



## **Towards a sustainable Open Data ECOsystem**

### **D6.7**

### **MOOC 'The Open Data Ecosystem'**



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## Abbreviations

ESR	Early Stage Researcher
MOOC	Massive Open Online Course
NGO	Non-Governmental Organisation
OER	Open Educational Resources

Nr	Partner	Partner short name	Country
<b>Beneficiary</b>			
1	Technische Universiteit Delft	TU Delft	Netherlands
2	Katholieke Universiteit Leuven	KUL	Belgium
3	Centre National de la Recherche Scientifique	CNRS	France
4	Universidad de Zaragoza	UNIZAR	Spain
5	Panepistimio Aigaiou	UAEGEAN	Greece
6	Aalborg Universitet	AAU	Denmark
7	Università degli Studi di Camerino	UNICAM	Italy
8	Farosnet S.A.	FAROSNET S.A.	Greece
<b>Partner organisations</b>			
1	7eData	7EDATA	Spain
2	Digitaal Vlaanderen	DV	Belgium
3	City of Copenhagen	COP	Denmark
4	City of Rotterdam	RDAM	Netherlands
5	CoC Playful Minds	CoC	Denmark
6	Derilinx	DERI	Ireland
7	ESRI	ESRI	Netherlands
8	Maggioli S.p.A	MAG	Italy
9	National Centre of Geographic Information	CNIG	Spain
10	Open Knowledge Belgium	OKB	Belgium
11	SWECO	SWECO	Netherlands
12	The government lab	GLAB	United States of America
13	Agency for Data Supply and Infrastructure	ADSI	Denmark
14	GFOSS Open Technologies Alliance	GFOSS	Greece
15	Inno3 Consulting	IC	France
16	Regione Marche	RM	Italy
17	Open Data Institute	OCI	United Kingdom
18	Swedish National Archives	SwNA	Sweden

# 1 Introduction

## 1.1 Deliverable objectives

This deliverable describes the development and content of the Massive Open Online Course (MOOC) 'The Open Data Ecosystem'. This free online course aims to disseminate the ODECO project outcomes to students, (future) researchers, practitioners, and other learners worldwide. The target group of practitioners includes managers and other personnel of all the target groups that are part of the ODECO project, including public organizations, businesses, developers, Non-Governmental Organisations (NGOs), students, and journalists. Hence, the MOOC has a wide target audience. The MOOC is of interest to anyone interested in or occupied with open data sharing and (re)use. The MOOC's key objective is to allow participants to master the basics of data and open data ecosystems, in data-driven research, and grasp the key principles surrounding open data ecosystems.

## 1.2 Learning objectives for the ESRs

Now that the ODECO project is ongoing for 45 months, the involved Early Stage Researchers (ESRs) have made considerable progress concerning their research. Beyond the formal objective of this deliverable, the MOOC was also an ideal way for the ODECO ESRs to develop new skills. It stimulated the ESRs to:

- reflect on their research findings and summarize these findings in a video of a maximum of six minutes;
- connect their findings to the key themes of the ODECO project (user-drivenness, inclusiveness, and circularity) to improve the connections between cross-cutting themes;
- formulate their findings in a way that is understandable to a wider audience beyond scientists;
- apply Open Science practices and spread the knowledge that has been created within the ODECO project beyond the project consortium;
- learn how to develop new online training material based on their research;
- consider lifelong learning beyond the project duration.

## 1.3 Massive Open Online Courses (MOOCs)

The MOOC should be viewed from the wider movement of Open Science. Open Science encompasses a range of initiatives, including Open Access (making scientific literature freely available), Open Data (sharing the primary datasets from research or government work), and Open Education (promoting the open licensing of teaching and research materials as open educational resources) [1].

The MOOC is related to Open Science in two major ways. First, content-wise, open data is one key aspect of Open Science [2]. One of the most crucial elements for the success of open science is open data, as it is an essential prerequisite for reproducibility and scientific progress [3]. When vast amounts of information can be effectively filtered, analysed, processed, and recombined, this increases the opportunities for improving quality and boosting productivity [1]. Second, the MOOC teaches the ESRs about how to openly share their research findings and contributes to applying Open Science principles – including open education – to their own research. Hence, in the ODECO project, Open Science was identified as one of the generic research themes that is relevant to ESRs' individual research projects and that ESRs should be trained in (see WP1 description).

TU Delft defines MOOCs as “freely accessible and open-licensed short courses, delivered to large groups of learners fully online” [4]<sup>1</sup>. According to the literature, MOOCs can be defined according to their four components: massive, open, online, and course [5]:

- **Massive.** The term ‘massive’ can be understood in various ways; however, [5] defines the threshold of 150 learners as an initial benchmark. The term massive may be used to mark the transition of a MOOC from a ‘group,’ where participants are familiar with one another, to a ‘network,’ defined by broader interactions [5].
- **Open.** Openness is often regarded as the greatest challenge facing MOOCs and their overall quality. Openness typically refers to unrestricted access, however, a number of MOOCs have sign-up requirements, admission criteria, and fees [5] (e.g. for earning certificates). As a result, there has been debate over whether such courses should truly be considered open [5]. In this deliverable we consider the openness components from the perspective of using open methodologies, meaning innovative Learning and education approaches, which has also been argued by other scholars [6] [7].
- **Online.** MOOCs need to be offered online since that is the only way to reach a large number of learners. Therefore, there should not be any offline activities required to fully take part in the MOOC [5].
- **Course.** The term ‘course’ is often defined as a sequence of events with a set beginning, a set conclusion, and a shared central theme. However, most MOOCs combine various formats and are typically delivered within a relatively short timeframe [5].

#### 1.4 Advantages and disadvantages of MOOCs

Various advantages of MOOCs have been identified in the literature. Zakharova and Tanasenko [8] identified three categories of MOOC advantages:

1. The potential to better structure the content of courses and organize the learning process. By doing so, MOOCs stimulate learning flexibility as learners can follow MOOCs at their preferred time. Moreover, the quality of MOOCs improves based on the reviews of learners.
2. Advancing instructors’ career and personal objectives. For example, MOOCs serve as platforms to promote individual courses, the affiliated university, and the instructor’s broader teaching portfolio. They can lead to innovative teaching experiences, using new educational formats, and increased knowledge sharing.
3. Accessibility and social mobility. MOOCs offer broad access to education, reaching diverse audiences including adult learners and individuals from around the world. They support self-paced learning and are typically free of charge. They democratize access to high-quality courses taught by leading academics.

Various disadvantages have also been identified. For instance, [8] state that the creation of MOOCs and the interaction with learners can be highly time-consuming, and that learning formats may not be perfect as these are not adjusted to individual learners.

#### 1.5 Outline

The next chapter explains our approach towards reducing the potential disadvantages and maximizing the MOOC advantages. Then, we present the MOOC content and draw conclusions.

<sup>1</sup> <https://online-learning.tudelft.nl/mooc-massive-open-online-courses/>

## 2 Approach

This chapter describes the approach taken in the development of the MOOC. The MOOC 'The Open Data Ecosystem' was prepared in such a way that it was complementary to existing open data MOOCs that had already been created by several beneficiaries. The MOOC builds on the eight modules of the ODECO online training program. While the online training program focused on open data basic knowledge, the MOOC integrated new insights that were derived from the research conducted by the ESRs over the past few years. The MOOC integrated contributions from the research of all fifteen ESRs on various aspects of open data ecosystems.

The preparations for this deliverable started in April 2024. During the training week at KU Leuven, an approach for the creation of the MOOC was proposed to the consortium. This approach included:

- examining which of the three themes - inclusiveness, circularity, or user-drivenness – the ESRs related the most to;
- discussing in groups what approach towards the MOOC would be most impactful for society and feasible for the ODECO consortium.

During the training week at KU Leuven, we discussed that each ESR would contribute one video to the MOOC, related to either the theme of inclusiveness, circularity, or user-drivenness.

During the meeting at KU Leuven, all consortium partners agreed on the following schedule:

1. June 2024: video instructions and start of video development.
2. September 2024: Finalization of video scripts by ESRs and feedback by supervisors and the project coordinator (check for consistency/alignment).
3. October 2024: Video recordings in Delft.
4. November 2024 – February 2025: Video editing and checking.
5. May 2025: MOOC ready.
6. July 2025 – July 2026: Evaluation.

In the following subsections, we report on each of these steps.

### 2.1 June 2024: video instructions and start of video development

All ESRs were asked to email their first and second choice regarding which of the three MOOC themes they preferred to contribute to: inclusiveness, user-drivenness, and/or circularity. In June 2024, TU Delft divided all fifteen ESRs among the three project themes, accommodating their preferences as much as possible. Each group was requested to show in their videos how they related to the theme.

The deadline for submitting the slides and scripts was 1 September 2024. To ensure consistency between the videos and to support the ESRs as much as possible, TU Delft sent specific guidelines to the ESRs. The instructions concerned both the structure of the video presentation and the recording process.

The instructions related to the video structure included the following:

- Use the following structure for the video presentations (quite similar to the setup of a paper:
  - 2-3 slides introduction of the topic. The first slide should explain how your video relates to the theme of inclusiveness/ circularity/ or user-drivenness.
  - 1-2 slides concerning challenges/ problem statement.
  - 1-2 slides with some background information.
  - 3-5 slides concerning results.
  - 2-3 slides concerning conclusions. Ensure you mention both the scientific and societal implications of your research.

The instructions related to the recording process included the following:

- Use the ODECO template for the slides.
- On the slides, only use keywords. Even better: use visuals instead of text wherever you can (see example attached).
- While recording, you will use the autocue and will not see the slides yourself. You will only look into the camera that has the text/autocue. Someone else will click to go to the next slide for you. Hence, you need to create a script in which you indicate what you want to say for each slide and when someone should click (see attached example).
- Use animations in your video, meaning not all text/elements of visuals appear at once. Indicate in the script when the video recording team should 'click' to make your text/visual appear.
- The script should not be longer than 1,000 words, and close to 800 words would be ideal. No more than 6 minutes in total.
- It is nice to start the script with a teaser or a question that makes the viewer interested in seeing more of the video, even before you discuss the problem or objective of your study.
- Practice the script in combination with your slides and see if this works well. Nearly always, this leads to script and slide improvements.
- Do not introduce yourself in the video, and do not refer to other presentations or anything else that may change in the future. Instead, your introduction can be added in a description on the platform (next to the video).

Some examples can be found in Appendix 1.

## **2.2 September 2024: Finalization of video scripts by ESRs and feedback by supervisors and the project coordinator**

In September 2024, all the ESRs had to share the scripts and slides of their video presentations with Anneke Zuiderwijk and Bastiaan van Loenen (TU Delft). They organized feedback sessions, in which they provided feedback to the scripts and video presentation slides of all the ESRs. Moreover, each ESR had to review the script and slides of another ESR within their group, hence applying a peer review process. All scripts were shared with all ESRs in a shared MS Teams environment to stimulate peer learning. The results of the review process were noted in the shared documents and discussed in three online meetings, one for each theme. After this meeting, the ESRs still had a few weeks to process the feedback they gathered before submitting the final versions of their scripts and slides to Anneke Zuiderwijk (TU Delft) in mid-October.

## **2.3 October 2024: Video recordings in Delft**

All the MOOC videos were recorded at TU Delft in Delft, the Netherlands. This ensured consistency between the videos, and TU Delft has excellent facilities and support for professional video recordings. TU Delft has been developing MOOCs across a broad range of subject areas since 2013. More than three million people worldwide have enrolled in TU Delft's MOOCs, which form part of TU Delft's commitment to open education. [1]

A student assistant who had been trained in the recording and editing of videos for educational purposes prepared the scripts and slides for recording. For instance, when the text on a slide would need to be adjusted to make sure the presenting ESR would not be standing in front of the text, the student assistant adjusted the position of the text. In some situations, this was done after the recordings.

On three different days in October 2024 (28, 29, 31 October), the ESRs recorded their videos physically in a professional studio at TU Delft. Most videos were recorded two or three times, and the best recordings were selected for the final video. The student assistant supported the recordings and the editing of the videos afterwards. All videos were recorded in front of a green screen, which provided flexibility in the editing process.

## 2.4 November 2024 - February 2025: video editing

The videos were edited by the student assistant and then forwarded to the involved ESR, Anneke Zuiderwijk, and Bastiaan van Loenen (TU Delft) for a final check. Some minor mistakes were still corrected, such as minor language errors on the slides.

## 2.5 May 2025: MOOC ready

On the first of May, an introduction video was recorded by Bastiaan van Loenen and Anneke Zuiderwijk of TU Delft. This video was created to introduce the fifteen ESR videos. When all the videos were complete, the platform for disseminating them was decided upon. We obtained advice from an expert in lifelong learning (Joost Groot-Kormelink, TU Delft) to consider the most appropriate platforms for the dissemination of the MOOC.

Eventually, the decision was made to select the British OpenLearn platform. [OpenLearn Create](#) (formerly OpenLearn Works) is a pioneering open educational platform that enables individuals and organizations to publish and share open content, courses, and resources. Built on the Moodle open-source e-learning system, it offers features for collaboration, reuse, and remixing of materials, and supports the use of Open Badges. OpenLearn Create operates as a sister site to [OpenLearn](#), which hosts specially designed open content from The Open University. OpenLearn Create currently offers more than 450 live public courses and 70 additional resources, such as articles and other learning materials. The platform attracts approximately 3.4 million visitors annually.

We selected OpenLearn Create because of the benefits it offers, including:

- the ability to personalize learning materials;
- a low-barrier environment for collaboratively developing educational content;
- a space to explore and test new technologies and innovative approaches to learning;
- opportunities for building communities around open educational resources (OER);
- a platform for research projects experimenting with new educational tools and practices;
- a cost-effective solution for initiatives aiming to deliver OER;
- a platform with an international focus and a large reach rather than a smaller national or local platform.

The MOOC can be found here:

<https://www.open.edu/openlearncreate/course/view.php?id=15309>

We applied a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International licence (CC-BY-NC-SA licence), meaning that the work of the contributors can be shared and adapted but only if appropriate credits is provided, it is not used for commercial purposes, and if the work is remixed, transformed, or built upon, the new work must be provided under the same license as the original work. Moreover, the MOOC videos have been published on YouTube <sup>2</sup> and on Zenodo<sup>3</sup> to enhance the reach of the videos. The next chapter provides an overview of the developed MOOC.

## 2.6 July 2025 – July 2027: Evaluation

In the following years, we will evaluate the impact of the MOOC. This will be done by reviewing the number of participants of the MOOC, the responses and comments they provide on the MOOC, and potential references to the MOOC videos (e.g., in other videos and blogs). If the responses and comments provided by the MOOC participants are potentially reason to improve the MOOC, we will consider this and adjust the MOOC accordingly.

<sup>2</sup> <https://www.youtube.com/channel/UC1VCKSFHtAlzlb6viUewadg>

<sup>3</sup> <https://zenodo.org/records/15388485>

### 3 Results

Sixteen videos have been made available to the public, see Table 1. In this chapter, we discuss how these videos have been made available through 1) OpenLearn, 2) YouTube, and 3) Zenodo.

*Table 1: Overview of MOOC videos, ordered by project theme.*

Project theme	Presenter	Video topic and URL
User-drivenness	ESR 02 Dagoberto Herrera	<a href="#">UX research in open data ecosystems</a>
	ESR 04 Ramya Chandrasekhar	<a href="#">Legal instruments for user-driven open data ecosystems</a>
	ESR 05 Mohsan Ali	<a href="#">Technical Interoperability of Open Data</a>
	ESR 07 Maria Ioanna Maratsi	<a href="#">Linked and semantically interoperable knowledge</a>
	ESR 11 Liubov Pilshchikova	<a href="#">The role of non-governmental organisations in user-driven open data ecosystems</a>
Inclusiveness	ESR 01 Davide Di Staso	<a href="#">Towards inclusive Open Data hackathons</a>
	ESR 03 Silvia Cazacu-Bucica	<a href="#">Data physicalisation</a>
	ESR 08 Abdul Aziz	<a href="#">Inclusive open data portals</a>
	ESR 10 Alejandra Celis Vargas	<a href="#">Developing open data competencies in elementary school</a>
	ESR 12 Caterina Santoro	<a href="#">Open data for social equity and inclusion in the public sector</a>
Circularity	ESR 06 Maria Elena Lopez Reyes	<a href="#">Evaluating the use of local governments' open data</a>
	ESR 09 Georgios Papageorgiou	<a href="#">The role of journalists in the open data ecosystem</a>
	ESR 13 Héctor Ochoa Ortiz	<a href="#">Fostering circularity by aligning private values</a>
	ESR 14 Umair Ahmed	<a href="#">Fostering circularity by employing AI and CI</a>
	ESR 15 Ahmad Ashraf Ahmad Shahrudin	<a href="#">The role of open data intermediaries in the open data ecosystem</a>

#### 3.1 OpenLearn

On the OpenLearn platform, the MOOC is structured as depicted in Figure 1, following the three pillars of the ODECO project (user-drivenness, inclusiveness, and circularity).

Course description	<b>Course content</b>	Course reviews
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## Course content

Below is the course content. You can click on any section here and it will take you through to this section of the course.

<b>Introduction</b>	>
<b>User-drivenness of open data ecosystems</b>	>
<b>Inclusiveness of open data ecosystems</b>	>
<b>Circularity of open data ecosystems</b>	>
<b>Conclusions</b>	>

*Figure 1: MOOC structure on the OpenLearn platform.*

The section 'Introduction' provides a general course introduction (see Figure 2).

## Course content

Below is the course content. You can click on any section here and it will take you through to this section of the course.

### Introduction

Many public and private organizations worldwide publicly share the data they create as part of their daily processes. This data can be used and reused without any restrictions and is provided free of charge.

Ideally, open data is provided and used in "cyclical, sustainable, demand-driven environments oriented around agents that are mutually interdependent in the creation and delivery of value from open data". This is what we refer to as open data ecosystems. This potential will be lifted if an open data ecosystem becomes user driven, inclusive, and circular. Value creation will be maximised and the sustainability of the ecosystem promoted.

This was the underlying reasoning of the ODECO project. ODECO is a 4-year Horizon 2020 Marie Skłodowska-Curie Innovative Training Network initiative (H2020-MSCA-ITN-2020, grant agreement 955569). The central aim of the ODECO consortium network is to train the next generation of creative and innovative early-stage open data researchers, to unlock their creative and innovative potential to address current and future challenges in the creation of a user-driven, circular, and inclusive open data ecosystem. During the course of the project, we developed new insights that resulted in a more nuanced and complete view on open data ecosystems.

One could argue that current open data ecosystems are supplier-driven, exclusively building on government data, and are linear, which means that the users of the open government data do not deliver value back to the open data ecosystem. The current situation results in some value, but there is much more potential.

The video below introduces the Open Data Ecosystem.


 Video 1: Introduction to the Open Data Ecosystem

Figure 2: Introduction section of the MOOC on the OpenLearn platform.

The Introduction section is preceded by the three content-related sections "User-drivenness" (Figure 3), Inclusiveness (Figure 4) and Circularity (Figure 5).

## Course content

Below is the course content. You can click on any section here and it will take you through to this section of the course.

Introduction

User-drivenness of open data ecosystems

Let us start with the first pillar: from supplier-driven to user-driven. We argue that an open data ecosystem should move away from a supplier-driven system towards a user-driven open data ecosystem.

At first glance, one may easily agree: users should be taken seriously by data providers. However, one should bear in mind that most, if not all, data has been collected for or with a purpose. At least for open government data, the data is collected to serve a public task. Be it a map for military purposes or the value of real property for taxation purposes. In these instances, there has been and is a close interaction between the provider and user of the data.

But after opening the data as open data, the user community expanded, resulting in an overwhelming number of new users and user types. With this, the direct connection with these new users became much more loose or is no longer there. As a result, there is now a what is generally considered a provider-driven ecosystem. So the success in attracting these new users is the explanation of the current lack of user involvement. Building on the definition of the EU open data directive and the term re-use, we may argue that open data ecosystems should not only be user-driven but also re-user driven.

The following videos address the topic of user-drivenness of open data ecosystems from different perspectives. Which ones can you identify?

- Video 2: UX research in open data ecosystems
- Video 3: Legal instruments for user-driven open data ecosystems
- Video 4: Technical Interoperability of Open Data
- Video 5: Linked and semantically interoperable knowledge
- Video 6: The role of non-governmental organisations in user-driven open data ecosystems

Inclusiveness of open data ecosystems

Circularity of open data ecosystems

Conclusions

Figure 3: User-drivenness section of the MOOC on the OpenLearn platform.

## Inclusiveness of open data ecosystems





Then the second pillar: towards an inclusive open data ecosystem. The sustainability of an open data ecosystem also depends on how inclusive the ecosystem is. Initially, we argued that an inclusive open data ecosystem is an ecosystem that not only includes open government data but also open data from other actors. Also, here we developed new insights.


In the ODECO project, we found that inclusivity goes beyond nongovernment actors providing open data. Non-government actors also participate in the open data ecosystem in many different ways and roles. For example, by hosting a platform that provides access to open data, or by organizing hackathons, or by developing teaching material on open data. Of course, these are examples and you may not find them in all open data ecosystems, but the concept of inclusivity entails much more than allowing or stimulating nongovernment actors to contribute their data as open data.


Another insight we developed is that inclusivity should also concern the content of datasets themselves. Also, these might not present the full picture, for example, by deliberately excluding certain groups or topics in the data.


More insights concerning inclusivity of open data ecosystems are being shared in the following videos. Which insights are new to you?

 [Video 7: Towards inclusive open data hackathons](#)

 [Video 8: Data Physicalisation and inclusiveness](#)

 [Video 9: Inclusive open data portals](#)

 [Video 10: Developing open data competencies in elementary school](#)

 [Video 11: Open data for social equity and inclusion in the public sector](#)

*Figure 4: Inclusiveness section of the MOOC on the OpenLearn platform.*

## Circularity of open data ecosystems








Finally, we discuss the third pillar: towards a circular open data ecosystem.

In the ODECO project, circularity is reached when Users of Open Government Data improve that data and provide the new data back to the Ecosystem as open data to ensure a fair distribution of value among data providers, re-users and other actors.

We found that circularity is much more than only providing improved open government data back to the open data ecosystem. If it is not improved Open Government Data that is contributed back, then non-government actors may contribute value by providing newly developed services for the open government data, or developing training material on how to use the OGD, or by providing feedback on the fit for purpose of the OGD. In many other ways, non-government actors contribute to the circularity of the open data ecosystem. You may see the connection or even overlap with the inclusivity pillar.

The following videos address the circularity aspects of open data ecosystems.

-  Video 12: Evaluating the use of local governments' open data
-  Video 13: The role of journalists in the open data ecosystem
-  Video 14: Fostering circularity by aligning private values
-  Video 15: Fostering circularity by employing AI and CI
-  Video 16: The role of open data intermediaries in the open data ecosystem

*Figure 5: Circularity section of the MOOC on the OpenLearn platform.*

Finally, we end the MOOC with a conclusion section.

**Conclusions**
^

These sixteen videos discussed open data ecosystems from user-drivenness, inclusiveness, and circularity perspectives. Finally, we discuss the concept of a sustainable open data ecosystem. We argue that if an open data ecosystem is user-driven, inclusive, and circular, then it would be sustainable. However, sustainability also has multiple dimensions, such as economic, environmental, and social. The fair distribution of economic value is already a complex puzzle. Adding the environmental and social dimensions makes it a wicked challenge that calls for future research endeavors.

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*Figure 6: Conclusion section of the MOOC on the OpenLearn platform.*

Participants can follow the MOOC at their own pace and select the elements that are most relevant to them.

### 3.2 YouTube

To enlarge the reach of the MOOC, it has also been made available on a YouTube channel (see Figure 7).

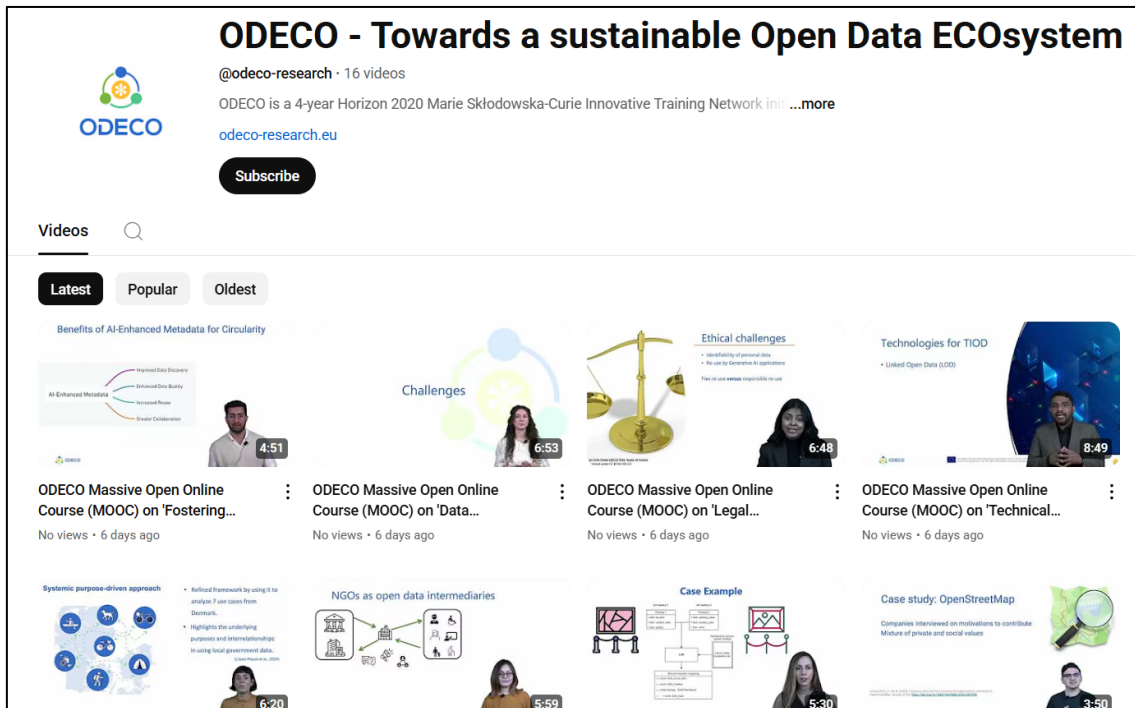


Figure 7: MOOC videos on the ODECO YouTube channel.

### 3.3 Zenodo

To further enlarge the reach of the MOOC and especially reach academics, the MOOC videos have also been made available through Zenodo (see Figure 8).

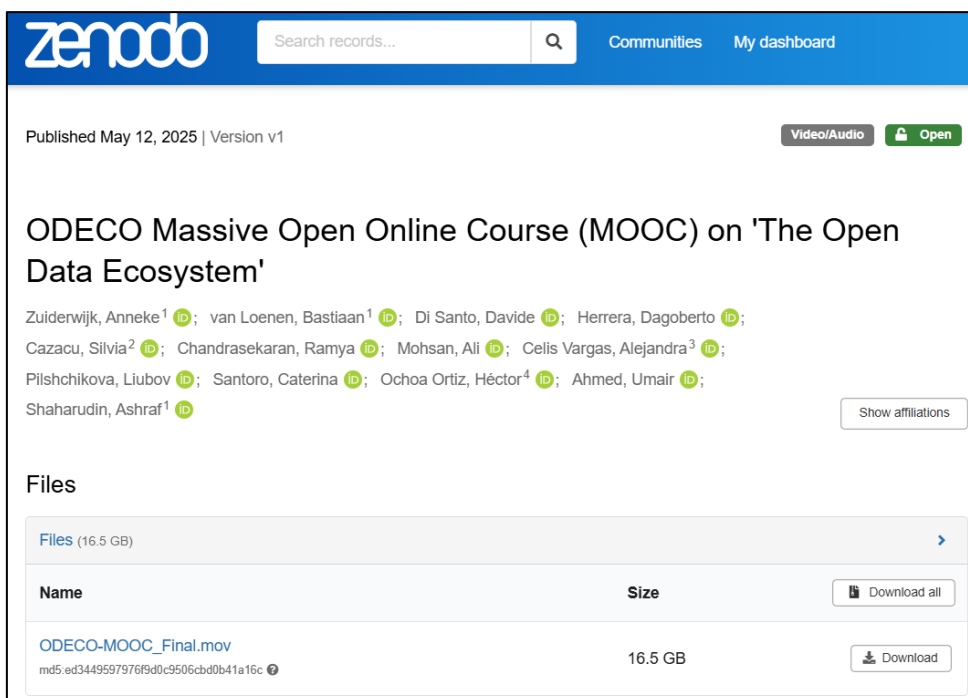


Figure 8: MOOC videos on the ODECO Zenodo section.

## 4 Conclusions

The deliverable describes the development and content of the Massive Open Online Course (MOOC) 'The Open Data Ecosystem'. This free online course was designed to disseminate the results of the ODECO project to a broad audience including students, researchers, practitioners, and other open data stakeholders. By presenting research insights from fifteen Early Stage Researchers (ESRs), the MOOC offers structured learning on the themes of *user-drivenness*, *inclusiveness*, and *circularity* within open data ecosystems. The course is accessible through multiple platforms—OpenLearn, YouTube, and Zenodo—to ensure wide dissemination and reuse.

Despite its successful launch, the development of the MOOC encountered several challenges. First, aligning the contributions of fifteen ESRs across three thematic areas required significant coordination, peer-review mechanisms, and editorial oversight to ensure coherence and quality across the videos. Second, the ESRs experienced time constraints, as the ESRs had to balance MOOC development with their ongoing research responsibilities. Third, the use of professional video recording facilities (e.g., autocue, green screen, animation timing) introduced a learning curve for ESRs unfamiliar with these tools. Fourth, a key difficulty was ensuring that videos were both scientifically accurate and understandable to a broad, non-expert audience. Striking this balance required iterative script development and careful guidance to ensure the balancing of academic rigor with accessibility.

From these challenges, we learned that clear instructions, templates, and early engagement helped streamline the content creation process. Moreover, peer-review and collaborative feedback across ESRs improved the quality and consistency of content while fostering learning among researchers. In addition, the centralized video production at TU Delft ensured technical consistency and benefited from institutional experience with MOOCs, and the open dissemination through multiple platforms maximized accessibility, visibility, and long-term value of the MOOC.

Looking forward, several recommendations and additions can strengthen the MOOC's future impact. We will actively collect and analyse feedback from learners through 2026–2027. Based on this, updates or refinements to the MOOC may be introduced. We will also consider adding quizzes, discussion forums, and self-assessment tools to improve engagement with the MOOC participants. Furthermore, we encourage the ESRs and project partners to incorporate the MOOC into their presentations, workshops, teaching, and public outreach. The videos can serve as reusable learning objects in various formats. Future additions could include more advanced or in-depth modules based on ongoing research outcomes or partner feedback.

In conclusion, the MOOC not only fulfils its objective of disseminating ODECO insights but also stands as a model for combining open science, cross-institutional collaboration, and digital education. It enhances the long-term sustainability and outreach of the ODECO project.

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## 6. Appendix 1

The first example we provided can be found here

<https://www.youtube.com/watch?v=qLq0YTm5qRY&t=109s>.

The second example we provided can be found here:

<https://www.youtube.com/watch?v=V6vEoNJOaT8&t=374s>.

The third example we provided can be found here:

<https://www.youtube.com/watch?v=Fj1Bb8lzHlk&t=2s>.