OPENING DOORS

Opportunities and education in networked innovation for new graduates with PhDs using open online resources

Science with and for Society in Horizon 2020

H2020-SwafS-2020-1

Draft course curriculum and proposed online delivery format

Deliverable 2.1

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Introduction

OPENING DOORS is a project, funded by the European Commission, that sets out to develop an educational intervention that is: open, intersectoral, interdisciplinary, international, networked, state-of-the-art, scalable, sustainable, and fit-for-purpose. Its objective is to enrich the learning experience offered by higher education to early career researchers. The goal of this project is to shape more innovative, socially aware, entrepreneurial and employable research graduates, ready to meet the challenges of the future. This will be accomplished through a challenge-based, open, online educational course in open science and open innovation. Using a virtual learning environment, we aim to reach a larger, international cohort of postgraduate students for education in open science and open innovation using connectivism as the pedagogical approach. Connectivism reflects the networked innovation environments of the future. This education will not be discipline or sector specific.

Work Package 2 of Opening Doors, "Co-Design", was led by Maynooth University and involved all beneficiaries and partners. Building on the intelligence gathered in Work Package 1 (WP1), a 2-day co-design workshop was undertaken which involved a) the project personnel; b) the project advisory board and c) a purposeful sample of stakeholders including academics, industry representatives, citizen organisations, policy makers, data science experts, human resources specialists, intellectual property experts, social entrepreneurship experts, recent PhD and Post-Doctoral graduates. The participants were invited to an interdisciplinary, intersectoral "open innovation" curriculum design day which took place online, via Zoom due to Covid-19 health restrictions. The methodology utilised for this workshop is further detailed in section 1 of this report. The consortium members then met in a further workshop to integrate the findings from the co-design workshop and to explore how best to develop the valued skills identified in WP1 and collaboratively developed a module proposal and draft curriculum as detailed in sections 2 and 3 of this report respectively. Aarhus University took this draft curriculum and used it to develop a draft technical specification for an online open platform that would allow the Opening Doors consortium to deliver a sustainable curriculum. This is set out in section 4 of this report

This report is one step towards the final curriculum and technical specification. It is draft in nature and will go through further review by industry stakeholders in Ireland and the Czech Republic before being finalised by the Opening Doors consortium. This final version of both curriculum and technical specifications will be detailed in Deliverable 2.2. This process is further discussed in section 5 of this report.

1. Methodology

The Opening Doors Curriculum Co-Design Workshop took place online on Wednesday 2nd June 2021 from 11am to 3pm Irish Standard Time (IST). NUIM and UCD Leads co-organised the delivery of the workshop aimed at guiding/informing the design and development of the Opening Doors online PhD graduate educational course in Open Science and Open Innovation.

The workshop development was informed by the World Café methodology.[1] Under usual circumstances the design workshop would have taken place in a large room with a number of large round tables. The round table layout is considered to resemble a café. At each table there would be a nominated scribe, and this individual remains at the table throughout the workshop. Following discussion of the topic allocated to that table for the specified length of time the group moves to the next table. However, the scribe remains behind and updates the next group on the work already completed. The reasoning underpinning the rotation of the group is to build on the ideas and thoughts of the group which has gone before. This process enables a comprehensive discussion and debate of the issues at hand. Owing to the global pandemic it was not possible for this workshop to take place in a face-to-face environment, therefore breakout rooms in Zoom were used instead to mimic tables.

Through several rounds of discussion, the workshop captured the participants' perceptions of open innovation and open science and how best to design and develop the Opening Doors Open Science and Open Innovation online educational course for PhD students.

Overall, 21 people from Ireland, Denmark and the Czech Republic attended the online Zoom event. An anonymised list of participants (other than the consortium members and facilitators) is detailed in Appendix II. Those invited included the Opening Doors Advisory Board members, the Opening Doors consortium partners, and stakeholder experts affiliated with Open Science and Open Innovation networks across the 3 countries. The 21 participants were equally divided to form 4 groups across 4 break-out rooms based on 4 topics stemming from the results of Work package 1. These topics were as follows:

1. Collaborative and Interdisciplinary Research (Room 1),
2. Practical Applicability and Wide Communication of Research Results (Room 2),
3. Creating a Module that is Attractive to Students (Room 3), and
4. Open Science Tools (Room 4)

Topics were discussed in an informal and open way for approximately 20 minutes each for 3 rotations through the rooms. Overall, 5 assigned hosts guided and facilitated the interaction process.

This workshop resulted in a variety of unique ideas relating to the skills/competencies that are associated with each one of the 4 topics as well as the key learning goals that should be accomplished through the Opening Doors online course. Participants also discussed teaching and learning methods that might be employed during the module in order to enable students to meet these goals. The overall richness of data produced was supported by the questions asked and the room facilitators. In certain rooms, for example, in Room 1 which had 2 hosts, the online collaborative knowledge construction learning apart from rephrasing/summarizing the essentials and allocating time for reflection, was further assisted/advanced by the Google Drive shared documents "real time" note taking performed by the hosts which seemed to support attendee motivation and engagement with the design process/experience per se.

Guidance documents supplied to room hosts are available in Appendix I.

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[1] Lo, K., Weinhardt, M., Siebe, S. (2020) The "World Cafe" as a Participatory Method for Collecting Qualitative Data. *International Journal of Qualitative Methods*. 19: 1–15.

2. Findings

The notes and conversations from the co-design workshop were circulated to all consortium partners who discussed them in a second day workshop (limited to consortium members only) which took place via zoom on 11th June 2021. This workshop distilled the findings and discussions into a set of module proposals as follows:

2.1 Proposed Module Title

- Opening Doors & Building Bridges for Collaborative Research

2.2 Learning Objectives

1. Build awareness of and practice using open innovation frameworks and tools to facilitate co-creation and innovative thinking with stakeholders to increase societal value.
2. Design and implement collaborative projects with other researchers (from different sectors, disciplines and geographies), industry or community groups, understanding the importance of process as well as outcomes.
3. Communicate and open your research up to a variety of international stakeholders including researchers from other disciplines, community organisations, governments, businesses, and civil society.
4. Articulate and explain your knowledge, worldview, methodologies and research goals and be able to respectfully engage on this topic across sectoral and disciplinary boundaries.
5. Build awareness of, and practice using, a selection of open science tools and approaches including ethical considerations such as research integrity and data management.
6. Create a plan for professional development and the development of a professional network to open up traditional and non traditional career paths that align to your values, talents and interests.

2.3 Teaching and Learning Approach

This module will involve individual preparatory work in advance of the module delivery, such as: reading or watching introductory content; self-reflection/self-enquiry. Students will be expected to familiarize themselves with the introductory content in advance of the commencement of the module. They will then attend live seminars where experienced academics and/or practitioners will further assist them in developing the key concepts and ideas and will discuss the subject matter with the students. Students will then form groups and will implement and practice the key concepts while undertaking a real-life project in collaboration with a non-academic partner. This project will allow each participant to approach it from their own discipline, thereby creating a bigger picture. Examples of potential projects might include a business/industry/or societal issue. Students are then asked to articulate that challenge from their disciplinary perspective, listen to how others articulate the challenge, and together develop a collaborative approach to the project. An assigned facilitator will ensure open communication, regular meetings and a culture where all can participate and contribute.

2.4 Timetable

The module will run over three weeks with 2.5 days (e.g. Wed afternoon – Friday) of scheduled interactions (seminars and group work) each week. Students will be expected to spend about 3 hours per week on additional preparatory work. There will be two roll-outs of the module – one in October 2021 and a second in November 2021.

2.5 Learning Activities

2.5.1 Build awareness of and practice using open innovation frameworks and tools to facilitate co-creation and innovative thinking with stakeholders for real societal value.

- Mapping and understanding their position in an ecosystem of stakeholders including end users
- Entrepreneurship
- Creative thinking
- Exploitation
- Intellectual Property

2.5.2   Design and implement collaborative projects with other researchers, industry or community groups understanding the importance of process as well as outcomes.

- Co-design methodologies
- Ethnographic methodologies including interviewing and questioning techniques
- Team building
- Action research approaches ("doing" together)

2.5.3   Use situation specific frameworks and tools to communicate your research to a variety of international stakeholders including researchers from other disciplines, community organisations, governments, businesses, and the general public.

- Advocacy
- Presentations: PhD in 3. Peer review. Multiple opportunities to improve communication.
- Early Career Researchers, post grad research conference: dissemination skills / opportunity
- "Story Telling" as a methodology.
- Written communication skills in the areas of, social media, blogs, grant writing etc.
- Communication skills & situation-specific frameworks
- Communication frameworks, such as the elevator pitch 2-3 minutes: Present, past (what's relevant) and future is the person in front of you. Connection and Relevance.
- Eurodoc Open Science Ambassador Training http://eurodoc.net/ambassadors
- NStEP - National Student Engagement Program are offering online training modules for undergraduates

2.5.4   Articulate and defend your knowledge, worldview, methodologies and research goals and be able to respectfully engage on this topic across sectoral and disciplinary boundaries.

- The facilitator can organize "A day in my shoes"
- Speed partnering; seeing a project from another perspective
- An "interested visitor" perspective: cultivating an open mind

- Nurturing and harnessing your curiosity (a child's perspective)

2.5.5   Build awareness of, and practice using, a selection of open science tools and approaches including ethical considerations such as data management.

- Open Science principles/mindset and how this might influence your career
- FAIR principles
- Data Management Plans & tools
    - Data repositories – Open Science Framework - Core-TRUST (including Pre-registration of studies)
    - Data management planning tools - https://ds-wizard.org/
    - Data and Digital Outputs management Plan (DDOMP) templates
    - Exposure to a range of open science tools including:
        - Git-hub wiki for sharing of protocols, results, literature, equipment info, etc for the group.
        - Slack for task management, other channels that can be used for collaboration - depends on personal taste
        - Google docs is standard
        - Pre-registration of studies – „Open Science Framework" – live documents

2.5.6   Create a plan for professional development and the development of a professional network to open up traditional and non traditional career paths that align to your values, talents and interests

- Short term internship: Writing the email/letter seeking an internship, locating expertise
- Mentoring programme.
- Networking Skills
- Talks from industry experts and potential employers – long term potential financial incentive
- Adaptation of "The PhD Career Ladder Program" https://phdladder.wixsite.com/phdladder/about-pclp

3 Draft Curriculum

	Week 1	Week 2	Week 3
Pre-reading/ watching	• Open Science & Open Innovation Intro • Open workflow/collaborative technologies • Tuckman's Team Dynamics • Effective Listening techniques	• Public Engagement in Research – Citizen Science; crowdsourcing, CBPR • Videos on Individual Tasks • Responsible Research & Innovation • FAIR principles	• Presentation Skills • Team Reflexivity
Wed After-noon	• Introduction/Scene Setting • Socical Change – ecological understanding; systems thinking – example of social innovation where this was evident • Learning Organisations – making tacit knowledge explicit; sense-making; dialogue • Quiz in groups - based on Team Science Readiness Table / KAS for Team Science • Individual Self-evaluation • Baseline Data Collections (e.g. intercultural sensitivity; other instruments?)	• Open Science Initiatives • Introduction to Individual Task and brief explanation of each one– Carry out one of the following: Create a data management plan for your research; pre-register a study; design an engaged research interaction; a fourth? • Group Discussion on which tasks are most relevant to your research and why	• Guest Speaker – Intellectual property Exploitation • Parallel tutorials on individual assignments
Thurs Morning	• Collaborative Working : • Affective/Behavioural/Cognitive Relational States and Processes • Cognitive biases – group discussion • Effective Leadership & communication within interdisciplinary teams communication – Case Study Discussion • Learning how to communicate - diagram	• Working on Group Challenges • Prepping for meeting (facilitated)	Working on Group Challenges (Alone)
Thurs After-noon	• Introduction to Challenges & choosing challenge to work on	• Interim meetings with External Partners (Alone)	Working on Group Challenges (Alone)

	• Prep Thesis in 3 • Personalised Area for Growth wrt Communication	• Facilitated Reflection	
Fri Morning	In Assigned Challenge groups: • Present thesis in 3 to your group; speed dating (i.e. explain in 3 minutes how you view the project from your disciplinary perspective); "Idea Tree" on the project; • Working on Challenges – Hackathon methodology as an example of open innovation approach/ Other Creativity Approach?	Working on Group Challenges (Alone)	• Group Project • Presentations

Table 1: Draft Curriculum

4. Draft Technical Specification

Based on the module proposal and draft curriculum in Table # the following draft technical specification was developed:

4.1 Enrollment and registration (standalone website)

- Enrollment in course (name, e-mail, position, affiliation)
- Registration of users in course systems

4.2 Mailing list for all users

4.3 Main course site/system (Wordpress Blog)

- Webpage for description of course
- Webpages for each module
- Webpages should enable embedding of videos, etc.
- Webpage with links to course content, blog/forum, collaboration tools, webinars, etc.
- Student should be able to post on blog/forum

4.4 Course communication forum (Teams/blog/Currents)

- Messages from teachers and students
- Comments by teachers and students

4.5 Course content (OneDrive/Google Drive/Teams)

- Storage of files accessible to course participants

4.6 Collaboration tools (Google Drive/Office365/Teams)

- Documents and presentations for collaborative group work
- Students should be able to upload and create new documents
- Feedback and comments
- Shared list of references (Zotero)
- Shared annotation platform (Hypothesis)

4.7 Video conference tool (Zoom)

- Webinars for teaching, supervision, guidance and group work
- Shared screen
- Breakout rooms

4.8 Tools for open science

- Open science platform (osf.io or European Open Science Cloud – which has just become available)

NB: Our approach is to integrate tools and practices of open science within the course, whenever possible, and mentioning at the same time how some areas are under development and therefore "unstable", e.g., about tools/formats for online publishing and tools/formats for knowledge construction - beyond linear text.

5. Conclusion and Next Steps

The draft curriculum presented in Table 1 will now be reviewed by industry panels in both Ireland and the Czech Republic. Feedback from both panels will be reviewed by the consortium and used to refine the curriculum. This refined curriculum will be used to develop a detailed technical specification. The final curriculum and specification will be published as Deliverable 2.2. Please see Figure 1 below which illustrates this process.
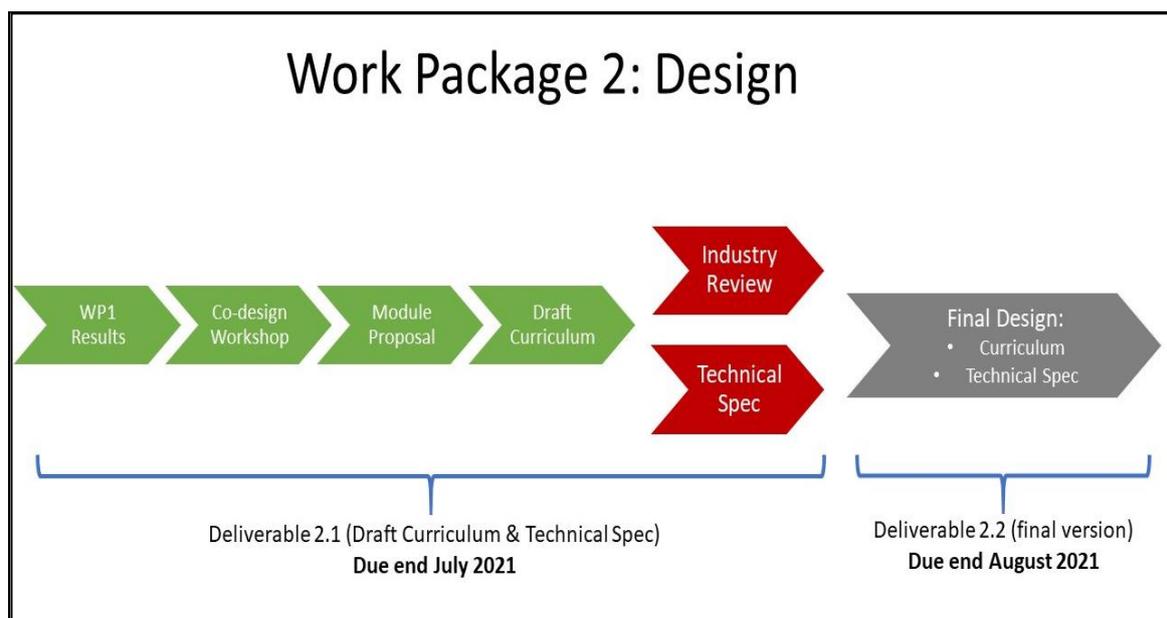

Figure 1: Flowchart for Curriculum Co-Design

Appendix I: Opening Doors Co-Design Workshop: Rooms and Topics

2nd June 2021 – 11am to 3pm Irish Time.

Room 1: Nicola
Topic: Collaborative and interdisciplinary research

Questions:
First round:

Q: *What are the key skills/components of collaborative interdisciplinary research in your view?*

Prompts if necessary:

- Creating collaborative research networks
- Choosing the right consultants and collaborators Identification of my and my colleagues' skills
- Giving and accepting feedback from fellow researchers
- Looking for opportunities to get experience outside of my specialisation
- Searching for common language with experts from other disciplines
- Leadership of teams consisting of experts with various backgrounds (interdisciplinary leadership)
- Understanding my colleagues' interests and motivation in research
- System thinking about the place of my research in the context of other scientific problems

******

Second round: Host summarises all skill/components identified in round 1 and includes missing elements from above list.

Q: What are the four key learnings with regard to collaborative interdisciplinary research that we should aim to achieve with our module?

******

Third round: Host presents 4 key learning outcomes as decided in previous round.

Q: How should we go about teaching/practicing these skills/competences?

Room 2: Tara

Topic: Practical applicability and wide communication of research results

Questions:

First round:

Q: *What are the key skills/components required for researchers to ensure their results make a real impact through wide communication and practice-engagement?*

Prompts if necessary:

- Identifying users of the research
- Understanding needs and expectations of the users
- Designing research to produce useful outputs
- Looking for opportunities for practical experience beyond my research
- Ability to offer benefits to commercial partners
- Goal-oriented approach to my research
- Identification of job opportunities outside academia
- Legal aspects of intellectual property (patents, licenses)
- Business skills, economy of research
- Acknowledging the value of research for the society
- Explaining my research to non-experts
- Participation in debates in the public realm
- Defend the need for funding of research
- Creating educational materials from research results
- Citizen science – involving wider public in research

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Second round: Host summarises all skill/components identified in round 1 and includes missing elements from above list.

Q: *What are the four key learnings that we should aim to achieve in order to ensure practice impact / wide communication of research?*

******

Third round: Host presents 4 key learning outcomes as decided in previous round.

Q: *How should we go about teaching/practicing these skills/competences?*

Room 3: Ciara

Topic: Creating a module that is attractive to students

Questions:

First round:

Q: *What might attract a student to this type of module? What might stop them from doing it?*

Prompts if necessary:

- Structure
- ECTS
- Assessment
- Timing
- Delivery mode

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Second round: Host summarises key blocker/attractors identified above

Q: What can we do to make this module as attractive as possible for students?

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Third round: Host presents key attractors for programme

Q: what should we call the module? What should be our key message(s) to students?

Room 4: Denise

Topic: Open science tools

Questions:

First round:

Q: *What are the key tools for open science of which young researchers should be made aware?*

Prompts if necessary:

- Open education resources
- Open access publishing
- Data repositories
- Remote collaboration tools
- Open source code use
- Preregistration
- Open Note books

******

Second round: Host summarises all tools identified in round 1 and includes missing elements from above list.

Q: *What are the four key tools that we should introduce to Opening Doors students? Are there disciplinary-specific considerations?*

******

Third round: Host presents 4 key tools as decided in previous round.

Q: *What is the best way to introduce/teach/practice using these tools?*

Appendix II: Anonymised list of workshop participants

Sector	Organizational Role/Position	Male/Female	Country
Pharma	Director for Digital Endpoints	M	Ireland
Social Enterprise	CEO	M	Ireland
Academia	Careers and Skills Consultant	F	Ireland
Academia	Professor	M	UK
Food (NGO)	Managing Director	M	Denmark
Innovation Support (NGO)	Business Innovation Manager	M	Czech Republic
IT	CEO	M	Czech Republic
Students Union	Student Representative	F	Ireland
Online Learning	Head of Digital and Enterprise Learning Solutions	F	UK
Smart cities	Projects Facilitator	M	Ireland
Academia	Researcher - humanities and nature	F	Japan
M-Health	CTO	M	Spain
Academia	Coordinator Open Science	F	Czech Republic
Innovation	Innovation Institute Director	M	Czech Republic
Academia	Researcher, Academy of Sciences	M	Czech Republic
IT	Affiliate	F	Czech Republic
Academia	Associate Prof. in Entrepreneurship and Entrepreneurship Education	F	Denmark
IT/Education	CEO	M	Denmark
Academia	Vice dean and head of graduate school arts	F	Denmark
Connected Health	PhD Graduate (recent)	M	Ireland
Connected Health	PhD Graduate (recent)	F	Ireland