D7.3: Educational materials

Authors: Vana Stavridi, Nicole Sarla, Panagiotis Kavouras

Project title: The Equitable, Inclusive, and Human-Centered XR Project

Project acronym: XR4Human

Grant Agreement no.: 101070155
Lead contractor for this deliverable: NTUA

Funded by the European Union

Deliverable factsheet:

Project Number:	101070155
Project Acronym:	XR4Human
Project Title:	The Equitable, Inclusive, and Human-Centered XR Project
Title of Deliverable:	Educational materials
Work Package:	WP 7
Due date according to contract:	M25
Authors:	Vana Stavridi, Nicole Sarla, Panagiotis Kavouras
Editor(s):	Rigmor Baraas, Rose Bernabe
Contributor(s):	Michael Bangrover , Rigmor Baraas, Rose Bernabe, Cristiana-Anca Voinov, Shereen Cox, Ellen Svarverud, Lene A. Hagen, Miltos Ladikas, Alina Kadlubsky , Oliver Schreer,Ekaterina Prasolova-Førland,
Reviewer(s):	Oliver Scheer
Approved by	Rigmor Baraas, Rose Bernabe

Consortium:

	ROLE	NAME	Short Name	Country
1.	Coordinator	UNIVERSITETET I SOROST-NORGE	USN	NO
2.	Partner	XR4EUROPE	XR4Europe	BE
3.	Partner	UNIVERSITETET I OSLO	UiO	NO
4.	Partner	ETHNICON METSOVION POLYTECHNION	NTUA	EL
5.	Partner	NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU	NTNU	NO
6.	Partner	UNIVERSITEIT LEIDEN	ULEI	NL
7.	Partner	KARLSRUHER INSTITUT FUER TECHNOLOGIE	KIT	DE
8.	Partner	INSTITUTT FOR ENERGITEKNIKK	IFE	NO
9.	Partner	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV	Fraunhofe	DE
10.	Partner	OPEN AR CLOUD EUROPE GEMEINNUTZIGE UG	OARC EU	DE
11.	Partner	STICHTING FONTYS	Fontys	NL
12.	AP	UNIVERSITY OF LEEDS	UNIVLEEDS	UK

Revision history:

VERSION	DATE	Revised by	Reason
0.1	25/10	Vana Stavridi	Preparation of the fisrt draft
0.2.	29/10	Nicole Sarla	Review of the first draft
0.3.	31/10	Vana Stavridi	Preparation of the 2nd draft of the deliverable by incorporating the partners' comments.
0.4.	04/11	Oliver Scheer	Review of the second draft
1.0.	29/11	Rigmor Baraas, Rose Bernabe	Final version

Contents

Funded by the European Union

1. Introduction

The purpose of this deliverable is to describe the objectives and content of the educational materials, their development process as well as their intended impact. In full accordance with the overall main goal of XR4Human - to provide guidance and tools to ensure the fair, inclusive and human-centered development of XR (Extended Reality) technologies - educational materials were created to increase end-user awareness, enabling them to make informed decisions about using XR applications and equipping them with criteria for responsible use of XR technologies.

After deliberation with XR4Human project' s coordinators and partners on the most effective approach to deliver training content on XR technologies, the educational materials were finally designed in video format. Videos were chosen as the ideal medium because of their strong visual and narrative potential, which allows complex topics such as the risks and applications of XR to be communicated in a clear, engaging and accessible way. This format effectively supports a diverse audience with varying levels of familiarity with XR, ensuring that technical information and ethical issues are presented in a comprehensive and user-friendly manner.

This decision aligns with the goal of WP7, within the context of which the educational materials were developed: the empowerment of end users through a rating system and an educational toolbox that emphasizes inclusiveness and adaptability of content to meet the needs of all users. This approach resulted in three videos aimed at building foundational knowledge, raising awareness of risks, and promoting best practices for responsible XR use. These videos, designed to help users make informed and safe choices in immersive environments, are now available on the XR4Human YouTube channel and will be featured on the homepage of the XR4Human website.

2. Educational materials' objective.

The development of educational materials (videos) is one of the core components of the XR4Human project, aimed at enhancing the quality and safety of XR experiences for end users. These resources are designed to empower European citizens by providing clear and accessible information about XR applications, enabling users to make informed choices tailored to their specific needs. By increasing awareness and understanding of immersive technologies, users will be better equipped to navigate digital environments safely and responsibly.

Each of the three videos serves a distinct objective and focuses on a different theme within XR technology, targeting different aspects of XR from foundational knowledge to ethical implications. The three videos are systematically structured to begin with overarching concepts, such as definitions and terminology before progressing to more specific issues pertaining to XR technologies and specific XR applications. The specific content and objective for each video is detailed below:

2.1. Video #1: Familiarizing with XR technology: Starting from the basics

The first video, titled ***Familiarizing with XR technology: Starting from the basics***, is designed to further familiarize end users with the essential terminology surrounding immersive technologies and aims to educate the public on their applications and use.

Essentialy, its primary objective is to provide viewers with a foundational understanding of XR technologies. This is accomplished by presenting definitions of the different types of XR and their relation (Virtual Reality, Augmented Reality, Mixed Reality) along with a presentation of the technological developments enabling the immersive experience.

In addition, the video aims to explain how these emerging technologies create unique interactions with virtual environments, distinguishing them from traditional media, clarifying key concepts to prepare users for further exploration of XR's capabilities and implications.

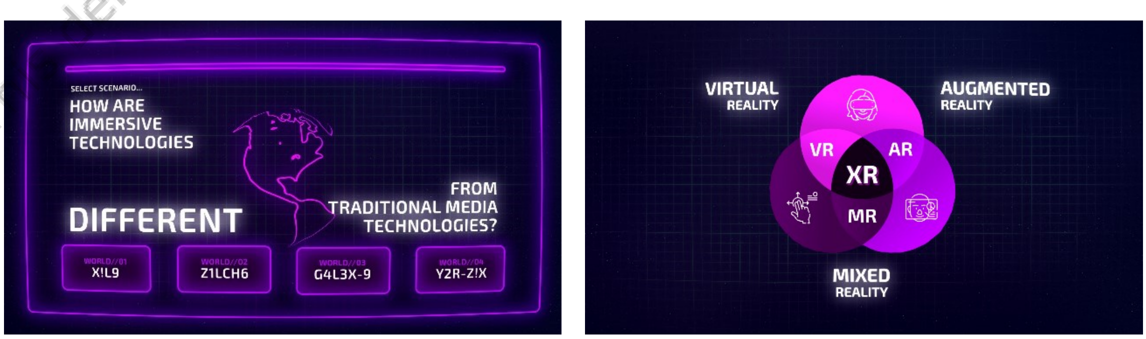


Figure 3: Illustrative captions from the 1st video.

2.2 Video #2: Bridging the Gaps: The Imperative for Responsible XR Technologies.

The second video, titled ***Bridging the Gaps: The Imperative for Responsible XR Technologies***, examines the gaps identified in addressing ethical issues, regulatory and governance challenges, and interoperability issues, while also providing some recommendations for addressing these challenges.

The objective of the second video is to raise awareness of the ethical and practical risks associated with XR, such as data privacy, accessibility challenges, and interoperability issues. This objective is captured in visuals of the video. Beginning with a visual introduction of XR4Human's mission, the video presents "risk doors" representing different categories of risks. Examples include privacy risks due to data tracking, accessibility limitations for various social groups, and fragmentation in interoperability across XR platforms.

This video educates users on the significance of understanding and navigating XR's ethical challenges and the importance of informed use.

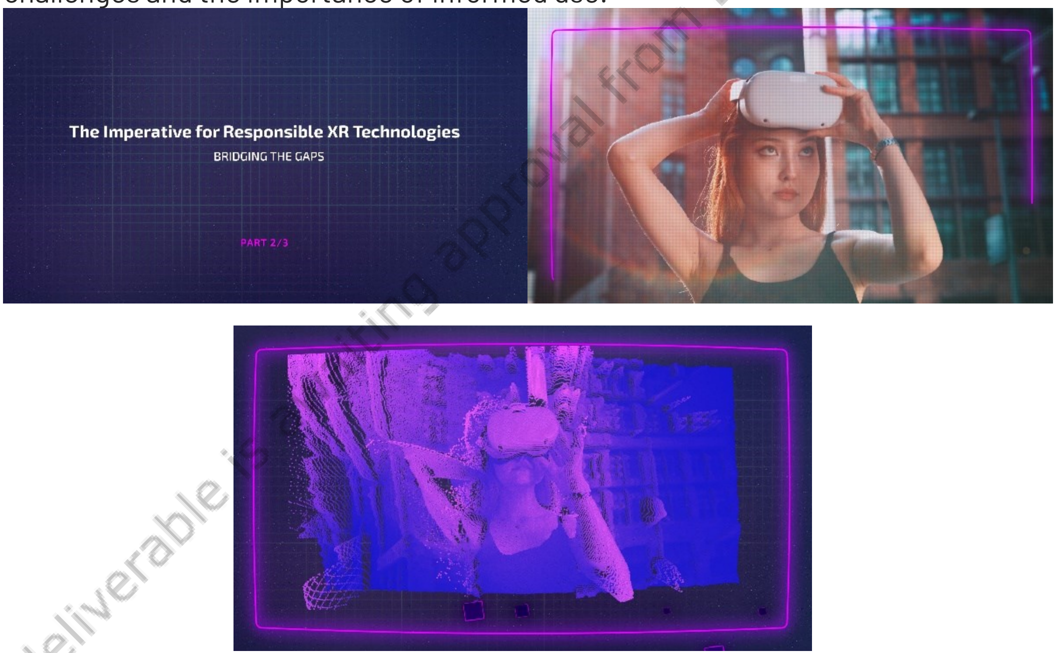


Figure 4: Illustrative captions from the 2nd video

2.3. Video #3: Emerging Frameworks for human-centered XR EU ecosystem.

The third video, ***Emerging Frameworks for human-centered XR EU ecosystem***, describes the types of best practices proposed by XR4Human and outlines the principles that will shape our code of conduct, offering examples of best practices that adhere to ethical standards as showcased in the XR4Human Library.

Funded by the European Union

Its objective is to advocate for responsible XR use, providing users with practical guidelines and strategies to make informed and safe choices when engaging with XR technologies.

The visuals of the third video include examples of applications, such as VR based application focused on vocational education and career guidance for young job seekers. Additionally, XR4Human's European XR Code of Conduct and Interoperability Guidelines are highlighted as key resources for ethical development of XR Technologies.

This final video emphasizes XR4Human's commitment and contribution to promoting ethically guided, human-centered XR applications that align with values of inclusivity, accessibility, and safety.

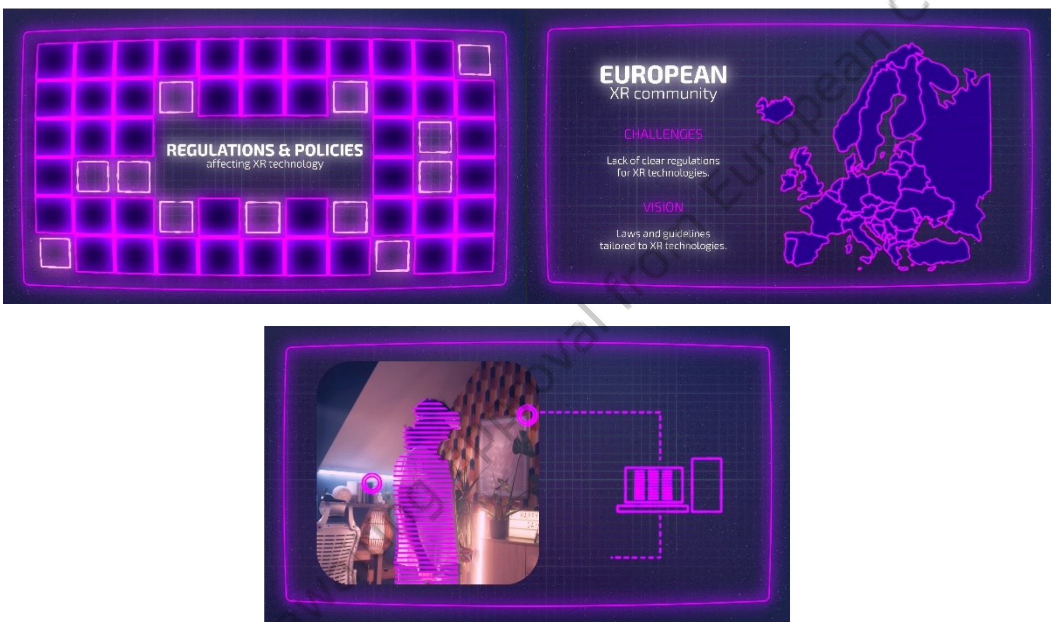


Figure 5: Illustrative captions from the 3rd video

Despite the fact that the three videos serve different objectives, their structure and content support the overarching goal of empowering users, fostering informed decision-making, and encouraging responsible engagement with XR technologies in a manner that is accessible and relevant to all individuals.

3. Video design and format

The videos were designed to align with the unique visual identity and branding of XR4Human. We consistently utilized the project's official colors, fonts, and icons to create a cohesive and recognizable appearance. The visual identity of the project, marked by vibrant colors and imagery associated with VR, AR, and XR technologies, was intentionally applied to enhance the visual appeal and user-friendliness of the content. Consequently, the visuals in the videos complement these essential elements, ensuring a consistent and engaging aesthetic throughout.

Below, the unique visual identity and the branding of XR4Human is presented by showcasing some characteristic screen captures:

Figure 6: Illustrative captions of branding applications from videos.

4.Development Process

The current state of the narrative for each video reflects the reviewers' feedback provided during the review meeting in July. Following the comments from the PO and the reviewers, we revised the initial draft of the video scripts by incorporating input from the respective WPs to align the content with the focus of each video.

The input requested by NTUA focused on three main areas:

1. Familiarization with XR terminology and applications.
2. The question, "Why do we need ethical standards?", which is the theme of the second video.
3. The exploration of "What types of best practices does XR4Human propose?", covered in the third video.

For the development of the script for the first video, definitions and concepts from relevant literature were combined with contributions from WP2 members. The script for the second video was based on inputs from WP2, WP3, and WP4. Similarly, the third video's script was primarily developed using contributions from WP6, WP4, and WP5.

To illustrate the development process of the three videos, the following figures provide a comprehensive overview of both the initial design phase and the final stage. These visual elements highlight how feedback from various partners was systematically gathered and integrated into the final videos design, ensuring a polished and collaborative outcome.

XR4HUMAN

Please fill in the table(s) with your input. We need 2-3 lines summarizing your findings (as detailed in your WP deliverables) for **one** or **both** of key areas.

The summary should be simple and easy to understand as it will be included in the XR4Human educational videos.

1. **Why do we need Ethical standards? (**What gaps have we identified in addressing ethical issues, regulatory and governance gaps, and interoperability challenges?)

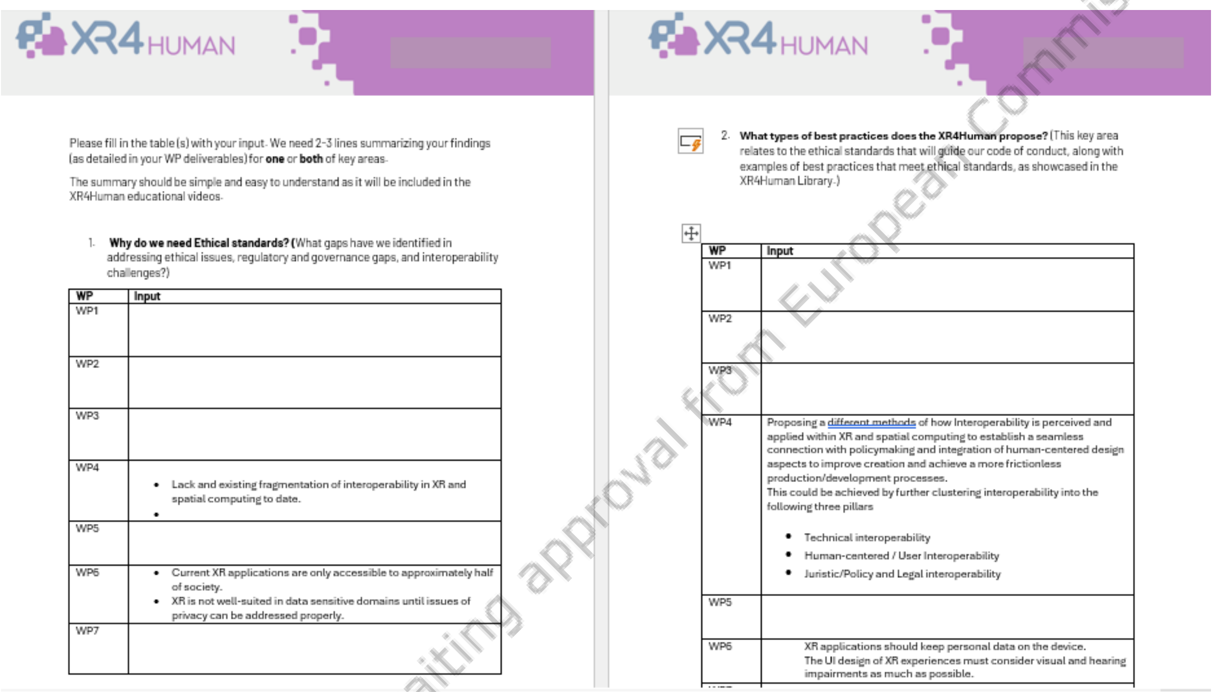
WP	Input
WP1	
WP2	

XR4HUMAN

2. **What types of best practices does the XR4Human propose?** (This key area relates to the ethical standards that will guide our code of conduct, along with examples of best practices that meet ethical standards, as showcased in the XR4Human Library.)

WP	Input
WP1	
WP2	

Figure 7: Document for gathering input from WP Members.


Please fill in the table(s) with your input. We need 2-3 lines summarizing your findings (as detailed in your WP deliverables) for **one** or **both** of key areas.

The summary should be simple and easy to understand as it will be included in the XR4Human educational videos.

1. **Why do we need Ethical standards? (**What gaps have we identified in addressing ethical issues, regulatory and governance gaps, and interoperability challenges?)

WP	Input
WP1	
WP2	
WP3	
WP4	• Lack and existing fragmentation of interoperability in XR and spatial computing to date. •
WP5	
WP6	• Current XR applications are only accessible to approximately half of society. • XR is not well-suited in data sensitive domains until issues of privacy can be addressed properly.
WP7	

2. **What types of best practices does the XR4Human propose?** (This key area relates to the ethical standards that will guide our code of conduct, along with examples of best practices that meet ethical standards, as showcased in the XR4Human Library.)

WP	Input
WP1	
WP2	
WP3	
WP4	Proposing a different methods of how Interoperability is perceived and applied within XR and spatial computing to establish a seamless connection with policymaking and integration of human-centered design aspects to improve creation and achieve a more frictionless production/development processes. This could be achieved by further clustering interoperability into the following three pillars • Technical interoperability • Human-centered / User Interoperability • Juristic/Policy and Legal interoperability
WP5	
WP6	XR applications should keep personal data on the device. The UI design of XR experiences must consider visual and hearing impairments as much as possible.

Figure 8: Received feedback from WP Members.

Funded by the European Union

Script Template

Video Title	Bridging the Gaps: The Imperative for Responsible XR Technologies
Writer	Nicole Sarla, Vana Stavridi

Draft voice over (~545-word script)
Duration app. 4 minutes (130-word/min)
Notes and directions in *italics*

Scene	Script	Visual	Audio
1		*(Same as video #1)* *Gradual appearance of the XR4HUMAN logo in the form of pixels which, as they are composed, will create the complete image of the logo.* **Note: The colors and theme should match those of the XR4Human website (https://xr4human.eu/). The transitions between words and graphics should be a bit more interesting than just fading or sliding. More like, popping, growing, shrinking, and moving.*	
	used and manipulated in various ways; from intimate data sharing to the possibility of behaviour manipulation in extended reality.		
7	Citizens should not need to be experts when interacting with XR technologies. They, however, need to be informed.	*A user wears VR headsets, immerses in the virtual environment where they find 3 doors, one for each risk. On the door the specific type of risk is written using the glitch effect, along with a sound of glitch. The user opens each door and inside finds a representation of a digital environment, with words floating around. The words are specified for each "door"/"type of risk" as follows in the next scenes.*	Glitch sound effect
8	XR technologies raise significant concerns related to data, particularly in data-sensitive domains, where challenges emerge concerning privacy, confidentiality, and the vast amount of data collected.	Door #1 "DATA" and inside the room floating words: -PRIVACY AND CONFIDENTIALITY ISSUES -VOLUME OF DATA EXTRACTED	Glitch sound effect (when showing the door)
9	Particularly critical is the data collection through inside-out tracking, which involves not only the user's physical data, but also environmental information captured by	*-Searching for visual ... Something related to data gathering*	

Figure 9: Sample of final 2nd video script with XR4Human partners' input on narration and visualization

Script Template

Video Title	Emerging Frameworks for human-centered XR EU ecosystem
Writer	Nicole Sarla, Vana Stavridi

Draft voice over (~527-word script).
Duration app. 4 minutes (130-words/min)
Notes and directions in *italics*

Scene	Script	Visual	Audio
1		*(same as video #1)* *Gradual appearance of the XR4HUMAN logo in the form of pixels which, as they are composed, will create the complete image of the logo.* **Note: The colors and theme should match those of the XR4Human website (https://xr4human.eu/). The transitions between words and*	

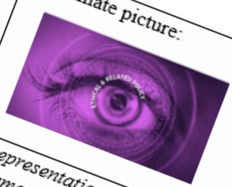
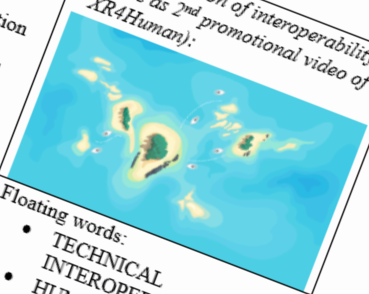
	functionality across diverse environments.	Animate picture: 	
7	XR4Human's purpose is to reimagine how interoperability is perceived and applied within XR and spatial computing to establish a seamless connection with policymaking and integration of human-centered design aspects to improve the creation and achieve a frictionless development process.	*Representation of interoperability (same as 2nd promotional video of XR4Human):* 	
8	This could be achieved by further clustering interoperability into the following three pillars: • Technical interoperability • Human-centered / User Interoperability • Juristic/Policy and Legal interoperability	Floating words: • TECHNICAL INTEROPERABLITY • HUMAN-CENTERED/USER INTEROPERABILITY • JURISTIC/POLICY AND LEGAL INTEROPERABILITY	

Figure 10: Sample of final 3rd video script with XR4Human partners' input on narration and visualization

5. Deviations from DoA

As outlined in the DoA, the educational videos were initially scheduled for completion by M20. However, an extension was requested by the coordinators to the PO to complete this task, and the delivery of the educational videos has been rescheduled for M25. The reason for this request was that these videos serve as educational materials, and we deemed it essential for them to include as comprehensive information as possible. This includes addressing ethical issues surrounding XR technologies and showcasing specific applications necessary to practically demonstrate the ethical development of XR technologies—outcomes that were originally planned for a later stage of the project.

.