

# Upskilling IT Professionals: A MOOC for the Data Science and IoT domains

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SEnDIng online conference  
PCI 2020 Special Session “Education and training on Data Science and IoT”  
21 November 2020

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# Introduction

- We present a MOOC for Data Science and IoT developed by the Erasmus+ project [SEnDIng](#).
- The MOOC is based on interdisciplinary curricula combining technical knowledge and skills with transversal skills and competences.
- The SEnDIng project aims to address the Data Science and IoT skills gap of IT professionals, by providing them with knowledge, skills and competences that meet the needs of Data Science and IoT industries, are transferable and recognized among EU countries.

# Pedagogical principles for MOOC design (1/2)

- **Match to the curriculum:** there must be clear objectives, relevance to the content covered, appropriateness of students' activities.
- **Inclusion:** inclusive practices should be seen in terms of different range of achievement, physical disabilities, different social and ethnic groups and gender.
- **Learner engagement:** learners should be engaged and motivated, activities should have a worthwhile educational aim, not just to occupy the learners, be enjoyable and improving the learning atmosphere.

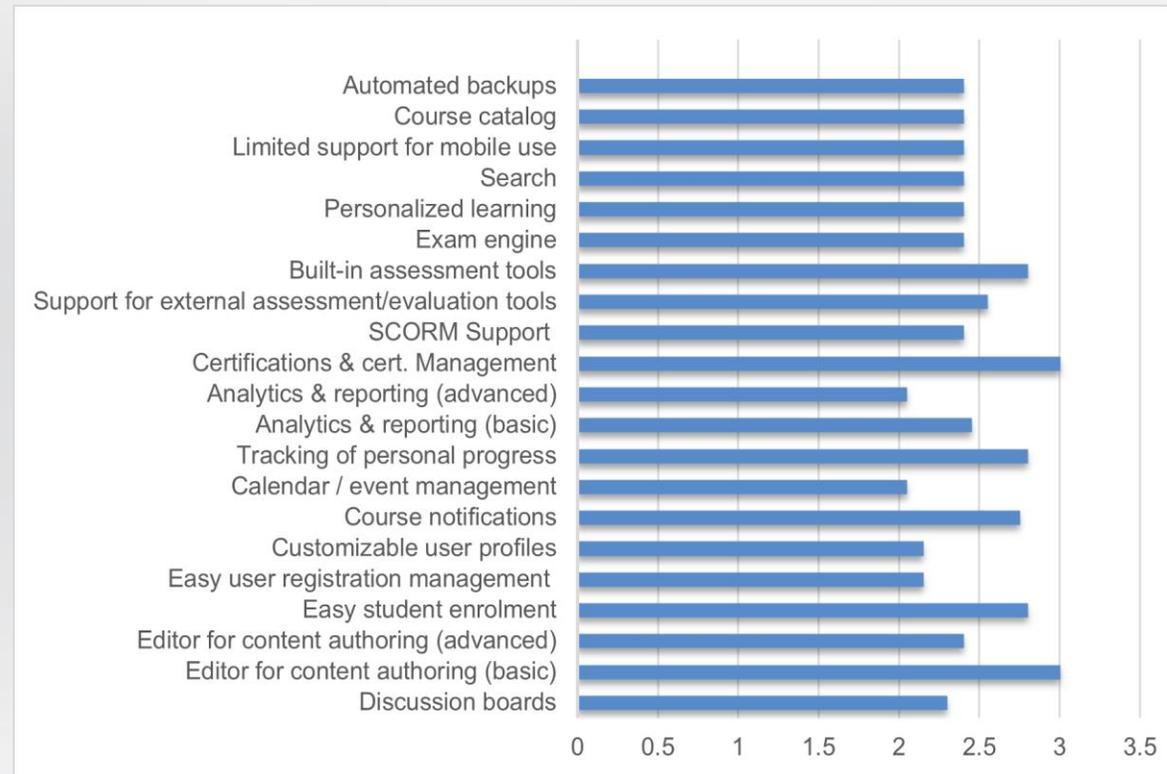
# Pedagogical principles for MOOC design (2/2)

- **Effective learning:** promoting personalized learning, learners' autonomy, encouraging metacognitive thinking and collaboration.
- **Provision of formative and summative assessment:** This is essential for the purposes of improving and grading learners.
- **Consistency and transparency:** objectives, content, activities and assessment should match to each other.
- **Ease of use:** being open and accessible and not requiring special guidance on use.

# MOOC features (1/2)

- We conducted a survey among SEnDIng project's partners to define the features of the MOOC.
- The weight of each feature takes 4 values: 0 (useless), 1 (nice to have), 2 (useful) and 3 (must have).
- The features were categorized into 4 categories based on the average score they got at the survey
  - Low importance: average score 0.00 – 0.99
  - Medium importance: average score 1.00 – 1.49
  - High importance: average score 1.50 – 1.99
  - Very high importance: average score: 2.00 – 3.00

# MOOC specifications (2/2)



Features defined as having very high importance

# Survey of MOOC solutions

- **Moodle.** It is the most popular and widely spread open source learning management system, which in principle, has all the required features, at least through extensive customization. It is a stable platform, but some users find the functions a bit unnatural. It is primarily used as an LMS.
- **Open edX.** It has better usability features and exploits APIs which foster easier use. Open edX covers most of the required features, at least through add-ons and plugins. Open edX is more oriented as a MOOC environment, compared to Moodle which is more oriented as an LMS environment.
- **Sakai LMS.** It has limited functionalities compared to Open edX and Moodle and a rather limited community in Europe.
- **Cypher Learning NEO LMS.** Commercial LMS with strong features, visuality and clarity.

Open edX has been chosen as the platform for MOOC design

# SEnDIng MOOC (1/2)

- Available at <http://mooc.sending-project.eu/>
- It aims to provide ICT professionals with knowledge and skills at the Data Science and Internet of Things domains + transversal skills.
- It contains
  - 6 Data Science courses
  - 6 Internet of Things courses.
  - 1 Transversal Skills course
- Currently +250 registered users at MOOC

# SEnDIng MOOC (2/2)

- Each course, except the introductory courses at Data Science and IoT is divided at 3 learning units:
  - **Introduction:** Covers the most important aspects of the course
  - **Core:** Principles of the course are covered in adequate depth, so that the learner can discuss matters with other stakeholders and acquire additional knowledge when necessary
  - **Advanced:** Advanced aspects of the course are covered in sufficient detail so that the learner can apply the knowledge and skills on the job
- The training material is delivered in the form of text, figures and short videos embedded at each course
- Self-assessment quizzes are provided at the end of each learning unit
- Hands-on projects are provided at the end of each course
- The training material is also provided as OERs for downloading at the end of each course

# Data Science online courses

## Introduction to Data Science (DS-EM1)



## Applied Machine Learning (DS-EM2)



## Python for Data Science (DS-EM3)



## Storing and Retrieving data (DS-EM4)



## Statistics for Data Science (DS-EM5)

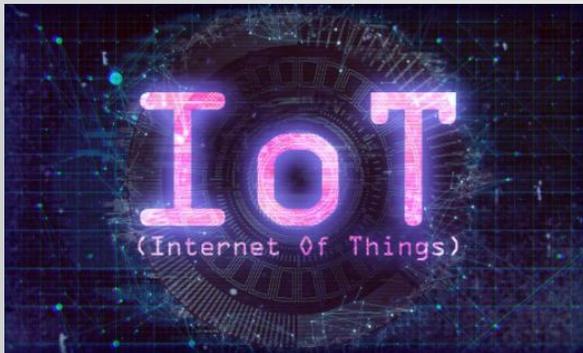


## Data Visualization (DS-EM6)



# IoT online courses

## Introduction to IoT (IoT-EM1)



## IoT Security and Privacy (IoT-EM4)



## Architectural Design and Applications in IoT (IoT-EM2)



## IoT Devices (IoT-EM5)



## IoT Communication Technologies (IoT-EM3)



## IoT Business Value (IoT-EM6)



# Transversal Skills online course

## Effective communication and presentation (TS-EM1)



## Change management (TS-EM2)



## Team working (TS-EM3)



## Goal setting (TS-EM4)



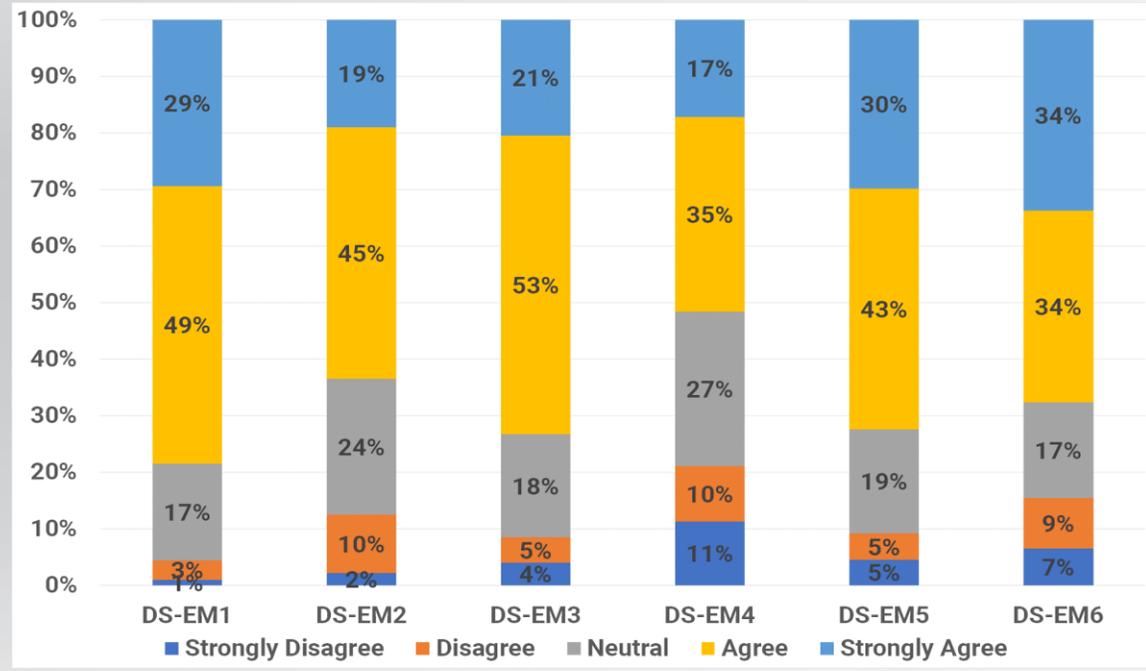
## Creative thinking (TS-EM5)



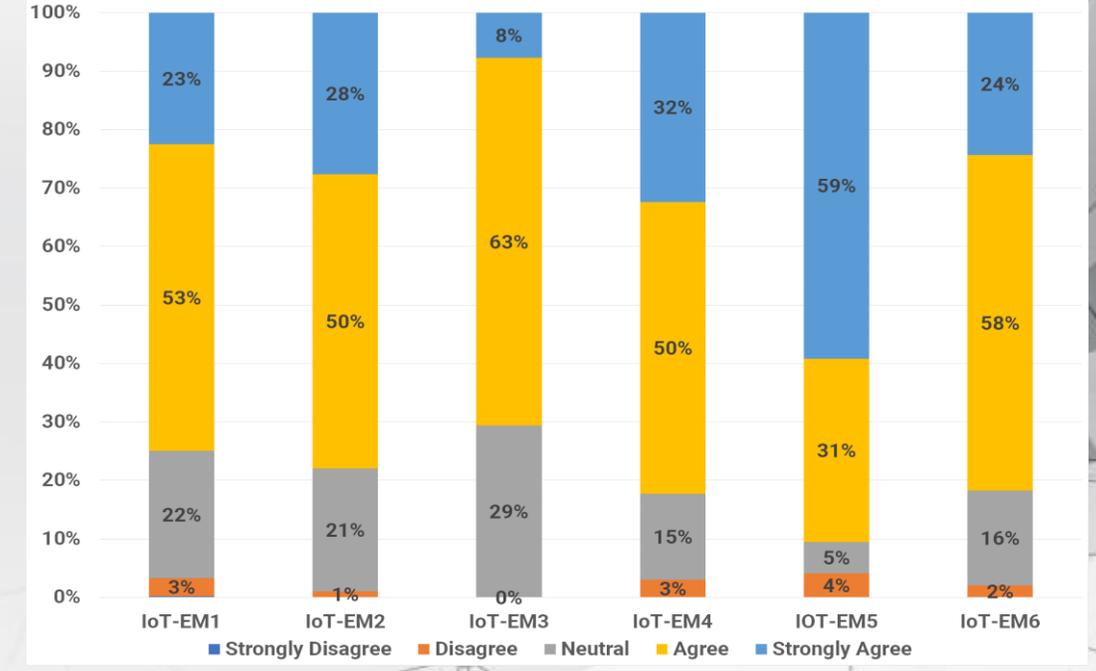
# MOOC evaluation by trainees (1/2)

- The trainees have been asked to evaluate the following characteristics of each course at a scale ranging from 1 up to 5 (1: Strongly Disagree, 5: Strongly Agree)
  - I have enjoyed the course
  - This course was challenging
  - The course meets my expectations
  - The quality of the training material was high
  - The content was well organized and easy to follow
  - The course will be useful in my work
  - The objectives of the course were clearly defined
  - The time allocated for the course was reasonable
  - The course enhanced my knowledge of the subject matter
  - In this course, I have been challenged to learn more than I expected.

# MOOC evaluation by trainees (2/2)



Evaluation of Data Science online courses



Evaluation of IoT online courses

# Thank you!

For further information please contact



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