SEnDIng

Co-funded by the Erasmus+ Programme of the European Union

The SEnDIng project

Data Science and Internet of Things professionals' training

[EVENT: SEnDIng FINAL CONFERENCE, 21/11/2020, online]

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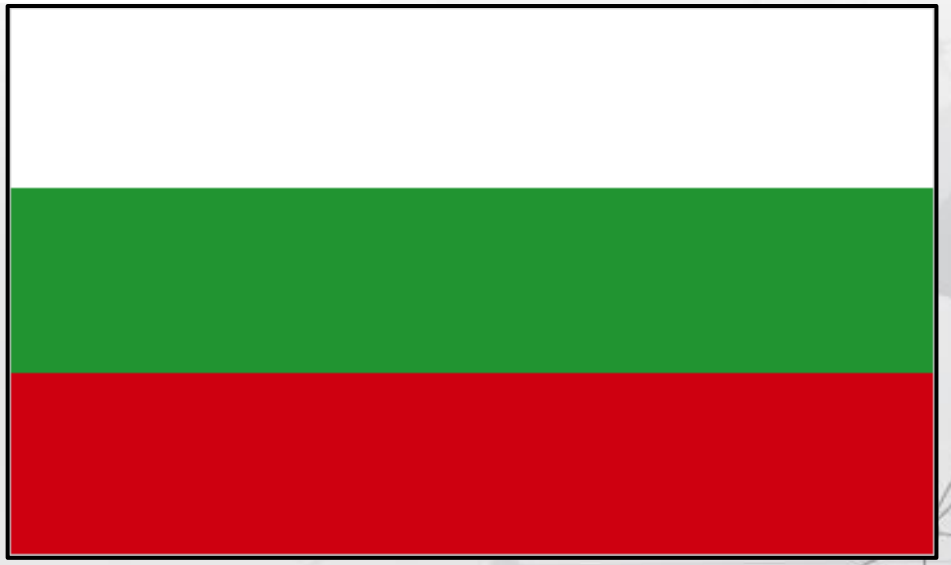
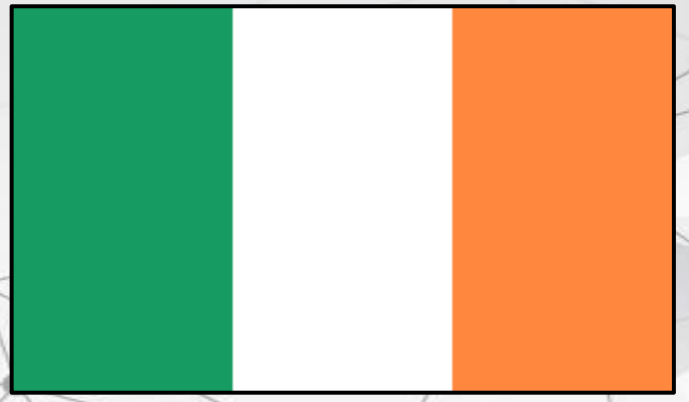
Project overview

- **Program**: Erasmus+ KA2: Cooperation for innovation and the exchange of good practices - Sector Skills Alliances
- **Call ID**: EACEA-04-2017
- **Lot**: Lot 2, SSA for Design and Delivery of VET
- **Project Number**: 591848-EPP-1-2017-1-EL-EPPKA2-SSA
- **Grant Agreement Number**: 2017-3184/001-001
- **Project Coordinator**: University of Patras
- **Duration**: 36 months
- **Number of Partners**: 12
- **EU grant**: 982.537 €
- **Start Date**: 1st December 2017
- **End Date**: 30th November 2020 – *(just received a 2 months extension)* *31/1/2021*





DS and IoT scenery

- Rapid and continuous evolution of DS and IoT technologies and their application in many industries (ICT, banking, energy, marketing, etc.)
- Their value for the EU economy is huge;
  - it was projected that the value of the EU Data Economy will reach 739 billion by 2020
  - the total installed base of IoT devices projected to amount to 75.44 billion worldwide by 2025
  - expansion and impact of the IoT will increase, especially when IoT is used in combination with other technologies like AI, machine learning and Big Data, domains closely related to Data Science
- SKILLS GAP
  - the demand for Data Scientists increased by 28% in 2020, with the unfilled DS positions at the same time are estimated at 485,000
  - the need for IoT skills is huge, as 68% of businesses struggle to hire IoT experts

SEnDIng objectives

- Address the **skills' gap** of ICT professionals in the domains of Data Science (DS) and Internet of Things (IoT)
- Contribute to the **increased demand** for highly-qualified DS and IoT professionals coming from industry sectors other than ICT (e.g. banking, energy, logistics)
- Provide the DS and IoT professionals with skills and competences, that are **transferable** and **recognized** among European countries
- Make the vocational trainings more relevant to the actual **needs of the labor market**

Target Groups

- ICT professionals and associations
- VET providers
- Companies & SMEs
- Certification bodies
- Higher Education Institutes
- Policy-makers


Project Management
WP2
WP3
WP4
WP5
Learning outcomes identification and design of Vocational Curricula/educational modules and training/assessment methodology
Implementation of training material
Implementation of Skills Certification mechanism
Design of e-learning platform and delivery of vocational trainings
Quality Assurance
Dissemination and Exploitation

Main results (1)

- **Learning outcomes** of Data Science and IoT VET programs
- A **reference scheme** of knowledge, skills and competences for Data Scientists and IoT professionals.
- Two modular learning outcomes-oriented **vocational curricula**
  - *Modularity*: each curriculum is divided into educational modules and each module into training units at three levels of proficiency (introduction, core, advanced)
  - *Personalized learning*: a different learning path for each learner according to the occupational profile
- Each VET program is delivered in three phases
  - e-learning (100 hours),
  - face-to-face (20 hours) and
  - work based learning (4 months)
  - *train at least 75 IT professionals on DS and 75 on IoT*

Main results (2)

- A **MOOC** supporting the online training phase of the 2 VET programs
- **Open Educational Resources**
- A **training methodology** incorporating online training, face-to-face training and work-based learning
- A methodological framework for the **certification**
- A **survey** for the validation, certification & accreditation of provided VET programs and their alignment with NQFs, EQF and ECVET
- A set of **exploitation toolkits** for IT Professionals, VET providers and Companies
- **3 Workshops** (Greece, Cyprus and Bulgaria) and a **Final Conference** organized in Greece

Curricula design

- Learning outcomes in terms of Knowledge, Skills and Competences
  - **Desktop research** on existing Data Science and Internet of Things curricula and courses -> definitions of skills and knowledge
  - The draft version of the DS and IoT Learning outcomes was discussed among partners and **key experts** in the respective fields
  - Design and distribution of an **online survey** among CIOs of IT companies to explore on their plans and needs (skills and knowledge) in the IoT and the Data Science domains (more than 140 companies and organizations).

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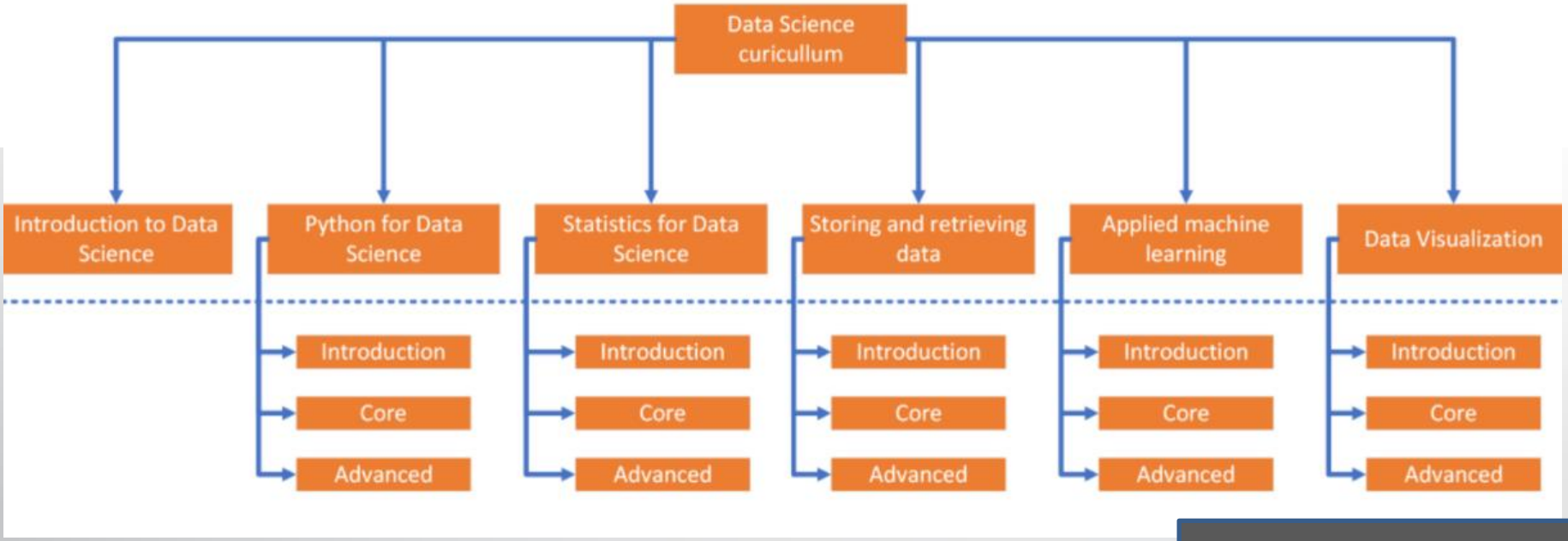

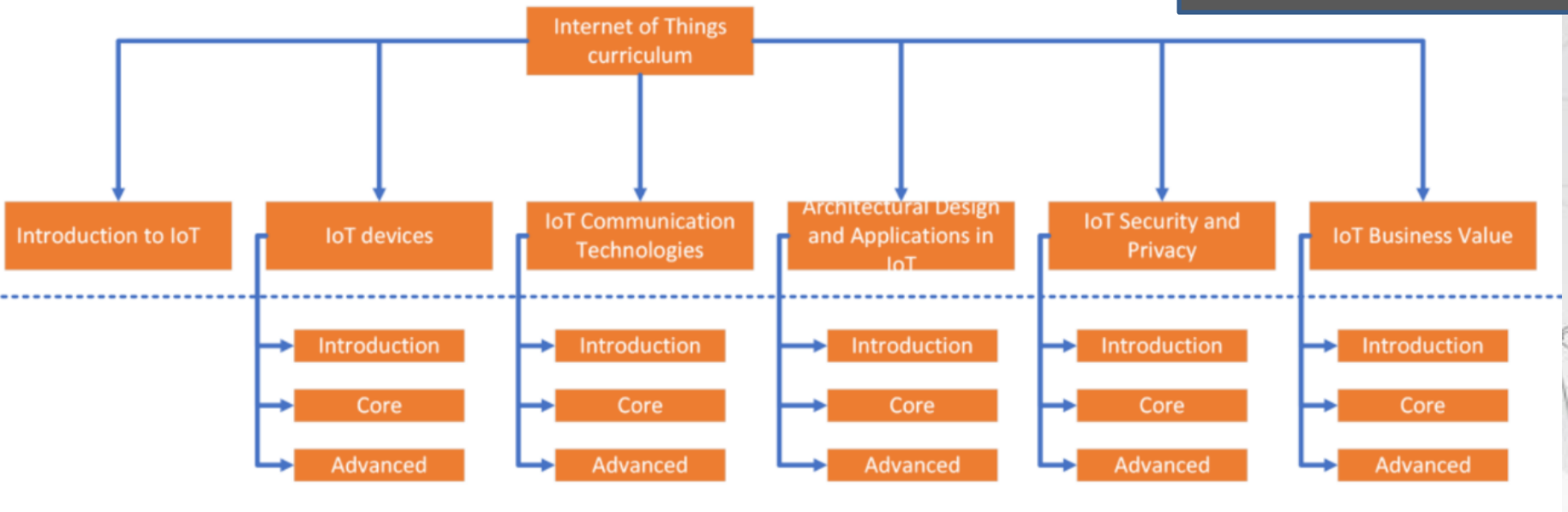

Soft Skills

- Communication skills
- Change management
- Team working
- Goal setting
- Creative thinking

Data scientist roles

[adapted from the proposal done by the EDISON project for ESCO classification]

1. **Data Analyst**. Analyses large variety of data to extract information about system, service or organization performance and present them in usable/actionable form.
2. **Data Architect.** Designs and maintains the architecture of Data Science applications and facilities. Creates relevant data models and processes workflows.
3. **Database Administrator.** Designs and implements or monitors and maintains large scale cloud databases.
4. **Machine Learning Engineer.** Designs and applies machine learning algorithms.
5. **Data Scientist.** Gathers and interprets rich data sources, manages large amounts of data, merges data sources, ensures consistency of data-sets, and creates visualizations to aid in understanding data. Builds mathematical models, presents and communicates data insights and findings.

Mapping of DS training units to professional roles

I: Introductory **C:** Core **A:** Advanced	Data Analyst	Data Architect	Database Administrator	Machine Learning Engineer	Data Scientist
Introduction to Data Science	I	I	I	I	A
Python for Data Science	A	C	I	A	A
Statistics for Data Science	C	C	I	A	A
Storing and retrieving data	C	A	A	C	A
Applied machine learning	I	I	I	A	A
Data Visualization	A	I	I	C	A

IoT Engineer roles

1. **IoT Product Manager**. Supervises the execution part of the project. Collaborates with the development teams to take care of business requirements and implementations.
2. **IoT Architect**. Manages the functional requirements gathering, technology selection (hardware, software, protocols) and solution architectural design for IoT systems and applications.
3. **IoT Software Developer.** Implements IoT systems and applications according to approved designs and conducts rigorous testing of the applications. Deploys the systems and applications to the cloud as well as app stores.
4. **Data Scientist.** Finds and interprets rich data sources, manages large amounts of structured and unstructured data, merges data sources, ensures consistency of data-sets, and creates visualizations.
5. **IoT Cloud Engineer**. Deploys the IoT system infrastructure on the cloud, from middleware to data storage (e.g. databases) for collecting, storing and processing data from the IoT devices in the network
6. **IoT Industrial Engineer**. Looks into the hardware components involved in IoT systems and applications, programs robots and smart embedded devices.

Mapping of IoT training units to professional roles

I: Introductory
C: Core
A: Advanced

	IoT Product Manager	IoT Architect	IoT Software Developer	Data Scientist	IoT Cloud Engineer	IoT Industrial Engineer
Introduction to IoT	I	I	I	I	I	I
IoT Devices	C	C	I	C	C	A
IoT Communication Technologies	C	C	C	C	A	C
Architectural Design and Applications in IoT	C	A	A	C	A	C
IoT Security and Privacy	I	C	C	I	A	C
IoT Business Value	A	I	I	I	I	C

SEnDIng in numbers

250	320	100	25
trainess on MOOC	hours work based learning	trainees on work based learning	enterprises on work based learning
6	6	20	20
online courses on IoT	online courses on Data Science	hours training on transversal skills	hands-on projects

Current status and future plans

- 2 months to the finish line
- Finishing up the work-based learning (by the end of December)
- Upcoming task:
  - Certification of participants (3 rounds starting in mid Dec until the mid of Jan)
  - Work on a sustainability plan

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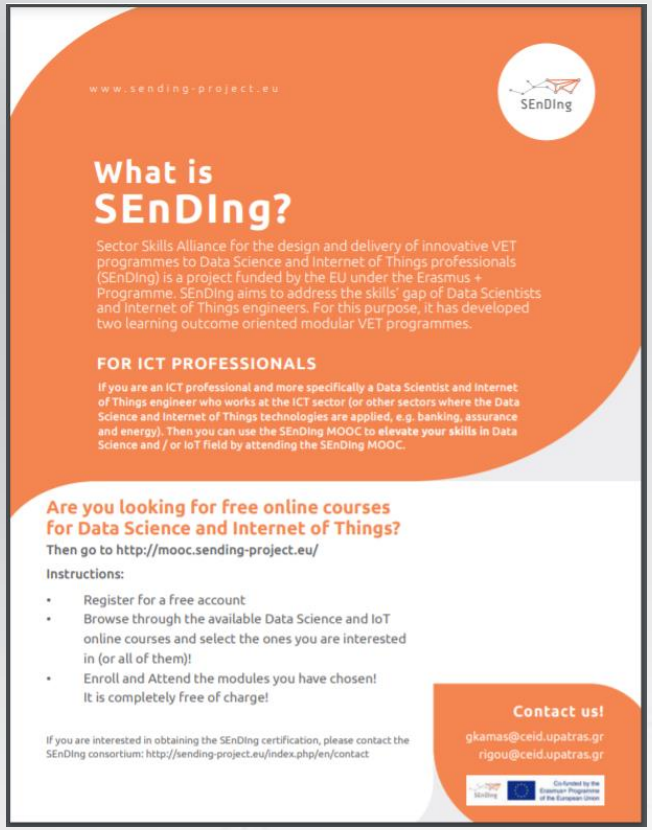
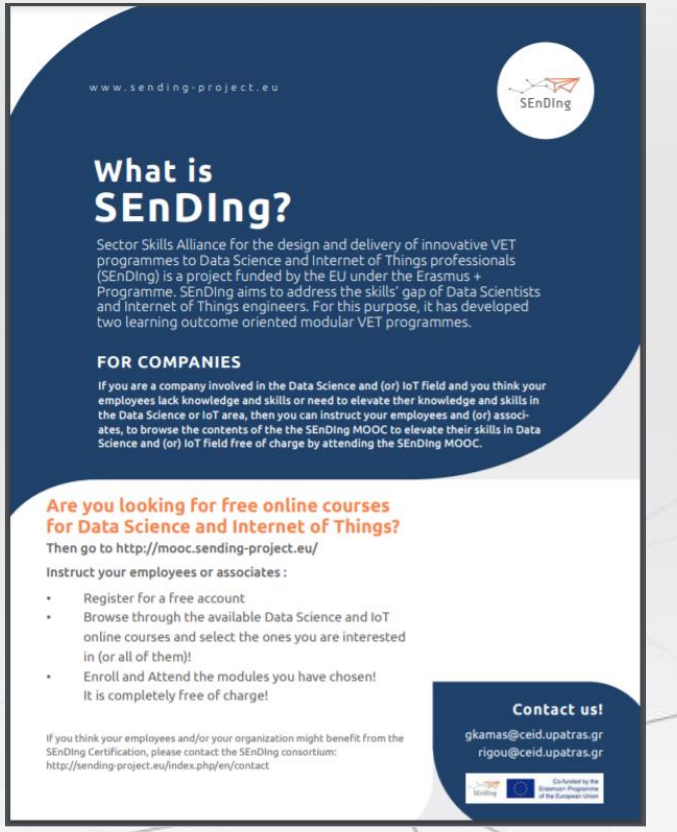
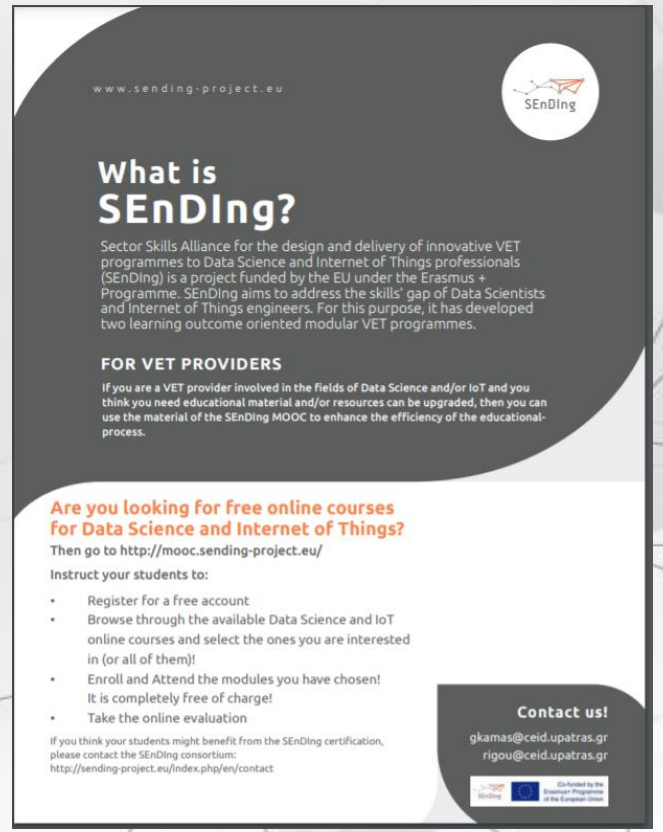
- (In the long-run) support the online training component and potentially the certification scheme developed after the end of the project
- Foster the **sustainability** of the MOOC ideally by establishing an update mechanism
  - Open access to the MOOC and certification of attendance
  - offering flexibility through adequately tailored learning paths (according to professional roles in both DS and IoT)

Toolkits and teaser







Thank you!

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or visit

The SEnDIng Project website at: http://sending-project.eu

The MOOC at: http://mooc.sending-project.eu/