D4.1 - Design of the Online Competence Centre platform

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Colophon

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Abbreviations

3D	Three-dimensional form
AI	Artificial Intelligence
API	Application Programming Interface
AR	Augmented Reality
CHIs	Cultural Heritage Institutions
CMS	Content Management System
DEP	Digital Europe Programme
EU	European Union
LMS	Learning Management System
ML	Machine Learning
MOOC	Massive Open Online Course
VR	Virtual Reality
XR	Extended Reality

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1. Executive Summary

The 3D-4CH Platform is established as an **online competence center** dedicated to empowering the cultural heritage sector through advanced 3D technologies, aligning precisely with the Grant Agreement's strategic aims and identified target groups including cultural heritage professionals, institutions, researchers, and creative industries. **Addressing the escalating demand for digital transformation in cultural heritage, particularly for 3D digitization**, virtual museums, and immersive experiences, the platform provides a solution by offering structured, high-quality training, standardized practices, and specialized tools. It is strategically positioned to fill the gap **where broader platforms may lack the necessary depth in 3D expertise**.

Its core offerings are comprehensive: a Centralized Knowledge Base serves as **a go-to repository for good practices, guidelines, and technical standards in 3D cultural heritage**.The platform provides **a diverse range of learning opportunities**, including 3D-4CH developed online courses, interactive modules, in-person workshops, and links to external resources like the Europeana Academy. Complementing these, the platform features a curated **Tools library, timely News and Events updates, and an informative "About the Project" section.**

Designed with a user-centric approach, the platform features **an intuitive, responsive interface,** visually distinguished by a modern magenta palette while strictly adhering to WCAG accessibility standards, ensuring optimal contrast and non-color-dependent information for all users across various devices. Architecturally, it is **built on a modular, scalable, and secure cloud-hosted infrastructure**, engineered for high performance and robust data protection. Critically, the platform **integrates deeply with the Common European Data Space for Cultural Heritage** and Europeana via robust APIs, facilitating the sourcing of inspiring examples, always encouraging citation of original providing institutions. Connections also extend to specialized 3D data (e.g., EUreka3D, 3DBigDataSpace) and AI/XR (AI4Culture, XRculture) initiatives for advanced content sourcing and tool access.

Ultimately, the 3D-4CH Platform is set to **significantly enhance the skills and capabilities of cultural heritage professionals, contributing profoundly to the long-term preservation and enhanced accessibility of European cultural assets in 3D**. By fostering innovation and cross-border collaboration, this initiative will solidify Europe's leadership in the dynamic field of digital cultural heritage.

2. Introduction

The digital transformation of the cultural heritage sector is both an opportunity and a challenge. With the increasing availability of advanced digital tools such as 3D digitisation, AI, and XR, there is a growing need for coordinated support to enable cultural institutions, professionals, and other stakeholders to make effective use of these technologies. The 3D-4CH project responds to this need by designing and deploying an Online Competence Centre, a central digital platform that will empower cultural heritage professionals to develop digital skills, access certified training, collaborate across disciplines, and reuse 3D cultural data in meaningful and sustainable ways. The Competence Centre will provide a user-friendly online environment, i.e. Platform, where professionals, researchers, educators, and enterprises can access a rich set of resources and services, including:

- Accredited training and upskilling opportunities;
- Educational resources, good practices and technical standards;
- Tools and services for 3D data management;
- A library of reuse scenarios across sectors such as education, tourism, and conservation;
- A hub for news, events, and collaboration in the digital cultural heritage space, mostly related, but not limited to 3D.

To follow the EU policies and strategies, the platform is being developed to support the goals of the 2021 European Commission Recommendation on 3D digitisation of cultural heritage (European Commission 2021) and align with the DEP objectives (European Commission, n.d.), especially in the areas of advanced digital skills and the deployment of digital technologies in the culture and creative sectors. This Platform will serve as a strategic enabler for the Common European Data Space for Cultural Heritage, ensuring the long-term preservation, accessibility, and reuse of 3D cultural content, including full integration with past, ongoing and upcoming European projects (e.g., 5DCulture (5DCulture Project, n.d.), AI4Culture (AI4Culture project, n.d.), XRculture (XRCulture Project 2025), 3DBigDataSpace (3DBigDataSpace Project 2025).

Through the platform use and support of the Online Competence Centre, 3D-4CH will significantly contribute to strengthening digital capabilities across Europe's cultural institutions, enhancing access to heritage for diverse audiences, and stimulating innovation and the reuse of 3D cultural content by creative industries, researchers, CHIs and the public.

The document consists of four main elements:

- **Analysis of recent 3D-related initiatives and projects:** This chapter looks at the services dimension of existing 3D-related projects and initiatives. The overview is followed by main insights for designing and developing the 3D-4CH platform.
- **Overview of existing platforms:** This chapter looks at existing online platforms for training delivery and distinguishes between two main dimensions: the content (i.e., training, services) and the functional aspects of existing platforms. The overview is followed by main insights for designing and developing the 3D-4CH platform.
- **User Requirements:** The chapter describes and details both the content perspective of the platform as well as graphic and functional elements and technological infrastructure to support it.
- **Design of the user interface:** The chapter presents the design of all main pages of the platform.

3. Analysis of recent 3D-related initiatives and projects

3.1 Overview of recent 3D-related initiatives and projects

The core concept driving the 3D-4CH Platform is to provide tailored, high-quality, and distinctive services and resources that precisely meet the diverse needs of its user base, which spans cultural heritage professionals, institutions, researchers, and creative industries. This commitment ensures the platform not only fulfills the requirements set out in the Grant Agreement but also delivers significant added value to its users.

To achieve this, an analysis of existing 3D-related initiatives and projects was undertaken. The aim of this overview was to specifically examine their activities and identify how these could be leveraged, linked, or integrated to enhance the 3D-4CH platform's functionalities. For instance:

- **Content Sourcing:** By understanding how platforms like Europeana, EUreka3D, and 3DBigDataSpace aggregate and manage 3D content, 3D-4CH can establish robust mechanisms to source high-quality 3D models and associated metadata for its Knowledge Base and training examples. This avoids duplication of effort and provides access to a vast existing digital heritage.
- **Training Methodologies:** Insights from projects like 4CH and the Europeana Academy inform the structure and delivery methods of 3D-4CH's Training Hub, ensuring effective pedagogical approaches for 3D digitization and related skills.
- **Tool Integration & Accessibility:** Analyzing the tools and frameworks developed by projects such as XRculture and AI4Culture (e.g., AI for 3D processing, XR visualization frameworks) helps 3D-4CH to provide curated access to these advanced capabilities, either by direct linking or by integrating their functionalities where feasible.
- **Standardization & Good Practices:** By examining the guidelines and standards promoted by initiatives across the European data space, 3D-4CH ensures its own content and recommendations for 3D content management align with established best practices, fostering interoperability and long-term preservation.
- **Collaborative Features:** Understanding the collaborative aspects of platforms like ECHOES (European Collaborative Cloud for Cultural Heritage) guides the design of 3D-4CH's features that encourage knowledge sharing and project-based learning among users.

In essence, this analytical approach allows 3D-4CH to build upon existing successes, integrate with established ecosystems, and avoid common pitfalls, ensuring its functionalities are directly relevant, cutting-edge, and truly valuable to the cultural heritage sector.

Projects and initiatives are presented in alphabetical order.

3.1.1 3DBigDataSpace - 3D Big Data for the Data Space for Cultural Heritage

The 3DBigDataSpace (3DBigDataSpace Project, 2025) project is dedicated to significantly expanding the availability of high-quality 3D models within the common European data space for cultural heritage (Common European data space for cultural heritage, n.d.) by integrating datasets from a wide range of providers and aggregators. To support this goal, the project will implement stable, long-term storage solutions across Europe for various types of 3D data, including original models, raw sensor data, and derivatives for 3D viewers. To improve the usability and accessibility of 3D content, 3DBigDataSpace will build on existing aggregation efforts—particularly those led by Europeana —and explore AI-driven data enrichment technologies. These tools will enhance the discoverability, contextual understanding, and targeted reuse of 3D content. Additionally, the project will enable the extensive 3D collection to serve as a resource for Virtual and Augmented Reality viewers, as well as for applications in 4D digital environments. To showcase the potential of the technologies and content, the project will implement demo cases across diverse sectors such as museums, education, cultural tourism, and urban heritage. Furthermore, it will conduct outreach and capacity-building activities, including in-person events, the development of open-access educational materials, and broader dissemination initiatives. These efforts aim to empower cultural heritage stakeholders to create, reuse, and share 3D content more effectively.

Consortium consists of: Time Machine Organisation (TMO), Partners: Friedrich-Schiller-Universität Jena (FSU), IN2 Digital Innovations GmbH, Stichting Europeana, Inception SRL, Fondazione Bruno Kessler (FBK), Rooom AG, The Hunt Museum, Instytut Chemii Bioorganicznej Polskiej Akademii Akademii Nauk (IBCH PAS), Universidad de Vigo (UVIGO), Conferencia de Rectores de las Universidades Españolas (CRUE), European Historic Houses (EHH).

Target users: cultural heritage organizations, research institutions, technology companies

Services:

- **Services & Tools:** Expansion of high-quality 3D models in the European data space; establishment of long-term storage solutions for 3D models and related data, including original models, sensor raw data, and 3D viewer derivatives; AI data enrichment technologies to improve findability and contextualization.
- **Training & Materials:** Capacity-building and outreach activities, including in-person events and open-access educational resources.
- **Demo cases:** will showcase real-world applications of the project's tools and data within different fields such as museums, education, cultural tourism and urban heritage.
- **Technologies:** AI technologies for data enrichment; support for Virtual and Augmented Reality viewers and 4D world applications.

Focus: Aggregating, storing, and enhancing high-quality 3D content for digital cultural heritage.

3.1.2 4CH Project: The Competence Centre for the Conservation of Cultural Heritage

The 4CH project (4CH Project, n.d.) aimed to establish the methodological, procedural, and organizational framework for a Competence Centre, an infrastructure designed to organize and transfer knowledge through various means such as training, standardization, and interdisciplinary collaboration. Employing a holistic and multidisciplinary approach to cultural heritage conservation, the Centre has fostered coordination among cultural heritage institutions across Europe. It has provided services and tools to support the preservation and conservation of historical monuments and sites, leveraging the latest and most effective technologies, with a particular emphasis on 3D technologies. The 4CH project has benefited a wide range of institutions and organizations, both public and private, that are responsible for managing European cultural heritage, as well as service providers such as cultural heritage professionals and SMEs, the creative industries, the hospitality sector, and heritage agencies. Additionally, public bodies, including ministries and decision-makers who influence policies and strategies for conservation, preservation, and digitization, have also benefited. The consortium included leading academic institutions, industry partners, SMEs, and research centers, all bringing complementary expertise and a broad geographic representation across Europe. Consortium consists of Istituto Nazionale di Fisica Nucleare (INFN), INCEPTION SRL, PIN Scrl – Servizi Didattici e Scientifici per L'Universita di Firenze, PRISMA Culture, TECNALIA - Fondacion Technalia Research & Innovation, Visual Dimension BVBA, RDF, KNAW - Koninklijke Nederlandse Akademie van Wetenschappen, Alma Mater Studiorum – Universita di Bologna (UNIBO), Laboratorio Nacional de Engenharia CivilL (LNEC), The Cyprus Institute (CYI), Information Systems Laboratory, Centre for Cultural Informatics, ICS FORTH, Istituto Centrale per il Catalogo Unico Delle Biblioteche Italiane e per le Informazioni Bibliografiche (ICCU), Istituto Centrale per il Catalogo e la Documentazione (ICCD), CARARE - Connecting Archeology and Architecture in Europe, Michael Culture, Institutul National al Patrimoniulu (INP), Universite de Tours, LEICA Geosystems AG.

Target users: Cultural heritage institutions, public and private bodies managing European monuments and heritage sites, cultural heritage professionals

Services:

- **Services & Tools:** Design and definition of a platform to host services suitable for cultural heritage study; development of a framework to link tangible and intangible heritage.
- **Training & Materials:** Guidelines and standards for 3D digitization; capacity-building activities to support digital transformation in cultural heritage.
- **Technologies:** Digital tools and infrastructures for preservation, conservation, and enhancement of cultural heritage.
- **Database:** on EU CH-related projects.
- **Competence Centre:** focused on the preservation and conservation of historical monuments and sites.

Focus: Establishing a competence center for conservation, preservation and valorization of cultural heritage through digital technologies.

3.1.3 5DCulture - Deploying and Demonstrating a 3D Cultural Heritage Space

5Dculture (5DCulture Project, n.d.) enhances the availability of European 3D digital cultural heritage assets in the data space and promotes their reuse across key domains such as education, tourism, and the broader cultural and creative sectors, driving socially and economically sustainable outcomes. Specifically, the project has:

- Delivered high-quality 3D content by identifying and engaging existing datasets from partners' collections, with a focus on fashion, archaeology, and architecture—areas that hold a central place in Europe's rich cultural heritage;
- Developed multiple reuse scenarios that experiment with these assets in their full complexity, from high-quality originals to derivative content, across the following domains: Fashion Collections, Archaeological 3D Content, and Historic Buildings and Cityscapes.

The project has also facilitated the management, enrichment, and reuse of 3D content and employs a range of digital technologies and tools, including AI and semantic technologies. In addition, it has created and promoted capacity-building materials and activities designed to equip cultural heritage institutions with the necessary knowledge and skills to enable broader reuse of their 3D cultural assets.

Consortium consists of: IN2 Digital Innovations GmbH, Europeana Foundation, European Fashion Heritage Association (EFHA), Time Machine Organisation (TMO), Connect Archaeology and Architecture in Europe (CARARE), Inception SRL, Fondazione Bruno Kessler (FBK), Stichting Centraal Museum, Universidad de Jaén (UJAEN), The Discovery Programme: Centre For Archaeology And Innovation Ireland, Stichting Nederlands Instituut Voor Beeld En Geluid (NISV), ARCTUR.

Target users: cultural heritage institutions, educational sectors, tourism industries, cultural and creative sectors, researchers, public administration

Services:

- **Services & Tools:** High-quality 3D content focusing on fashion, archaeology, and architecture; AI, ML and semantic technologies for processing and categorizing 3D assets; Community of Practice platform for sharing tools and good practices.
- **Training & Materials**: Capacity-building materials and workshops to equip cultural heritage institutions with skills for managing and reusing 3D content.
- **Technologies:** AI and machine learning tools for 3D asset management; development of reuse scenarios in domains like education, tourism, and museums.

Focus: Enriching European 3D digital cultural heritage assets and promoting their reuse in education, tourism, and creative industries.

3.1.4 AI4Culture - An AI Platform for the Cultural Heritage Data Space

The project (AI4Culture project, n.d.) aims to create the 'AI4Culture platform', an online capacity-building hub focused on the application of AI technologies within the cultural heritage sector. This platform will provide access to a wide range of AI-related resources, including openly labeled datasets for training and testing AI models, a set of deployable and reusable tools, and various capacity-building materials.

Consortium consists of: National Technical University of Athens, Europeana Foundation, Datoptron, Fondazione Bruno Kessler (FBK), Translated, Datable, Pangeanic, University of Leuven (KU Leuven), European Fashion Heritage Association (EFHA), Stichting Nederlands Instituut Voor Beeld En Geluid (NISV), Austrian Institute of Technology (AIT), CrossLang.

Moreover, the platform will be tailored to meet the specific needs of cultural heritage institutions, offering customisable components for the following use cases:

- Multilingual text recognition in scanned documents
- Multilingual subtitles generation and validation
- Enrichment of content with information extracted from images and semantic linking
- Machine translation for cultural heritage metadata

All platform components will be fully interoperable with the common European data space for cultural heritage, facilitating data sharing, enhancing the reusability of cultural content, and strengthening the connection between the data space and cultural heritage institutions.

Target users: cultural heritage professionals, researchers, educators, cultural heritage enthusiasts

Services:

- **Services & Tools:** Development of the AI4Culture platform, an online capacity-building hub for AI applications in cultural heritage; access to AI-related resources and deployable tools (openly labelled datasets for training and testing AI models).
- **Training & Materials:** Capacity-building materials for multilingual text recognition, subtitle generation, image information extraction, and machine translation.
- **Technologies:** AI technologies for various applications in cultural heritage; interoperability with the common European data space for cultural heritage.

All components will be interoperable with the common European data space for cultural heritage to facilitate data sharing and reusability of cultural content.

Focus: Developing an online platform for applying AI technologies in the cultural heritage sector.

3.1.5 Dicolab Cultura al Digitale

The Dicolab Cultura al digitale (Dicolab Cultura al Digitale, n.d.) project is a strategic national initiative by the Italian Ministry of Culture aimed at advancing the digital transformation of the cultural sector in Italy. Backed by the PNRR Cultura 4.0 program, it delivers free, certified, and high-quality training through an innovative blended learning model that combines online and in-person activities. The project plans to mobilize up to 10 regional hubs to support capacity building and engage a broad network of cultural institutions, professionals, businesses, and local organizations. It is already underway in collaboration with national and local authorities.

By June 2026, the goal is to deliver 40,000 training units, create 100 original educational resources, offer 400 hours of hands-on workshops, and involve over 300 experts and instructors. Learners will have access to a rich variety of resources, including serious games, podcasts, and video lessons, all tailored to enhance digital competencies in the cultural field.

Target users: cultural organizations, cultural sector operators

Services:

- **Services & Tools:** Free, certified training for cultural organizations and professionals; modular and scalable blended learning model with both in-person and online activities.
- **Training & Materials:** Online courses including multimedia content, video lessons, interactive tools, MOOCs, digital workshops, serious games, and podcasts.
- **Technologies**: Digital platforms and tools to support the development of digital skills in the cultural sector.

Focus: Providing free, certified training courses on digital content production and management.

3.1.6 Eureka3D and Eureka3DXR

EUreka3D (Eureka3D Project, n.d.) is a European Union-funded project under the Digital Europe Programme, aimed at advancing the digital transformation of the cultural heritage sector, with a particular focus on 3D digitization. Running from January 2023 to December 2024, the project supports Cultural Heritage Institutions (CHIs)—especially smaller ones—in adopting high-quality 3D digitization practices, enhancing access, storage, and sharing of cultural assets. Key initiatives include the development of the EUreka3D Data Hub, a cloud-based platform registered on the European Open Science Cloud (EOSC) (European Open Science Cloud, n.d.), which provides CHIs with storage and computing resources to manage their 3D assets. The project also emphasizes capacity building through training materials and activities, and contributes to Europeana by aggregating new 2D and 3D digital records, facilitating their reuse in areas like education and tourism.

Consortium consists of: Photoconsortium, Europeana Foundation, Technologiko Panepistimio Kyprou - Cyprus University Of Technology (CUT), Centre for Image Research and Diffusion (CRDI), Ajuntament de

Girona, Bibracte, Associazione Museo Della Carta Di Pescia Ets - Museo Della Carta Di Pescia, Imec, EGI Foundation (EGI), Academic Computer Center CYFRONET AGH.

EUreka3D-XR (Eureka3DXR Project 2025) is a continuation of the EUreka3D project, funded by the European Union's Digital Europe Programme. Building on the features and services developed and tested in the original project, EUreka3D-XR aims to create innovative tools and re-use scenarios that enable the development of extended reality (XR) applications.

Consortium consists of: Photoconsortium, Cyprus University Of Technology (CUT), Centre for Image Research and Diffusion (CRDI) of the Municipality of Girona, Bibracte EPCC, National Technical University of Athens, Europeana Foundation, EGI Foundation.

Target users: Cultural Heritage Institutions (CHIs), Heritage professionals and curators, Researchers and academic institutions, Europeana aggregators and data providers, Policy makers and stakeholders, Education and tourism professionals.

Services:

- **Services & Tools**
  - Integration of XR (Extended Reality) technologies into the common European data space for cultural heritage
  - Tools for immersive storytelling and interactive heritage experiences
  - Support for cultural institutions to publish 3D/XR content in FAIR-compliant ways
- **Training & Materials:**
  - Capacity-building workshops and webinars for cultural heritage professionals on XR tools and workflows
  - Guidelines and tutorials on publishing and using XR content
- **Technologies:**
  - XR publishing toolkit compatible with the data space infrastructure
  - Interoperable solutions for metadata and content alignment across platforms

Use Cases:

- Enabling museums and heritage sites to deliver interactive, immersive experiences
- Supporting digitization strategies with innovative visualization methods
- Use in education, public engagement, and tourism through enriched 3D/XR content

Focus: Enhancing access to and reuse of high-quality 3D and XR cultural heritage content by integrating it into the European data space and empowering institutions with tools, standards, and immersive technologies.

3.1.7 Europeana

Europeana Initiative (Europeana Foundation, n.d.) is the European Union's flagship platform for digital cultural heritage, comprised of three interlinked organizations: Europeana Foundation, Europeana Network Association, and Europeana Aggregators' Forum, and providing access to millions of digitized items from thousands of cultural institutions across Europe. It focuses on making digitized cultural heritage accessible and supporting its reuse across various sectors. Europeana aims to empower cultural heritage professionals with digital skills, support researchers in innovative uses of digital cultural heritage, and provide educational resources for integrating digital culture into teaching practices.

Target users: Cultural heritage professionals, developers, researchers, educators, general public.

Services:

- **Services & Tools:** Europeana Collections (a digital repository of artworks, books, music, etc.); Europeana APIs (APIs for searching, retrieving, and reusing metadata and content).
- **Training & Materials:** Europeana Academy (training on services, frameworks, standards, products, and tools); MOOCs and Webinars (online courses on digital education with cultural heritage, data reuse, Europeana APIs); Educational Resources (materials for educators).
- **Technologies:** Digital platform for accessing and reusing digitized cultural heritage; APIs for data integration.
- **Use cases:** Providing access to digitized cultural heritage items for general consumption, supporting research through funding and documentation, enabling digital education, and empowering cultural heritage professionals with digital skills.

Focus: Providing access to digitized cultural heritage items and supporting their reuse.

3.1.8 European Cloud for Heritage OpEn Science (ECHOES)

The European Collaborative Cloud for Cultural Heritage (ECCCH) (ECHOES Project, n.d.). also known as the Cultural Heritage Cloud, is a key initiative by the European Union aimed at establishing a shared digital infrastructure for cultural heritage institutions and professionals across Europe. Its purpose is to provide dedicated digital collaboration tools tailored to the needs of the sector while also addressing the challenges faced by smaller and more remote institutions. The Cultural Heritage Cloud is designed to integrate a digital dimension into the preservation, conservation, restoration, and enhancement of cultural heritage. It will offer state-of-the-art technologies for the digitisation of artefacts and support research on artworks. The initiative seeks to empower cultural heritage organisations and research bodies—regardless of their size—as well as professionals and non-professionals, in managing their digital assets more efficiently. Through improved visibility, interconnectivity, and access to scientific resources, training, and advanced digital tools, the Cultural Heritage Cloud will play a crucial role in helping institutions adapt to and thrive within the digital transformation of the cultural heritage sector.

Consortium consists of: The French National Center for Scientific Research (CNRS), The National Research Council (CNR), Heritage Science Foundation (Fondation des Sciences du Patrimoine), Europeana

Foundation, Poznań Supercomputing and Networking Center (PSNC), FORTH, Fraunhofer-Gesellschaft, The Royal Institute for Cultural Heritage (KIK-IRPA), The Cyprus Institute (CYI), The Universitat Politècnica de Catalunya · BarcelonaTech (UPC), University of Helsinki, The Austrian National Library (ONB), Media Solution Center (MSC) / Hochschule der Medien (HdM), The Netherlands Institute for Sound and Vision (NISV), The ARIADNE Research Infrastructure AISBL (ARIADNE RI), The Network of European Museum Organisations (NEMO), European Confederation of Conservator-Restorers' Organisation (E.C.C.O.), The International Council on Monuments and Sites (ICOMOS), ENCATC, The EGI Foundation, The Digital Research Infrastructure for the Arts and Humanities (DARIAH), Université de Tours, CY Cergy Paris University (CYU), The Italian Institute of Technology (IIT), The Center for Advanced Studies, Research and Development in Sardinia (CRS4), The Institut national du patrimoine (INP), The Europeana Network Association, PIN, PRISMA, GRNET S.A. – National Infrastructures for Research and Technology, The Austrian Academy of Sciences (OEAW), The Belgrade Center for Digital Humanities (BCDH), Athena RC, Swedish National Heritage Board (Riksantikvarieämbetet), Michael Culture Association (MCA), The National Gallery, London, The University of York.

Target users: heritage professionals, researchers

Services:

- **Services & Tools:** Shared digital infrastructure connecting cultural heritage institutions and professionals; digital collaboration tools tailored for the sector.
- **Training & Materials:** Access to scientific resources, training, and advanced digital tools to support digital transformation, building digital twins, digitisation of existing knowledge and the collaborative analysis of cultural heritage assets, facts, and phenomena.
- **Technologies:** Cutting-edge technology (AI) for artifact digitization and artwork research; enhanced visibility and interconnectivity.
- **Platform:** designed to provide heritage professionals and researchers with access to data, scientific resources, training, and advanced digital tools tailored to suit their needs.

Focus: Creating a shared digital infrastructure for accessing data, innovative scientific and training resources, and advanced digital tools.

3.1.9 The common European data space for cultural heritage

The common European data space for cultural heritage (Common European data space for cultural heritage, n.d.) is a flagship initiative of the European Union aimed at accelerating the digital transformation of the cultural heritage sector. The data space is delivered by a consortium of partners, led by the Europeana Foundation and with 19 specialist organisations from nine EU countries. It encompasses state-of-the-art infrastructure, a vibrant community, and a range of products, frameworks, and tools that facilitate the open and trustworthy sharing of heritage data across Europe. The data space empowers the sector by providing capacity-building opportunities and supporting digital strategies for cultural heritage within Europe. It offers access to high-quality data, with a special emphasis on 3D content, and encourages its reuse to uncover new value. The foundation of this data space is Europeana.eu (Europeana Foundation, n.d.), which offers access to over 59 million digitized items shared by cultural heritage institutions across Europe—ranging from

books, paintings, maps, and manuscripts to audiovisual materials. Educators, researchers, creatives, and citizens are encouraged to explore and reuse this data in innovative ways. The data space will build upon this existing data offering by expanding the inclusion of 3D content and introducing new types of media objects.

Consortium consists of: Europeana Foundation, AIT Angewandte Informationstechnik Forschungsgesellschaft mbH (AIT-Graz), AIT Austrian Institute of Technology GmbH (AIT-Vienna), Archives Portal Europe Foundation (APEF), Capgemini Nederland BV (CAPG), Connecting Archaeology and Architecture in Europe (CARARE), Digital Research Infrastructure for the Arts and Humanities (DARIAH), Datoptron P.C (DATO), Deutsches Filminstitut & Filmmuseum e.V (DFF), European Fashion Heritage Association (EFHA), EUN Partnership AISBL (EUN), Euroclio European Association of History Educators (EuroClio), Facts & Files Digital Services GmbH (F&F), Inception s.r.l (INCEPTION), Michael Culture AISBL (MCA), Stichting Nederlands Instituut voor Beeld en Geluid (NISV), International Consortium for Photographic Heritage Photoconsortium (Photocons), Instytut Chemii Bioorganicznej Polskiej Akademii Nauk - Poznańskie Centrum (PSNC), Time Machine Organisation (TMO).

Target users: Cultural heritage institutions, educators, researchers, creative industries, general public

Services:

- **Services & Tools:** Shared digital infrastructure connecting cultural heritage institutions - frameworks and tools which facilitate the open and trustworthy sharing of heritage data across Europe; access to high-quality data with an emphasis on 3D; support for digital strategies in cultural heritage.
- **Training & Materials:** Capacity-building opportunities to empower the sector.
- **Technologies:** Frameworks and tools facilitating open and trustworthy sharing of heritage data across Europe.

Built upon the work of the Europeana Initiative, and together with 13 other data spaces, it's central in Europe's ambition for a thriving, data-driven society.

Focus: Sharing digitized cultural heritage content across Europe, including 3D media objects.

3.1.10 TRANSMIXR - Ignite the Immersive Media Sector by Enabling New Narrative Visions

The future of media experiences presents exciting challenges, and the advancement of XR and AI technologies offers a unique opportunity for the European Creative and Cultural Sector to reimagine digital co-creation, interaction, and engagement. In the TRANSMIXR (TRNASMIXR Project, n.d.) project, we aim to develop a variety of human-centric tools for remote content production and consumption through social virtual reality. The TRANSMIXR platform will feature a distributed XR Creation Environment that enables remote collaboration practices, as well as an XR Media Experience Environment designed for delivering and consuming highly immersive social media experiences. Additionally, the platform will facilitate the reuse of diverse assets across immersive content delivery platforms.

Consortium consists of: Vrije Universiteit Brussel (VUB), Center for Research and Technology - Hellas (CERTH), Weblyzard Technology GmbH, Immersion, INTEL Deutschland GmbH, Creative Sator e Studio, True Communication Technologies Limited, RTV Slovenija, Agence France-Presse, Stichting Nederlands Instituut Voorbeeld en Geluid, Baltic Film & Creative Tech Cluster, Khora APS, EBU-UER, Sparknews.

Target users: cultural heritage organizations, media organisations, citizens

Services:

- **Services & Tools:** Creation of human-centric tools for remote content production and consumption via social virtual reality; distributed XR Creation Environment; XR Media Experience Environment.
- **Training & Materials:** Resources and support for reimagining digital co-creation, interaction, and engagement possibilities.
- **Technologies:** XR and AI technologies for immersive media experiences.
- **Use cases:** introducing a format for reusable immersive storytelling and social XR-powered workflow for immersive experience production.

Focus: Creating immersive experiences to enhance interaction with cultural heritage.

3.1.11 WEAVE - Widen European Access to Cultural Communities via Europeana

The project developed a framework that links the tangible and intangible heritage of cultural communities, preserving the rich and invaluable cultural heritage they represent. Specifically, the project aggregated over 5,000 new high-quality records to Europeana and showcased these collections through a series of engaging editorials and a virtual exhibition. It conducted several capacity-building activities to strengthen the connection between cultural heritage institutions (CHIs), minority cultural communities, and Europeana (Europeana Foundation, n.d.). In addition, WEAVE (WEAVE Project, n.d.) created a set of open and reusable tools for managing annotations, semi-automatically recognizing specific gestures and movements, and visualizing performances and 3D models.

Consortium consists of: IN2 Digital Innovations GmbH, Europeana Foundation, European Fashion Heritage Association (EFHA), Time Machine Organisation (TMO), Connect Archaeology and Architecture in Europe (CARARE), Inception SRL, Fondazione Bruno Kessler (FBK), Stichting Centraal Museum, Universidad de Jaén (UJAEN), The Discovery Programme: Centre For Archaeology And Innovation Ireland, Stichting Nederlands Instituut Voor Beeld En Geluid (NISV), ARCTUR.

Target users: cultural communities, cultural heritage institutions, researchers, educators

Services:

- **Services & Tools:** Aggregation of over 5,000 new high-quality records to Europeana (Europeana Foundation, n.d.); development of open and reusable tools for annotation management, gesture recognition, and visualization of performances and 3D models.
- **WEAVE Toolkit:** consists of several open and reusable tools and technologies employing a mix of AI techniques, machine learning, natural language processing, big data analysis and innovative interface engineering: 3D Asset Manager, Motion Notes, WEAVEX, Metadata Enrichment Tools.

- **Training & Materials:** Capacity-building activities to connect cultural heritage institutions with minority cultural communities; creation of engaging editorials and a virtual exhibition.
- **Technologies:** AI technologies for semi-automatic recognition of specific gestures and movements; tools for visualization of performances and 3D models.

Focus: Linking tangible and intangible heritage of diverse cultural communities and developing guidelines for preservation.

3.1.12 XRculture - eXplore & Reuse 3D cultural heritage within the Data Space

XRCulture (XRCulture Project 2025) is focused on expanding the availability of high-quality 3D and XR content within the common European (Europeana Foundation, n.d.) data space by applying cutting-edge technologies. The project addresses multiple use cases, including cultural preservation, education, and tourism, and will utilise advanced AI tools—such as NeRF and Gaussian Splatting—for the creation and enhancement of 3D models. These 3D models will form the basis for XR applications developed across various contexts, such as museum exhibitions, endangered heritage, and lost cultural assets. By demonstrating practical reuse scenarios of 3D data in different domains, XRCulture aims to encourage the broader adoption of 3D technologies among businesses, researchers, citizens, and public administrations. Moreover, the project will design an open framework for 3D web visualisation and model management, offering a user-friendly, accessible solution for cultural heritage institutions to digitise, store, and manage their collections. XRCulture will also promote good practices to support the integration of these technologies, accelerating the digital transformation of the cultural heritage sector and strengthening its overall digital capability.

The consortium consists of: INCEPTION, Fondazione Bruno Kessler (FBK), Europeana Foundation (EF), IN2, ARCTUR, RDF, Pixelated Realities (PR), Università Politecnica delle Marche (UNIVPM), Italian Ministry of Culture (MIC), TALENT S.A.

Target users: cultural heritage institutions, businesses, citizens, researchers, public administration

Services:

- **Services & Tools:** Increase in high-quality 3D and XR content in the data space; development of XR applications for various scenarios including museums and heritage sites., AI tools for 3D model generation and improvement (NeRF, Gaussian Splatting).
- **Training & Materials:** Promotion of good practices for adopting 3D technologies in the cultural heritage sector.
- **Technologies:** AI tools for 3D model generation and improvement; open framework for 3D web visualization and management.
- **Use cases:** availability of high-quality 3D and XR content in the data space through innovative technologies, catering to various use cases such as preservation, education, and tourism.

Focus: Enriching the European data space for cultural heritage through innovative 3D digitization and XR Technologies.

3.2 3D-4CH connections with existing platforms and tools

The 3D-4CH platform, as an Online Competence Centre for 3D Cultural Heritage, has an important requirement to connect and source content from other projects and platforms within the broader European cultural heritage data space. This not only enhances its own offerings but also contributes to the interoperability and sustainability of the entire ecosystem.

To maximize its value and avoid duplicating efforts, strategically the 3D-4CH must connect key existing European digital cultural heritage platforms.

Europeana and the Common European Data Space for Cultural Heritage

- **Primary Source of 3D and Related Content:** This is the foundational platform for digitized European cultural heritage, with an increasing focus on 3D.
- **How 3D-4CH Connects:**
    - **Source cultural heritage examples** for training modules and demonstrations without hosting the original data.
    - **Alignment with Europeana Publishing Framework (EPF):** Ensure any 3D data or metadata generated or processed within 3D-4CH (e.g., from user projects or specific digitization training) is **compatible with the Europeana Publishing Framework and Data Model (EPF & EDM)**. This facilitates potential future contribution *from* 3D-4CH *to* Europeana.
    - **"Powered by" Recognition:** Recognizing Europeana's emphasis on crediting original sources, the 3D-4CH platform will focus its acknowledgment on the partnership and collaboration with Europeana and the Common European Data Space for Cultural Heritage. This approach highlights the vital frameworks, important networks, and invaluable discovery capabilities these initiatives provide, allowing 3D-4CH to present inspiring examples while still directing users to cite the original providing institution for specific items.

Specialised 3D data Platforms and Tools (e.g., EUreka3D Data Hub, WEAVE, 3DBigDataSpace, XRCulture

- **Specialized 3D Data Aggregators & Tools:** These platforms are specifically designed to collect, store, and often enhance high-quality 3D models for cultural heritage. While some are still under development, their aim is to facilitate data sharing.
- **How 3D-4CH Connects:**
    - **Integration:** Seek integration with existing platforms and initiatives to facilitate sharing 3D cultural collections in the Common European Data Space.
    - **"Demo Cases" Integration:** Showcase "demo cases" or use case examples developed by 3DBigDataSpace or XRCulture within 3D-4CH's training modules, illustrating practical applications of 3D data and technologies.

Specialised data aggregators (e.g. CARARE, MICHAEL-Culture, PhotoConsortium, Sound & Vision, national aggregators)

- **Europeana aggregators**: Aggregators work with cultural heritage institutions to gather authentic, trustworthy and robust data and make it accessible through Europeana. The Europeana Aggregators' Forum (EAF) is a network of national, regional, domain and thematic aggregators. Some aggregators have developed specialized services for the aggregation of 3D models for cultural heritage, others have services under development.
- **How 3D-4CH connects:**
    - **Content Sourcing:** We'll explore direct technical connections with specialized 3D aggregators (e.g., those developing 3D aggregation services) to source high-quality 3D models and associated metadata for use in our training materials and knowledge base.
    - **Good Practice Exchange:** We'll collaborate with aggregators to share good practices for 3D data aggregation, standardization, and publication to Europeana, aligning our training with real-world needs.
    - **Networking and Partnerships:** We'll engage with the Europeana Aggregators' Forum (EAF) to build partnerships and identify new opportunities for content collaboration and mutual support in advancing 3D digital heritage.

AI-focused Platforms (e.g., AI4Culture)

- **Source of AI Tools and Datasets:** AI4Culture (“AI4Culture”, n.d.) is a capacity-building hub providing access to AI tools, openly labeled datasets, and upskilling materials relevant to cultural heritage.
- **How 3D-4CH Connects:**
    - **AI4Culture API:** 3D-4CH can use AI4Culture’s API to:
        - **Link to AI Tools:** Direct users to specific AI tools for 3D data processing (e.g., object detection on 3D model textures) available on AI4Culture.
        - **Reference Datasets:** Point learners to openly labeled datasets for training and testing AI models relevant to 3D cultural heritage tasks.
    - **Content Curation:** Integrate "Upskilling Materials" or "Recipes" from AI4Culture into 3D-4CH's curriculum to explain how AI can be applied to 3D heritage workflows.

Collaborative Cloud Platforms (e.g., ECHOES/ECCCH)

- **Shared Infrastructure for Collaboration:** The European Collaborative Cloud for Cultural Heritage (ECCCH) (ECHOES Project, n.d.) aims to be a shared digital environment for professionals to access data, scientific resources, and collaborative tools.
- **How 3D-4CH Connects:**
    - **Collaborative Workspaces:** Explore future integrations that allow 3D-4CH users (during advanced training or projects) to utilize or interact with collaborative workspaces or shared scientific resources provided by ECCCH, for instance, for joint analysis of 3D heritage digital twins.

4. Existing Platform Analysis

For the analysis purpose, we have evaluated two distinct categories of digital platforms that are highly relevant to the design and functionality of the 3D-4CH platform. The first category comprises prominent online platforms that primarily deliver training content, often in video format, and serve as marketplaces or aggregators for diverse educational materials. The second category focuses on the underlying tools and software that facilitate the creation, management, and delivery of online courses and learning experiences, commonly known as Learning Management Systems (LMS).

This dual evaluation approach provides comprehensive insights into both the content delivery models and the technical infrastructures necessary for a robust online competence center, ultimately informing the strategic choices for the architecture, features, and user experience of the 3D-4CH platform to best meet the needs of cultural heritage professionals.

Projects and initiatives are presented in alphabetical order.

4.1 Overview of existing platforms

For the analysis purpose, we have evaluated:

1. **Platforms that are offering training videos (e.g. Course Marketplace):**
    - Coursera – Platform offering video-based courses from universities and institutions.
    - Udemy – Marketplace for video-based courses by independent instructors.
    - Skillshare – Subscription-based platform offering creative and professional video classes.
2. **Tools & Software, which offer the course & LMS creation:**
    - Moodle – Open-source Learning Management System (LMS) software.
    - Teachable – Course creation platform for hosting and selling video and other types of courses.
    - Thinkific – All-in-one software for creating, marketing, and selling online courses.
    - TalentLMS – Corporate-focused cloud LMS platform for training and eLearning.
    - LearnWorlds – Course creation platform with interactive video tools, quizzes, and marketing features.
    - Open edX - open-source software platform for delivering online learning experiences, particularly designed for (MOOCs) and Small Private Online Courses (SPOCs).

4.1.1 Coursera

A global leader in online education, Coursera (Coursera, n.d.) partners with top universities and companies to offer certified courses, professional certificates, and degree programs. It features high-quality video lectures, assignments, and peer-reviewed assessments.

About:

- **Content & Functionalities:** Offers a vast array of courses, specializations, and degree programs from leading universities and companies worldwide.
- **Real-World Application:** Courses are designed in collaboration with academic and industry partners, ensuring relevance to current job markets.
- **Content Delivery Methods:** Includes video lectures, interactive quizzes, peer-reviewed assignments, and community discussion forums.
- **Tools & User Features:** Provides personalised course recommendations, progress tracking, and certificates upon completion.
- **Pricing:** Offers both free and paid courses; paid options include certifications and degree programs.
- **Technical Interoperability:** Integrates with various LMS and enterprise systems for seamless learning experiences.
- **Semantic Alignment:** Utilises standardised course structures and metadata for consistency across offerings.
- **User Engagement & Training:** Engages learners through interactive content and community support.
- **Legal & Licensing:** Courses are subject to specific licensing agreements; users should review the terms for each course.
- **Added Value for Training**: Provides access to high-quality education from reputable institutions, enhancing professional development.

Functionalities:

- Course Content Delivery: High-quality university-level video lectures, quizzes, downloadable content, and peer-reviewed assignments.
- Marketplace Functionality: Advanced filters, instructor bios, verified reviews, free courses, paid certificates, and Coursera Plus subscription.
- Instructor Tools: University-level tools, detailed analytics, high support for educators, but only for partners.
- Learner Progress & Certification: Detailed tracking, accredited certificates, specializations, and degree programs.
- Global Accessibility & Localization: Extensive language support, subtitles, mobile apps, accessibility features.
- Community & Support: Active forums, peer support, instructor Q&A, and robust help center.

Insights for designing 3D-4CH platform:

- Free courses, hands-on projects, certificate programs, and stackable credentials.
- Provide transformative learning with expert-curated, AI-driven learning programs.
- Offers lot of information about the course: duration, difficulty level, rating of users

4.1.2 LearnWorlds

Known for its interactive video capabilities, LearnWorlds (“LearnWorlds”, n.d.) allows educators to build engaging video-based courses with embedded questions, transcripts, and note-taking. It also offers robust analytics and marketing tools.

About:

- **Content & Functionalities:** A highly interactive platform that allows course creation with videos, eBooks, SCORM, quizzes, exams, certificates, and discussion forums.
- **Real-World Application:** Used by educators and companies to build interactive academies or branded online schools.
- **Content Delivery Methods:** Modular courses, live sessions (Zoom, Webex integration), self-paced and cohort-based learning.
- **Tools & Features:** Video editor, interactive video features (quizzes within video), advanced analytics, white-label options, customizable templates, and marketing automation.
- **Pricing:** Paid-only platform with multiple tiers; no free version but offers trial periods.
- **Technical Interoperability:** Integrates with Zoom, HubSpot, Zapier, Mailchimp, and supports SCORM and HTML5.
- **Semantic Alignment:** Strong structuring tools, tagging, and course templates support semantic organisation.
- **User Engagement & Training**: Offers interactive videos, gamified elements, personalised learning paths, and certificates.
- **Legal & Licensing:** Complies with international data regulations; terms vary based on account type.
- **Added Value for Training**: Great for professional educators needing high interactivity and course branding.

Functionalities:

- Course Management: Rich multimedia support, including interactive videos and ebooks.
- User Management: User segmentation, profiles, and flexible role permissions.
- Assessment and Evaluation: Advanced quizzes, exams, certificates, and assignments.
- Progress Tracking & Reporting: Detailed learner analytics and automation.
- Communication & Collaboration: Social learning tools, discussion boards, notifications.
- Integration & Customization: Strong API, SSO, white-labeling and advanced branding options.
- Mobile Accessibility: Fully responsive design and white-label mobile app options.

Insights for designing 3D-4CH platform:

- Re-imagined interactive video learning: Effortlessly converting videos into exceptional experiences with automatically extracted transcripts, quizzes, and tables of contents.

4.1.3 Moodle

A popular open-source learning management system (LMS) (Moodle, n.d.) is widely used in academic institutions across Europe. It allows for the creation of video-integrated courses, quizzes, assignments, and collaborative tools.

About:

- **Content & Functionalities:** An open-source LMS allowing educators to create customised learning environments.
- **Real-World Application:** Widely used in academic institutions for course management and delivery.
- **Content Delivery Methods:** Supports various formats, including videos, quizzes, forums, and assignments.
- **Tools & User Features:** Offers extensive customisation, plugins, and mobile access through Moodle apps.
- **Pricing:** Free to use; hosting and additional services may incur costs.
- **Technical Interoperability:** Highly interoperable with other systems via plugins and standards like SCORM.
- **Semantic Alignment:** Allows for standardised course structures and metadata tagging.
- **User Engagement & Training:** Facilitates interactive learning through forums, chats, and collaborative tools.
- **Legal & Licensing:** Distributed under the GNU General Public License; users must comply with open-source terms.
- **Added Value for Training:** Provides a flexible, scalable solution for diverse educational needs.

Functionalities:

- Course Management: Highly advanced, supports all content types including SCORM and custom plugins.
- User Management: Full control with user roles and detailed permission settings.
- Assessment and Evaluation: Robust quizzes, assignments, and grading system with rubrics.
- Progress Tracking & Reporting: Advanced analytics and reporting, compliance tracking supported.
- Communication & Collaboration: Integrated forums, messaging, and third-party live session tools.
- Integration & Customization: Extensive plugin library, API access, full branding and SSO options.
- Mobile Accessibility: Responsive design and official mobile app available.

Insights for designing 3D-4CH platform:

- Platform accessible in multiple languages
- Easy to use, allows you to effortlessly create engaging videos with quizzes, wordpuzzles, chats, notes, etc.

4.1.4 Open edX

As an open-source platform for online learning, Open edX (Open edX Project, n.d.) empowers educational institutions, corporations, and non-profit organizations to deliver scalable and customizable learning experiences. It is particularly well-suited for large-scale initiatives like MOOCs but can be adapted for diverse training needs.

About:

- **Content & Functionalities:** Open edX is a robust, open-source LMS that supports a wide array of multimedia content (videos, text, images, PDFs, audio), interactive problems (quizzes, assignments, peer assessments), discussion forums, and collaborative tools. It also supports SCORM and xAPI for content interoperability.
- **Real-World Application:** Widely used by leading universities (e.g., MIT, Harvard via edX.org), large corporations for employee training and development, professional certification programs, and government initiatives. It's effective for onboarding, compliance, skills development, and broad public education.
- **Content Delivery Methods:** Supports self-paced courses, instructor-led courses with scheduled content releases, blended learning, and adaptive learning pathways.
- **Tools & Features:** Course authoring environment (Studio) for rich content creation, a Learner Management System (LMS) for student experience, comprehensive assessment tools (graded assignments, quizzes, in-video assessments), analytics (Open edX Insights), discussion forums, progress tracking, and certification capabilities.
- **Pricing:** Free to download and use the open-source code. Costs arise from hosting, customization, development, and support, typically provided by Open edX service providers. Pricing models from providers (e.g. MOOCit) can vary, including fixed-price, hourly rates, or dedicated team models, depending on the scope and customization required.
- **Technical Interoperability:** Strong API support (Courses, Enrollment, Users, Grades APIs), LTI (Learning Tools Interoperability) integration for connecting external tools, and support for SSO (OAuth2, SAML, OpenID Connect) for user authentication. Integrates with video hosting, CRMs, and analytics tools.
- **Semantic Alignment:** Allows for hierarchical structuring of courses, modules, and units. Supports metadata and tagging for effective content organization and discovery.
- **User Engagement & Training:** Features discussion forums, peer interaction, and the ability to set learning goals. While not inherently gamified like some commercial tools, gamification can be added through customization or third-party integrations. Resources for course authors and administrators are available through documentation and the community.
- **Legal & Licensing:** As open-source software, it offers flexibility in data ownership and privacy. Open edX's privacy policy addresses GDPR principles regarding data collection, use, sharing, retention, and security, making it adaptable for GDPR compliance.
- **Added Value for Training:** Provides flexibility and scalability for large user bases. Offers deep customization options to align with specific organizational branding and learning objectives.

Cost-effective for organizations with in-house technical capabilities or those leveraging managed service providers (e.g. MOOCit).

Functionalities:

- **Course Management:** Highly flexible course structure, supports various content types, conditional content release, SCORM package integration, and version control for course materials.
- **User Management:** Robust user management with role-based access control, comprehensive user profile management, and options for individual or bulk enrollment.
- **Assessment and Evaluation:** Diverse assessment types including multiple-choice, drag-and-drop, open-ended assignments, peer grading, and proctored exam integration. Supports robust grading and progress tracking.
- **Progress Tracking & Reporting:** Open edX Insights provides detailed analytics on learner engagement, progress, and performance, enabling data-driven course improvement. APIs allow for exporting data for external analysis.
- **Communication & Collaboration:** Built-in discussion forums, ability to send broadcast messages, and integration capabilities for live sessions (e.g., Zoom, Teams via LTI).
- **Integration & Customization:** Extensive customization capabilities for branding, features (via XBlocks), and workflows. Supports SSO and a wide range of third-party integrations.
- **Mobile Accessibility:** Offers native mobile apps for iOS and Android (often developed by service providers) providing offline access, push notifications, and an optimized mobile learning experience. The core web platform also adheres to WCAG 2.2 for web accessibility.

Insights for designing 3D-4CH platform:

- The modular design and extensive customization options allow for tailoring the platform precisely to the unique needs of cultural heritage institutions, including specialized 3D visualization and asset management.
- The strong assessment and analytics capabilities could be leveraged to track engagement with 3D models and XR experiences, providing valuable insights for cultural heritage preservation and outreach.

4.1.4 Skillshare

Focused on creative and business skills, Skillshare (Skillshare, n.d.) offers thousands of video-based classes with project assignments. It operates on a subscription model and emphasises peer interaction and feedback.

About:

- **Content & Functionalities:** Focuses on creative and entrepreneurial skills, offering project-based classes.
- **Real-World Application:** Courses aim to enhance creative abilities applicable in various professional contexts.
- **Content Delivery Methods:** Short video lessons accompanied by class projects and community discussions.
- **Tools & User Features:** Provides curated class lists, project galleries, and feedback from peers.
- **Pricing:** Subscription-based model with a free trial; no permanent free access.
- **Technical Interoperability:** Accessible via web and mobile apps; limited integration with external systems.
- **Semantic Alignment:** Courses follow a consistent format, enhancing user experience.
- **User Engagement & Training:** Encourages active participation through projects and peer interaction.
- **Legal & Licensing:** Content is licensed for personal use; redistribution is prohibited.
- **Added Value for Training:** Offers a community-driven platform for developing creative skills.

Functionalities:

- Course Content Delivery: Creative and project-based video lessons, downloadable materials, no formal quizzes.
- Marketplace Functionality: Creative focus with trending tags, instructor bios, feedback ratings, all-access subscription model.
- Instructor Tools: Simplified tools for video and content upload, earnings analytics, strong peer community.
- Learner Progress & Certification: Minimal progress tracking, no certificates, project-based learning focus.
- Global Accessibility & Localization: Subtitles and mobile apps available, basic accessibility support.
- Community & Support: Project galleries, student interaction, help center, limited instructor Q&A.

Insights for designing 3D-4CH platform:

- Since the platform focuses mainly on creative and practical skills, it offers design-aligned tools, very creative videos.
- Simple platform, easy to use.

4.1.5 TalentLMS

Designed for corporate training, TalentLMS (TalentLMS, n.d.) is used by companies across Europe to deliver structured learning. It includes video lessons, tests, certifications, and user tracking features.

About:

- **Content & Functionalities:** TalentLMS is a cloud-based LMS designed for corporate training. It supports multimedia lessons, tests, assignments, SCORM, xAPI, and video conferencing.
- **Real-World Application:** Widely used for employee onboarding, compliance training, and skills development in organisations.
- **Content Delivery Methods:** Structured learning paths, blended learning, microlearning, and synchronous/asynchronous training.
- **Tools & Features:** Course builder, assessment engine, gamification, reporting tools, user groups, certifications, and mobile learning.
- **Pricing:** Free tier with limited users; scalable paid plans based on active users or registered users.
- **Technical Interoperability:** API support, integration with Zoom, Salesforce, BambooHR, and others. SCORM and xAPI-compliant.
- **Semantic Alignment:** Supports hierarchical structuring of courses, metadata, and tagging for content organisation.
- **User Engagement & Training:** High engagement via gamification, badges, leaderboards, and mobile access.
- **Legal & Licensing:** GDPR compliant, with customizable user permissions and audit logs.
- **Added Value for Training:** Excellent for internal corporate training with strong analytics and user segmentation.

Functionalities:

- Course Management: Strong enterprise features, SCORM/TinCan support, easy to use.
- User Management: Full control with role-based access, automation options for enrollment.
- Assessment and Evaluation: Built-in quizzes, assignments, and certification tracking.
- Progress Tracking & Reporting: Advanced analytics and compliance tracking tools.
- Communication & Collaboration: Discussion forums, email, and live session support.
- Integration & Customization: Wide integrations, SSO support, corporate branding features.
- Mobile Accessibility: Mobile responsive and native app support for Android/iOS.

Insights for designing 3D-4CH platform:

- Intuitive, nicely designed and well-structured, user-friendly interface. With the responsive design, logging in and leaning into training happens anytime, anywhere.
- Bringing together all training tools and material in one convenient place.

4.1.6 Teachable

A platform (Teachable, n.d.) that allows individuals and organizations to build customizable online courses. It supports video content, quizzes, and assignments and includes monetization and marketing tools.

About:

- **Content & Functionalities:** Teachable enables creators to build and sell online courses, coaching services, and digital products. Users can upload video content, PDFs, quizzes, and more. It supports payment gateways, marketing tools, and course analytics.
- **Real-World Application:** Popular among entrepreneurs, coaches, and small businesses to monetize knowledge. Integrated with email marketing, CRM tools, and affiliate systems.
- **Content Delivery Methods:** Self-paced video-based courses, downloadable materials, coaching sessions, and quizzes.
- **Tools & Features:** Course builder, customizable landing pages, email campaigns, sales tracking, analytics, and affiliate marketing tools.
- **Pricing:** Paid plans starting from basic to professional tiers. No free version, but it offers a limited free trial.
- **Technical Interoperability:** Integrates with Zapier, Mailchimp, ConvertKit, and other third-party tools.
- **Semantic Alignment:** Content structure is creator-defined but supports curriculum-based organisation.
- **User Engagement & Training:** Supports progress tracking, quizzes, comments, and drip content to retain engagement.
- **Legal & Licensing:** Creators own their content. Teachable takes a commission based on the pricing tier.
- **Added Value for Training:** Strong for monetisation and branding; ideal for instructors looking for full ownership and direct revenue generation.

Functionalities:

- Course Management: Easy-to-use course creation with video, quizzes, and downloads.
- User Management: Basic user roles and student profiles, limited customization.
- Assessment and Evaluation: Simple quizzes and basic grading; lacks advanced testing tools.
- Progress Tracking & Reporting: Basic reporting dashboard and certificates.
- Communication & Collaboration: Email-based messaging; no forums or native live tools.
- Integration & Customization: Good branding options, limited APIs, no full SSO support.
- Mobile Accessibility: Responsive site design; no dedicated mobile app.

Insights for designing 3D-4CH platform:

- Teachable offers building an online community directly in the platform, which none of the other platforms offer. It is an in-built tool for building powerful user-to-user connections.
- Users can easily create digital downloads (courses, training materials or handouts), provide it on the platform and engage with other users.
- Build a professional-looking course in minutes—no coding or design skills necessary. Users can use the AI course starter to create content, upload it through builders and customise it in minutes.

4.1.7 Thinkific

Used for building, marketing, and selling online courses, Thinkific (Thinkific, n.d.) supports multimedia lessons including video, quizzes, and downloadable resources. It's popular with professionals and businesses creating their own branded courses.

About:

- **Content & Functionalities:** Thinkific allows users to create, market, and sell online courses and memberships. It supports multimedia content (videos, PDFs, audio), quizzes, surveys, and certificates.
- **Real-World Application:** Used by educators, consultants, and enterprises to create scalable training programs.
- **Content Delivery Methods:** On-demand video courses, downloadable files, live lessons (via integrations), and scheduled content release (drip).
- **Tools & Features:** AI-powered content and design tools, drag-and-drop course builder, marketing integrations, affiliate program tools, white-label branding, community forums.
- **Pricing:** Offers a free tier with limited features and several paid plans with enhanced capabilities.
- **Technical Interoperability:** Supports integrations with Zoom, Stripe, Shopify, and other platforms.
- **Semantic Alignment:** Structured modules and lessons with consistent UX design; metadata tagging supported.
- **User Engagement & Training:** Features quizzes, surveys, certificates, and learner progress dashboards.
- **Legal & Licensing:** Instructors retain full ownership. Platform compliance with data protection regulations.
- **Added Value for Training:** Strong for B2B and B2C education delivery with robust branding, scalability, and customisation.

Functionalities:

- Course Management: Strong tools for organizing multimedia courses; supports quizzes and videos.
- User Management: Roles for admins and instructors; learner progress tracking available.
- Assessment and Evaluation: Basic quizzes, assignments via third-party tools.
- Progress Tracking & Reporting: Dashboard for performance insights, basic certificate support.
- Communication & Collaboration: Limited to email and comments; live session integration via Zoom.
- Integration & Customization: Good customization and branding; third-party app integrations.
- Mobile Accessibility: Fully responsive, mobile-friendly; no dedicated app.

Insights for designing 3D-4CH platform:

- The platform prioritises customer engagement and course completion
- AI Course Outline Generator for an easy start
- Free AI tools (course name generator, community name generator, course idea generator)
- Quizzes, assessments, and automated learning notifications
- Fully customised users' dashboards
- Certificates and accreditation system: automatically sending completion certificates after they finish a course.

- Engaging multimedia lessons, including different formats

4.1.8 Udemy

A widely used platform (Udemy, n.d.) offering affordable, on-demand courses in a broad range of subjects. It allows educators to upload video-based courses with interactive content like quizzes and discussion forums, catering to learners of all levels.

About:

- **Content & Functionalities:** Hosts a wide range of courses across various fields, created by individual instructors.
- **Real-World Application:** Courses often focus on practical skills applicable to current job roles and industries.
- **Content Delivery Methods:** Primarily video-based lectures supplemented with quizzes and downloadable resources.
- **Tools & User Features:** Features lifetime access to purchased courses, mobile learning, and certificate of completion.
- **Pricing:** Courses are individually priced, with frequent discounts; some free courses are available.
- **Technical Interoperability:** Accessible across multiple devices; integrates with certain enterprise systems.
- **Semantic Alignment:** Course quality and structure can vary due to diverse instructor backgrounds.
- **User Engagement & Training:** Encourages self-paced learning with community Q&A and instructor feedback.
- **Legal & Licensing:** Content is owned by instructors; users receive a license to access purchased courses.
- **Added Value for Training:** Offers affordable, flexible learning options for individuals seeking specific skills.

Functionalities:

- Course Content Delivery: Flexible content with pre-recorded videos, quizzes, downloadable files, and occasional assignments.
- Marketplace Functionality: Large catalog with filters, instructor info, user reviews, frequent sales and lifetime course access.
- Instructor Tools: Open platform for instructors, easy-to-use tools, revenue dashboards, community support.
- Learner Progress & Certification: Simple progress tracking, certificates of completion (not accredited), no formal learning paths.
- Global Accessibility & Localization: Multiple language subtitles, mobile app with offline viewing, accessibility support.
- Community & Support: Basic forums, limited instructor Q&A, comprehensive help documentation.

Insights for designing 3D-4CH platform:

- Easy way to find videos, since these are listed according to topic.

- Offers Hands-on training: Upskilling effectively with AI-powered coding exercises, practice tests, and quizzes.

4.2 Insights for designing the 3D-4CH platform

Designing the 3D-4CH platform requires careful consideration of various aspects to ensure its success and sustainability. Drawing from the insights of other platforms, the design builds upon several factors.

Content & Learning Experience

1. **Maintaining High Quality and Relevance:**
    - **Pitfall:** Offering content that is outdated, lacks depth, or isn't directly applicable to real-world cultural heritage challenges.
    - **Careful about:** Ensuring all video lectures, 3D models, and resources are meticulously curated, technically accurate, and directly address the needs of cultural heritage professionals. Regular updates are critical, especially given the rapid advancements in 3D technologies and AI. Partnering with reputable institutions (from consortium, stakeholder panel and advisory board) will help maintain this standard.
2. **Balancing Breadth and Depth of Content:**
    - **Pitfall:** Overwhelming users with too much generic content or, conversely, being too niche to attract a broad audience.
    - **Careful about:** Striking a balance between foundational 3D skills applicable across cultural heritage (e.g., photogrammetry basics) and highly specialized topics (e.g., specific object reconstruction techniques). Content shall be structured into clear learning paths, specializations, and individual courses.
3. **Ensuring True Interactivity (beyond passive video):**
    - **Pitfall:** Merely uploading pre-recorded videos without opportunities for hands-on application or immediate feedback.
    - **Careful about:** Leveraging interactive video features (like seen in LearnWorlds), embedded quizzes, and practical assignments. For 3D heritage, this means allowing users to work with 3D datasets, perhaps through browser-based tools or downloadable practice files. Gamification elements (points, badges, leaderboards) can also significantly boost engagement.
4. **Clear Learning Objectives & Assessment:**
    - **Pitfall:** Vague course objectives or assessments that don't truly measure skill acquisition.
    - **Careful about:** Clearly defining what learners will be able to *do* after each course or module. Implement robust assessment methods, including practical projects, peer reviews, and quizzes that validate understanding and skill application in a 3D cultural heritage context.

User Experience (UX) & Design

1. **Intuitive Navigation & User Interface:**
    - **Pitfall:** A cluttered, confusing interface that makes it hard for users to find content, track progress, or access tools.

- **Careful about:** Prioritizing a clean, logical, and user-friendly design. Easy search and filtering of 3D topics, cultural heritage types, and skill levels (like seen in Udemy). Clicks to access essential information shall be minimized.

2. **Responsive Design & Mobile Accessibility:**
   - **Pitfall:** A platform that works well on desktop but is clunky or unusable on mobile devices, limiting accessibility for users on the go.
   - **Careful about:** Ensuring the platform is fully responsive and offers a seamless experience across desktops, tablets, and mobile phones.
3. **Visual Appeal & 3D Integration:**
   - **Pitfall:** A visually dull platform, or one that handles 3D content poorly (slow loading, low quality rendering).
   - **Careful about:** Creating a visually engaging platform that celebrates cultural heritage and effectively showcases 3D models. 3D asset loading and rendering shall be optimised for smooth user experience, even on varying internet speeds.
4. **Comprehensive Accessibility:**
   - **Pitfall:** Excluding users with disabilities, such as visual impairments, due to design oversights.
   - **Careful about:** Adhering to **Web Content Accessibility Guidelines (WCAG)** standards to ensure the platform is usable by everyone. This includes providing **alt text for images**, ensuring **keyboard navigation**, offering **high contrast options**, and making sure text is **resizable and screen-reader compatible** for users with visual impairments or other disabilities.

Community & Engagement

1. **Motivating Completion & Retention:**
   - **Pitfall:** High drop-off rates due to lack of motivation or perceived value.
   - **Careful about:** Implementing features that track progress, offer certifications (like seen in Coursera and Thinkific, and provide automated nudges or personalized recommendations. Gamification elements can significantly boost engagement and completion rates.

Technical & Operational Aspects

1. **Scalability of 3D Content & User Base:**
   - **Pitfall:** Performance issues (slow loading, crashes) as the number of users or complex 3D models grows.
   - **Careful about:** Building on a robust, cloud-based infrastructure (like TalentLMS recommends) that can handle large volumes of data (especially 3D models) and a growing user base without compromising performance.
2. **Integrations & Interoperability:**
   - **Pitfall:** Being a siloed platform that doesn't easily connect with other tools cultural heritage professionals might use.

- **Careful about:** Planning for API access and integrations with relevant tools (e.g., data repositories) to ensure a seamless workflow for users. SCORM and xAPI compliance can be beneficial for institutional partners.

3. **Data Security & Privacy (Especially for Cultural Heritage Data):**
   - **Pitfall:** Inadequate protection of user data or sensitive cultural heritage information.
   - **Careful about:** Implementing robust security measures from day one. Clearly communicate data collection, usage, and sharing policies. Comply with relevant data protection regulations like GDPR, especially when handling private user data.
4. **Content Management & Ease of Creation:**
   - **Pitfall:** Making it too difficult for experts or partners to create and upload their heritage content.
   - **Careful about:** Providing intuitive tools for content creation or offering technical assistance. This empowers more experts to contribute high-quality materials.

Legal & Licensing

1. **User-Generated Content (UGC) - Copyright & Moderation:**
   - **Pitfall:** Users uploading copyrighted 3D models or content without proper rights, or posting inappropriate material.
   - **Careful about:**
     - **Clear Terms of Service/Use:** Define ownership of UGC, grant necessary licenses to the platform for display/distribution, and outline prohibited content.
     - **User Consent:** Implement clear "opt-in" consent mechanisms when users submit content, explicitly stating how their content might be used (e.g., for showcasing, promotional material).
     - **Reporting Mechanisms:** Provide a simple way for users to report inappropriate or infringing content.
     - **Moderation Policy:** Have a clear plan for content review and removal, balancing automation with human oversight. Be mindful of liability for user-generated defamatory or infringing content, especially under EU law.
2. **Platform Content Licensing:**
   - **Pitfall:** Ambiguity about who owns the intellectual property of courses developed *for* the platform, or how cultural heritage data shared on the platform can be used.
   - **Careful about:** Clearly defining licensing agreements for content provided by partners and educators. For cultural heritage data, establish clear policies on data reuse (e.g., Europeana Rights Statements (Europeana Foundation 2024), Creative Commons licenses for open access resources).
3. **GDPR Compliance**
   - Pitfall: Some non-EU based providers of services claim to be GDPR compliant, but a thorough check is needed to confirm this is done sufficiently.
   - Careful about: checking GDPR compliance and having all processes in place and transparent.

5. User Requirements

5.1 Aim of the Online Competence Centre Platform

The 3D-4CH project is creating the Online Competence Centre Platform as a central hub for 3D in the cultural heritage domain. Designed with users in mind, the platform aims to become a comprehensive resource for cultural heritage professionals seeking knowledge, developing skills, accessing training, and connecting with experts and consultants.

The platform will offer extensive resources, including training courses, guidelines, standards, best practices, case studies, and practical tools and services. Users will be able to share their knowledge, access resources for facilitating decision-making when applying 3D digitisation workflows, explore innovative methods and technologies for data capturing and processing, including complex and non-collaborative objects, archiving and preserving, publishing and aggregating, and creating storytelling for audience engagement through Extended Reality (XR).

A central aim of the platform will be to support professionals in understanding and implementing workflows for creating and aggregating high-quality 3D content into the common European data space for cultural heritage, ensuring the long-term accessibility, interoperability, and preservation of digital assets. Special attention will be given to supporting Ukrainian Cultural Heritage Institutions (CHIs) through a tailored aggregation pipeline, addressing their specific needs in preserving and sharing their heritage digitally.

Through these efforts, the 3D-4CH Online Competence Centre intends to actively support and stimulate ongoing transformation in Europe's digital cultural heritage landscape, fostering meaningful collaboration, effective knowledge exchange, and the widespread adoption of innovative 3D technologies and best practices across the sector.

5.2 Design process

The design process for the 3D-4CH platform has been structured to be highly collaborative and iterative, ensuring it aligns with the project's foundational goals while dynamically responding to user needs and expert insights.

Initially, the Project Work Plan provided the core framework, clearly defining the main aims, overarching goals, target user groups, and the primary types of content (e.g., training, knowledge base, tools) the platform is expected to deliver. This established the strategic direction and essential parameters.

Building upon this foundational understanding, a 3D-4CH Workshop on user requirements was held on 20th February 2025, in Trento, Italy (see photos in Appendix 9). During this intensive session, project partners engaged in active brainstorming to refine and detail the specific needs of the prospective users. This direct engagement with stakeholders was vital for translating high-level objectives into concrete, user-centric requirements.

Following the workshop, the design proceeded through an iterative process, consisting of 4 design sprints over a period of 5 months . This involved cycles of designing, discussing, and refining various options for the platform's features and functionalities. Critical discussions were held, particularly with **Work Package 2 on Training and Capacity Building** (**WP2**), which focuses on training and the knowledge base, and **Work Package 3 on the Adoption of R&D advances In 3D Cultural Heritage** (**WP3**), responsible for the presentation of tools. This cross-WP collaboration ensured that the design comprehensively addressed both pedagogical and technical aspects, integrating the expertise from different project areas.

In July 2025, the design was presented and discussed at the meeting with the **3D-4CH Advisory Board and Stakeholder Panel**. The participants have shared several comments and proposals, all of which have been considered and if appropriate integrated in the final version of the design.

A key decision during this design phase was to adopt a gradual implementation strategy. This approach acknowledges the evolving nature of the platform's content and the need for continuous development. The first public launch of the platform is scheduled for Month 13, as specified in the Grant Agreement, delivering essential functionalities. Subsequent releases will then progressively introduce new features and content, directly corresponding with the ongoing preparation and availability of new training materials and tools. This phased rollout allows for continuous feedback integration and refinement, ensuring the platform remains responsive and valuable to its users.

5.3 Target Groups and User Needs

The platform will be tailored to meet the distinct needs of various user groups (assessed in collaboration with Task 5.1: Definition of target groups) ensuring that each can benefit from the advanced capabilities and services offered in the domain of 3D data, XR technologies, and digital cultural heritage. The platform will provide value through training, knowledge sharing, collaboration, and innovation, with a focus on long-term digital preservation and accessibility.

The 3D-4CH Platform will provide targeted services for key user groups. The **Cultural Heritage Institutions (CHIs)** and the **Technology and Creative Industries and professionals** constitute the core audiences, requiring robust support in terms of training, up-skilling, capacity building, certification opportunities, and access to established best practices. The Educational Sector, encompassing **researchers, educators and students students**, will be actively engaged through strategic partnerships aimed at fostering co-creation, collaborative training initiatives, and the aggregation and promotion of educational content. Additionally, **Civil Society**, including European citizens and volunteers, represents a significant yet often underrepresented group, for whom informal learning pathways, innovative communication strategies, and initiatives aimed at enhancing digital literacy are essential. Lastly, **Policy and Governance stakeholders** - such as European networks and high-profile professional organisations - should be involved in high-level strategic dialogue. Their role is key in aligning the Centre’s activities with broader cultural and digital agendas, including contributions to policy harmonisation and shared research priorities.

- **Cultural Heritage Institutions (CHIs)**
    - Benefits:

- Access to a curated set of good practices, standards, and tools developed through previous and ongoing 3D and XR projects.
- Training opportunities designed specifically for CHI professionals, enabling capacity building in 3D digitisation, metadata creation, content management, and storytelling through XR.
- A formal certification process in collaboration with academic and training institutions to validate acquired skills and knowledge.
- Access to services for preservation, conservation and restoration, including large-scale and high-quality heritage digitization, and exploiting data to plan and manage interventions.

- **Technology and Creative Industries and professionals**
  - Benefits:
    - A collaborative environment to explore innovation in 3D, XR, and AI for the cultural heritage sector.
    - Access to high-quality infrastructure, datasets, and digital tools to support product and service development such as re-using data to produce heritage-based content, apps, games, education and tourist service.
    - Opportunities to partner with CHIs, researchers, and public bodies on digital transformation initiatives.

- **Researchers**
  - Benefits:
    - A platform to collaborate, experiment, and co-create with access to datasets, tools, and methodologies from leading 3D digitisation and XR projects.
    - Certification pathways that align with academic standards.
    - Opportunities to contribute to the evolution of good practices and support the documentation of case studies and pilot actions.

- **Educators and Students (across all levels)**
  - Benefits for Educators:
    - Access to innovative educational resources and pedagogical tools based on 3D data and XR technologies, enabling engaging and immersive learning experiences in subjects like archaeology, history, art, and technology.
    - Training and professional development in digital competencies, specifically in the application of 3D and XR in educational contexts, to enhance their teaching methods and curriculum.
    - Certifications that validate their skills and knowledge in integrating advanced digital technologies into teaching.
  - Benefit for Students:
    - Access to immersive and interactive cultural content that goes beyond traditional textbooks, improving understanding and interest in cultural heritage.

        - Development of key digital competencies through practical exploration of 3D and XR technologies, preparing them for the digital future.
        - Access to certification pathways that can complement their academic training and enhance their career prospects.

- **Citizens and Tourists**
    - Benefits:
        - Access to storytelling and educational materials that enhance cultural understanding and digital literacy.
        - Exposure to diverse cultural narratives and heritage assets that may otherwise be inaccessible.

- **Policy and Governance stakeholders**
    - Benefits:
        - Access to a centralised Knowledge Base with digitisation guidelines, technical standards, and policy-relevant resources to develop strategies for conservation, preservation and digitization.
        - Comparative tools and good practices tailored to various scales and heritage contexts.
        - Insights and resources for supporting smart cultural policies and investment in digital cultural infrastructure.

The needs of target groups have been more extensively explored and described within "**WP5: Stakeholder validation and long term sustainability**" that aimed at identifying relevant stakeholders and their familiarity with 3D technologies, mapping training needs and barriers to adopting 3D digitisation, and gathering insights to tailor services, tools, and training within the Competence Centre. Consult "*D5.1 - Definition of the target groups*" for more information.

5.4 Contributors

The consortium includes partners, affiliated partners and associated partners will contribute to cover the entire cultural 3D data value chain:

- Cultural heritage organisations (PIXELATED, KMKG, DISC, NISV, TMO, VF) that can directly contribute with relevant cultural heritage objects, requirements for advanced and high-quality digitisation - even considering emerging learning-based methods - and means to validate the proposed solutions for data fruition such as solutions for 3D models management and visualisation, and XR. They also represent a broader network of organisations and professionals to gather requirements from, validate solutions and disseminate results.
- Professional associations (CARARE, EFHA, ENA, MCA) who are positioned to support knowledge transfer and able to support the inclusion of new 3D content in the data space.
- Universities, research centres and institutes (UNIFE, FBK, CNRS-MAP, CNR-ISPC, CYI, PSNC, ATHENA, INFN, PIN, HIGHBURY, ICPD, IUIAI-UJA) are positioned to provide formal education and significant expertise, infrastructure, and interdisciplinary collaborations for the advancement

beyond-the-state-of-the-art of technologies and methodologies for using AI-based methods for 3D modelling and XR visualisation of 3D content for cultural heritage. These research centres include relevant IT and software infrastructures, and technological platforms.

- IT SMEs (INCEPTION, ARCTUR, IN2, RDF, 3Dresearch) providing cutting edge solutions for the end-to-end workflow of 3D object acquisition, management and sharing: FBK, INCEPTION, PRPO, DISCOVERY, ARCTUR and many others with proven know-how in 3D digitisation of cultural heritage artefacts and buildings; ARCTUR with large 3D data (models and point clouds) storage infrastructure and visualisation tools; INCEPTION and RDF with semantic tools for 3D monuments and sites for categorising and processing 3D BIM models and making them shareable, linkable and easily accessible; IN2 providing solutions for innovative reuse of content through digital storytelling and previous know-how on developing Communities of Practice.
- Services providers (TALENT, PSNC) that operate with advanced technology to develop innovative software products and services, having also experience in communications and dissemination.
- The key deployer of the data space for cultural heritage (EF) that will close the loop for the integration of the solution deployed in the project by integrating them into the core infrastructure within the data space for cultural heritage.

5.5 User roles and access

The platform operates with **five (5) clearly defined user profiles**:

1. **Visitors (View-only users)**
   - No registration required.
   - Can access all content (list and description of online courses, knowledge base, events, news …) without interaction rights (cannot enroll in online courses, cannot bookmark resources from Knowledge Base …).
   - Unregistered users attempting to interact with content will see the following prompt: “To interact, you need to register or log in. Please do so to continue.”

2. **Interactive Users**
   - Registration required.
   - Can access all content with interaction rights (enrolling in online courses, bookmarking resources from Knowledge Base …).
   - Can rate, comment, and share content.
   - Cannot upload or edit content.

3. **Content Managers**
   - Can create, edit, and manage dynamic content (e.g., news, knowledge base, scenarios …)

4. **Administrators**
   - Appointed by the Super Administrator.
   - Responsible for managing Primary Content (static platform content).
   - Handle content translation and structure maintenance.

5. **Super Administrator**
    - Predefined by the development team.
    - Manages the platform infrastructure and appoints Administrators.
    - Currently solely responsible for Training course creation and management (this may be expanded to Administrators in future stages).

Users may access the platform in two ways:

- Register with a dedicated platform account.
- Sign in via Google (auto-fills available fields and requests missing data).

User roles are assigned based on registration form data and follow this workflow:

- Content Managers are assigned by Administrators
- Administrators are appointed by the Super Administrator.
- The Super Administrator role is predefined and does not require platform registration.

5.6 Visual Identity of the Platform

The 3D-4CH platform's visual identity is being designed to be modern, intuitive, and highly engaging, designed to attract and retain a diverse user base. Our approach ensures the platform's look and feel directly supports its mission as a leading competence center for 3D in Cultural Heritage.

The design is fully aligned with the overall project branding, incorporating elements like the 3D-4CH logo and established color palette. To maintain visual coherence and avoid clutter, magenta has been selected as the leading platform color from the broader set of colors present in the project logo.

A paramount focus is on delivering a clean, user-friendly interface that guarantees smooth navigation and clarity across all devices. This commitment stems from our previous discussions emphasizing the need for responsive design and mobile accessibility, ensuring users have a seamless experience whether on a desktop, tablet, or smartphone. We're carefully selecting typography, iconography, and other visual elements to enhance usability, making information easily digestible and interactions straightforward.

Crucially, the platform will leverage dynamic visuals to showcase its technological edge. This includes interactive 3D renderings and interactive modules. Incorporating features AI-enhanced 3D visualisation (from projects like XRCulture) will be central to making the content lively and practical. This also supports the aim of providing hands-on training and project-based learning, allowing users to truly interact with cultural heritage assets in 3D.

Finally, the design is being developed with strict adherence to accessibility standards (WCAG), ensuring inclusivity for all users. While magenta was specifically chosen as the leading platform color, its implementation will strictly prioritize readability and contrast. This means carefully selecting complementary text and background colors to meet required contrast ratios, ensuring legibility for all users. Beyond color, our

commitment to accessibility extends to foundational design choices: providing alternative text for all images, enabling full keyboard navigation, offering high-contrast modes, and ensuring content is compatible with screen readers and resizable text. By integrating these measures, the 3D-4CH platform will deliver a visually distinctive yet fully inclusive and high-quality experience for everyone.

The platform will also be adaptable for multilingual use, a critical feature for a European initiative, reflecting insights from platforms like Moodle. This commitment guarantees a high-quality, accessible experience for every user, regardless of their linguistic background or specific needs.

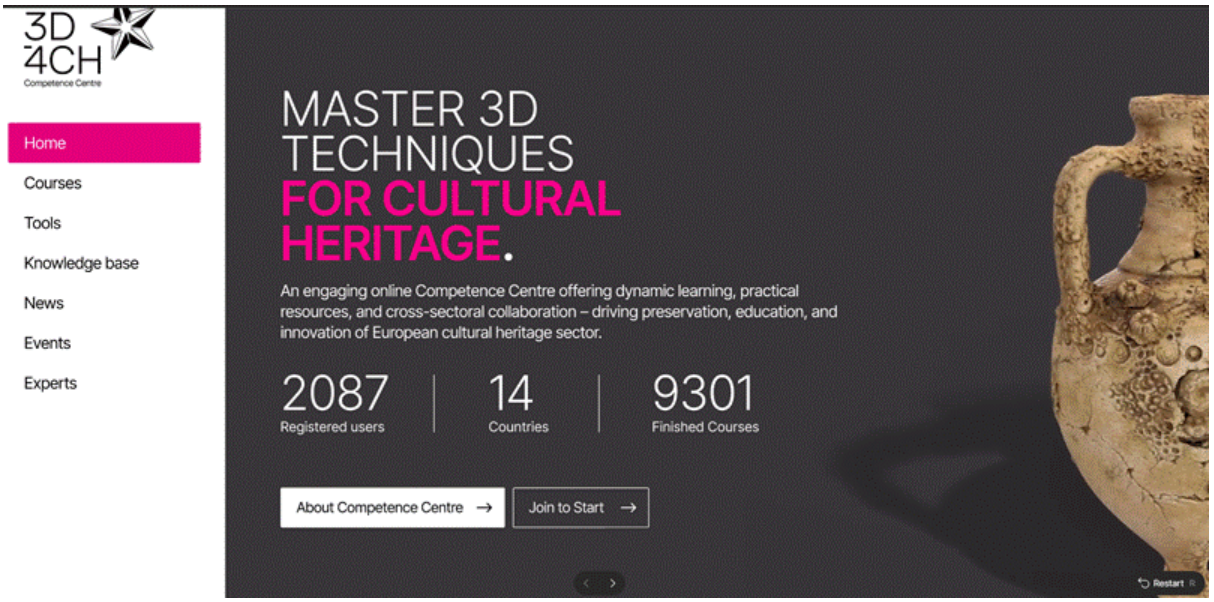

Figure 1: The initial design idea shows the entry page of the Platform.

5.6 Functional Requirements of the Platform

The 3D-4CH Platform's functional requirements define the essential features and capabilities needed to deliver a high-quality, user-centric experience. Every function is designed to support the platform's overarching goals: promoting 3D technologies in cultural heritage, enabling long-term preservation and accessibility of digital assets, and fostering innovation through collaboration and knowledge sharing. The platform will be modular, scalable, and interoperable, allowing for seamless integration with existing infrastructures and future expansion.

General Platform Properties:

- **User-Friendly, Useful, and Intuitive:** The platform's design prioritizes ease of navigation, practical utility, and an intuitive user experience. This means clear pathways for learning, accessing tools, and engaging with content, ensuring users can achieve their goals efficiently.
- **Adaptability for Different Devices**: The online platform will be fully responsive, adapting seamlessly to various devices and screen sizes, including mobile phones, tablets, and desktop computers. It will be rigorously tested and optimized across different platforms and browsers to guarantee consistent functionality and accessibility.
- **Performance and Loading Speed:** High performance and fast loading speeds are crucial for a positive user experience, especially when dealing with complex 3D data and rich multimedia. The platform will be engineered for efficiency to minimize wait times and enhance user flow (frontend, backend, and infrastructure optimizations).
- **Security and Data Protection:** The platform will ensure robust security and data protection through advanced authentication and authorization mechanisms. This commitment safeguards user data and the integrity of valuable cultural heritage assets shared or managed on the platform.
- **Potential for Growth and Expansion:** The platform is designed with an inherent potential for growth within its existing service sections, allowing for the continuous addition of new content and features. Furthermore, its architecture supports future expansion into other fields beyond its initial focus on cultural heritage, demonstrating foresight and adaptability.
- **Modern Hosting and Infrastructure:** The platform's hosting and underlying infrastructure will be built upon modern, robust solutions. This ensures reliability, performance, and the ability to leverage contemporary technological advancements for enhanced functionality and future readiness.

5.8 Main Services

The initial and ongoing activity (T4.1) has centered around the design and definition of the 3D-4CH platform, which will host services provided by the project members. The list of contents, features, and characteristics was developed during a workshop (Figure 1) where partners brainstormed potential ideas using the post-it method (Figure 2). This process was followed by further discussion and grouping of content to ensure the platform would offer the most intuitive and user-friendly experience.

The 3D-4CH platform is structured around several key content categories, designed to serve its diverse user base and achieve its strategic objectives in cultural heritage digitization. Each category supports the platform's role as a comprehensive competence center, providing both developed and curated external resources.

Online Courses

This section will be the central hub for structured learning. According with the developments under WP2, it will host online training courses developed specifically by 3D-4CH, integrating various media formats such as text, video lectures, links to external resources and tools, and knowledge assessments. Additionally, it will present and link to relevant existing external online training courses (third-party platforms), such as those offered by the Europeana Academy, expanding the breadth of available educational opportunities.

3D-4CH online courses will follow an Action Learning approach, where learners work on real challenges, learning and developing through reflection and action. Each course will be made up of structured modules that include content, reflection, and practical activities.

Core functionalities include:

- Organized collection of training courses
- Multimedia learning materials
- Interactive tools and exercises
- Robust browse and search capabilities with filters for Topic, Target Group, Course Format, and Language.
- Clear indication of 3D-4CH certification for completed courses.
- User progress tracking to monitor learning journeys.
- An advanced search filter will be implemented in a second phase, if user demand warrants it.
- A mechanism for contribution of new courses by qualified educators and institutions.

Online courses will be either hosted and delivered through the 3D-4CH platform or hosted and delivered by third-party educational platforms (e.g. Europeana Academy).

Aligining with minimal metadata for learning resources developed by the Research Data Alliance[1] and adopted as a starting point by WP2, all online courses will be presented with:

- Course title
- A brief description of the course
- Main topic and keyworks
- Course provider and author(s)
- Target group (audience)
- Expertise (Skill) Level and prerequisites
- Course objectives and learning outcomes
- License
- Available languages

Delivery of courses and Certification Framework

- Delivery of **online courses and types of educational materials** and user assessment will depend on the selected platform:
    - 3D-4CH platform will enable multimedia educational materials, interactive tools (e.g. Quizzes, Flip cards, Interactive videos …).
- **Record of completion** will depend on the used platform:
    - 3D-4CH platform-hosted online courses: Progress is automatically tracked and visible to a user. Successful completion is automatically recorded and will be used to award the certificate.

[1] https://www.rd-alliance.org/wp-content/uploads/2022/04/Recommondations_MinimalMD4LearningResources.pdf

- Third-party platform-hosted online courses: Depending on the platform the progress might not be tracked within the 3D-4CH platform. In this case, completion is manually recorded by the user himself. The user can add attachments (such as certificates, awarded by third-party platforms) to manually recorded completed courses. Some platforms have APIs that potentially would allow certificates of users to be shown on the 3D-4CH platform.

- **Awarding certification** will depend on the adopted framework. Task 2.4 on Certification is already active in defining this framework, which will be designed to operate almost independently of the specific platform chosen for delivering the courses. Current options (potentially complementary are):
  - Certificate awarded as **Open Badge**, portable digital token that certify specific skills or learning achievements.
  - **Micro-Credential** as more formal recognitions, aligned with competency-based frameworks and potentially stackable towards higher qualifications.

Tools

This category will serve as a curated directory for digital tools relevant to 3D cultural heritage. It will feature the presentation of tools identified in Deliverable 3.1 and other pertinent external resources, providing direct links to their respective websites.

Key functionalities include:

- Comprehensive browse and search functions, allowing users to filter tools by Process, Category, and License.
- An option for contribution of new tools, fostering a growing and up-to-date resource.

Knowledge Base

Designed as a central repository for foundational and in-depth information, the Knowledge Base will present a wide array of resources, including links to external websites, downloadable documents, and bundled file sets (e.g., photogrammetry datasets). This may encompass:

- The official 3D-4CH curriculum, lesson plans, and textbooks.
- Pre-recorded lessons or demonstrations.
- Curriculum guides and syllabi.
- Slides, narrative texts, images, and audio-visual resources.
- Sample datasets for processing (e.g., photogrammetry data, point clouds) to be used in lessons or courses.
- Interactive resources.
- Good practices and case studies presented in a standardized format with rich metadata.

Users will benefit from browse and search functions filtered by Keyword, Type of Resource, Format, and Language. An advanced search filter will be considered for a second phase, based on user requirements. A mechanism for contribution of new resources will also be available.

Storytelling Scenarios

This category will present a series of storytelling scenarios focussing on different digital tools within the field of Extended Reality (XR), such as (social) VR, AR and MR. It will offer a select amount (5 - 10 scenarios) of

in-depth, qualitative scenarios, exploring different possible routes for accessing and communicating 3D heritage using XR technologies and frameworks.
This section of the platform will provide insights into what immersive storytelling entails, how to define which type of storytelling and which type of XR technology fits the professional user's (cultural heritage professionals such as curators, exhibition designers, archivists, etc) goal and hands-on guidance for narrative-building with XR. Users will be able to navigate through the different scenarios, based on their interests and needs. Each individual scenario will represent a separate 'route' towards possible creation and implementation of a 3D narrative and offers step-by-step guidance on how to get there.
Through textual and visual components, such as image, video and potentially 3D animation content, the user will be able to get a clear understanding of what possibilities exist and which steps to take in order to successfully pursue a XR storytelling format for their 3D heritage.
This section of the platform functions both as a source of inspiration, sparking imagination of the potential creative uses of 3D heritage, as well as a resource for concrete action plans to pursue a storytelling project.
Key functionalities include:

- Showcasing 5-10 storytelling scenarios that elaborate on different forms of XR storytelling
- Video embedding to showcase short demonstration videos illustrating the different XR use cases
- 3D-models: allowing users to interact directly with 3D-material.
- Cross-linking to Online Training modules, Tools and/or Knowledge Base content
- Possibility to extend existing scenarios or add more scenarios in the future

News
This section will provide timely updates relevant to the 3D cultural heritage sector.
Functionalities include:

- Presentation of news articles.
- Browse and search capabilities filtered by Date, Topic, and Target Group.
- An option for contribution of news items.

Events
This category will highlight upcoming and past events pertinent to the field.
Functionalities include:

- Presentation of events.
- Browse and search capabilities filtered by Date, Topic, and Target Group.
- An option for contribution of event information.

About the Project
This dedicated section will offer comprehensive information about the 3D-4CH initiative, including:

- An overview of the project itself.
- Details on its deliverables and achieved results.
- Information on the project partners, stakeholder panel members, and advisory board members.

A Frequently Asked Questions (FAQ) section is proposed to further enhance user support, pending final confirmation.

5.9 Supporting functionalities

Beyond the user-facing features, supporting functionalities are essential to power the 3D-4CH platform, ensuring its efficient operation, content management, and personalized user experience. These core system capabilities are vital for platform administrators, content creators, and the overall integrity of the learning environment.

Content Management System (CMS)
In-house Content Management System (CMS), called ACM, will be at the heart of the platform. This system will enable seamless creation, editing, publishing, and organization of all content categories—including online courses, tool descriptions, knowledge base resources, news, and events.
Key capabilities include:

- Intuitive authoring tools for text, multimedia, and links.
- Version control to track changes and revisions for all content.
- Metadata management to ensure consistent tagging and discoverability across all content types.
- Workflow management for content review and approval processes, particularly important for ensuring the quality and accuracy of the Knowledge Base and Online Courses.

Analytics and Reporting
Comprehensive analytics and reporting tools will provide invaluable insights into platform usage, content effectiveness, and user behavior. This data will be critical for continuous improvement and strategic decision-making.
Key capabilities include:

- User engagement metrics (e.g., time spent on courses, resource downloads, tool clicks).
- Content performance metrics (e.g., most popular courses, most accessed resources, search query analysis).
- Progress tracking insights for individual users and aggregated group performance.

User Management and Personalization
User management and personalization features will ensure secure access, tailored experiences, and efficient administration of the user base.
Key capabilities include:

- Secure Login Functionalities: An authentication system (e.g., username/password) to control access to platform features and personal data.
- User Registration and Profiles: Management of user accounts, roles (e.g., learner, content contributor, administrator), and personal preferences.
- Personal Dashboard: A customized user interface where individuals can:
    - Track their learning progress for online courses.
    - Access bookmarked resources and tools.
    - Notification System: Automated alerts for course updates, new content releases, upcoming events, or feedback on contributions.

Search and Indexing Engine
A powerful search and indexing engine will underpin all browse and search functionalities described for user-facing content.
Key capabilities include:

- Full-text search across all content categories.
- Advanced filtering and faceted search capabilities, enabling users to refine results by multiple criteria (e.g., topic, format, language, license).
- Optimized indexing for quick and accurate retrieval of information, even with large datasets including metadata for 3D models.

API Layer for Interoperability
An Application Programming Interface (API) layer will be a foundational technical component, enabling seamless communication and data exchange with external platforms and tools.
Key capabilities include:

- Data import/export functionalities to connect with platforms like Europeana, EUreka3D Data Hub, and AI4Culture, allowing for efficient sourcing and contribution of content.
- Integration points for external tools (e.g., 3D viewers, AI services) to be embedded or accessed directly from the platform.
- Facilitating future expansions and collaborations without requiring extensive re-engineering.

These essential background functionalities will ensure the 3D-4CH platform operates effectively, delivers a highly personalized experience, and remains a dynamic, evolving resource for the cultural heritage community.

5.10 Content Management

- **Primary Content** (e.g., core platform structure) is managed exclusively by Administrators.
- **Dynamic Content** (e.g., news, internships, reflections, events) is submitted by Content Managers.
- **Training content** is currently created and managed solely by the Super Administrator. This aligns with governance roles (see Section 2 and 8) and may be updated in future platform stages.

Supported languages are: To be defined at a later stage

5.11 Architecture of the Platform

The platform uses a secure, scalable cloud-based architecture:

- **Languages**: PHP 8.3, JavaScript
- **Databases**: MariaDB, PostgreSQL
- **Authentication**: Keycloak with SSO and multi-factor authentication
- **Storage & Caching**: Minio (S3-compatible), Varnish
- **Deployment**: CI/CD tools and container-based infrastructure
- **Accessibility**: WCAG-compliant with responsive design across devices

The platform will be hosted at Arctur Data Centre in Nova Gorica, Slovenia:

- Hosted in an ISO 27001-certified data center
- Redundant systems: dual power, backup generators, dual ISPs
- Daily checksum-verified backups with 24h disaster recovery
- 24/7 monitoring and secure server access

6. Design of the user interface

The design of the 3D-4CH platform emerged from a structured, iterative process. Starting with the core aims, goals, target groups, and content types defined in the Grant Agreement, a dedicated workshop in Trento on February 20, 2025, gathered project partners to brainstorm and detail user requirements. This informed an ongoing, iterative design phase, involving close collaboration with WP2 (training and knowledge base), WP3 (tools) and WP7 (communication), ensuring all functional and content aspects were considered. The design has been also discussed with Stakeholder Panel and Advisory Board members at a meeting in July 2025. This collaborative effort ultimately led to a gradual implementation plan.

For the interactive version please visit:

https://www.figma.com/proto/MW6n34DA5O20TE1axtBLmb/3D-4CH-v3--edit-Jasna-?node-id=70-372&viewport=1052%2C237%2C0.22&t=8FpMBZoLD76HJ7BK-0&scaling=scale-down-width&content-scaling=fixed&starting-point-node-id=70%3A372

Entry page:

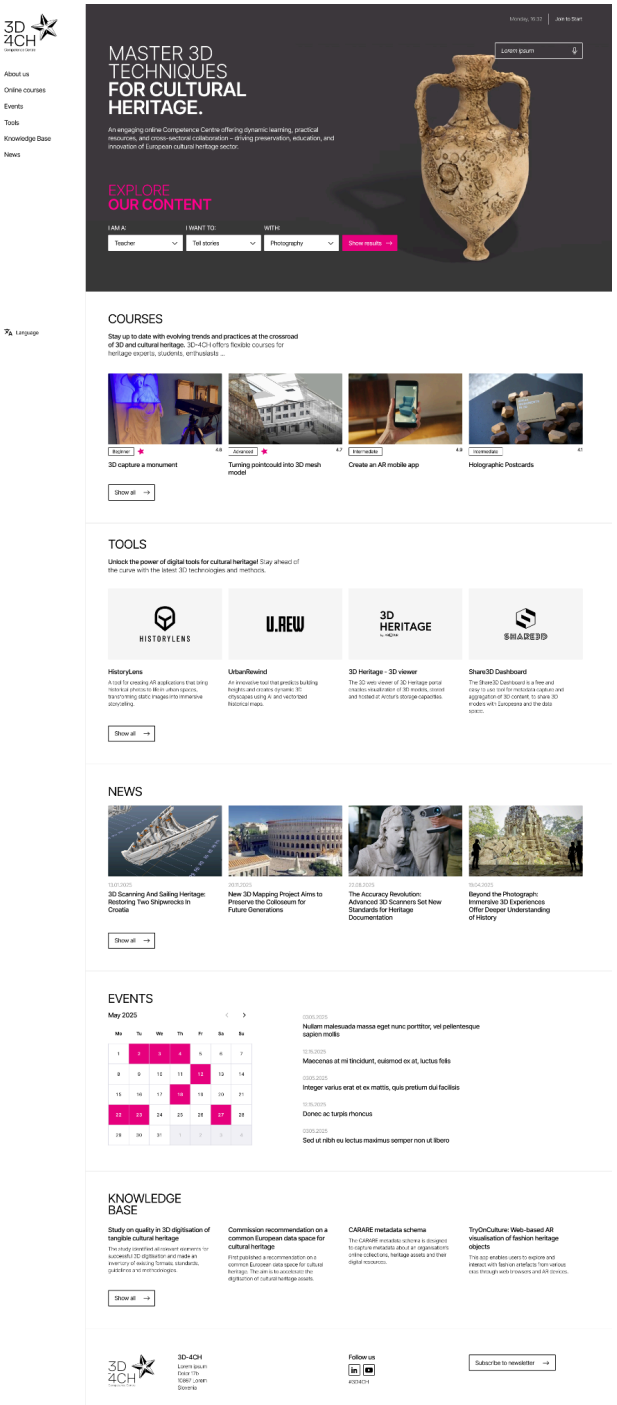

Figure 2: Mock-up of the entry page.

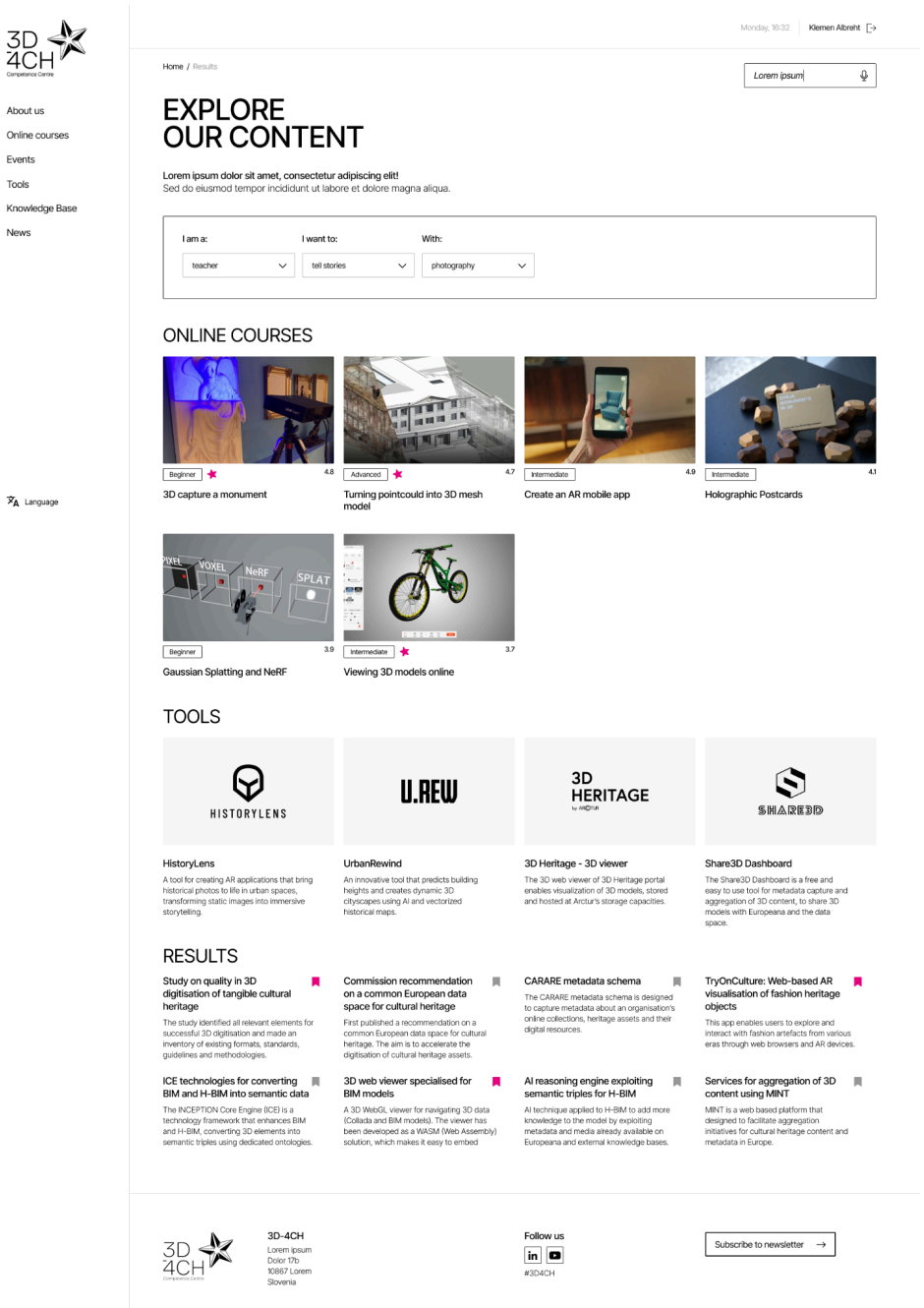

Figure 3: Mock-up of the search results.

About us section:

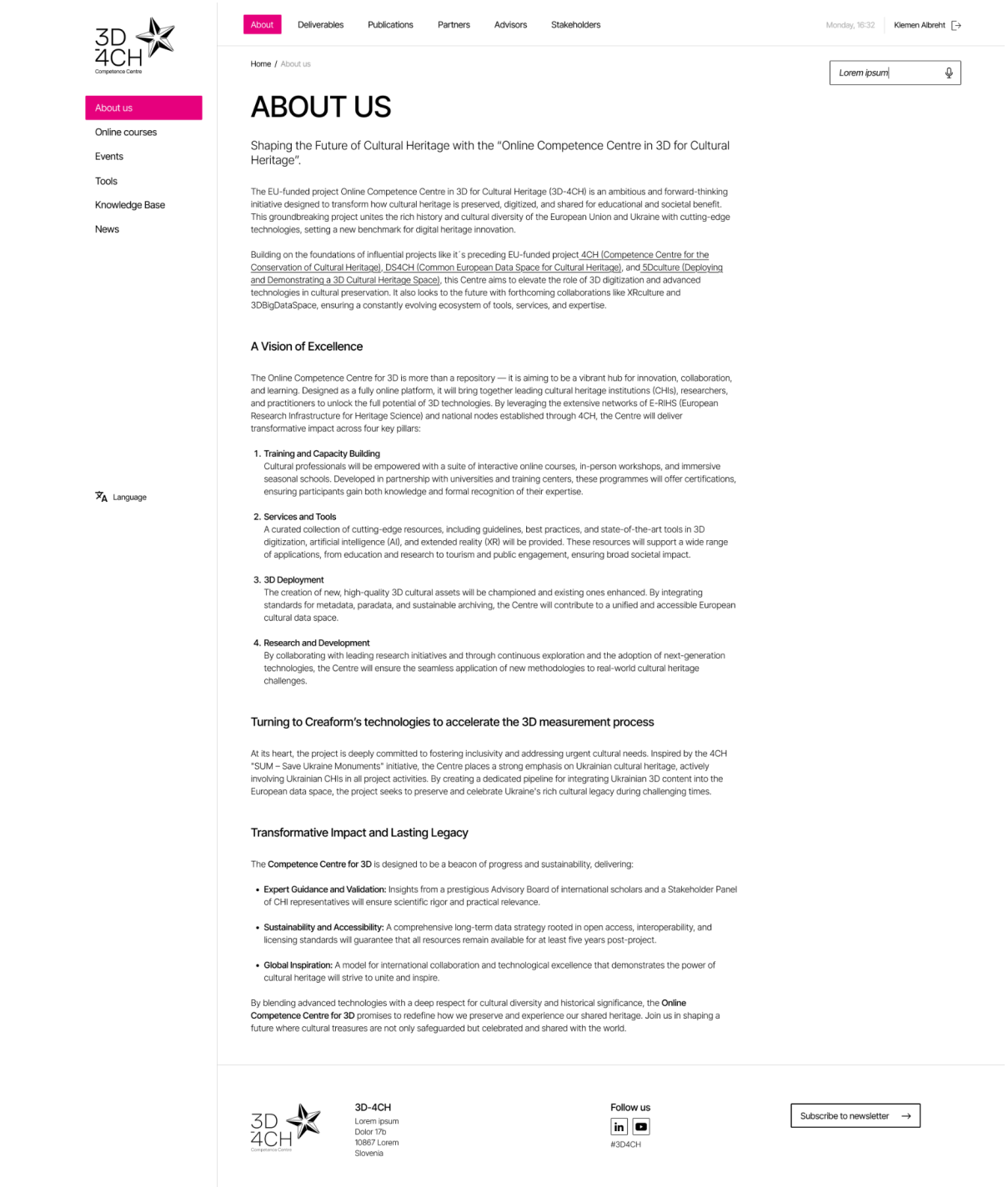

Figure 4: Mock-up of the About Us pages (project description).

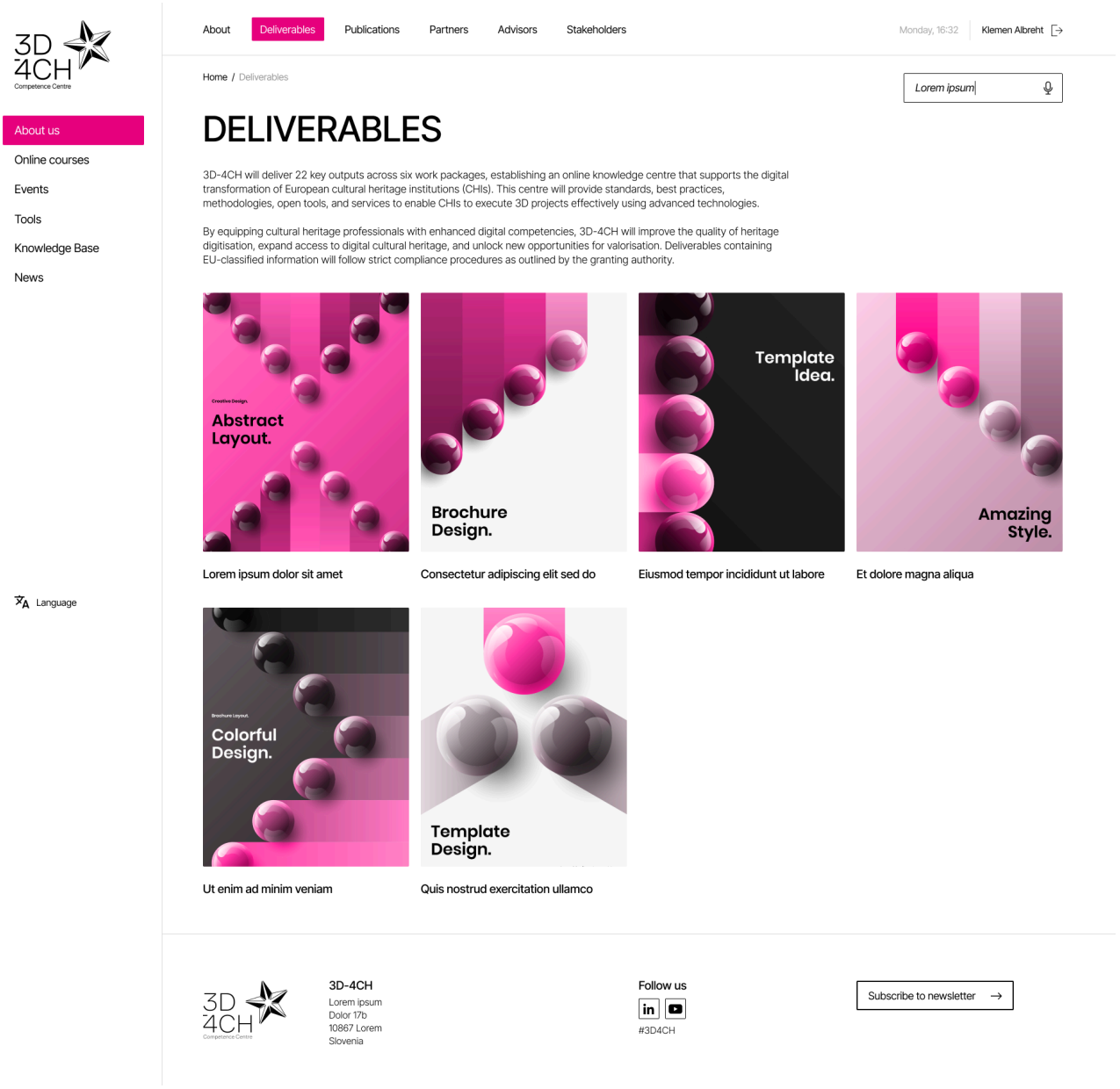

Figure 5: Mock-up of the About Us pages (deliverables).

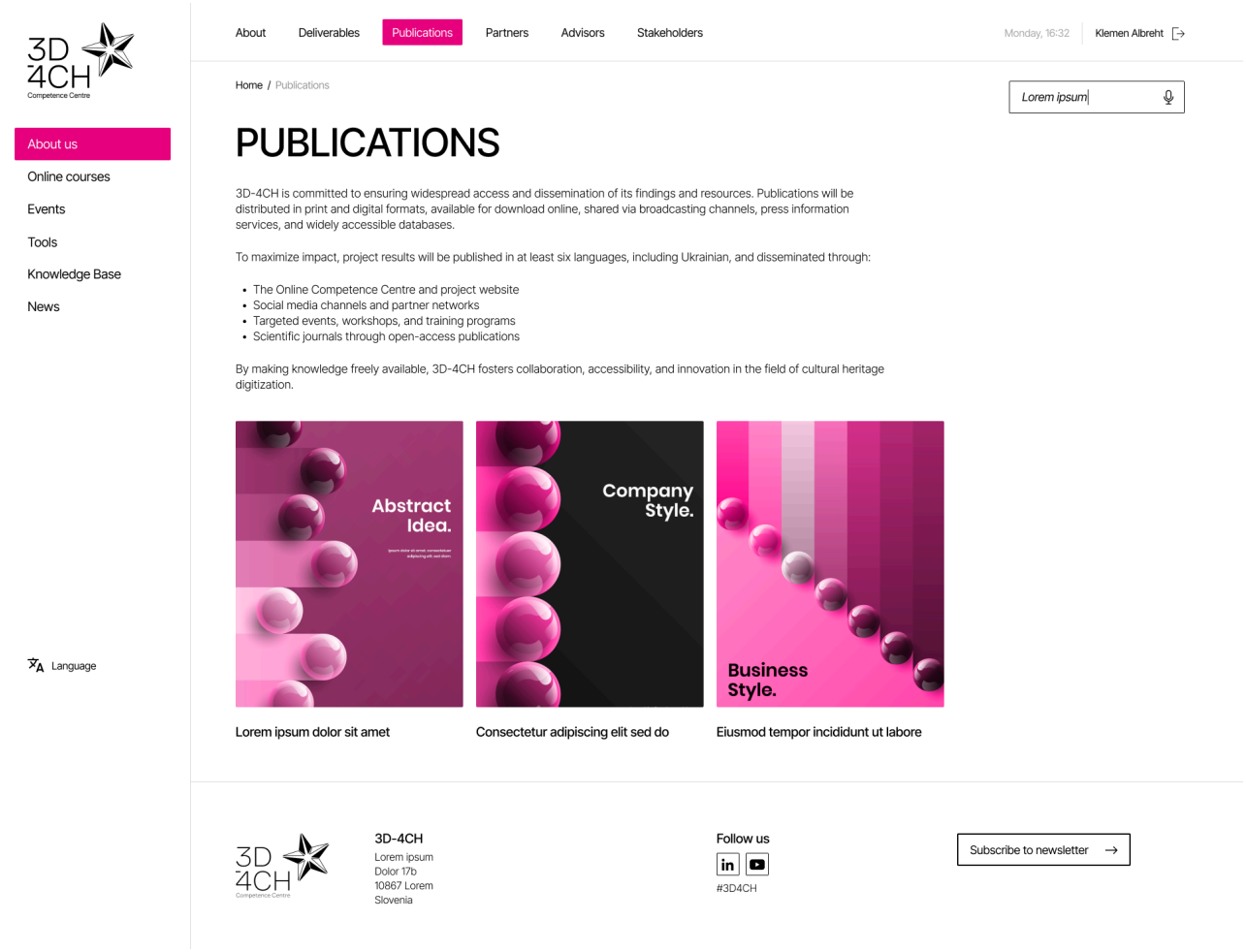

Figure 6: Mock-up of the About Us pages (publications).

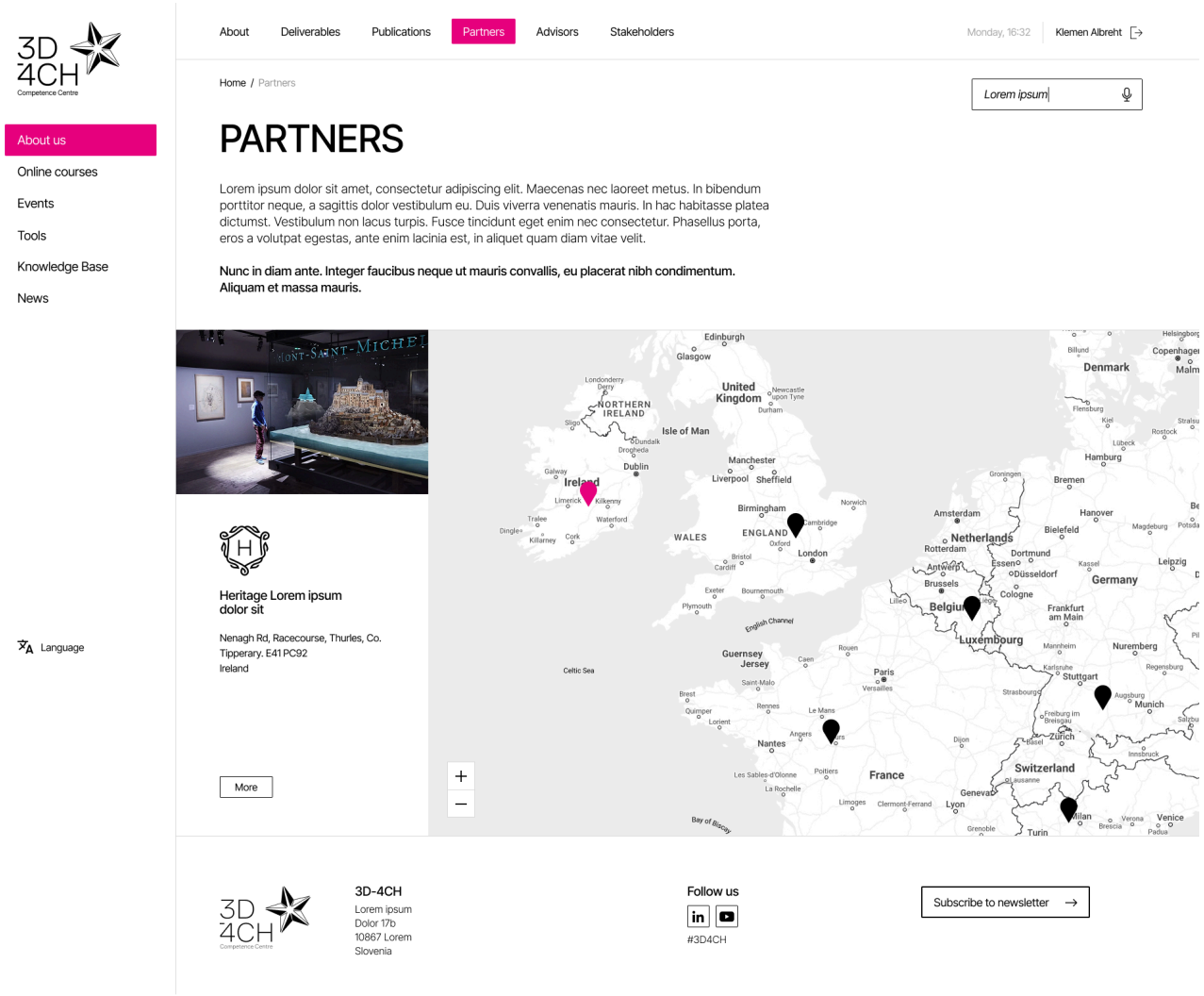

Figure 7: Mock-up of the About Us pages (partners).

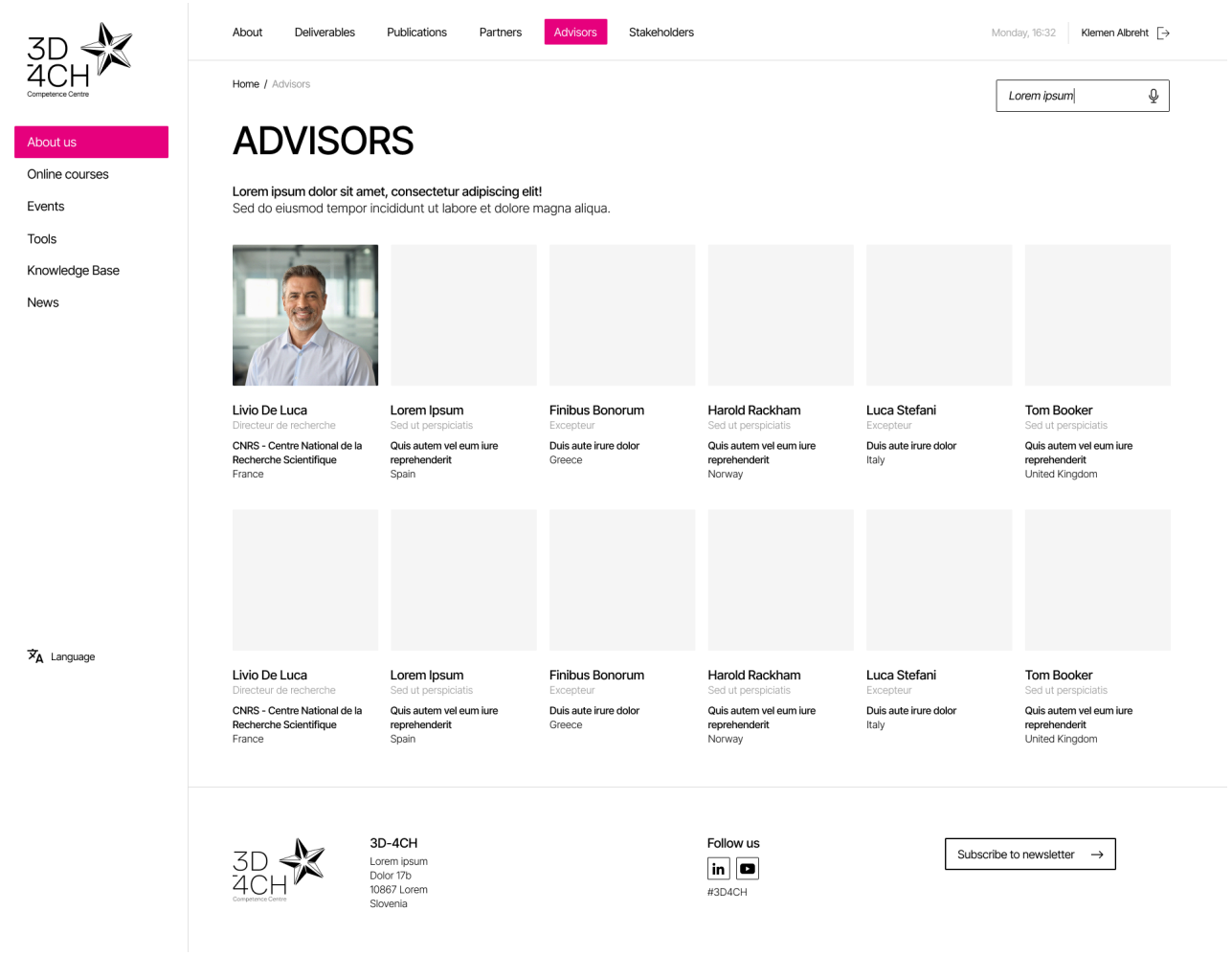

Figure 8: Mock-up of the About Us pages (Advisory board).

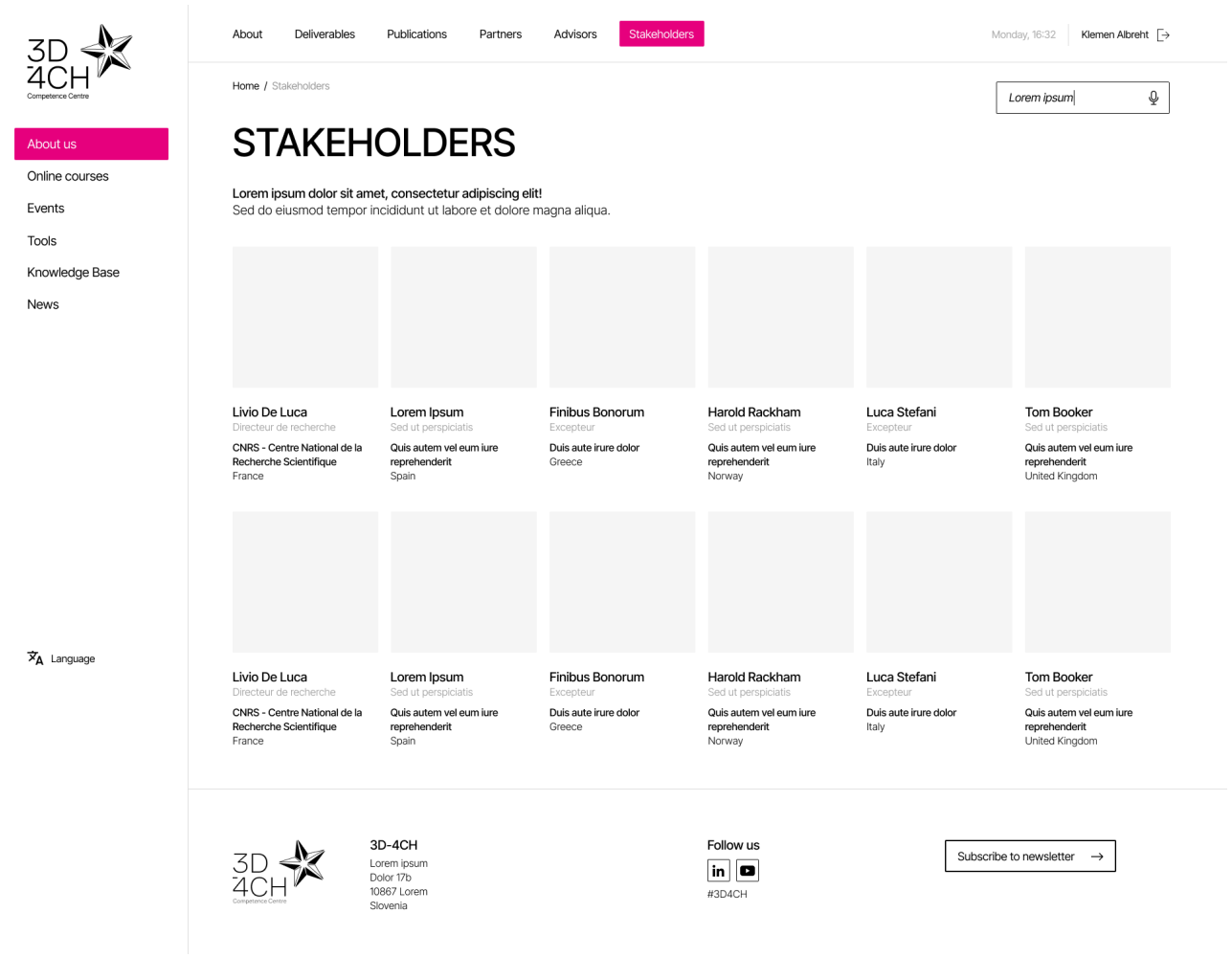

Figure 9: Mock-up of the About Us pages (Stakeholder Panel).

Online courses section:

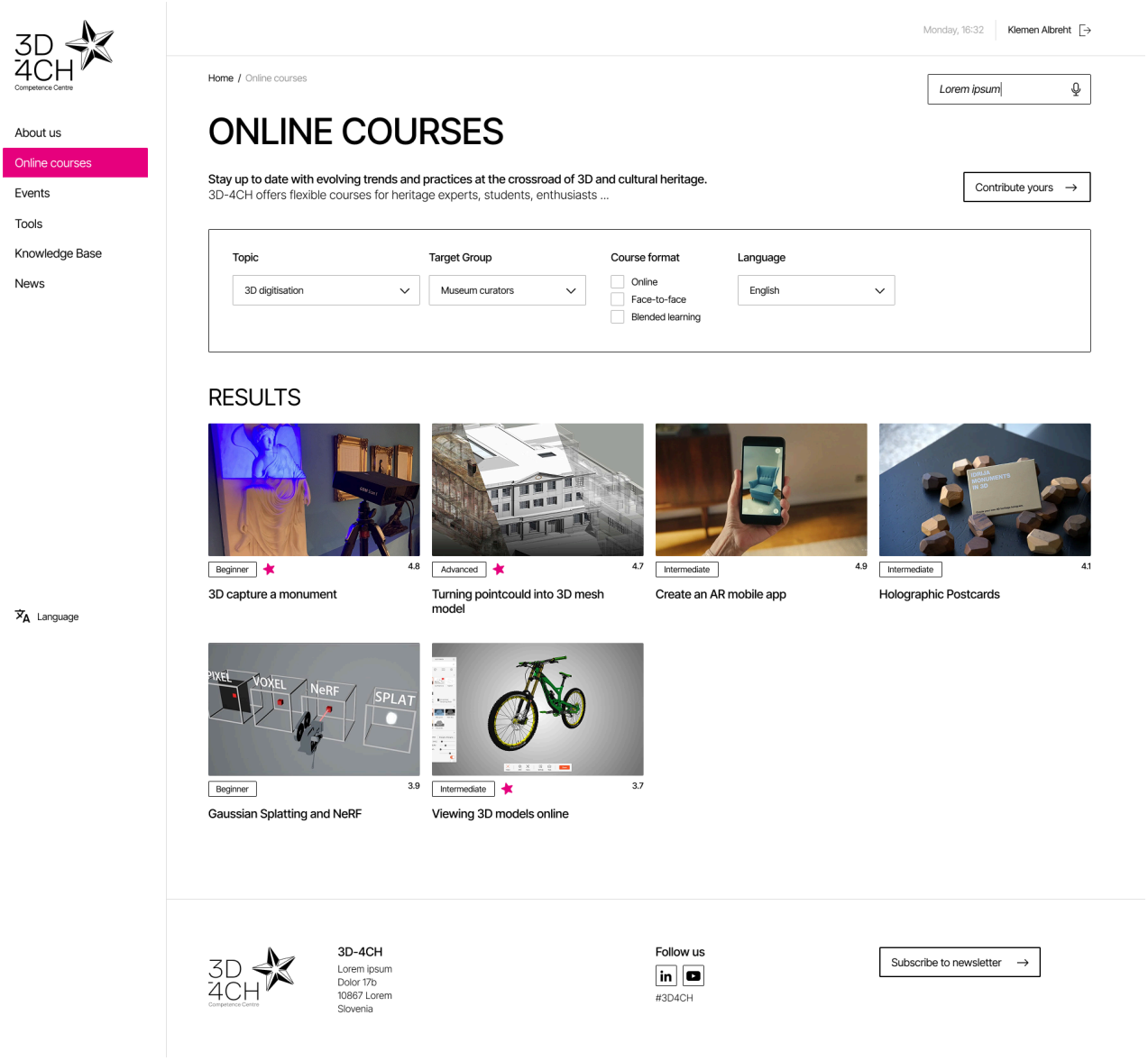

Figure 10: Mock-up of the Online Courses page.

Tools section:

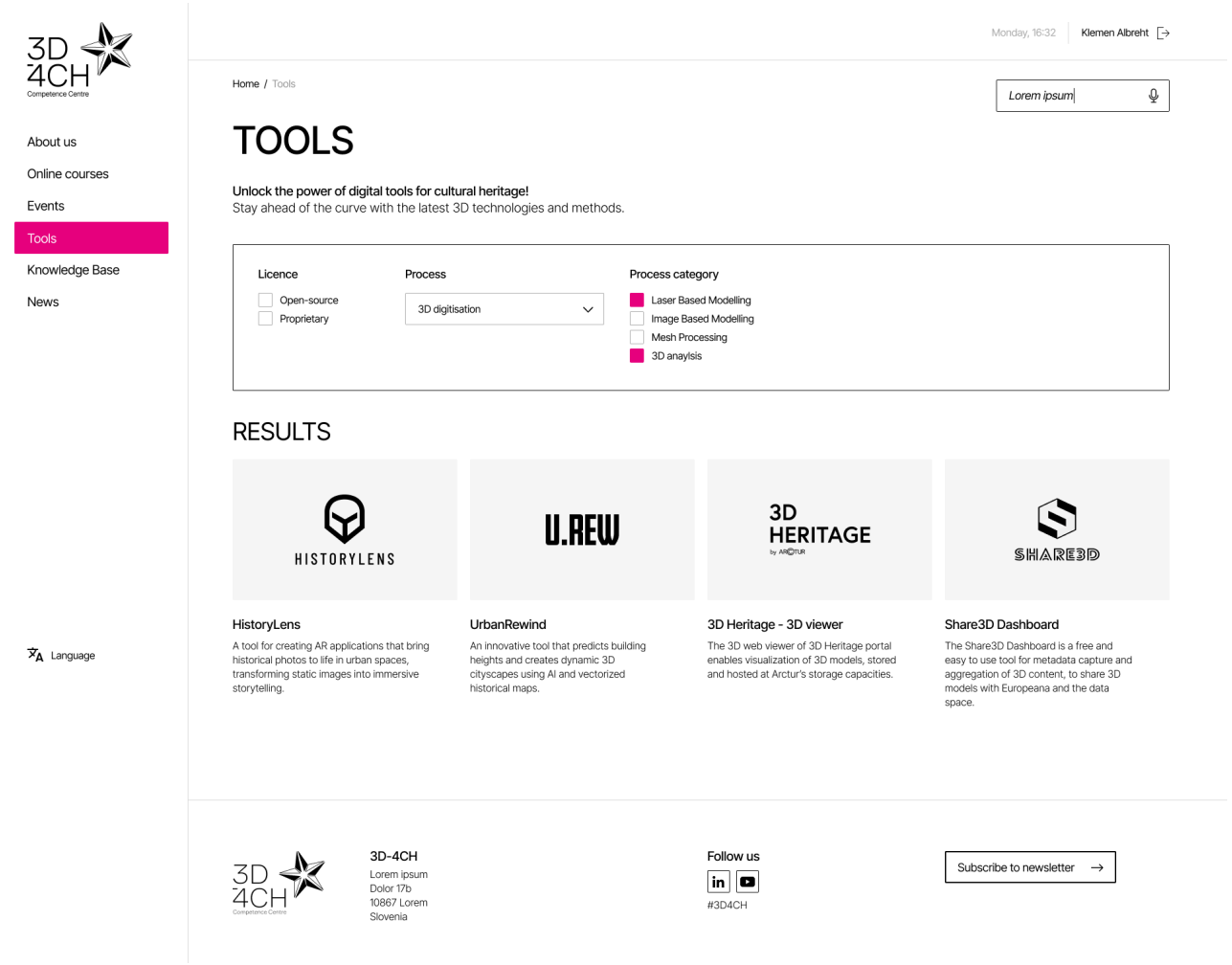

Figure 11: Mock-up of the Tools page.

Knowledge Base section:

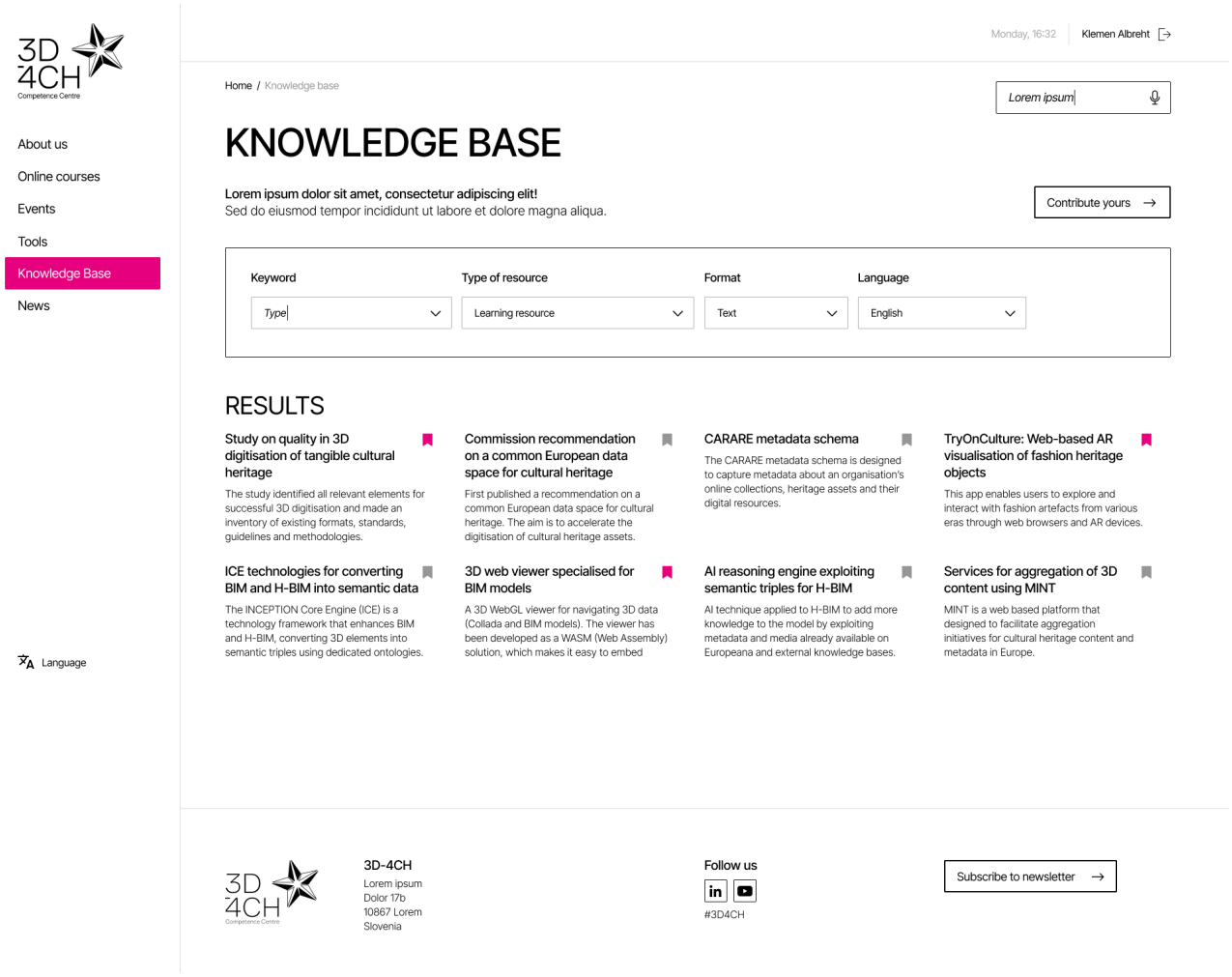

Figure 12: Mock-up of the Knowledge Base pages (search results).

Figure 13: Mock-up of the Knowledge Base pages (individual resource).

News section:

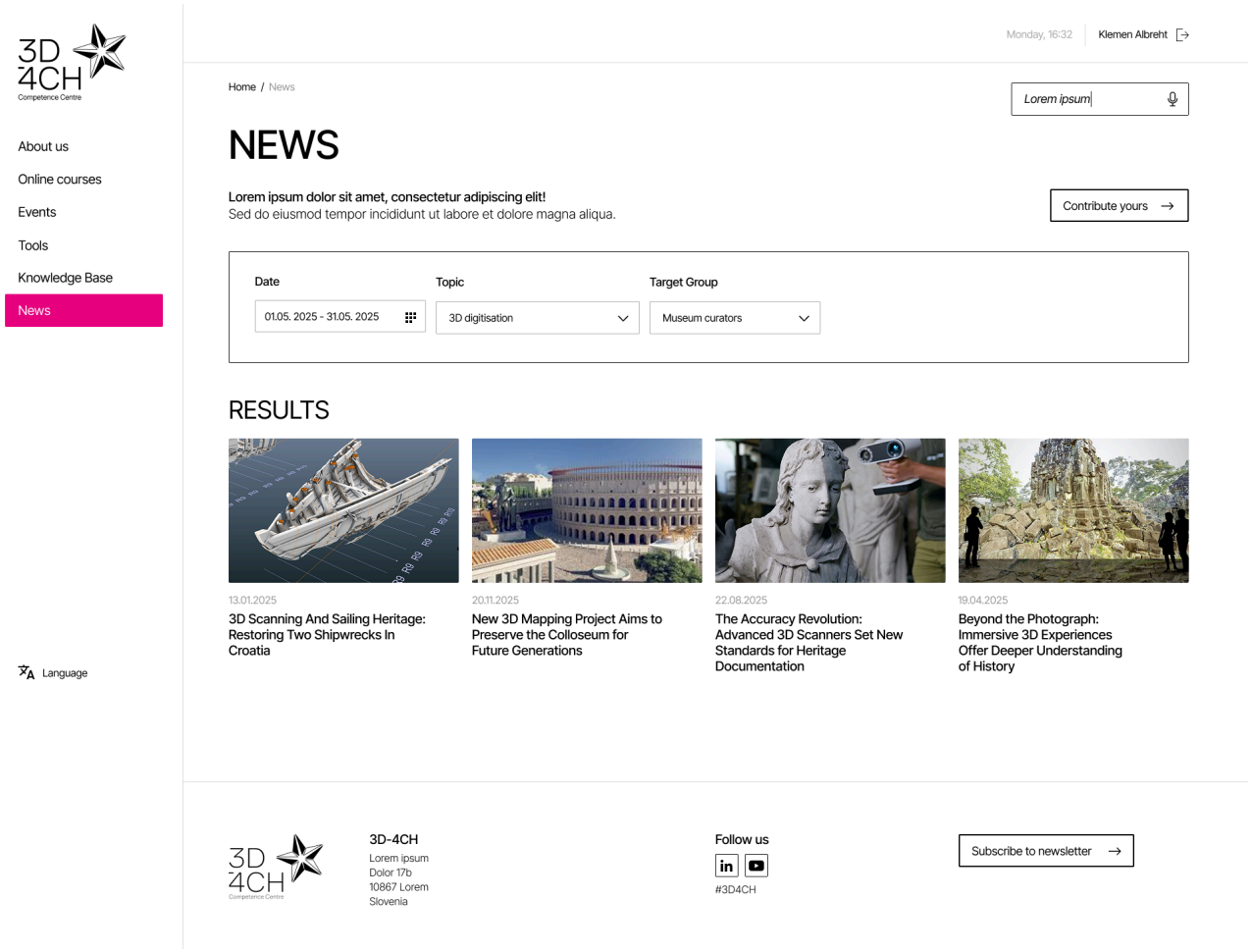

Figure 14: Mock-up of the News collection page.

Personal dashboard section:

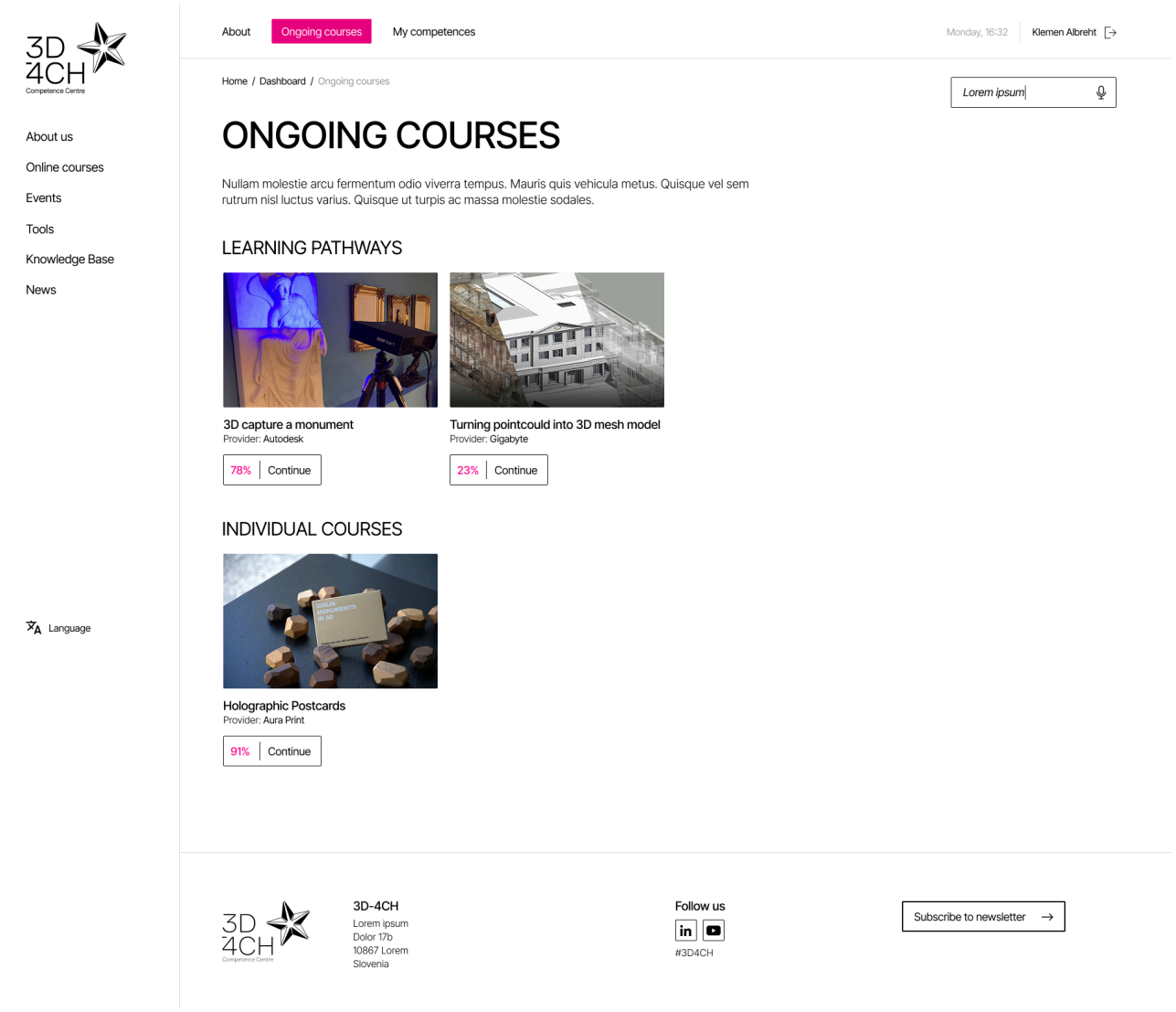

Figure 15: Mock-up of the Personal Dashboard (ongoing courses).

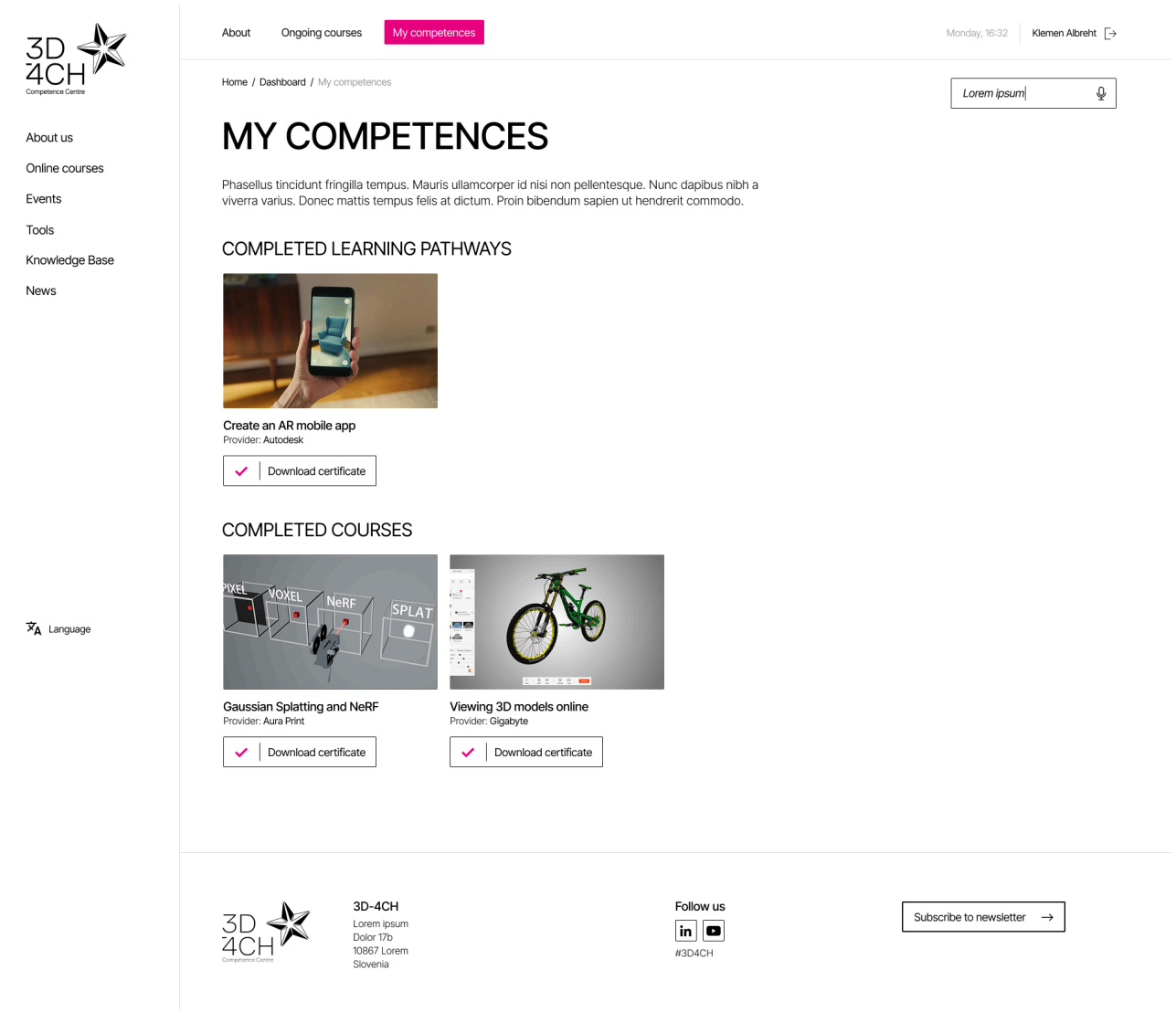

Figure 16: Mock-up of the Personal Dashboard (completed courses and pathways).

Contribute function:

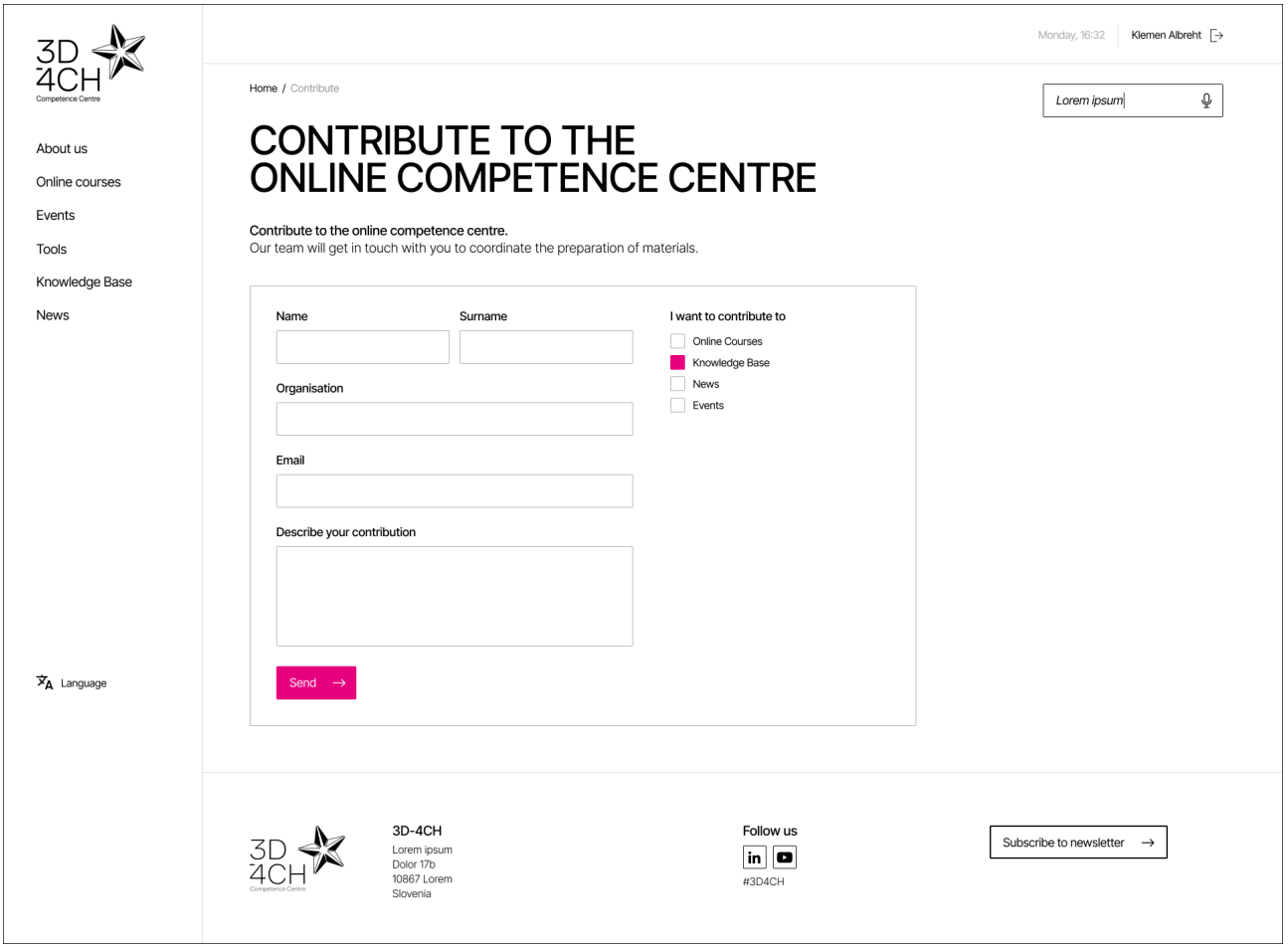

Figure 16: Mock-up of the Contribution page.

7. Conclusion

This D4.1 deliverable, "Design of the Online Competence Centre platform," marks a pivotal step in the 3D-4CH project. By conducting an analysis of existing 3D-related initiatives (Section 2) and prominent online learning platforms (Section 3), we have identified key insights and good practices crucial for shaping a robust, user-centric, and highly effective Online Competence Centre platform.

The platform is designed to be a central hub, empowering cultural heritage professionals, researchers, educators, and enterprises with accredited training, good practices, tools for 3D data management, and a library of reuse scenarios. It directly addresses the need for coordinated support in leveraging advanced digital tools like 3D digitisation, AI, and XR within the cultural heritage domain.

By integrating with past and running European projects such as 5DCulture, AI4Culture, and XRculture, the 3D-4CH platform will significantly contribute to the Common European Data Space for Cultural Heritage. This ensures the long-term preservation, accessibility, and sustainable reuse of 3D cultural content, enhancing access to heritage for diverse audiences across Europe and stimulating innovation in the creative industries and public sector.

The detailed analysis of functional and content dimensions of comparable platforms has provided a solid foundation for defining the 3D-4CH Platform's user requirements, functional specifications, and architectural design. The continued commitment to a user-friendly and highly interoperable environment will ensure the 3D-4CH Online Competence Centre becomes an invaluable resource, strengthening digital capabilities and fostering a vibrant ecosystem for 3D cultural heritage in Europe.

8. References

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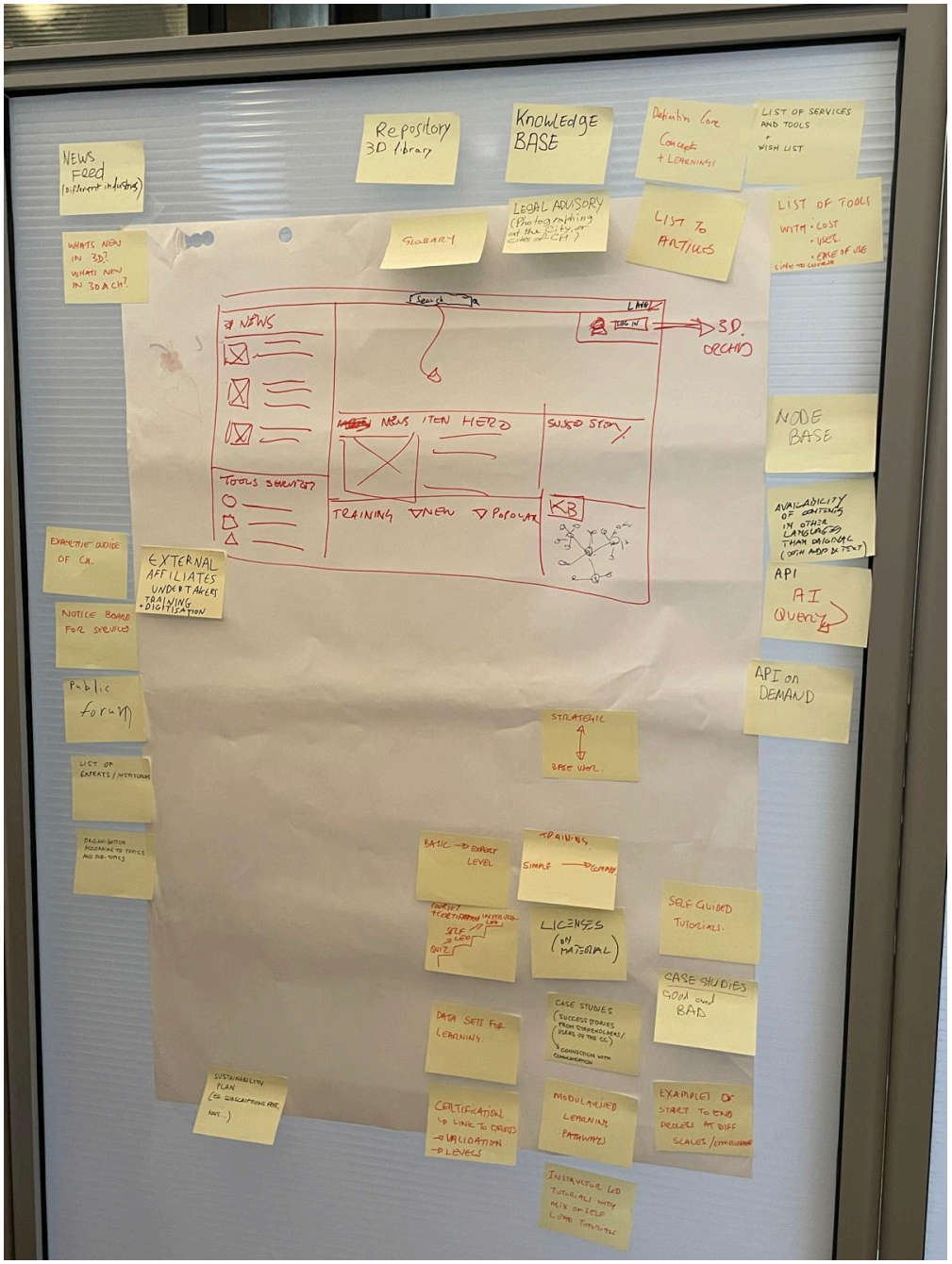
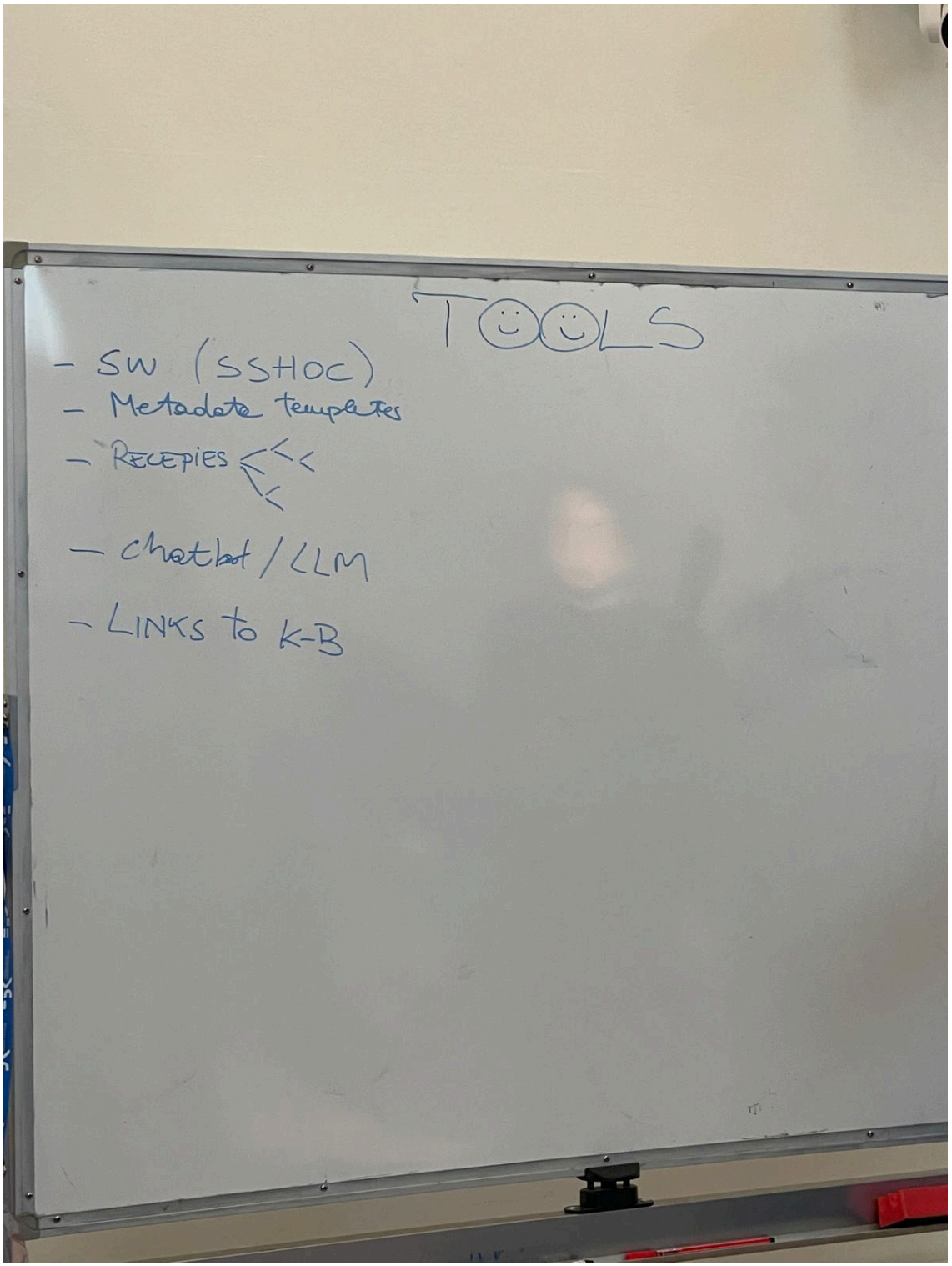
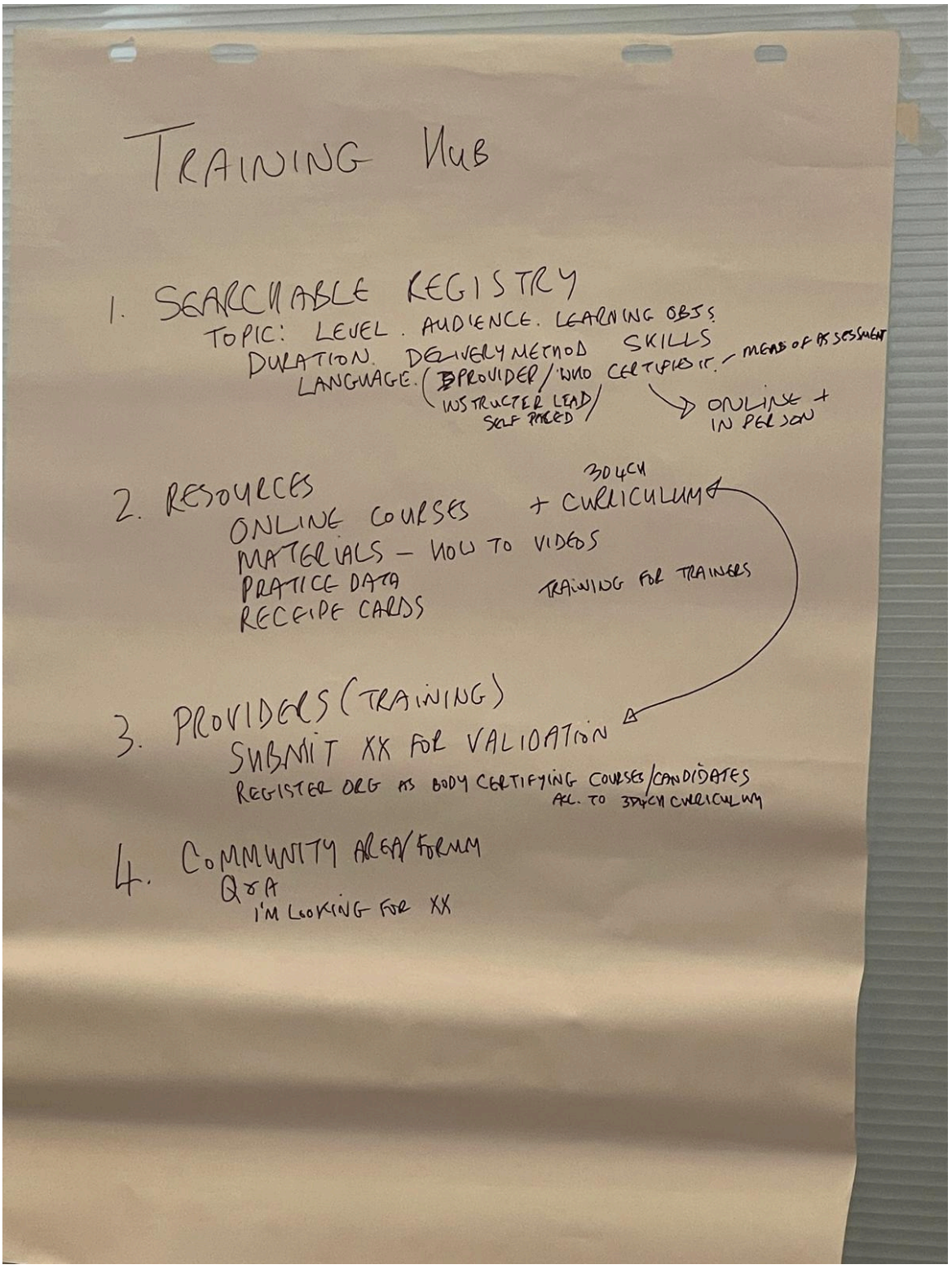
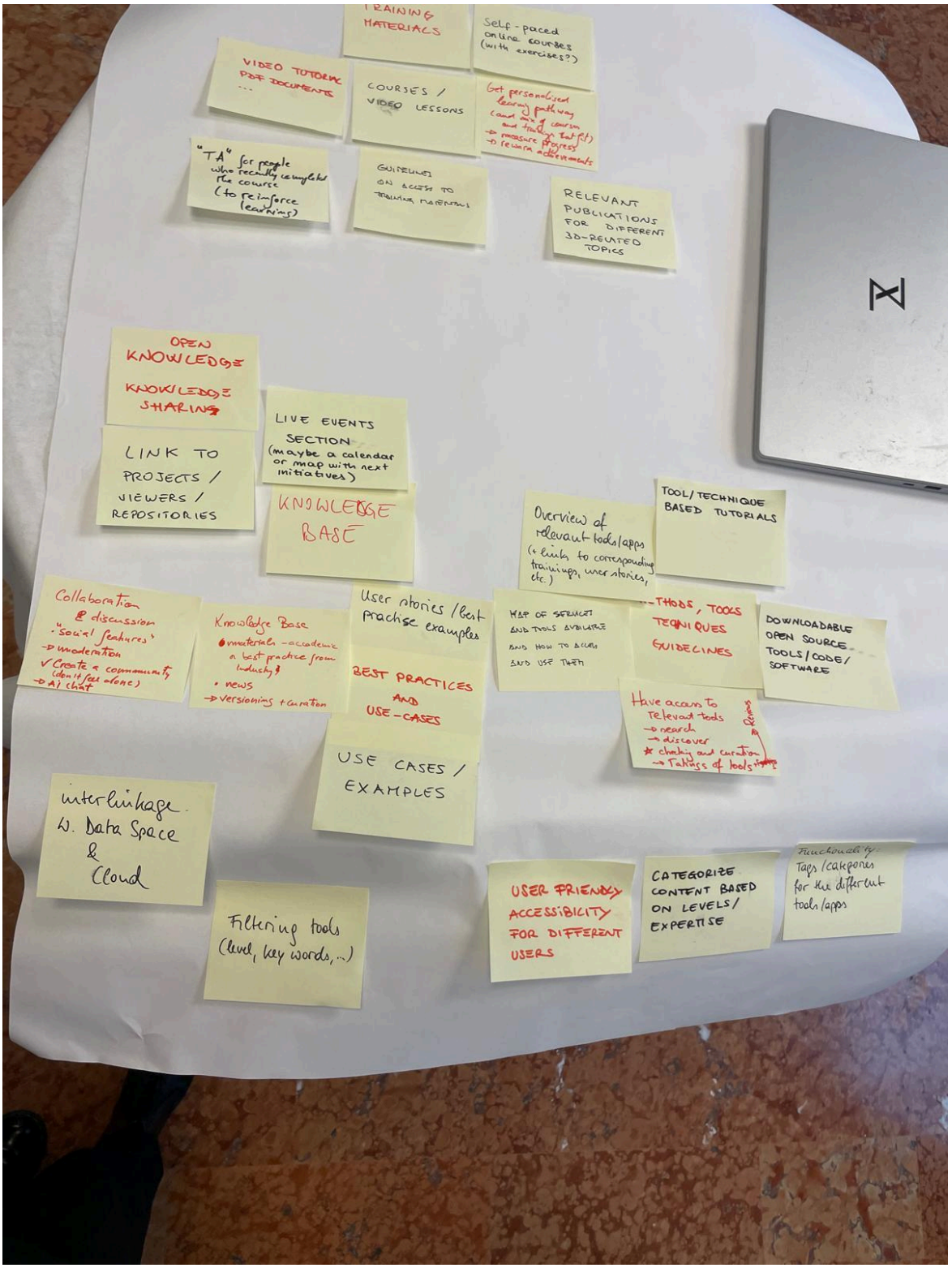
9. Appendix

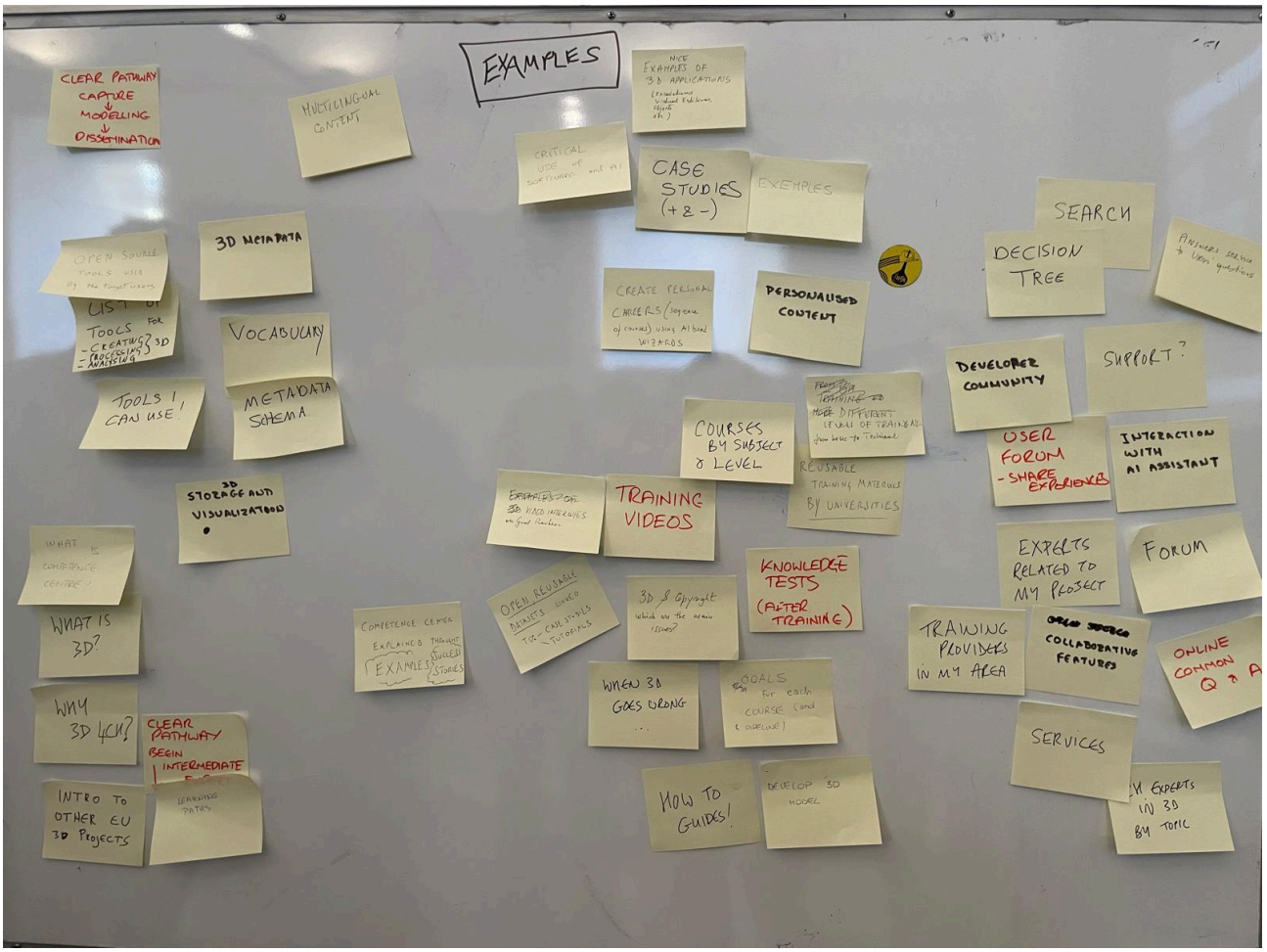
9.1 Photos from workshop on user requirements, Trento, February 2025

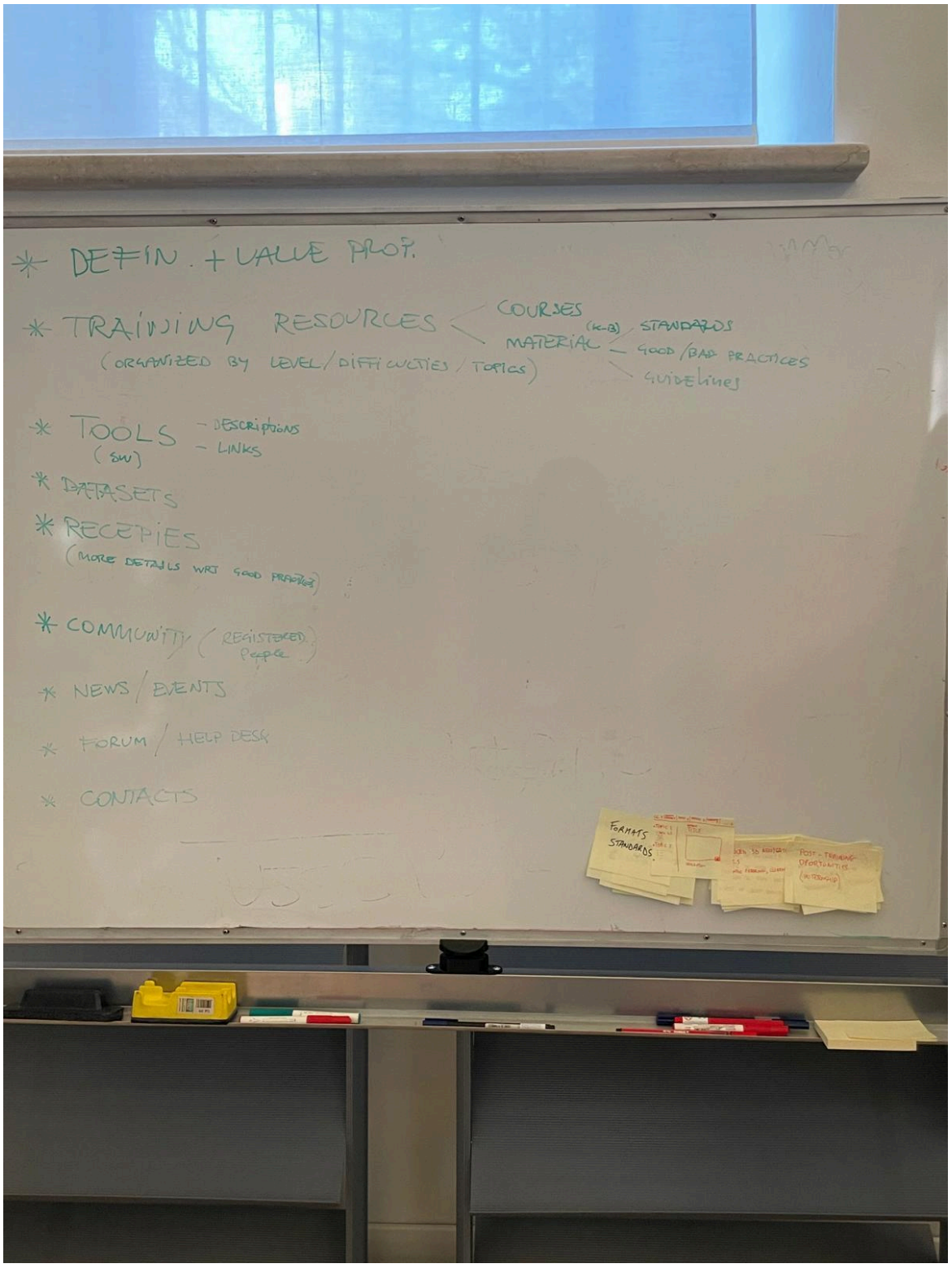


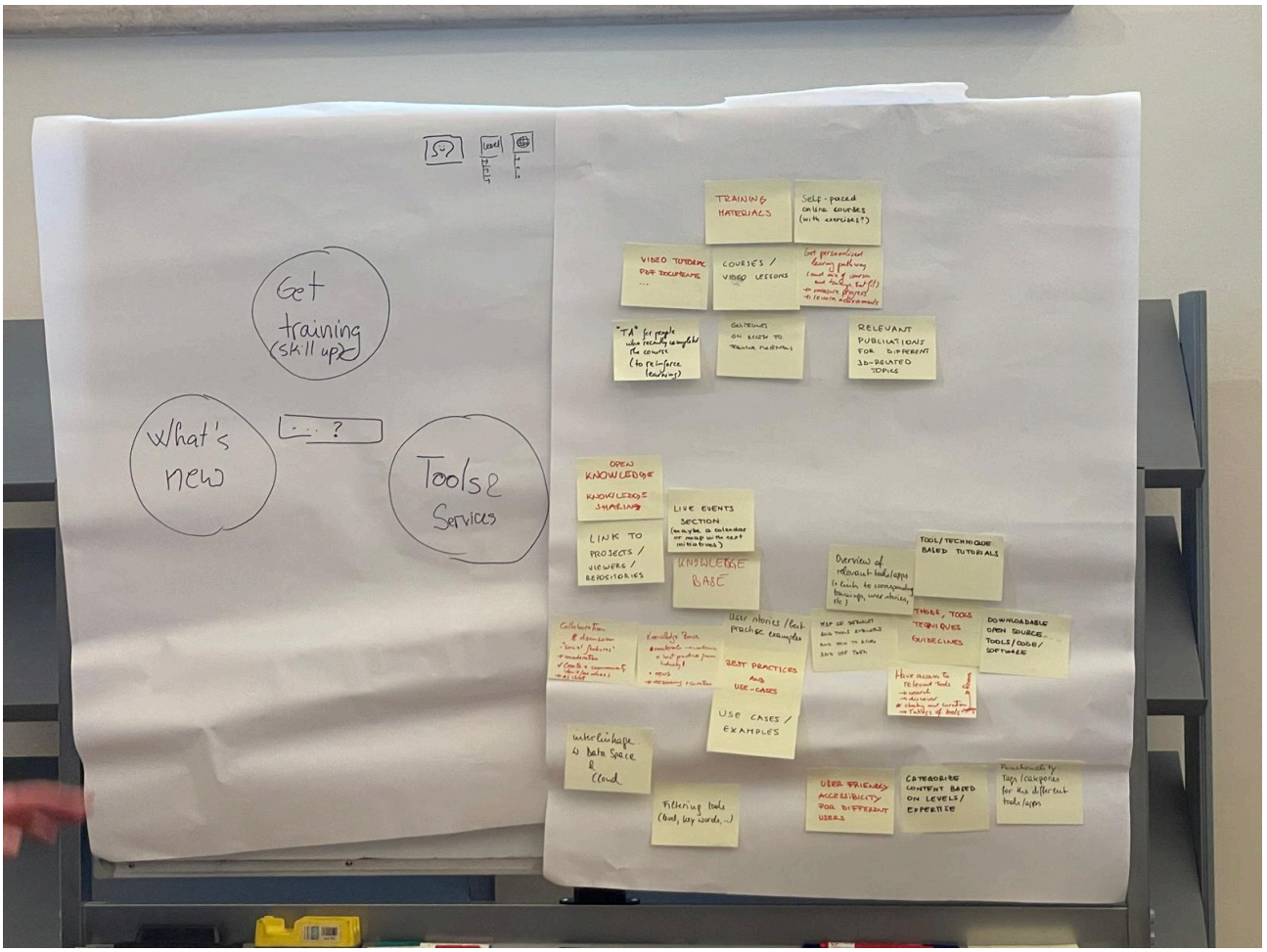

TOOLS
- SW (SSHOC)
- Metadata templates
- RECEPIES
- chatbot / LLM
- LINKS to K-B

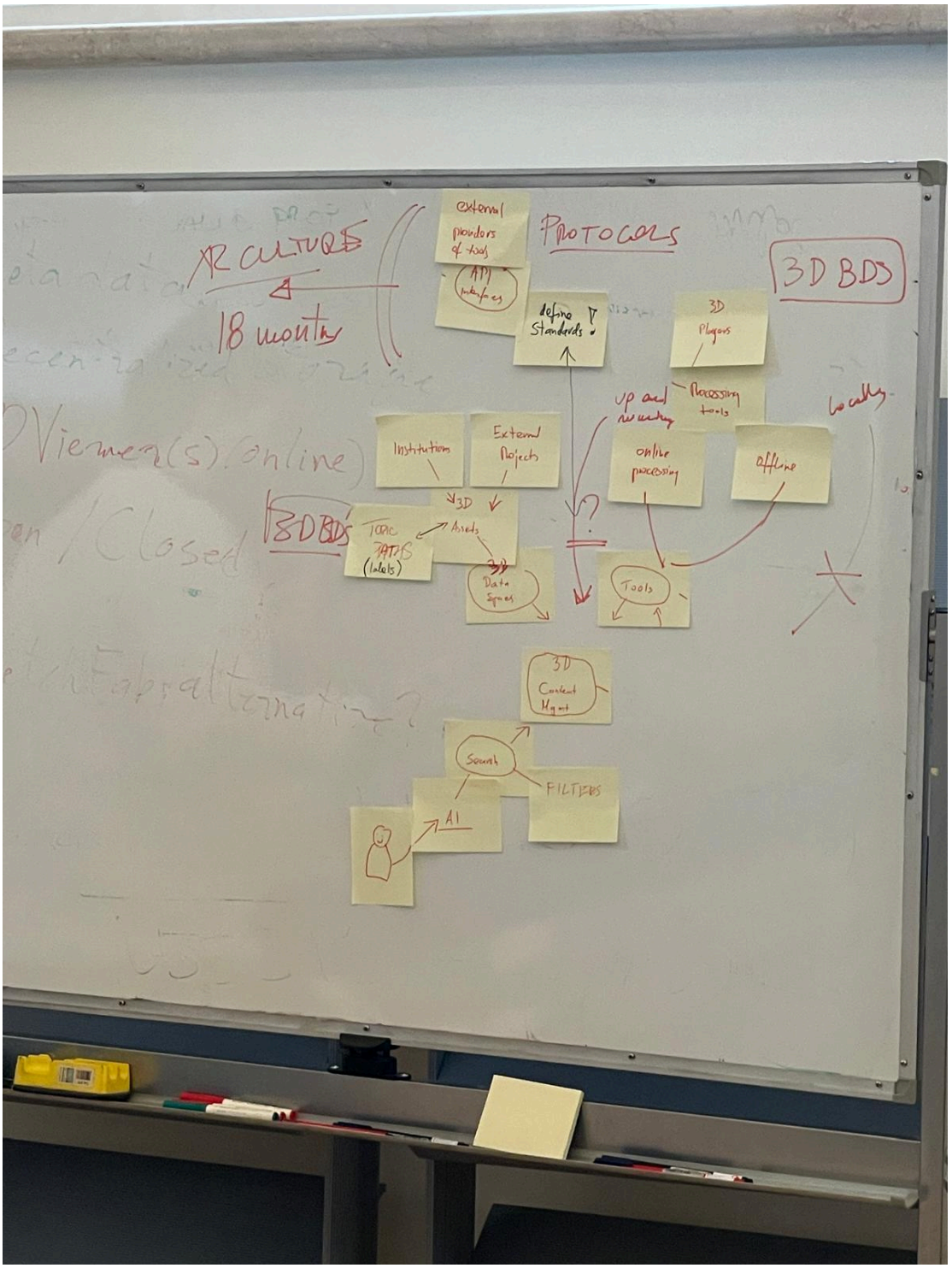

TRAINING HUB
1. SEARCHABLE REGISTRY
TOPIC: LEVEL. AUDIENCE. LEARNING OBJS
DURATION. DELIVERY METHOD SKILLS
LANGUAGE. (PROVIDER/WHO CERTIFIES IT. – MEANS OF ASSESSMENT
INSTRUCTER LED/
SELF PACED
ONLINE + IN PERSON
2. RESOURCES
ONLINE COURSES
MATERIALS – HOW TO VIDEOS
PRATICE DATA
RECEIPE CARDS
3D4CH
+ CURRICULUM
TRAINING FOR TRAINERS
3. PROVIDERS (TRAINING)
SUBMIT XX FOR VALIDATION
REGISTER ORG AS BODY CERTIFYING COURSES/CANDIDATES
ACC. TO 3D4CH CURRICULUM
4. COMMUNITY AREA/FORUM
Q&A
I'M LOOKING FOR XX

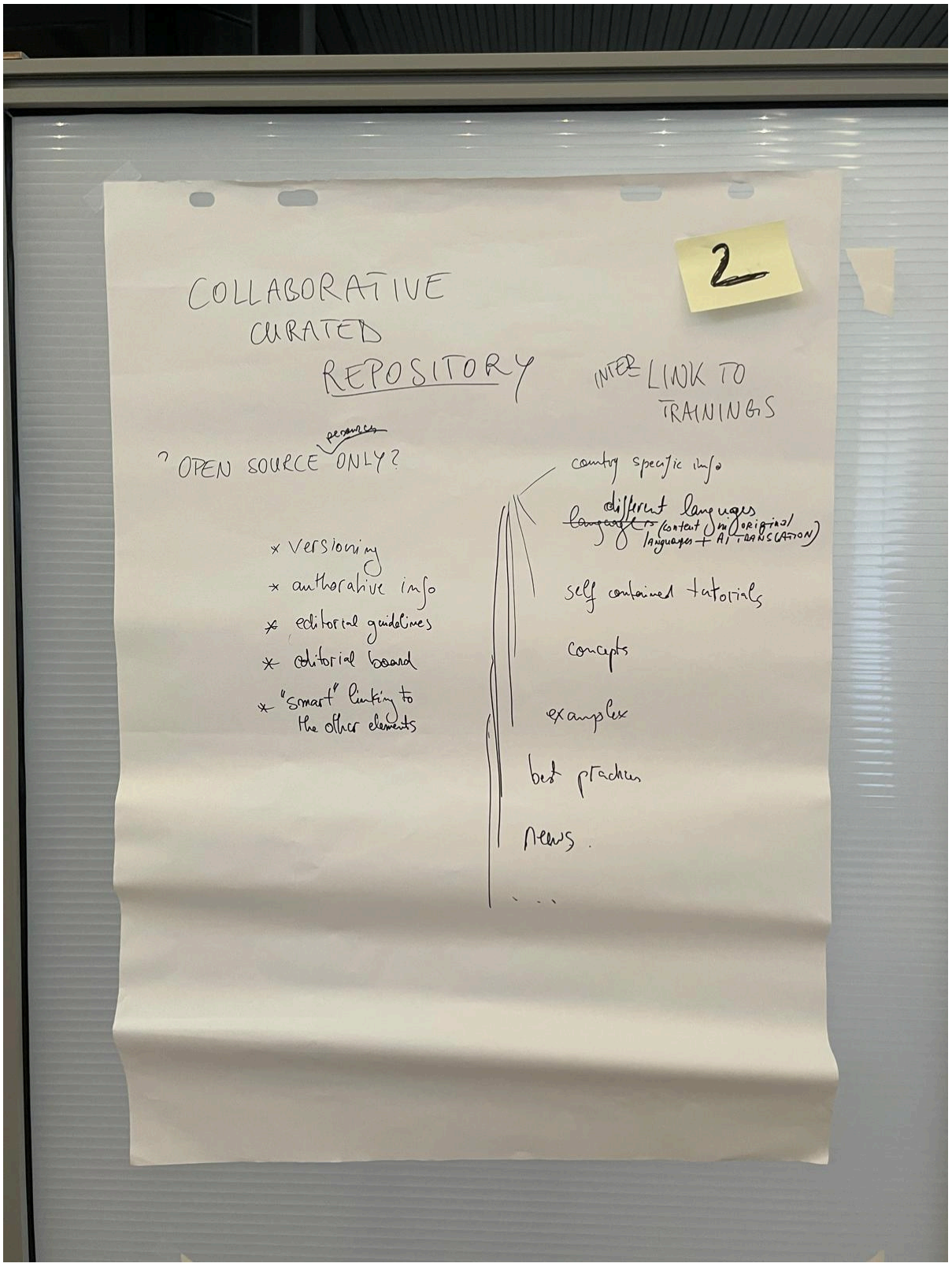

TRAINING & MATERIALS
Self-paced online courses (with exercises?)
VIDEO TUTORIAL PDF DOCUMENTS ...
COURSES / VIDEO LESSONS
Get personalised learning pathway (based on ... and track progress → measure achievements
"TA" for people who recently completed the course (to reinforce learnings)
GUIDELINES ON ACCESS TO TRAINING MATERIAL
RELEVANT PUBLICATIONS FOR DIFFERENT 3D-RELATED TOPICS
OPEN KNOWLEDGE
KNOWLEDGE SHARING
LIVE EVENTS SECTION (maybe a calendar or map with next initiatives)
LINK TO PROJECTS / VIEWERS / REPOSITORIES
KNOWLEDGE BASE
Overview of relevant tools/apps (+ links to corresponding trainings, user stories, etc.)
TOOL/TECHNIQUE BASED TUTORIALS
Collaboration & discussion
"social features"
→ moderation
✓ Create a community (don't feel alone)
→ AI chat
Knowledge Base
• materials - academic & best practice from industry
• news
→ versioning + curation
User stories / best practise examples
BEST PRACTICES AND USE-CASES
MAP OF STEINCET AND TOOLS AVAILABLE AND HOW TO ACCESS AND USE THEM
-THODS, TOOLS TECHNIQUES GUIDELINES
DOWNLOADABLE OPEN SOURCE TOOLS/CODE/ SOFTWARE
Have access to relevant tools → search → discover ★ checks and curation → Ratings of tools
USE CASES / EXAMPLES
interlinkage w. Data Space & Cloud
Filtering tools (level, key words, ...)
USER FRIENDLY ACCESSIBILITY FOR DIFFERENT USERS
CATEGORIZE CONTENT BASED ON LEVELS/ EXPERTISE
Tags/categories for the different tools/apps

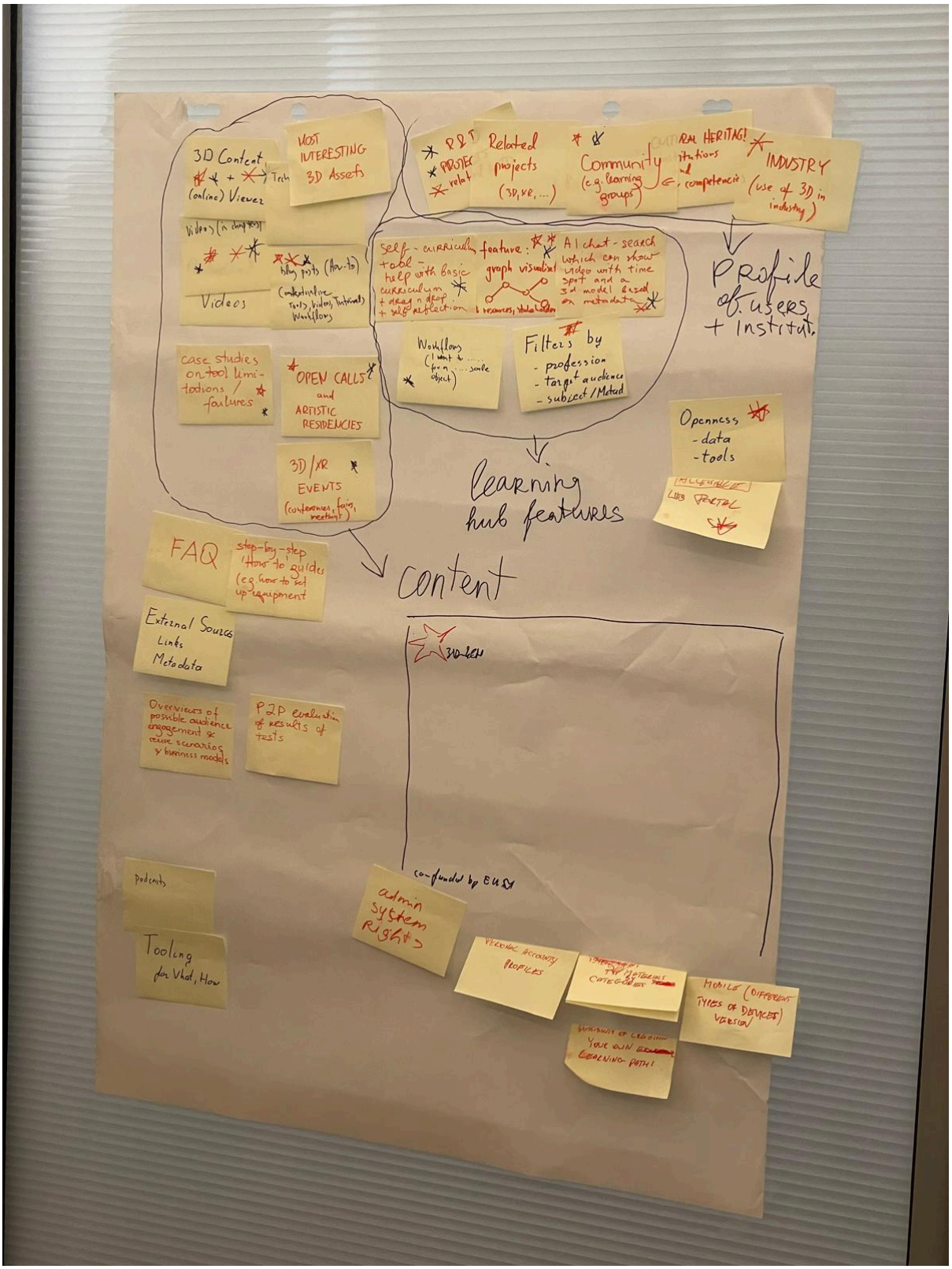

EXAMPLES
CLEAR PATHWAY
CAPTURE
MODELLING
DISSEMINATION
MULTILINGUAL CONTENT
CASE STUDIES (+ & -)
EXEMPLES
3D METADATA
VOCABULARY
METADATA SCHEMA
TOOLS I CAN USE
CREATE PERSONAL CAREERS
PERSONALISED CONTENT
SEARCH
DECISION TREE
DEVELOPER COMMUNITY
SUPPORT ?
USER FORUM - SHARE EXPERIENCE
INTERACTION WITH AI ASSISTANT
COURSES BY SUBJECT & LEVEL
REUSABLE TRAINING MATERIALS BY UNIVERSITIES
TRAINING VIDEOS
KNOWLEDGE TESTS (AFTER TRAINING)
EXPERTS RELATED TO MY PROJECT
FORUM
TRAINING PROVIDERS IN MY AREA
COLLABORATIVE FEATURES
ONLINE COMMON Q
SERVICES
3D STORAGE AND VISUALIZATION
WHAT IS 3D?
WHY 3D 4CH?
CLEAR PATHWAY
INTRO TO OTHER EU 3D PROJECTS
WHEN 3D GOES WRONG
HOW TO GUIDES!
DEVELOP 3D MODEL


DEFIN. + VALUE PROP.
TRAINING RESOURCES
COURSES
MATERIAL
STANDARDS
GOOD / BAD PRACTICES
GUIDELINES
(ORGANIZED BY LEVEL / DIFFICULTIES / TOPICS)
TOOLS
- DESCRIPTIONS
- LINKS
(SW)
DATASETS
RECEPIES
(MORE DETAILS WRT GOOD PRACTICE)
COMMUNITY (REGISTERED PEOPLE)
NEWS / EVENTS
FORUM / HELP DESK
CONTACTS
FORMATS
STANDARDS


Get training (skill up)
What's new
Tools & Services
TRAINING MATERIALS
Self-paced online courses (with exercises?)
VIDEO TUTORIAL PDF DOCUMENTS
COURSES / VIDEO LESSONS
RELEVANT PUBLICATIONS FOR DIFFERENT 3D-RELATED TOPICS
OPEN KNOWLEDGE
KNOWLEDGE SHARING
LIVE EVENTS SECTION
LINK TO PROJECTS / VIEWERS / REPOSITORIES
KNOWLEDGE BASE
TOOL/TECHNIQUE BASED TUTORIALS
THEORY, TOOLS TECHNIQUES GUIDELINES
DOWNLOADABLE OPEN SOURCE TOOLS/CODE/ SOFTWARE
BEST PRACTICES AND USE-CASES
USE CASES / EXAMPLES
Interlinkage & Data Space & Cloud
Filtering tools (kind, key words, ...)
USER FRIENDLY ACCESSIBILITY FOR DIFFERENT USERS
CATEGORIZE CONTENT BASED ON LEVELS/ EXPERTISE


XR CULTURE
18 months
external providers of tools
API interfaces
PROTOCOLS
define Standards
3D BDS
3D Players
Processing tools
Institutions
External Projects
online processing
offline
3D Assets
Data Spaces
Tools
3D Content Mgmt
Search
FILTERS
AI


2
COLLABORATIVE
CURATED
REPOSITORY
INTER LINK TO
TRAININGS
? OPEN SOURCE ONLY?
resources
* versioning
* authorative info
* editorial guidelines
* editorial board
* "smart" linking to the other elements
country specific info
different languages
(content in original languages + AI TRANSLATION)
self contained tutorials
concepts
examples
best practices
news
...


3D Content
(online) Viewer
MOST INTERESTING 3D Assets
Related projects (3D, VR, ...)
Community (e.g. learning groups)
INDUSTRY (use of 3D in industry)
Videos
Profile of users + Institut.
Filters by
- profession
- target audience
- subject / Metad
OPEN CALLS and ARTISTIC RESIDENCIES
3D/XR EVENTS
Openness
- data
- tools
learning hub features
content
FAQ
External Sources
Links
Metadata
Podcasts
Tooling
admin
System
Rights
co-funded by EU