CreDiT
Creative Digital WaTers

Digitizing Water Heritage

CREATE AND CO-DESIGN DIGITAL TOURS TO PROMOTE
THE VALUE OF OUR NATURAL AND CULTURAL ASSETS FOR PROTECTION
OF AQUATIC BIODIVERSITY AND SUSTAINABLE DEVELOPMENT

Toolkit

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The CreDiT project

The **CreDiT** project (**CRE**ative **DI**gital wa**T**ers) meets the goals of education for the sustainable use of water set by the 2030 Agenda, the European Green Deal, and the Phase 9 of the Intergovernmental Hydrological Programme (IHP) of UNESCO. The project also meets the goals of the UNESCO-IHP Resolution (no.5-XXIII) which in 2018 was unanimously endorsed by all Member States of the United Nations to create the Global Network of Water Museums (WAMU-NET) and promote further water sustainability education worldwide.

About

The CreDiT project is co-funded by the European Commission (Programme Creative Europe) and responds to the need of improving the digitization of water heritages to achieve the SDGs. It includes training and digitization activities for the partnering water museums. Indeed, the digitization of natural and cultural water heritage must be promoted at all institutional levels to build more sustainable futures in Europe.

Today, Education for Sustainable Development (ESD) is a crucial prerequisite for more forward-looking water management and a stimulating field for creative innovation of water museums, eco-museums and interpretive centres whose mission is to ensure a smooth transmission of water values to new generations.

Aims

- Promoting attractive education activities to address climate change and water challenges.
- Improving people's access to and interpretation of water heritages inside and outside museums.
- Contributing to prevent further losses of natural and cultural water heritage in the long-term.

Activities

Training courses, workshops, and digitization campaigns have been implemented to engage not only museums but also schools and educational institutions in order to co-design new digital tools.

To increase the number of visitors (both online and physical visits) for the partnering water museums, the co-created tools include digital tours, 3D models, and interactive educational materials for kids and adults.

Direct beneficiaries of these tools are thousands of visitors and students that every year visit museums and that will be more aware of the challenges for more forward-looking water management, protection of biodiversity, and prevention of further loss of aquatic ecosystems.

Results

- Needs analysis on digital skills and training gaps of water museums.
- Co-designed digital tours for each partner aimed at involving new audiences.
- 3D models and interactive educational materials for kids and adults.
- A web platform aiming to facilitate interaction among museums and the sharing of results.
- Worldwide exploitation involving several water museums as co-beneficiary institutions.

Digital Tours, 3D Modelling, Coloring and Arting:

https://www.uace.eu/aquatika-karlovac/

https://www.uace.eu/hydria-project/

https://www.uace.eu/opificio-bologna/

https://www.watermuseums.net/education/aquaplay/

Project Partners

The project lead partner is Doc Servizi: for the digital acquisition of data, images and videos it worked in close cooperation with its Doc Creativity Network:
https://docservizi.retedoc.net/ and https://doccreativity.it/

VirtualGeo is the company appointed to manage all digital contents using the UACE platform: a pre-existing platform which was functional to test new digital tools and pilot activities with the beneficiary partners:
https://www.uace.eu

The three beneficiary museums which piloted the planned activities (from content selection, to digitization and post-production) are:

Opificio delle Acque Bologna (Water Factory Bologna), Italy:
https://www.opificiodelleacque.it/

AQUATIKA Freshwater Aquarium, Karlovac, Croatia:
https://www.aquariumkarlovac.com/en/homepage/

MIO-ECSDE and HYDRIA, Athens, Greece:
https://mio-ecsde.org/ and www.hydriaproject.info

The Global Network of Water Museums - which is a 'flagship initiative' of the Intergovernmental Hydrological Programme of UNESCO - disseminated the project results involving several water museums globally:
https://www.watermuseums.net


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AQUATIKA
FRESHWATER AQUARIUM KARLOVAC


MIO-ECSDE


Opificio
delle Acque
CENTRO DIDATTICO DOCUMENTALE

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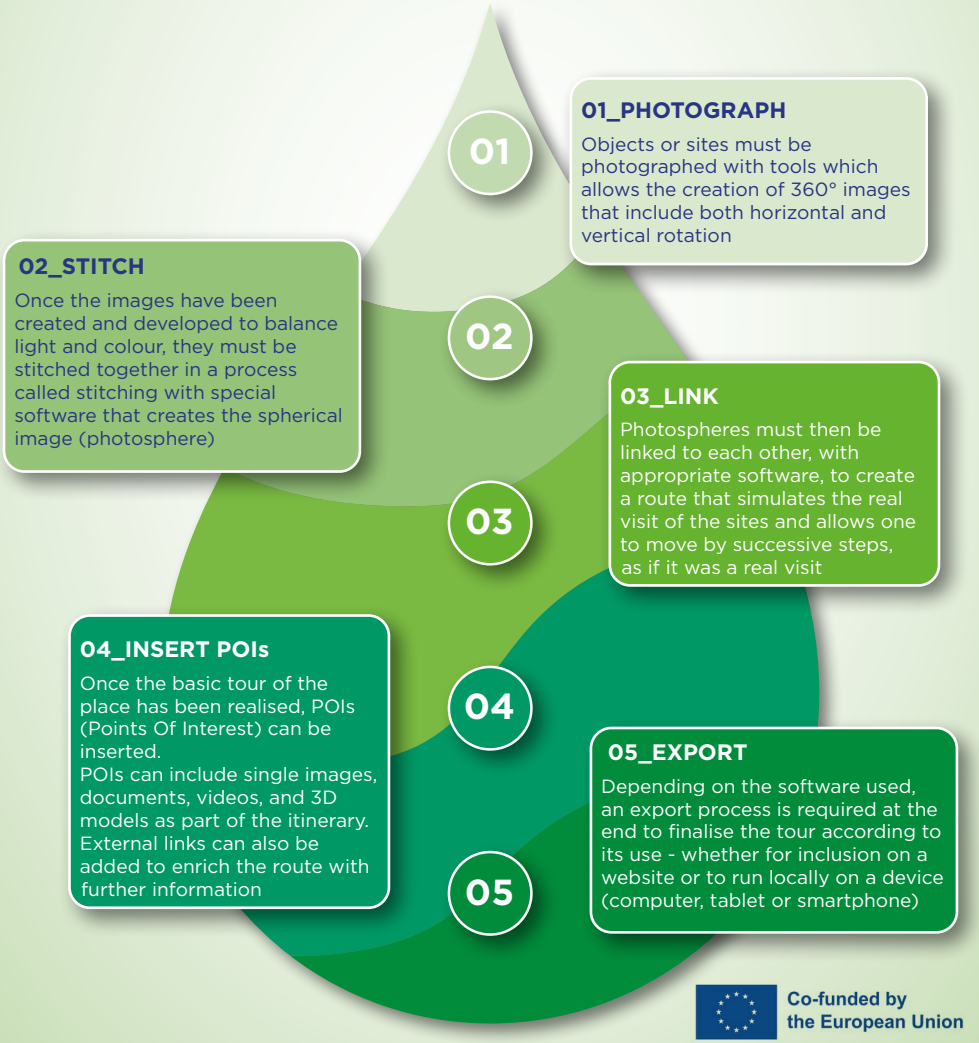
5 STEPS TO CREATE A DIGITAL TOUR OF A CULTURAL OR NATURAL HERITAGE

DIGITAL TOURS - Simple guidelines on how to create a 3D modelling of museums, monuments, and heritage sites



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DIGITAL AND VIRTUAL TOURS

There are several terms to call digital interactive tours:

- '**Virtual tour**' is the most commonly used: this term was coined by an English engineer for the first digital tour made in a castle.

- '**Digital tour**': this term is equally common for works related to museums, monuments, and cultural heritage in general. The term 'digital' is appropriate since the tour documents things that already exist in reality and not virtual things. This term is also used for historical reconstructions and imaginary panoramas realised in 3D modelling.

- '**Videoguide**': this term is also used commonly to describe digital tours that allow one to "virtually" visit buildings, squares, monuments, exhibitions, and places.

Realising these tours requires the use of different technologies and software, which must be carefully chosen according to the quality and resolution desired for the final product.
The more detailed one wants to have the digital reproduction, the more complex are the techniques and technological structures to be used.

In general, the procedure for creating a digital tour is as follows:

1) The environment/object concerned must be photographed with instruments that allow '**photospheres**' **(360° photographs)** including both horizontal and vertical rotation. This work can be done in various ways: manually with a special tripod ('panorama head') which allows one to take a series of photographs from a fix position; automatically, using special motorised 'robotic' heads that do the same work automatically, once properly set up and programmed.

In alternative, it can be done using special cameras designed to automatically produce spherical panoramas. It is important not to confuse photospheres, which reproduce space in every direction, with simple linear panoramas (e.g. those realised by smartphones).

2) Once the individual images have been created, to combining them correctly and balancing the light and colours, it is necessary to match them in a process called '**stitching**' with special software (there are several types) that creates the spherical image ('photosphere').

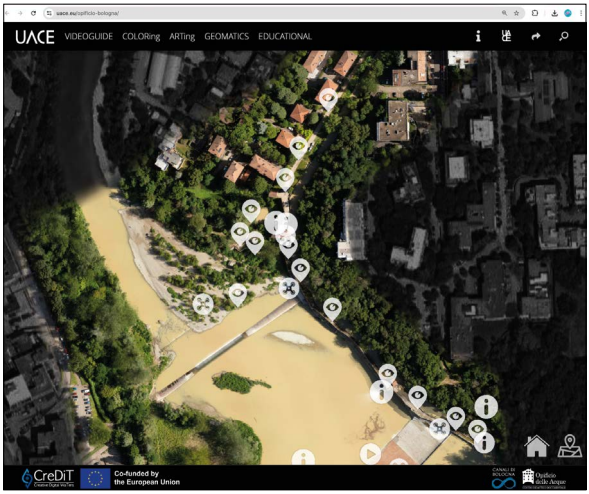
3) At this point, the **photospheres** must be linked to each other, using special software, to create a route that simulates a real visit to a place and that allows one to move within it in successive steps, as if it were a real visit, or even through quicker steps, using maps and plans.

4) Once the basic tour of the places has been created, **POIs (Points Of Interest)** can be inserted, to allow individual images, documents, videos, and 3D models to be displayed within the tour. It is also possible to upload external links to enrich the tour information.

5) At the end, through the software used, an '**export**' process must be carried out to finalise the tour, depending on its use: for example, to be included into a website, or to run on a local device (computer, tablet or smartphone). Many software packages also offer the possibility of exporting projects for Virtual Reality viewers, which require adjustments according to the available model.

Drone used for digitisation campaigns in Italy and Croatia to take aerial photos and create 'photospheres'

A photosphere with a 360° view of the case study in Bologna, Italy: the Medieval dam of Casalecchio.



Combination of several Points Of Interest (POIs) from the aerial view and detail of a single POI along the historical dam.

Co-designing a Digital Tour

Aquatika, the Freshwater Aquarium of Karlovac, Croatia, has successfully partnered with the Polytechnic of Karlovac on the CreDiT project, engaging tourism students as key participants in project activities. This collaboration highlights the shared commitment to innovative education and the promotion of water-related cultural and natural heritage.

KEY ACTIVITIES OF THE COLLABORATION

1) **Identification of Participants:** Recognizing tourism students as potential beneficiaries of the project, Aquatika initiated collaboration by reaching out to professors at the Polytechnic. The project was introduced and the interest of students was gauged during regular classes. A presentation about the project was conducted, allowing students to voluntarily sign up. This approach ensured a motivated and proactive group of participants.

2) **Workshops on Digital Tools:** The museum hosted workshops to equip students with knowledge and skills in using digital tools essential for creating digital itineraries. These sessions introduced innovative techniques and platforms, fostering creativity and technological competence among participants.

3) **Group Work and Task Assignments:** The students were organized into three groups, each tasked with collecting data and crafting a narrative centered around local rivers. This exercise encouraged teamwork, research, and storytelling skills, blending educational theory with practical application.

4) **Utilizing the UACE Online Platform:** A specialized workshop was conducted to guide students in integrating their digital materials into the UACE online platform. This session provided hands-on experience in applying their knowledge to a professional-level digital interface.

5) **Presentation of Final Outputs:** Toward the conclusion of the project, students had the opportunity to present the digital content they developed. This celebratory event showcased their contributions and demonstrated the outcomes of their collaborative effort.

6) **Acknowledgment of Participation:** Both professors and students involved in the project received formal written certificates recognizing their participation. These certifications highlight their contribution to the project and provide tangible acknowledgment of their learning and achievements.

7) **Impact and Benefits:** This partnership has empowered students with practical skills in digital storytelling, enhanced their understanding of water-related heritage, and provided valuable insights into tourism innovation.

For Aquatika and the Polytechnic of Karlovac, the collaboration has strengthened ties between education and cultural institutions, ensuring mutual growth and community enrichment. This joint effort exemplifies how educational initiatives can effectively combine theory, practice, and digital innovation to promote sustainable tourism and heritage preservation.

Presentation of the CreDiT project to students of Polytechnic of Karlovac

Workshops with students on Digital Tools in Aquatika - Freshwater Aquarium Karlovac

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5 STEPS TO CREATE 3D MODELS BASED ON A SEQUENCE OF PHOTOGRAPHS

PHOTOGRAMMETRY is used to apply images to a 3D model. This modulation technique consists in creating a sequence of photographic images which are then elaborated automatically by a software to create the 3D model.

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3D MODELLING

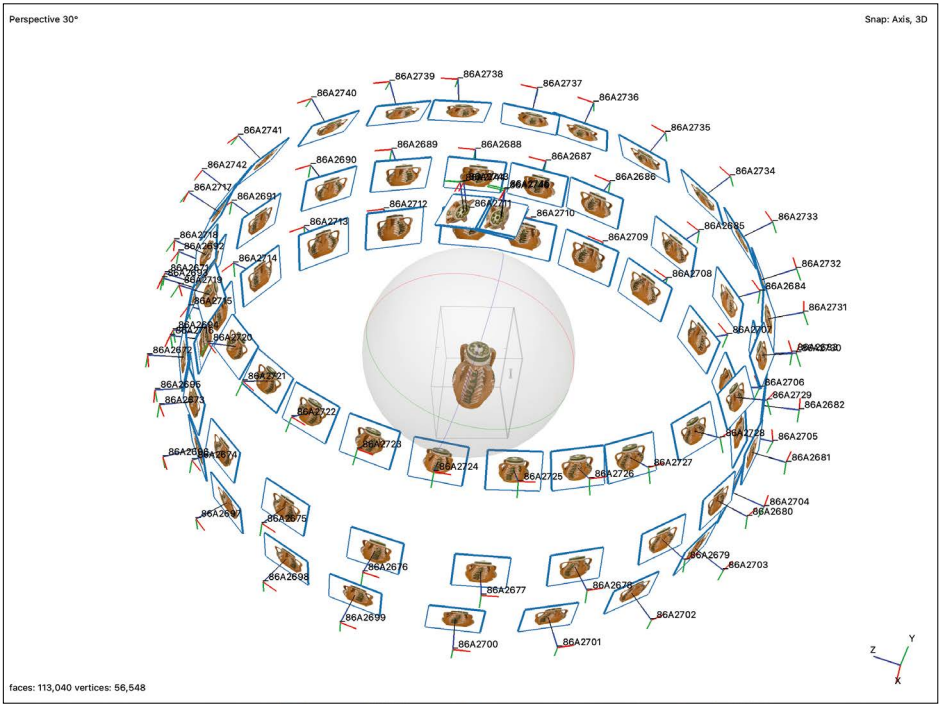
Photogrammetry is a 3D modelling technique based on a sequence of photographs. It consists of making a series of photographic images with precise rules, depending on the software used to make the 3D model.

Photogrammetry is used to apply photographic images to a 3D model that has already been made through surveying techniques (survey scanner or structured light scanner, NIR). In this way you can create 3D models of buildings, objects, and more.

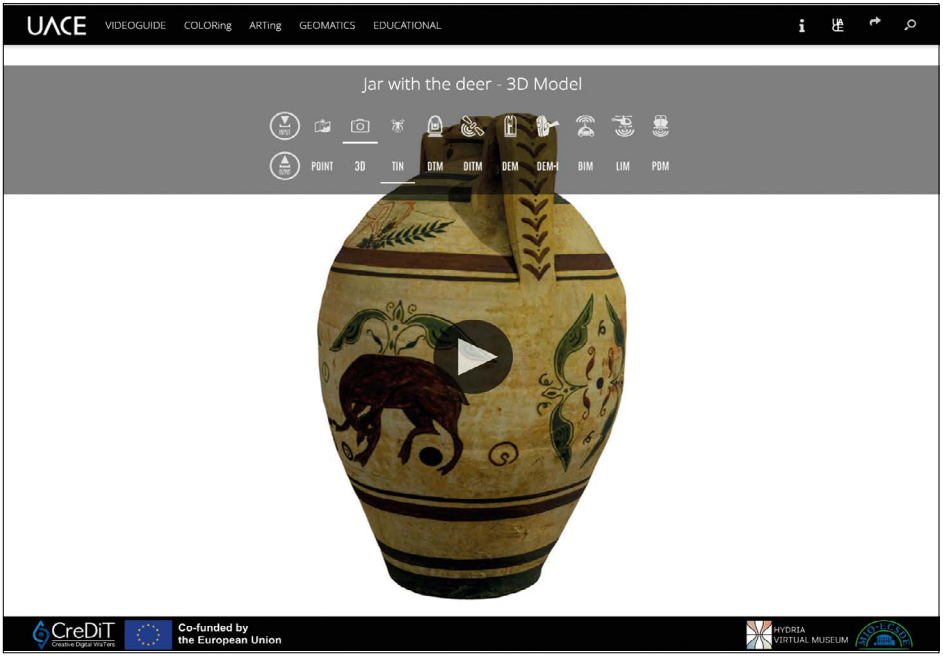
All photographs to be applied to the predefined model must have the exact same characteristics, so it is important to:
1) use a single photographic format (file size)
2) always use the same focal length (lens)
3) always use the same aperture (*f*)
4) expose the image correctly

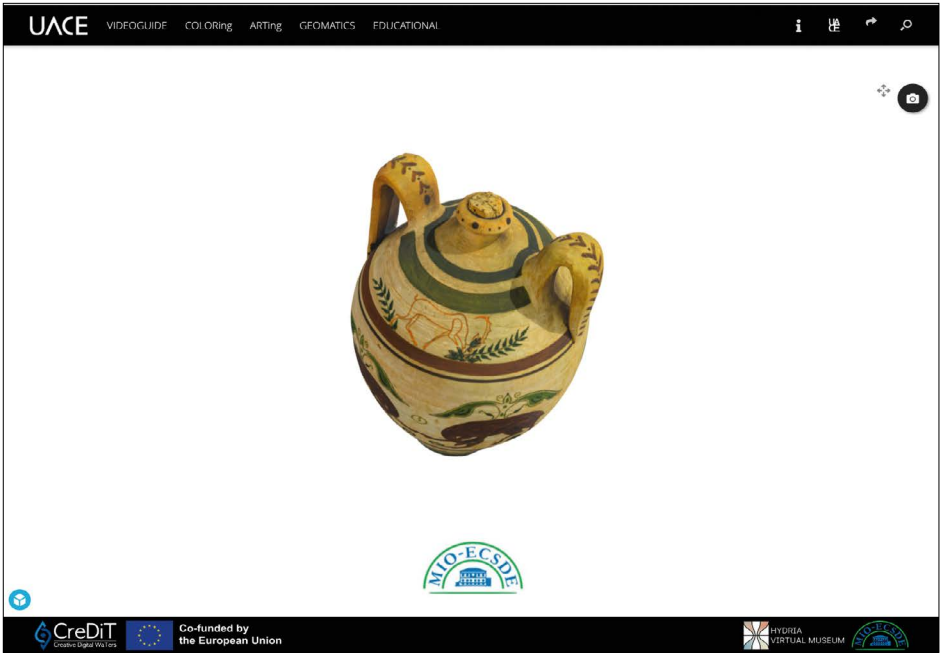
During development, images can be edited in terms of colour and brightness, but not in terms of geometry or re-framing.
Some basic corrections are possible, if applied by the software (such as the 'objective correction'), but they must be applied uniformly to all images and not just to single pictures.
Once imported into the software, images are automatically processed to generate the 3D model.

To view the 3D model on a computer or online, a special 'viewer' software is required.
The 3D models of CreDiT have been uploaded to the Sketchfab portal for online view on the UACE platform.
The 3D models of Hydria's ancient jars were created following this procedure.

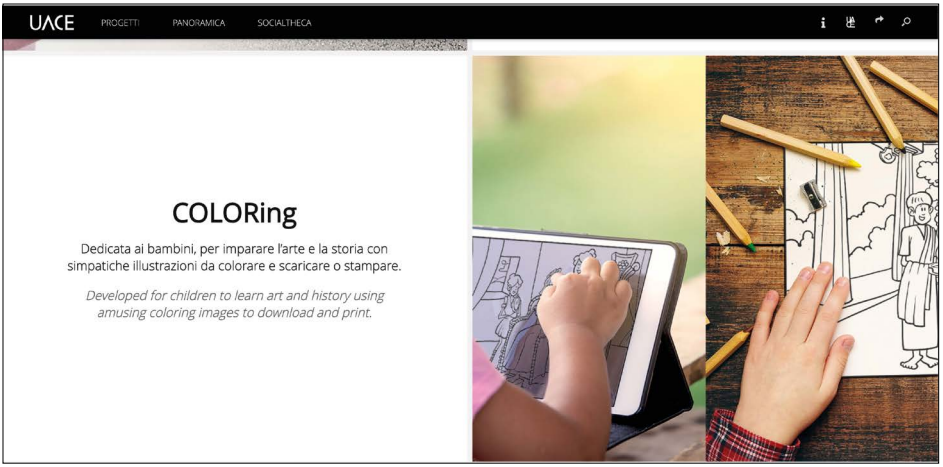


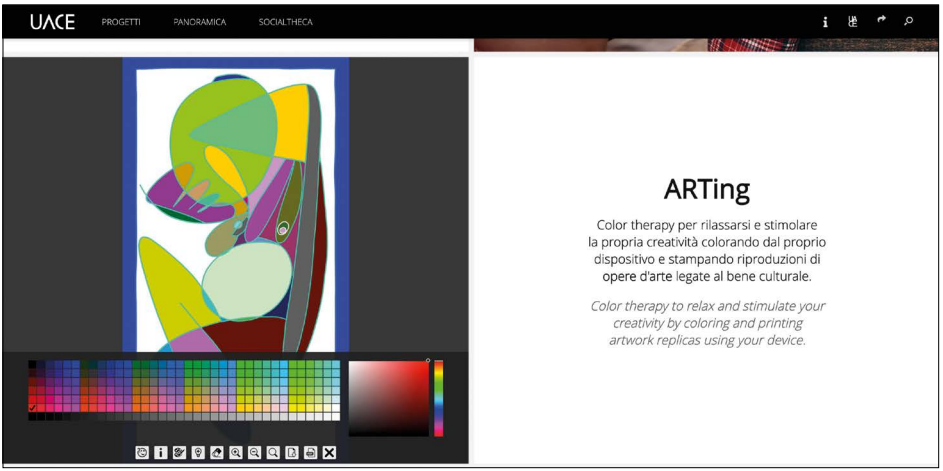
Shooting of a series of photographs of an object for 3D modelling: the collection of historical water jars from Hydria in Athens.





Online 360° view of an object through the Sketchfab viewer on the UACE platform: https://www.uace.eu/hydria-project/geomatics/





The Coloring, and Arting sections of the UACE platform host the artworks produced for the CreDiT project.

COLOURING AND ARTING

'Coloring' and 'Arting' are two sections of the UACE platform dedicated to online colouring for children and adults.
Colouring is aimed at an audience of young visitors, while Arting at an audience of adults.

'**Colouring**' allows children to interactively colour online various drawings related to the natural and cultural heritage of water. By playing and having fun, this edutainment tool aims to convey informally important educational messages.
The edu-tool allows users to color, share, and download drawings, either coloured or in black and white, with the title of the drawing, the artists' name and copyright printed in the caption.

The '**Arting**' section provides essentially similar functionality, but it's aimed at the adult world in that it contains more colouring options and much more complex drawings to color. Arting brings together, for example, works and paintings provided by local artists and enables to play with any kind of complex artwork.

For the CreDiT project, the 'Arting' section was created using drawings from the competition 'The Water We Want': a youth prize contest which is organised annually by the WAMU-NET network and that aims to promote the correct use of water resources through the vision of young students.
The drawings in the 'Colouring' section, on the other hand, were created by the three partnering museums involving some local artists.

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5 STEPS ENGAGING THE MUSEUM VISITORS THROUGH ONLINE COLORING TO BETTER PROTECT OUR WATER HERITAGE

AQUA PLAY

An interactive tool aiming to engage students online as a legacy of the CreDiT project to the Phase 9 of UNESCO-IHP

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AQUAPLAY

A large part of the drawings uploaded on the UACE platform and provided with the functionality for 'online colouring', are also available in another platform: **AQUAPLAY**.

AQUAPLAY includes a larger number of drawings made by schools affiliated to museums that are members of the UNESCO-IHP's Global Network of Water Museums (more than 120 worldwide).
AQUAPLAY is accessible for free from the website of WAMU-NET and is designed as a smart working platform for teachers and schools.

AQUAPLAY groups all the available drawings within the following four thematic areas in order to facilitate in-depth studies on specific topics by teachers and students.
1) Biodiversity and Freshwater Ecosystems
2) Water Heritage and Living Waters
3) Climate Change, Pollution and Water Scarcity
4) Peace and Cooperation through Water

AQUAPLAY's drawings capture the vision of new generations for preserving water heritage, addressing water pollution, and proposing futuristic solutions for water scarcity.

Through AQUAPLAY, the CreDiT project aims to strengthen sustainability education and foster new water perceptions and behaviors among the younger generation, engaging students as water ambassadors and storytellers of our liquid futures.


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