Deliverable 2.2
Digital Curation Curriculum

**Supporting the Digital Transformation of Museums.
The DCBox approach**

Supporting the Digital Transformation of Museums. The DCBox approach

D2.2 Digital Curation Curriculum

General information	
Due date of deliverable	September 30,2022
DELIVERABLE	**D2.2 Digital Curation Curriculum**
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Version	4

Summary

Digital Curation Curriculum

AREA A

DIGITAL TRASFORMATION OF CULTURAL HERITAGE

AREA A	Digital transformation of Cultural Heritage
MODULE 1	**Digital transformation of Cultural Heritage**
Lesson 1.1	Digitization and digitalization
Lesson 1.2	Digital Museology and Museography
Lesson 1.3	Digital Humanities
Lesson 1.4	Digital curator's role
Lesson 1.5	Storytelling for CH
Quiz 1	

MODULE 1. DIGITAL TRANSFORMATION OF CH

Responsible	Università Politecnica delle Marche (UNIVPM)
Contents	5 lessons + 1 quiz
Introduction and module description	The module 1 is and introduction to the course's contents and objectives. The digital transformation is the most effective process in order to preserve, enhance and disseminate the CH. Since in the next modules you will face the most common used tools and techniques, a proper overview on the fascinating scenario of Digital Cultural heritage can give you a sound base.

Specific Competences addressed in the module

1. To be able to describe what digitization of Cultural Heritage is
2. To be able to determine the main digital curator's skills
3. To be able to define some technological innovation for museums

Learning objectives of the module

- To become aware of the importance of preserving and enhancing Digital Cultural Heritage
- To explain terms like museology, museography, digital humanities, digital twin, digital heritage
- To became aware of the role of the museum curator throughout the years
- To define the requested humanistic and digital skills to participate in the digitization process

Expected Learning outcomes

At the end of the first module students will own some basic concepts and principles as regards Digital Cultural Heritage and all the involved processes. It will allow students to have a sound base to better focus on the main topics and activities addressed in the next modules. Students will become aware of some essential keywords like digitization, digitalization, museology, digital humanities, digital twin and will be exposed to a brief overview of the curator's figure since the 15th century to the modern digital age. The essential humanistic and digital skills for a digital curator will be discussed in order to preserve, enhance and disseminate Cultural Heritage.

Activities

There is no planned activity for Module 1

Quiz/Self-assessment test

Quiz Module 1

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AREA B
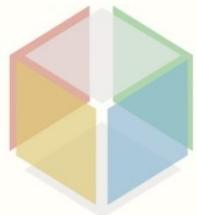
ADVANCED 3D DIGITIZATION

AREA B	Advanced 3D Digitization
MODULE 2	**Digitization**
Lesson 2.1	Range-based digitization
Lesson 2.2	Range-based survey techniques
Lesson 2.3	Image-based digitization
Lesson 2.4	Image-based survey techniques
Lesson 2.5	Structure from motion
Lesson 2.6	High resolution images production
Lesson 2.7	Projects overview: HD paintings
Quiz Module 2	

MODULE 2. DIGITIZATION

Responsible	The Cyprus Institute (CyI)
Contents	7 lessons + 1 Activity + 1 quiz
Introduction and module description	The Module 2 tackles the reality-based 3D modelling domain from different perspectives, in order to provide a solid knowledge of all the methodologies involved. Lectures will be mixed together with practical exercises and tutorials.

Specific Competences addressed in the module

1. To be able to complete 3D modeling related projects exploiting active (3D scanners) and passive sensors (DSLR cameras)
2. To be able to plan and collect data according to the most appropriate methodology
3. To be able to process data and deliver accurate results

Learning objectives of the module

- To understand the main difference between active and passive sensors
- To be able to choose the most appropriate technique according to the specific project goal
- To understand the full range-based 3D modelling pipeline for data processing: from range maps to a complete 3D model
- To understand the full image-based 3D modelling pipeline: from images to a complete 3D model
- To understand the potentialities of high-resolution imaging techniques
- To be able to process 3D data exploiting a wide array of software
- To understand how to assess the conservation conditions exploiting range-based techniques and perform basic analysis of objects of different scales.

Expected Learning outcomes

By the end of the Module the students will develop the competences that allow them to plan, perform, process the collected data, and deliver a high-resolution accurate 3D model or digital related product.

They will be introduced to the use of several sensors installed on aerial and terrestrial platforms. Hands-on exercises, exploiting open source and commercial software, will give them the chance to practice on real case-studies, challenging themselves with open questions and solutions.

Activities
Activity 2.3

2.3 Point clouds alignment

Tutor	Daniele Arturo De Luca
Description	In this activity the students will be guided through the workflow for point cloud alignment. A step-by-step booklet will be provided highlighting all the tasks.
Explanation	Upload a screenshot of the clouds aligned with the report as shown in the tutorial

Quiz/Self-assessment test

Quiz Module 2

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AREA B	Advanced 3D Digitization
MODULE 3	**3D Modelling and Data Implementation**
Lesson 3.1	3d modelling and data optimization
Lesson 3.2	Projects overview: direct modelling
Lesson 3.3	Projects overview: reality-based modelling
Lesson 3.4	Virtual Reconstruction
Quiz Module 3	

MODULE 3. 3D MODELLING AND DATA IMPLEMENTATION

Responsible	The Cyprus Institute (CyI)
Contents	4 lessons + 1 quiz
Introduction and module description	The Module 3 tackles the 3D modelling workflow for reality and non-reality-based data post processing and data optimization. Both practical and theoretical approaches will be highlighted, coupled with real case studies.

Specific Competences addressed in the module

1. To be able to complete master different methods for reality and non-reality-based 3D modelling
2. To be able to post process and optimize 3D data for different kind of purposes
3. To Assess and evaluate Cultural Heritage Projects

Learning objectives of the module

- To understand and practice on 3D modelling and data optimization
- To study and assess direct and procedural modelling through the analysis of real case studies
- To perform and complete virtual restoration and 3D modelling restoration tasks through practical exercises

Expected Learning outcomes

By the end of the Module the students will have a broad understanding of the technique to process, optimize and manage reality and non-reality-based 3D models.

They will be introduced to the use of several post-processing software and 3D data ranging from small objects to monumental scale. Students will have the chance to analyze and discuss on real case-studies, developing an analytical and critical thinking process.

Activities

There is no planned activity for Module 3

Quiz/Self-assessment test

Quiz Module 3

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Lesson 3.1

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AREA **C**

POLICIES AND DIGITAL DATA PRESERVATION

AREA C	POLICIES AND DIGITAL DATA PRESERVATION
MODULE 4	**Policies rules and licensing**
Lesson 4.1	Excursus over the last decades
Lesson 4.2	CH laws
Lesson 4.3	DCH Laws between public institutions and private businesses
Lesson 4.4	ISO and EN standards
Lesson 4.5	Open File Formats: images, videos, sounds
Lesson 4.6	Open File Formats: Point Clouds, Mesh

MODULE 4. POLICIES RULES AND LICENSING

Responsible	University of Córdoba (UCO)
Contents	5 lessons + 1 quiz
Introduction and module description	The module 4 provides a number of essential topics for management and preservation of Digital Cultural Heritage. It includes the study of European policies and recommendations for Digital Cultural Heritage; Digital information and Cultural Heritage Law; EN and ISO standards and Open File Formats for interchanging and preservation.

Specific Competences addressed in the module

- To be able to manage Digital Cultural Heritage according to international and European guidelines and rules
- To be able to guarantee the interchanging and preservation of Digital Cultural Heritage using the Open Formats
- To be able to manage and adapt Digital Cultural Heritage to the EN and ISO standards

Learning objectives of the module

- To learn about the International Conventions and the European and national laws related to Digital Cultural Heritage
- To be able to define what Digital Cultural Heritage is.
- To be introduced to intellectual property laws in connection to cultural institutions and Digital Cultural Heritage
- To understand the EN and ISO standards regarding the management of digital sources and adapt them to Digital Cultural Heritage
- To learn about the Open Data Formats that can be used for Digital Cultural Heritage
- To be able to promote standardized interoperability and interchanging of Digital Cultural Heritage between institutions

Expected Learning outcomes

By the end of the module the students will develop the competences that allow them to manage Digital Cultural Heritage according to the European and international conventions and guidelines. They will be able to adapt the EN and ISO standards about digital sources to standardizing Digital Cultural Heritage for the international scenario. In addition, they will be able to use the Open formats for digital cultural heritage's preservation.

Activities

There is no planned activity for Module 1

Quiz/Self-assessment test

Quiz 4

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AREA C	POLICIES AND DIGITAL DATA PRESERVATION
Module 5	**Digital data preservation**
Lesson 5.1	Digital cataloguing strategies for CH
Lesson 5.2	Digital cataloguing tools and techniques
Lesson 5.3	Database design
Lesson 5.4	Data models (ER, EER)
Lesson 5.5	Database development
Lesson 5.6	Information management methodologies
Lesson 5.7	Planning tools

MODULE 5. DIGITAL DATA PRESERVATION

Responsible	University of Córdoba (UCO)
Contents	5 Lessons + 1 Activity + 1 Quiz
Introduction and module description	The module 5 provides a number of essential topics for management and preservation of Digital Cultural Heritage. It includes the Digital Cataloguing strategies for Cultural Heritage; Tools and techniques for cataloguing; Database design and Information Management System.

Specific Competences addressed in the module

- To be able to develop good strategies for the cataloguing and information management of Digital Cultural Heritage
- To be able to model data using the Entity-Relationship (ER) and the Enhanced Entity Relationship (EER) Models
- To be able to understand the importance of Organization and Management in developing and running innovative information systems

Learning objectives of the module

- To learn the methodologies of cataloguing Cultural Heritage
- To be able to define the main areas of interest aimed at communicating and enhancing the cultural heritage
- To understand Database System Concepts and Architecture
- To create database queries
- To learn basic concept of Structured Query Language (SQL).
- To be able to create strategic and long-term planning information management system

Expected Learning outcomes

By the end of the module the students will be able to develop state-of-the-art strategies regarding the preservation and interchanging of the digital data and they will acquire the knowledge that allow them to develop long- and short-term plans for the information management and cataloguing of Cultural Heritage.

In addition, the students will be able to understand data model, to interact with existing databases and to collaborate with software engineers to design data-centric applications focused on Digital Cultural Heritage.

Activities

Activity 5.2

5.2 Digital cataloguing tools and techniques	
Tutor	Massimo Gasparini
Description	In this activity you will be able to do a Catalog file following the steps you have learn in the lesson.
Explanation	Following the previous lesson, you will be able to do a catalog file with the examples mentioned. You will select a heritage asset from your town or community that is not listed in Europeana and we will create its catalog file following the structure studied. Once the file is completed, it must be accompanied by a brief report explaining points detailed in the activity.

Quiz/Self-assessment test

Quiz 5

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AREA **D**

DIGITAL ACCESS: UNIVERSAL DESIGN AND VIRTUAL EXPERIENCES

AREA D	Digital access: Universal design and virtual experiences
MODULE 6	**Communication**
Lesson 6.1	Managing of websites
Lesson 6.2	Virtual exhibitions
Lesson 6.3	Video production and podcasting for museums
Lesson 6.4	Digital accessibility and inclusion
Activity 6.5	Making of a Website
Quiz 6	

MODULE 6. COMMUNICATION

Responsible	Universidade Lusófona (LUSO)
Contents	4 Lessons + 1 Activity + 1 Quiz
Introduction and module description	The dissemination and the communication of the digital Cultural Heritage owned by museum represents of the main Topic and challenge. This module focuses on Tools, resources, best practices, and descriptive standards for building robust digital collection programs and for adopting marketing strategies.

Specific Competences addressed in the module

1. To be able to understand the framework of digital dissemination for the Cultural Heritage
2. To be able to use marketing principles and strategies
3. To be able to preliminary design a museum website

Learning objectives of the module

- To understand the framework of digital dissemination for the Cultural Heritage
- To acquire some marketing principles and strategies
- To preliminary design a museum website

Expected Learning outcomes

By the end of the course students will develop the competences that allow them to orient themselves in the world of digital tools, especially with regard to the relationship between cultural heritage and the public. With the presentation of tools like website, video production, podcasting, students will be able to ideate a hypothetical museum website.

Activities

6.5 Making of a Website

Tutor	Ricardo Geraldes
Description	In this activity the students will be able to create a website homepage by following a website tree structure that is essential to organize the information flow of a website.
Explanation	Following the lessons of this module, the students will be guided through the creation of a website homepage with the implementation of one of the three essential structures to build a website: sequences, hierarchies and webs. By implementing these fundamental architectures, the students will start to organize the information workflow of the website, regarding Cultural Heritage in Museums context.

Quiz/Self-assessment test

Quiz 6

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AREA D	Digital access: Universal design and virtual experiences
MODULE 7	**Virtualization**
Lesson 7.1	Virtual Reality
Lesson 7.2	Augmented & Mixed Reality
Lesson 7.3	Applications on the web
Lesson 7.4	Mobile applications
Lesson 7.5	Wearable devices applications
Activity 7.6	How to develop a mobile app
Quiz 7	

MODULE 7. VIRTUALIZATION

Responsible	Università Politecnica delle Marche (UNIVPM)
Contents	5 lessons + 1 activity + 1 quiz
Introduction and module description	CH virtualization represents a challenge in terms of humanities and informatics skills. It is a tangible means for the enhancement and the narrative of museums' collections. The module 7 offers a concise and effective overview of the Extended Reality technologies and explains how they are employed in the sector of the app developing through the study of some of the best digital practice. The module 7 includes 5 lessons and 1 activity where you will be able to choose the most effective technologies based on some real case scenario and develop a simple mobile application.

Specific Competences addressed in the module

1. To be able to distinguish the main Extended Reality technologies for Cultural Heritage
2. To be able to define and evaluate the best XR solution basing on some real cases
3. To be able to ideate and develop simple applications for museums

Learning objectives of the module

- To learn the main concepts, enabling technologies, and key applications for XR in CH
- To recognize strengths and weaknesses of VR and AR for new XR applications
- To become aware of the main applications for web, mobile and wearable devices
- To develop a simple XR application

Expected Learning outcomes

By the end of the module, students will be able to explain the conceptual and technological differences between VR, AR, MR, and XR. Furthermore, they will learn the underlying concepts, enabling technologies, and key applications for XR in CH. In the activity students will choose the most effective technology based on some real case scenario.

In addition, students will be able to recognize and classify all the applications according to the technology and the device and will gain good knowledge of some common software. Furthermore, students will test an available platform for the development of new XR experiences for a museum collection.

Activities

Activity 7.6

7.6 How to develop a mobile app	
Tutor	Mirco D'Alessio, Daniele Arturo De Luca
Description	In this tutorial all the steps to develop a simple mobile application exploiting Augmented Reality will be shown.
Explanation	Submit a video screen capture of the builded Application during the functioning

Quiz/Self-assessment test

Quiz 7

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AREA D	Digital access: Universal design and virtual experiences
MODULE 8	**New frontiers in CH**
Lesson 8.1	Introduction to Artificial Intelligence
Lesson 8.2	Machine learning
Lesson 8.3	Deep learning
Lesson 8.4	The role of AI in the Heritage Sciences dimension
Lesson 8.5	Evaluation questionnaires for museum experience
Lesson 8.6	ICT for tracking behaviour
Activity 8.7	Evaluation Questionnaires Developing
Quiz 8	

MODULE 8. NEW FRONTIERS IN CH

Responsible	Università Politecnica delle Marche (UNIVPM)
Contents	6 lessons + 1 activity + 1 quiz
Introduction and module description	Some of the new frontiers in CH will be discussed in this module. By using AI and XR technologies it is possible to implement sophisticated tracking of user experiences or automatized the 3d modelling processes that currently are mostly manual.

Specific Competences addressed in the module

1. To be able to distinguish the main AI technologies for Cultural Heritage
2. To be able to define most common assessment questionnaires
3. To be able to conduct a simple survey on a museum application

Learning objectives of the module

- To explain terms like Machine Learning, Deep Learning and Neural Networks
- To become aware of best practices of AI in the heritage science
- To become aware of the most common assessment questionnaires and their underlying concepts
- To design and conduct a simple survey on a museum application

Expected Learning outcomes

By the end of this module, students will learn what Artificial Intelligence (AI) is, explore concrete cases and applications of AI, understand AI concepts and terms like machine learning, deep learning and neural networks. They will become aware of some key applications of AI in Heritage Science by means of the best-case studies of the last years.

Moreover, they will acquire an overview of the most common assessment questionnaires and will be able to explain terms like level of engagements and level of readiness. Finally, they will carry out an activity designing and producing a simple assessment questionnaire about a museum application.

Activities

Activity 8.7

8.7 Evaluation Questionnaires Developing

Tutor	Andjela Djordjevic
Description	In this activity all the steps in order to develop a simple questionnaire about a virtual tour using will be shown. Literature containing basic rules for creating questionnaires and formulating questions will be proposed to the students.
Explanation	

Quiz/Self-assessment test

Quiz 8

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Relevant material

None