9.3. "CURRICULUM DEVELOPMENT" modules. Please check all that apply *

	I'm interested in the module	I'm not interested in the module	The format is appropriate for this topic	The format should be a different one
Research trends in additive manufacturing. Trends in additive manufacturing including application areas for Tunisia	☐	☐	☐	☐
Energy Efficiency/Renewable Energy	☐	☐	☐	☐
Research trends in energy in the Euro-Mediterranean Area. Trends in energy in Euro-Mediterranean area	☐	☐	☐	☐
Demand side management. Methods to modify consumer demand behavior	☐	☐	☐	☐
Energy systems optimization. Modelling, analysis and optimization of numerous types of energy systems in various applications	☐	☐	☐	☐
Design Thinking. Introduction of design thinking, steps, tools, and use cases	☐	☐	☐	☐
Simulation. Definitions, Applications, Techniques, main references, Course examples	☐	☐	☐	☐
Simulation & Optimization of advanced manufacturing systems. Definitions, Applications, Techniques, main references, Course examples	☐	☐	☐	☐
Circular Economy. Definitions, Applications, Techniques, main references, Course examples	☐	☐	☐	☐
Industry 4.0 Technologies. Automation in	☐	☐	☐	☐

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of the European Union

D 5.1
Organization of a program of
training for teachers and staff

NePRev
TOWARDS THE NEXT PRODUCTION REVOLUTION

production systems
using industry 4.0
technologies

Radical Design /
Strategic Innovation.
Radical Innovation
Design methodology
based on proofs of
value, innovation, and
concept

☐ ☐ ☐ ☐

Lean 6 Sigma and
Industry 4.0.
Introduction of lean
six sigma and
Industry 4.0, steps,
tools, use cases

☐ ☐ ☐ ☐

Business Intelligence ☐ ☐ ☐ ☐

Data Science ☐ ☐ ☐ ☐

9.4. Please let us know why you're interested (or not) in the modules you checked
above

Your answer

9.5. Please let us know if you would prefer a different format for a particular
module

Your answer

9.6. Do you think other modules are needed? If yes, please indicate the topic and
the format (general contents, ecosystem building, curriculum development).

Your answer

10. Please write down any additional comment or suggestion

Your answer

Submit