

Program for the 3D digitalization of Catalonia's cultural heritage





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Introduction



Through the Directorate General of Cultural Heritage (DGPC) and the Catalan Agency for Cultural Heritage (ACdPC), the Department of Culture of the Government of Catalonia is launching a program that promotes the use of 3D scanning technology to reproduce the objects and buildings managed by the organizations in charge of Catalonia's cultural heritage.

This document introduces this technology, analyses the current situation in Catalonia in a European context, and presents the Giravolt program as a broadly effective tool.

Giravolt is a program based on four clearly defined lines of action that can help to improve access to our heritage: the creation of an online digital corpus of 3D reproductions of objects and buildings, the creation of ties to the professional and educational sector, the promotion and reuse of these materials, and the establishment of the Department of Culture as a role model in this area. Giravolt is an extremely necessary opportunity for modernization that opens up a whole range of possibilities.

This document lists all initiatives associated with these actions and describes the current status of the project and the coming phases of development. It also includes the corresponding annual budgets and timetables.





1. 3D technology and cultural heritage



1.1. Digital transformation and cultural heritage

The management of cultural heritage has always included a scientific and technological component. Methods of conservation, documentation and even communication have gradually incorporated the innovations of new generations. Ways of capturing and representing heritage elements have gone from manual sketches to black-and-white photography, colour photography and, occasionally, video. Now, as we enter the second decade of the 21st century, a new, rapidly-growing innovation is making its way into all professional sectors, including the preservation of cultural heritage: 3D technology.

Recent analyses of technologies currently under development list three that will have a particularly big impact on the cultural heritage sector in the coming years: big data, telepresence and 3D technologies both for capturing and sharing data.

None of these three innovations are recent; in fact, they have already been around for over a decade. However, they have gone from being costly, complicated, and requiring a specialized team to being simple tasks that are accessible to small- or medium-sized organizations. In fact, 3D technology is now present in the daily lives of most citizens: it can be found in the newest generation of smartphones (with facial recognition, Instagram or Snapchat filters), films (where spaces are 3D-recorded before being combined with actors filmed in-studio), mapping, industry, augmented reality, virtual reality, and videogames. With things like telecommuting or online meetings, data management and telepresence have also become common elements in people's everyday lives.



In 2020, due to the COVID-19 pandemic, confinement and telecommuting, there was a spike in the number of online seminars discussing the future limits of work in the heritage sector. In the end, the overall consensus was the need to try and find applications for each of the three principal technological innovations throughout the world of heritage preservation.

- Research
- Documentation
- Internal management
- Conservation and restoration
- Education
- Marketing and audience management
- Communication and participation

The Giravolt program was created to work throughout this sector, addressing each of the many impacts 3D technology can have on cultural heritage. It is a program focused on internal improvement that provides support, training and promotion grounded in a specific strategy with initiatives for both movable and immovable heritage. In the end, its objective is to ensure that the organizations in charge of Catalonia's cultural heritage are aware of these innovations, their advantages and difficulties, and that they have the autonomy to apply them when needed.

1.2. 3D technology

The term "3D technology" refers to both capturing reality in the form of 3D models and the use of these models, which can be can be posted online, interacted with, shared and reused. To capture reality in 3D, two main methods are used:

Photogrammetry

The most common method is photogrammetry, which uses hundreds or thousands of photographs taken of an object or building from different angles. These images are processed with specific programs that use geometrical analysis to reconstruct shapes, first as a point cloud and then as a polygon mesh. Finally, the shape is given a photographic texture. The final result is a complete, three-dimensional model based on photographs.





Laser scanning

Laserscan or High-Definition Surveying (HDS) technology is a highly precise technique used to capture reality. Measurements are made using laser pulses or beams, creating a homogenous distribution of points over the selected area. Lasers bounce off the object and return to the machine, which calculates the distance to each point. These points are then located using coordinates (X, Y and Z), which creates an extremely precise point cloud. Colour data can also be added, providing texture. The result is a highly precise 3D model showing principal dimensions, volumes and characteristics.





Other methods

Although they are not used as frequently, other methods of 3D capture also exist. These include magnetic resonance or structured light scanners, which cast beams of light with geometric grids onto the object to be scanned as a camera takes pictures of the deformations of the grid that are visible on the surface. Using this information, a program generates a point cloud that is later meshed and surfaced just like in the other two methods.

Finally, there is a fourth method for generating 3D models of cultural heritage elements: professionals can use existing data (drawings, photographs, measurements) to create a model using a 3D illustration program.

Transmission and communication

Some of the most significant changes in the use of 3D models by general society have been the progressive creation of common formats (.obj and .gltf for objects, .stl for printing, and .usdz for augmented reality) and the appearance of platforms where these models can be published and shared. Some such platforms are Sketchfab (the YouTube of 3D models) or Cesium Ion (for large formats). These platforms have also been directly incorporated into social networks such as Facebook, Instagram or can be viewed directly on virtual reality devices. The Windows 10 operating system, for example, already includes a standard 3D files viewer. In the coming years, the expectation is that there will be a significant growth in platforms where such content can be found and shared. Cultural heritage can play a very important role in communication channels where 3D information from a range of fields can be viewed and displayed.

1.3. The use of this technology in cultural heritage

3D technology has been used in the cultural heritage sector for over a decade, but until recently these tools were costly and complex. In recent years, however, commercial solutions in both hardware and software have appeared on the market, and new educational and funding methods have made their use possible with only minimal investments. This has led to an explosion in the use of 3D technology in a whole range of fields in both industry and culture.



In the management of heritage, if we follow the traditional workflow, this has the potential to generate benefits in:

- Research. Allows for analysis of the object or building by researchers in high detail and from anywhere in the world.
- Documentation. Currently, the 3D model is the most precise and concise way of physically documenting a cultural element.
- Internal management. Models can be incorporated into general documentation and management systems for the use of insurers, substituting postal mail with email.
- Conservation-restoration. Facilitates studies of stability, damage and joints or the preparation of supports, etc.
- Education. Extremely attractive activities can be designed to enrich students' knowledge of Catalonia's cultural heritage.
- Communication and participation. Provides a new way of making cultural heritage available to all audiences, especially youth. Allows citizen participation with collective 3D scanning initiatives. Allows for interaction with artists with the creation of new narratives, immersive experiences, virtual reality or augmented reality.





1.4. European policy on 3D digitalization

The European Commission has been one of the institutions most firmly committed to the 3D digitalization of our cultural heritage. One of the clearest examples is the working group on the publication of 3D elements that began in 2017 with an initial <u>collection of information</u>. It then took shape in 2019-2020 with the creation of a <u>TaskForce</u> to increase the presence of 3D elements in the pan-European heritage platform.

In 2020, Europeana dedicated <u>issue 14 of Europeana Pro</u> entirely to 3D technology, with examples of work by the IIIF (International Image Interoperability Framework 3D group) in the standardization of formats, the reuse of 3D data in Ireland or the Morphosource repository project.

The <u>conclusions of the 3D task force</u> were also published in 2020. This document suggests working on the standardization of formats to improve accessibility, defines the characteristics of digital elements that can be considered 3D, and proposes the use of Creative Commons licenses for the distribution of content.

3D digitalization has been seen as an opportunity for innovation as well. This is how it is treated by the <u>European Commission</u>'s unit on this issue, and in part of the <u>Horizon 2020</u> projects dedicated to 3D technology.

It is also referred to as a key issue in the meetings of the European Commission's <u>Expert</u> <u>Group</u>, and was one of the issues addressed by its <u>Interactive Technologies Unit</u>.

Furthermore, the European Commission has published a <u>list of 3D resources</u> including everything from models to virtual or interactive visits to pieces of European heritage so that they can be used for education and recreation during the pandemic.

The International Council of Museums – Committee for Conservation (ICOM-CC) also addresses this issue in its <u>documentation working group</u>.

Nevertheless, the archaeology sector has probably addressed this issue more than any other, especially regarding the virtual visualization and reconstruction of artefacts. A particularly significant early document on this matter is the London Charter, which sets the groundwork for 3D visualisation. More recently, the <u>Principles of Seville</u> were also published; both documents have been ratified by ICOMOS.



Finally, it is worth mentioning that the IIIF (International Image Interoperability Framework), the entity that monitors quality standards for images, has created a <u>working group</u> on 3D information that meets online once a month. It continues to work on improving the applicability of this new format in its different potential uses.

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Letter from the editors Europeana & IIIF 3D: Next Steps & Added Dimensions? The 3I MorphoSource: Creating a 3D web repository capable of archiving complex workflows and p	D Documentation and Reuse of Data Within the Cultural He providing novel viewing experiences	eritage Sector in Ireland 3D Activities of the Europeana
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3D Content in Europeana	EuropeanaTech Insight	3D Content in Europeana – task force review
The focus of this task force is on increasing the support for 3D cultural heritage in Europeana.	A multimedia publication about R&D developments by the EuropeanaTech Community	The advent of 3D technology is bringing new opportunities for the cultural heritage sector, offering innovative ways to provide access to

1.5. International role models

Regarding 3D documentation and its use in different tasks, two experiences in particular have paved the way for other institutions:

- Historic Environment Scotland's <u>Scottish Ten</u> project. Starting in 2009, it scanned 10 great monuments that have been declared World Heritage sites. In doing so, the organization obtained extensive experience it has since applied to the more than 300 monuments it manages, creating a digital documentation team that is a model for all of Europe.
- The documentation of the <u>Smithsonian Institution</u>'s immense collection. This organization, which manages 19 American museums, launched a potent policy for the 2D and 3D digitalization of its diverse collection over a decade ago. Since then, it has set an example for other institutions with the methods used, particularly the open-access publication of results.





Other European institutions or projects have also driven 3D digitalization, often with spectacular results, even if they have lacked the all-around vision of the two projects noted above. In recent years, a project by the <u>Virtual Museums of Małopolska</u> (Krakow region) has stood out in particular, and is fast becoming a model for the rest of Europe.



The most notable are:

- <u>CyArk</u>, created in 2003 after the destruction of the Buddhas of Bamyan (in collaboration with Scottish Ten).
- <u>Carare Project</u> (2010) and <u>3D Icons</u> (2012-15). Two European projects that have promoted 3D documentation for Europeana with the participation of entities from Spain, Italy and Cyprus: the Cyprus Institute, Politecnico di Milano, Computer Vision & Reverse Engineering Lab, Instituto de Arqueología Ibérica and Universidad de Jaén.
- <u>University College London</u>. Publication of a selection of objects from the University's museum.





- <u>Ufizzi</u> and Indiana University. Publication of a series of structures.
- <u>British Museum</u>. Publication of a wide selection from its collection, shared via social networks.
- <u>3DHop</u>. A viewer specialized in conservation developed by Italy's CNR.
- <u>Muséum National d'Histoire Naturelle</u>. 3D models of pieces from its Cabinet of Curiosities.
- <u>African Fossils</u>. Dissemination project on palaeontology.
- <u>Utrecht's Heritage</u>. 3D models of its work in heritage preservation.
- <u>Atalaya 3D.</u> 3D portal of the heritage of Andalusian universities.

At present, there is no nationwide project in Spain with the same characteristics as Giravolt. Different institutions are working on 3D models of their collections, but always individually. We are not aware of any projects that apply an overarching policy on movable and immovable heritage or that include both 3D scans and training for the entire sector.





2. Diagnosis of the use of 3D technology in Catalonia's cultural heritage



2.1. 3D technology and Catalonia's cultural heritage

Catalonia's cultural heritage is rich and diverse. It includes everything from prehistoric menhirs to the art of Antoni Tàpies, from Roman portraits of Augustus to the dresses worn by Margarida Xirgu. Any elements with a three-dimensional, physical and material component can be digitalized in 3D.

Most of the collections of Catalonia's museums and all of its architectural and archaeological monuments fulfil these requirements. As we have noted, this technology has already been used for specific applications for more than a decade, both in museums and in architectural and archaeological heritage. However, in almost all cases it has been used in specific instances to address specific needs, and its use as not been used as broadly as is possible. As a result, 3D models created for necessary structural analyses were not then added to documentation on the monument, nor were they used for educational purposes in universities or public promotions; in fact, they were not published at all. Nevertheless, several Catalan institutions have plenty of experience in 3D scans; they are listed below.

2.2. Catalonia's pioneers

Several Catalan institutions have been working on 3D documentation for years, either sporadically or regularly.

Directorate General of Cultural Heritage (DGPC)

Has a long history of 3D work including paleontological scans of sites like Fumanya, archaeological scans like the Menhir of Mollet or the Roman theatre of Tarragona. Also has a range of 3D architectural models created over the past 15 years of such notable monuments as Santa Maria del Mar, Santes Creus or Palau Moja. Most of these models have yet to be published.

Catalan Agency for Cultural Heritage (ACdPC)

Some of the Agency's museums and heritage associations have a great deal of experience in the creation of 3D models. This is the case of the Centre de Restauració de Béns Mobles de Catalunya (Centre for the Restoration of Movable Heritage of Catalonia), which has generated a whole series of 3D models, always as a result of analysis or conservation needs.

The same is true for many of the buildings managed by the entity. Some architectural



interventions generated a need for 3D models. In its archaeological research, MAC-Empúries has also generated models, like one of the ancient Greek town of Empúries. If we look at projects for public promotion, the most complete is that of the Archaeology Museum of Catalonia (MAC), which began at its Barcelona headquarters and soon expanded to include the rest of its centres and the Arqueoxarxa (*Xarxa de Museus i Jaciments Arqueològics de Catalunya*, or Network of Museums and Archaeological Sites of Catalonia). The Department of Monuments has created multiple public promotion projects that include 3D models of the buildings it manages. Still, few of these 3D models have been shared online; the only exception is the MAC, the first Museum in Catalonia with a large gallery of 3D models on its website.



Episcopal Museum of Vic and Archaeology Museum of Catalonia at Empúries

These two museums created Catalonia's first two 3D models with the reproduction of an Altarpiece by Bernat Sauler and a sculpture of Asclepius.

Institut Català de Paleontologia Miquel Crusafont (Miquel Crusafont Palaeontology Institute of Catalonia)

Works with palaeontological models. Includes a <u>laboratory specialized in 3D scanning</u>. Unpublished 3D models.



Catalan Institute of Classical Archaeology

3D architectural models. Plenty of experience in 3D models, with 80 published models.

History Museum of Catalonia

Currently the Department of Monuments of the Catalan Agency of Cultural Heritage. Its <u>project</u> <u>on the royal tombs at Santes Creus</u> created multiple 3D models of great scientific and educational interest. Some models have not yet been published in 3D.

Archaeology Museum of Catalonia

Has an important project for the public promotion of 3D models from its different museums and the Arqueoxarxa (Network of Museums and Archaeological Sites of Catalonia), with 105 models published to date.

Tarragona Archaeological Museum

Through an agreement with the Global Digital Heritage Foundation, the Museum has published a diverse range of objects from its collection.

Universitat Politècnica de Catalunya · Barcelona Tech (UPC)

3D model of the portal of the Monastery of Ripoll, one of Catalonia's first to be published online.

Museum of the Terres de l'Ebre.

39 models from its collection.

Museums of Sitges

24 models of architectural ornaments.

Societat d'Arqueologia i Patrimoni de Vilamajor

An excellent collection of 64 models that has also been used to promote accessibility for the blind using 3D models.

Natural Sciences Museum of Barcelona

A magnificent 3D collection of different specimens with 627 models published to date.



Many other Catalan heritage institutions have created 3D models for specific projects (rehabilitation, restoration), but they lack large collections of models published on the latest platforms. Several companies and specialized professionals are now publishing the work of these institutions, either of their own initiative or by request. For example:

- <u>4Datum</u>
- <u>Par. Arqueologia Virtual</u>
- Resguard
- <u>Calidos</u>
- Burzon*Comenge
- <u>Captae</u>. A large catalogue of unpublished models.

So far, no current studies plans from Catalonia's universities have taken a detailed look at the 3D digitalization of our cultural heritage. Photogrammetry or laser scanning are studied by students of topography, but with a strict orientation towards the aerial capture of landscapes. The only educational opportunities focused strictly on this topic are found at the University of Alacant, with its <u>Master's Degree in Virtual Heritage</u>, and in specific courses such as those offered by <u>Kore formación</u>. The latter have been taken by most of Catalonia's current specialized professionals.

No Catalan institutions currently offer an open repository of 3D data. The only models that have been published so far are low resolution and offered through the Sketchfab platform.

In the educational sector, 3D resources have mostly been used to create 3D environments, and the heritage sector is generally excluded from these initiatives.

Another component worth noting is the creation of models by part of the public that visits museums and monuments. 3D technology is becoming more and more universal: photogrammetry is available for mobile phone, and the most recent telephones and tablets already include small laser scanners. Needless to say, the quality and resolution of the models from these devices are only useful for public promotion, and are nowhere near those of professional scans. Still, the path is open for models created by the general public, as we can see in initiatives like <u>#despertaelpatrimoni</u>. Created as part of the 2020 European Heritage Days, this initiative teaches participants how to create 3D models with a mobile phone. It included 26 organizations and 30 nearly full sessions, and generated more than <u>120 3D</u> models in one weekend.





The use of 3D models will grow even larger in the coming years. In this context, a program like Giravolt can take advantage of existing work, reorganize action protocols and establish clear criteria for any institutions that want to take part. We need a program that digitalizes objects and buildings and makes them available to researchers, professionals and the general public, but also one that defines the playing field and the ecosystem where the institutions that manage our heritage can make the most of this technology.



2.3. SWOT of the current status of 3D digitalization in Catalonia

Strengths	Weaknesses	Opportunities	Threats
Rich, diverse heritage with many elements that could be attractive in 3D	Low level of technological adaptation in the cultural heritage sector in general	Distribution channels for 3D models are not yet saturated; we could still make a significant appearance	Without common strategies, the use of 3D technology on heritage will be defined by businesses, not institutions
There is a history of the use of 3D in different institutions	Absence of specific studies by Catalan universities	Europe is still in the "early adopters" phase; we are still in time to join	3D technology will be ubiquitous in a couple of years; if the sector is not familiar with it, we will seem even more antiquated and residual
There are companies and professionals with plenty of professional capacity	Absence of common standards	3D models of Catalonia's heritage have huge educational potential	We need a basis of previous knowledge and experience in this area to obtain European funding
The existence of the Giravolt program to launch 3D policies	Absence of a clear digital policy	Possibility to create new studies adapted to meet real needs	The technological requirements for a large-scale project are significant; a potent, agile digital infrastructure is necessary
Successful pilot programs with schools, public, museums and heritage management; proves viability of different initiatives	Most institutions lack the internal staff to develop these activities	Potential for agreements with both European institutions (Ireland, Scotland, Poland) and American institutions (Smithsonian, multiple universities)	3D models have to be incorporated into the system documenting Catalonia's heritage, which currently needs a significant update





3. The Giravolt program



Taking into account the current status of 3D technology in the cultural heritage sector, the strong support of European institutions, the examples provided by 3D pioneers and our diagnosis of the status of Catalonia's heritage sector, the Department of Culture has decided to launch Giravolt, a project that is both ambitious and necessary. This program will allow us to organize and promote the use of 3D technology in the organizations managing Catalonia's cultural heritage with a clear strategic definition, four clear lines of action and a series of specific initiatives associated with each.



3.1. Principles

Giravolt is meant to be a tool for promoting the use of 3D technology in Catalonia's cultural heritage sector. Its actions will be based on the following principles:

- Collaboration. Giravolt will always promote collaboration among all actors, both public and private, so as to generate a community of practice.
- Openness and transparency. Giravolt's processes will always be public and transparent, with information open to all.
- Open knowledge. Clearly promote a new way of seeing intellectual heritage in keeping with European directives, in which citizens, companies and other organizations can generate value and wealth with resources provided by the public administration.



- Learning through action. Prioritize practical training. Organize initiatives to ensure they
 are based on experience and not just word-of-mouth, directly involving students as
 recipients and active participants.
- Accessibility. Promote the use of resources by all audiences. Ensure access for users facing challenges of any sort.

3.2. Strategic goals and positioning vector

OE.1. Facilitate access to Catalonia's cultural heritage

One essential requirement to ensure broader social use of our cultural heritage is for it to be available in multiple formats and to be as accessible to all as possible. 3D technology provides new means of access, from a complete visualization of the object (something very difficult using other means) to three-dimensional guided routes or the use of immersive technologies like virtual reality. In addition, 3D digitalization opens the door to 3D-printed models that can be used for promotion and to make heritage elements accessible to those with partial or full visual disabilities. This whole range of possibilities allows for unprecedented access to cultural heritage, even from abroad. The ease of access to 3D models of Catalonia's cultural heritage from anywhere in the world also opens new perspectives that have not yet been explored.

OE.2. Guarantee knowledge and proper use of this technology by the sector

In our analysis of the current situation, we have already noted the importance of ensuring that this knowledge is provided in a well-structured manner with the scientific rigour essential to the heritage sector. Right now, a lack of action or coordination might open the door to an uncertain, unequal use of this technology, based on commercial offers instead of cultural criteria. The Department of Culture of the Government of Catalonia is the best organization to take charge of a nationwide project like this one. To ensure effective development, other institutions and administrations should also take part.



OE.3. Promote the use and reuse of 3D models of Catalonia's cultural heritage by all audiences

In the second decade of the 21st century, content management cannot be based simply on controlling the scarcity of content like it was two decades ago. It cannot be based on a strategy grounded in the analogical world or a passive strategy for the publication or public promotion of content. In 2020, the search for relevance has pushed us to adopt active policies that drive this reuse of our digital heritage. Cultural heritage is and must be an inspiration for our citizens: something useful for their welfare, inspiration and creativity. To this end, we need to move from promoting the publication of any content that may be of interest to a second stage: as much as possible, we need to facilitate its reuse by citizens in all areas—science, research, education, or for purely artistic purposes.

These three strategic goals generate a positioning vector that affects the role of the Department of Culture in this sector and that serves as an objective.

<u>VP. The Department of Culture as a role model in the use of 3D technology in cultural</u> <u>heritage</u>

The areas of the Department of Culture responsible for the management and establishment of policies on Catalonia's cultural heritage have the experience, the capacity for collaboration and the external recognition needed to lead this charge. The Department can become a role model in the application of 3D technology in the field of cultural heritage. It can also open the door to collaboration with Catalonia's other institutions and generate a well-structured system, both in the internal work of these two institutions and in providing coordination and support for the sector as a whole.





3.3. Lines of action and actions with operational objectives

Based on these three main objectives, we have generated four lines of action with specific steps to be taken. Each action is noted below with a description, operational objectives (milestones to pass during the program), and indicators that will allow us to evaluate fulfilment of our objectives. The positioning vector follows the same structure.

Strategic objectives	Lines of action	Actions		
	EIX 1. Improve accessibility for all	A.1.1. Catalan d	Scan significant pieces of cultural heritage	
		A.1.2.	Create a Sketchfab gallery	
OE1. Facilitate access to Catalonia's		A.1.3.	Create a microsite at patrimoni.gencat	
cultural heritage		A.1.4. elements that mar	Publish 3D models of scanned s on the websites of the entities hage them	
		A.1.5. models a disabled	Encourage the printing of 3D as an accessibility tool for the	





A.1.6. Promote international accessibility of Catalan cultural heritage

A.1.7. Publish models on Wikimedia Commons and other international repositories

A.2.1. Publish best practice protocol

OE2. Guarantee A.2.2. Online and in-person EIX 2. Train the knowledge and introductory training sessions sector in the use of proper use of this technology, this technology organize and by the sector A.2.3. Specialization workshops promote its use A.2.4. Create collaboration tools for the creation of a 3D ecosystem A.3.1. Reach agreements with universities to expand knowledge of these techniques and improve training EIX 3. Collaborate opportunities with the A.3.2. Actively offer Giravolt educational sector resources for use at different educational to promote the levels (primary, secondary, baccalaureate) discovery and use A.3.3. Create specific educational of cultural heritage units for use by the educational sector with 3D models A.3.4. Specific training sessions for educators OE3. Promote the use and reuse of 3D models of Catalonia's A.4.1. Organize a participatory activity for cultural heritage by citizens: #despertaelpatrimoni all audiences A.4.2. Actively promote reuse via social networks EIX 4. Encourage participation and A.4.3. Actively offer Giravolt resources for new uses for 3D use by researchers models of cultural heritage elements A.4.4. Reach agreements with multimedia artists for the creation of contemporary pieces using existing models



Strategic objectives	Lines of action	Actions
		VP.A.1.1. The governance of the Giravolt program: a model of transparency
		VP.A.1.2. Establish a 3D policy for all ACdPC agencies and DGPC services
VP1. Make the Department of	VP1.E1. Make the Department of Culture a role model in best practice	VP.A.1.3. Create and promote a public repository for high-definition files
Culture a role model in the		VP.A.1.4. Consulting
application of 3D technology to cultural heritage		VP.A.1.5. Indusion in a digital 3D corpus with tools for documenting architectural, archaeological and museum heritage
		VP.A.1.6. Establish collaborations with

international partners



3.3.1 EIX 1. Improve accessibility for all

Actions that permit remote access to Catalonia's cultural heritage by all.



Action 1.1

Scan significant pieces of Catalan cultural heritage. If we want to create new ways of accessing pieces of cultural heritage, the first step is to create 3D replicas of them. Using the criteria outlined in section 3.5.3, we will make a selection of the most significant pieces of Catalan cultural heritage and digitalize them in 3D. A high-resolution model will be created of each to document their current state and for use in research. A second model will be published and shared generally. Other activities will be dependent on these scans.

To create these scans, specialized professionals will visit the museum in question. The strategies they use will depend on the physical characteristics of the object: light tables will be used for smaller pieces, while appropriate illumination will be provided for larger objects. The handling of objects and the supervision of lighting will always be the responsibility of the specialist at the institution in question. Professionals from the Architectural Heritage Service will be responsible for laser scans, with the participation of a professional from the space in question who will supervise routes and placement. If necessary, drones can also be used once all necessary permits have been obtained. By the end of 2020, over 100 objects and buildings will have been scanned with help from 24 collaborating heritage organizations.

Operational objectives

Scan at least 80 heritage elements each year

By the end of the program, scan all monuments that are the property of the Department of Culture.



Indicators

Number of scans annually Number of participating institutions Percentage of monuments scanned annually

Action 1.2

Create a Sketchfab gallery. The version for general use of each 3D scan will be published on the Sketchfab platform. This may be either on the Giravolt project's channel or on the channel of the museum or entity in question as long as they initiate a 3D policy. This gallery will show the diversity of Catalonia's cultural heritage in all areas: by types, period, location, etc.

Sketchfab is accessible online using conventional computers, tablets or mobile phones. It is also accessible using the Sketchfab app. Models can be viewed with or without textures and the illumination can be changed; they can also be viewed in augmented reality and virtual reality using specific devices or mobile phones. Each model includes a brief description in three languages as well as more detailed notes based on the information provided by the museum or entity. Whenever an element is published, it will include the logo of the entity responsible for the element as well as the Giravolt logo. By the end of 2020, we intend to have published at least 80 models from a range of periods, styles and locations. Once the Giravolt program is presented, new models will be published weekly.

Operational objectives

80 models published by the end of 2020 80 models published each year New models published each week Get 3,000 followers by the end of the program Get 250,000 views by the end of the program Indicators

Number of models published

Number of followers

Number of views

Number of downloads



Action 1.3

Create a microsite at patrimoni.gencat. In 2020, a microsite was published on patrimoni.gencat.cat in Catalan, Spanish and English (with special treatment for content about the Aran Valley, which is also in Aranese). This microsite provides access to all information on the Giravolt project, including published 3D models, training activities, criteria, or documents produced in the process. All new developments will be added regularly to the site, which will be the central source for all information. Gradually, we will incorporate different interpretations aimed at different audiences (from researchers to the general public) of the elements in the gallery, such as different virtual exhibits, maps and timelines. These contents can also be put to use on the Department of Culture's other websites.

Operational objectives

Publication of the microsite in 2020

Publication of 4 virtual exhibits each year

Publication of maps and timelines for 3D models

Indicators

Number of virtual exhibits published

Number of visits

Duration of visits

Percentage of international visits

Action 1.4

Publish 3D models of scanned elements on the websites of the entities that manage them. Support will be provided for different heritage organizations so any models posted online can also appear on their websites, with either embedded viewers or a URL address. Models can also be included on the VisitMuseum platform.

Operational objectives

Any models published must appear on the website of the managing entity

Models must be included on the VisitMuseum website whenever possible



Indicators

Percentage of models published on websites of managing entities

Percentage of models published on VisitMuseum

Action 1.5

Encourage the printing of 3D models as an accessibility tool for the disabled. The project will promote the 3D printing of a selection of models that can be used in hands-on activities by heritage organizations, such as activities directed at the disabled community. To this end, we will reach agreements with entities and companies from the 3D printing sector.

Operational objectives

100 printed models

100 activities related to disabilities

Indicators

Number of printed models Number of completed activities

Action 1.6

Promote international accessibility of Catalan cultural heritage. The online accounts of patrimoni.gencat and Giravolt will be used as tools for the promotion of Catalonia's cultural heritage. The management of Giravolt's Sketchfab account and patrimoni.gencat's social network accounts will include actions in different languages, aimed at foreign audiences. We will also encourage the inclusion of the project in international forums and publications, and establish stable collaborative relationships with organizations that are developing projects with the same objectives.

Operational objectives

30 annual international messages Inclusion in one international forum each year One article published in international publications each year



Indicators

Engagement in international messages Number of participations in forums Number of published articles

Action 1.7

Publish models on Wikimedia Commons and other international repositories. In recent years, open collaborative repositories have been some of the most powerful tools for sharing knowledge. Their increasing use and trustworthiness have made them essential means of transmitting information. Wikimedia Commons is a repository used to feed different Wiki projects with accessible files. It already accepts 3D files in .stl format, and the .ojb and .gltb formats are currently being studied. This action consists of the selection of the most relevant models from the gallery in this platform and their use in Wikipedia articles in different languages. We will study inclusion in other international repositories, both those dedicated to 3D models and those dedicated specifically to digital cultural heritage.

Operational objectives

100 models published on Commons

500 articles enriched with 3D models

100 models published on international repositories

Indicators

Number of models published on Commons

Number of models published on other

repositories

Number of articles enriched with models

Number of views of each model





Actions to organize the sector and gradually introduce knowledge of these technologies.



Action 2.1

Publish a best practice protocol. At the end of 2020, we will publish a document that reviews the program's experience scanning objects in 2018 and 2019. We will also create a guide to the 3D documentation of movable heritage using photogrammetry. This guide will include examples of best practice in different areas and a protocol proposal for documentation on different levels. It will define requirements for a minimum standard of quality in activities of this sort. By the end of 2021, we intend to publish a similar document for captures using laser scanners.

Operational objectives

Publish protocol for photogrammetry in 2020

Publish protocol for laser scanning in 2021

Indicators

Publication

Number of downloads or consultations



Action 2.2

Online and in-person introductory training sessions. In coordination with the 3D scans, we will offer training sessions for professionals from the museum in question or from other entities that are nearby or specialized in a similar topic. These sessions will provide an introduction to photogrammetry and its use throughout the heritage network. In 2020, the attendance and frequency of these training sessions had to be reduced because of the confinement and other restrictions on gatherings. These sessions can also be offered online, however, with an initial introduction to techniques and the program followed by in-person workshops or classes. In 2020, in-person training sessions were offered in Tarragona and Lleida, and online sessions were provided for the Xarxa de Museus d'Etnologia de Catalunya (Network of Ethnology Museums of Catalonia).

Operational objectives

A minimum of 4 in-person sessions and 4 online sessions each year.

Indicators

Number of online classes

Number of in-person classes

Number of participants

Answers to questionnaires on training sessions

Action 2.3

Specialization workshops. Museums or professionals with experience in photogrammetry or who would like to get started in laser scanning can attend workshops offered by specialists to improve their techniques and stay up-to-date.

Operational objectives

One session each year

Indicators

Number of workshop participants

Answers to questionnaires on workshops



Action 2.4

Create collaboration tools for the creation of a 3D ecosystem. In organizing the 3D digitalization sector in Catalonia, one of the most important factors will be the availability of tools for interaction, the exchange of information and collective growth. As a result, the Department of Culture will organize open forums, common resources or regular gatherings to encourage cooperation. This ecosystem must be made up of museums, organizations that manage architectural and archaeological heritage, entities, professionals, companies, universities and research centres.

Operational objectives

Hold one gathering for the sector each year

Include all important actors from the sector in cooperative platforms

Indicators

Number of participants at gatherings

Number of participants in the platform

<u>3.3.3.</u> <u>Collaborate with the educational sector to promote the discovery and use</u> of cultural heritage with 3D models

Actions specifically focused on collaboration with different actors from the educational sector to organize training activities on heritage using 3D technology.





Action 3.1

Reach agreements with universities to expand knowledge of these techniques and improve training opportunities. Laser scan technology is currently taught at Catalan universities, but innovations in the photogrammetry of objects are not included in current studies plans. We need to reach agreements with Catalan universities for research on this topic and its inclusion in educational programs. This is key to ensuring quality growth in the coming years. In 2020, we initiated contacts with the UPC (Universitat Politècnica de Catalunya · Barcelona Tech) and with several professional training schools (with the mediation of Serveis Territorials de Cultura de Lleida) to begin to define these agreements in 2021.

Operational objectives

Have stable training programs on 3D documentation in Catalonia by the end of the program

Indicators

Number of agreements reached

Number of courses offered

Action 3.2

Actively offer Giravolt resources for use at different educational levels (primary, secondary, baccalaureate). The pilot programs launched in 2019 and 2020 have shown the immense potential of 3D models in the world of education. We will seek an agreement with the Department of Education for the inclusion of the 3D resources published by Giravolt in the different catalogues of tools for educators. These can be used in primary or secondary education, artistic training or university courses related to cultural heritage.

Operational objectives

Reach an agreement with the Department of Education

Indicators

Number of resources used by the educational sector

Number of educators using these materials



Action 3.3

Create specific educational units for use by the educational sector. Using our experiences from 2020, especially the #despertaelpatrimoni activity, we will promote the design and publication of different educational units on the 3D digitalization of cultural heritage using mobile phones. These units will be published by local facilities and will be adapted to fit different educational levels.

Operational objectives

Creation of a minimum of 3 different educational units

Indicators Number of educational units Number of uses Participating students Answers to questionnaires on educational sessions

Action 3.4

Specific training sessions for educators. Since 2019, we have launched several pilot workshops for educators on 3D techniques and heritage. Organized in collaboration with the Department of Education and mSchools, these workshops have had very positive results. Based on this experience, we have designed a training session that can be offered either online or in person.

Operational objectives

A minimum of four training sessions each year

Indicators

Number of sessions

Number of participants

Answers to questionnaires on educational sessions



3.3.4. Encourage participation and new uses for 3D models of cultural heritage elements

Beyond improving access to Catalonia's cultural heritage with 3D models, to promote its expansion we need to actively support reuse of these materials.



Action 4.1

Organize a participatory activity for citizens. As part of the 2020 European Heritage Days, we organized #despertaelpatrimoni, which encourages the public to create 3D models of cultural heritage elements and share them.

Operational objectives

Program the activity once a year

Indicators

Number of sessions of the activity

Number of participants

Number of models completed

Answers to questionnaires on

sessions



Action 4.2

Actively promote reuse via social networks. Create augmented reality filters with 3D models to encourage activity on social networks and other campaigns for reuse.

Operational objectives

Organize a minimum of 4 campaigns each year

Indicators

Number of campaigns

Number of uses

Action 4.3

Actively offer Giravolt resources for use by researchers. To maximise the use of Giravolt's 3D models in research into cultural heritage (archaeology, history, history of art, ethnology), we will organize informative sessions at universities and research organizations. Should any opportunities be identified, we will also establish agreements for specific digitalization projects in these areas.

Operational objectives

Hold a minimum of two sessions a year

Use 10 models a year for research

Indicators

Number of informative

sessions

Number of uses

Participating students

Responses to questionnaire

on sessions



Action 4.4

Reach agreements with multimedia artists for the creation of contemporary pieces using existing models. To show the creative potential of Girsavolt's 3D models, we will launch different strategies for the production of multimedia pieces based on models from the gallery. Two agreements were reached in 2020. The first is for the creation of a multimedia piece by Burzon*Comenge design studio that will be revealed at the public presentation of the program at the Ideal Barcelona centre. The second is a three-party agreement reached with the UPC's Image Processing and Multimedia Technology Centre, the Ideal Barcelona centre and the ACdPC to offer creation scholarships for the 2020-2021 academic year. The chosen students will work on the creation of a piece that will be presented at Barcelona Ideal.

Operational objectives

At least one multimedia piece each year

Indicators Number of multimedia pieces commissioned Number of attendees at events Number of online visits Media coverage Online interest

<u>3.3.5.</u> Making the Department of Culture an example of best practice in the application of 3D technology to cultural heritage





The governance of the Giravolt program: a model of transparency. In 2020, the Department of Culture created the Giravolt governance commission made up of members of the DGPC and ACdPC that is in charge of coordinating the program. All documents from the program (criteria, procedure, lists, etc.) are published in open access on the Giravolt microsite as an example of transparency.

Operational objectives

Publication of all documents on the microsite

Indicators

Number of visits to the microsite

Institutions following our example

Action VP 1.2

Establish a 3D policy for the Department of Culture's cultural heritage services and entities. During the program, we will work together with different entities to establish 3D strategies that are appropriate for each case. We will organize internal training activities and encourage coordination and collaborative work with different teams, as well as the exchange of information. We must provide stability for different 3D teams.

Operational objectives

By the end of the project, all entities should have their own 3D strategy

Indicators

Number of entities with their own strategy

Number of internal training sessions

Number of 3D actions completed by entities



Create and promote a public repository for high-definition files. Besides general use files, master files will be created with the highest level of detail. This information is extremely important and must be stored with all the necessary measures to guarantee its preservation. However, in addition to being correctly stored, this information must be made available to the public for scientific use. As a result, it is important to create a public repository to house them. This repository must also be promoted so potential users are aware of its existence. As a conservation measure, we must consider redundant storage of the data in other international repositories.

Operational objectives

Repository operational in 2021

Indicators Number of archived models Number of requests for use Number of researchers contacted

Action VP 1.4

Consulting. Through the Giravolt program, the Department of Culture will also be available to respond to queries from any participants in the ecosystem for the 3D documentation of cultural heritage. Should these consulting services go from occasional queries to the coordination of whole external projects, they may even be of commercial use. These consulting and coordination services can also be offered to external cultural organizations.

Operational objectives

Respond to any queries sent to the team

Indicators

Number of institutions requesting assistance

Number of consultation services provided



Action VP 1.5

Inclusion in digital 3D corpus with tools for documenting architectural, archaeological and museum heritage. All documents and models produced by the program will be available to those responsible for documenting cultural heritage so they can be added to general documentation systems.

Operational objectives

Inclusion of these documents in general systems in 2023

Indicators

Models included in general system

Date of inclusion

Action VP 1.6

Establish collaborations with international partners. Through the Giravolt program, the Department of Culture will promote collaboration with noteworthy international organizations to constantly improve the quality of our work. Because of its experience in the field and existing contacts, Historic Environment Scotland could be a preferred partner. We will promote exchanges of information, regular online meetings and staff exchange programs. The selected partners can be the basis for the establishment of transnational European projects.

Operational objectives

Ongoing contact with international partners

Indicators

Number of international partners

Number of online meetings

Number of common projects

Number of staff exchanges



3.4. Governance, parties involved and the role of each

The Giravolt program is an initiative of the Department of Culture. The following entities take part in its development:

Directorate General of Cultural Heritage (DGPC)

- <u>Service for Museums and the Protection of Movable Heritage</u>. Responsible for contact with the museums that participate in training activities or digitalisation.
- <u>Architectural Heritage Service</u>. Responsible for scanning architectural heritage and coordination with the movable heritage service in the case of joint operations.
- <u>Archaeology and Palaeontology Service</u>. Proposes priority actions in archaeological heritage and collaborates with other services and areas from the same field.

Catalan Agency for Cultural Heritage (ACdPC)

- <u>Public Programs Area</u>. Responsible for the general coordination of the program. Establishes and manages schedules and budgets for scans of movable heritage, and is responsible for training at museums. It is also the primary entity in charge of publishing contents and managing the Sketchfab community.
- <u>Communications Area</u>. Responsible for communication: manages the program's website and social networks, as well as its visual identity.

The technical team meets regularly in a working and coordination commission to follow the project, propose lines of work and approve annual initiatives. Their decisions receive the necessary validation from the respective management entities.





3.5. Methodology and work plan

3.5.1 Structure

The work of the Giravolt program is primarily based on digitalization initiatives, both in movable and immovable heritage. Each takes into account the entire cultural heritage ecosystem.

By scanning a series of pieces in a museum or an immovable element, we can improve:

- Research. We will contact the most relevant researchers to inform them that new 3D models are available and that they can use them to help create new content, for research, or to share with others.
- Documents. We will provide a copy of the master and public use models, as well as all preparatory
 materials (photographs, etc.) while preserving an additional copy in the internal repository of the
 Department of Culture.
- Internal management. We will inform the museum or entity of the advantages of having their own 3D policy, as well as the requirements involved. We will evaluate their resources and how they might affect the creation of such a policy, and provide guidance.
- Conservation-Restoration. We will consider the possible requirements when scanning fragile pieces or pieces that require specific monitoring.



- Education. We will inform the museum or entity of the activity formats that may be useful for educational use. In collaboration with the museum's educational service, specific sessions can be provided for professors that regularly visit the centre.
- Communication and participation. The generated models will be published on Giravolt's Sketchfab account and the websites of both patrimoni.gencat and the museum or entity in question, either as annotated models or part of virtual exhibits. We encourage the use of models in all areas, from scientific to artistic.

3.5.2. Selection of pieces for 3D scans

In keeping with point 3.3.5, promoting the Department of Culture as a role model in best practice, some 3D scans will be of the movable and immovable elements owned or managed by the Department.

As a result, scans of architectural heritage will begin with public monuments owned by the Government of Catalonia. This will follow a schedule designed in keeping with needs for intervention, documentation, and state of conservation. As a result, priority will be given to the monuments for which this task will be most useful in the coming years.

Regarding archaeological heritage, priorities will be established by agreement among the members of the commission, in keeping with the same criteria.

Regarding movable heritage, part of the program will be destined to the elements managed by the Department of Culture, while another will be open to a call for proposals announced through Catalonia's different museum networks.

Each year, at least one call for proposals will be announced through the museum networks so that those interested in scanning part of their collection can present a project. There will be no direct economic cost for participation by these entities. Once calls for proposals are provided through the system for subsidies, the General Directorate of Cultural Heritage will be responsible for defining the details.

Each participating entity must submit a form with the following information:

- Which project the scan will be a part of, if applicable (research on specific objects, promotion of a specific part of our heritage, restoration, reuniting scattered sets, etc.).
- List of proposed pieces (10 maximum)



- Description of the topics that may be addressed using each of the pieces (things like funeral rites, textile technology, gothic sculpture, ivory carvings, etc.) and a brief description of available documents (museum file, bibliography, studies, old photographs, sketches, videos, etc.)
- Resources available during digitalization (space for taking pictures, support staff to move objects, curators to provide information on the object, etc.)
- The museum's interest in 3D technology and including it in its regular processes, either with external commissions or by training staff and use of own resources.



The commission for the Giravolt project will consider the applications and select the pieces and projects of greatest interest according to the following criteria:

- The public impact of the object: its presence in reference texts (general histories, selections of notable items, heritage websites, lists of key pieces)
- Its potential role in different heritage presentations (historic, technological, social, gender-based, general, etc.)
- Diversity of cultural heritage by theme or type
- Representativeness of the object with regards to the original collection
- Geographical diversity
- Whether 3D visualization can help to better know the item, providing points of view that are not possible with current representations
- Institutions that have created a 3D recording policy will be given priority
- Special attention will be paid to sculptural groups that are currently split between different entities (such as the Descent from the Cross of Erill la Vall, currently split between the MEV and MNAC, or the work of the Master of Cabestany)



Once the selection has been made, an agreement will be signed between the Department of Culture and the chosen organizations that will include the details of the collaboration.

Any museums and monuments of the Government of Catalonia that are registered with the Catalan Agency for Cultural Heritage can apply to participate in the program at any time. They need only present the same documents as those listed above for applications from other organizations.

This system allows for equal access to the program. However, it may lead to an unequal representation of Catalonia's cultural heritage, with the predominance of certain styles, periods, or geographical locations. Therefore, to achieve our objective of making the full diversity of Catalan heritage accessible, underrepresented cultural elements will also be digitalized to balance this selection. The basic criteria will be the same as in the calls for proposals: diversity of types, themes, locations, styles and periods. The same criteria for public impact, representativeness, storytelling capacity and educational capacity will also be followed.

3.5.3. Model for 3D capture

Models will be captured in high resolution. Afterwards, a lower-resolution version for public use will be created. The high-resolution version will be stored, with one copy given to the collaborating museum or institution, while the lower-resolution version will be available for publication. High-resolution models captured using a laser scanner may contain 1,000,000,000 points or more in the case of complex buildings. The version for public use will contain 1-4 million points. When captured using photogrammetry, the high-resolution model may contain 40-100 million triangles, while the version for public use may have around 200,000.

3.5.4. Publication and licensing

Models will be published on the Sketchfab channel, on the Giravolt microsite within patrimoni.gencat and on the websites of the participating entities.

Regarding publishing licenses, it is worth following the example of pioneers like the <u>Smithsonian Institution</u>, which has published more than 2.8 million files (including 3D models) in the public domain—totally free of copyright. 27 museums from around the world have also published their 3D models in the public domain on <u>Sketchfab</u>.



Recently, the <u>Heritage Fund</u>, the British government agency that funds large heritage projects, has required that all applying projects publish their pieces under a Creative Commons license.

The <u>Government of Catalonia</u> has always been extremely supportive of open access to information, in keeping with European guidelines. It has actively supported online publications in Creative Commons with the following initiatives:

- Open Data
- Social media guide

See also the legal notices on all <u>Gencat</u> websites.

Therefore, we suggest publishing public models under a <u>Creative Commons-Attribution</u> license. This type of license allows the materials to be used in any way, as long as the source is properly cited. This preserves the traceability of the 3D model, which is essential for guaranteeing its authenticity.

<u>3.5.5.</u> <u>Archiving policy</u>

Models will be kept by the institution that owns or manages the item. They will also be kept on the internal network of the Government of Catalonia, which will prepare a repository specifically for this sort of materials so they can be preserved and be made accessible to part of the interested audience.





3.6 Budget

The program is funded through the regular budget of the Department of Culture. During the pilot phase of the project, the expenditure was \in 196,000. The estimated expense in the coming years is a fixed investment by the Department of Culture of \in 74,000 for 2021, \in 65,000 for 2022, and \in 60,000 for 2023. In total, an investment of \in 395,000.

In phase 1 of the project, the expectation is that the cost of digitalisation will be covered entirely and directly by the Department of Culture. From phase 2 onwards, once critical training activities in the sector have been completed and the standards for action begin to involve autonomous application by the entities, grants may be provided specifically for these activities.

3.6.1. Additional sources: European projects and sponsorships

The innovative and digital characteristics of this program make it particularly appropriate for participation in transnational projects. All current indications show that digitalization will cease to be one of the objectives of European funds in the coming years, as it is believed to have been completed over the last decade. Instead, emphasis will now be placed on digital transformation. Although this program will, of course, include a segment dedicated to digitalization, it will offer an integrated approach, and its objective will be the digital transformation of the sector in one of the three technologies that affect it. As a result, this project is an excellent candidate for the reception of European funds. In this sense, it is very similar to the project presented by the Krakow region cited in the "International role models" section.

A proposal combining everything from innovative capturing techniques to posting tangible results online or use in education or multimedia art is particularly attractive to sponsors. With moderate expense, we can achieve extremely visible results, as the fruits of our pilot projects have shown.



3.7. Phases and schedule. Timetable

This program consists of a pilot period (2018-2019) and two development phases (2020-2021 and 2022-2023).

In 2018, the first photogrammetry scans were completed to analyse both the level of quality using different types of technology and the requirements involved. Using the results of this analysis, in 2019 we prepared an outline of the program and scans in real-world contexts.

The first phase of the program (2020-2021) is focused on scanning and publishing referential 3D models, making these new technologies known in the heritage sector and initiating the leadership of the Department of Culture in this task.

This second phase (2022-2023) will be focused preferentially on promoting and supporting 3D policies initiated by Catalan heritage institutions while continuing 3D scans. In the second phase, promoting the presence of this technique in Catalan universities and the reuse of the resulting models in all manner of environments will also be important.

Lines of action	Actions	2020	2021	2022	2023
	A.1.1. Scan significant pieces of Catalan cultural heritage				
	A.1.2. Create a Sketchfab gallery				
EIX 1. Improve accessibility	A.1.3. Create a microsite at patrimoni.gencat				
For all	A.1.4. Publish 3D models of scanned elements on the websites of the entities that				
	A.1.5.Encourage the printing of 3D models as an accessibility tool for the disabled				
	A.1.6 Promote international accessibility of Catalan cultural heritage				

Giravolt Viu el patrimoni català en 3D			
	A.1.7. Publish models on Wikimedia Commons and other international repositories		
EIX 2. Train the sector in the use of this technology, organize and promote its use	 A.2.1. Publish a best practice protocol A.2.2. Online and in-person introductory training sessions A.2.3. Specialization workshops A.2.4. Create collaboration tools for the creation of a 3D ecosystem 		
EIX 3. Collaborate with the educational sector to promote the discovery and use of cultural heritage with 3D models	 A.3.1. Reach agreements with universities to expand knowledge of these techniques and improve training opportunities A.3.2. Actively offer Giravolt resources for use at different educational levels (primary, secondary, baccalaureate) A.3.3. Create specific educational units for use by the educational sector A.3.4. Specific training sessions for educators 		
EIX 3. Collaborate with the educational sector to promote the discovery and use of	A.4.1. Organize a		
cultural heritage with 3D models	participatory activity for citizens:		
EIX 4. Encourage participation and new uses for 3D models of cultural heritage elements	A.4.2. Actively promote reuse via social networks A.4.3. Actively offer Giravolt resources for use by researchers		
	A.4.4. Reach agreements with multimedia artists for the creation of contemporary pieces		



practice

VP.A.1.1. The governance of the Giravolt program: a model of transparency

VP.A.1.2. Establish a 3D policy for all ACdPC agencies and DGPC services

VP1 E1 Make the Department of Culture a role model in best VP.A.1.3. Create and promote a public repository for high-definition files

VP.A.1.4. Consulting

VP.A.1.5. Inclusion in a digital 3D corpus with tools for documenting architectural, archaeological and museum heritage

VP.A.1.6. Establish collaborations with international partners



3.8. Following indicators, evaluation and ongoing improvement

The program will be evaluated at different intervals: annually, by phase, and at the end of the program. The achievement of objectives will be evaluated the last trimester of each one-year period. The results of each line of action and its corresponding actions will be analysed in keeping with the stated indicators, and any necessary changes will be proposed to ensure maximum efficiency and efficacy in how resources are distributed.



At the end of the first phase, the commission will evaluate whether the level of development achieved is sufficient to move on to the second phase. Should it be deemed satisfactory, we will move on to the second phase and, should any lines of action or actions fail to achieve a sufficient level of maturity, an extension or reform can be granted for the next one-year period.

At the end of the program, during the second semester of 2023, all actions and objectives achieved will be evaluated in depth. The future of the program will be determined depending on the results of this evaluation. It may be extended for one or two more years, it may be closed, assets may be transferred to an existing unit, or a unit specifically dedicated to the digitalization of Catalonia's cultural heritage may be created.







Appendix 1. Answers to key questions

In a few words, what is the Giravolt program?

Through the Directorate General of Cultural Heritage (DGPC) and the Catalan Agency for Cultural Heritage (ACdPC), the Department of Culture of the Government of Catalonia is launching a program that promotes the use of 3D scanning technology to reproduce the objects and buildings managed by the organizations in charge of Catalonia's cultural heritage.

It operates in keeping with the following <u>principles</u>:

- Collaboration
- Openness and transparency
- Open knowledge
- Learning through action
- Accessibility

Its objectives are:

- 0.1. Facilitate access to Catalan cultural heritage
- 0.2. Guarantee knowledge and proper use of these technologies by the sector
- O.3. Promote the use and reuse of 3D models of Catalan cultural heritage by all manner of audiences

These goals establish a positioning vector of the Department of Culture as a role model:

 VP.1. Make the Department of Culture a role model in the application of 3D technology to cultural heritage.

What are its most significant activities?

- 3D scans of hundreds of pieces of Catalonia's movable and immovable cultural heritage from entities all over the country.
- The online publication of all this material under Creative Commons licenses so it can be accessed through computers, mobile phones, and in augmented and virtual reality.
- The training of the entire sector in 3D technology.
- The promotion of its use for educational, scientific and artistic purposes.



Why is this program so important?

Because 3D technology, telepresence and big data are the technological elements that will have the biggest impact on the cultural heritage sector in the coming years, and we need to prepare for it. This program will allow us to be pioneers and fulfil the European Commission's recommendations for development.

What is the budget for the program? An expected investment of €385,000 from 2018 to 2023.

How do you decide which pieces to scan? In keeping with the following criteria:

- The public impact of the object: its presence in reference texts (general histories, selections of notable items, heritage websites, lists of key pieces)
- Its potential role in different heritage presentations (historic, technological, social, genderbased, general, etc.)
- Diversity of cultural heritage by theme or type
- Representativeness of the object with regards to the original collection
- Geographical diversity
- Whether 3D visualization can help to better know the item, providing points of view that are not possible with current representations
- Institutions that have created a 3D recording policy will be given priority
- Special attention will be paid to sculptural groups that are currently split between different entities (such as the Descent from the Cross of Erill la Vall, currently split between the MEV and MNAC, or the work of the Master of Cabestany).
- Any other specific criteria established in each call for proposals.

Where can I find out more about this program?

At patrimoni.gencat.cat/giravolt

Why is it called "Giravolt"?

A "giravolt" is a 360° spin. The G in Giravolt and the name of the program are a metaphor for the movement we can generate with any of the 3D models that will be available online from this point on.



Appendix 2. Models to be published in December 2020

- 1. Tympanum of the Old Cathedral of Lleida (DGPC)
- 2. Flat-bottomed ship from Ullastret (MAC-ULLASTRET)
- 3. Cupid oil lamp (MAC-BCN)
- 4. Hippocampus oil lamp (MAC-BCN)
- 5. Bronze oil lamp (Museu d'Història de Cambrils)
- 6. Goddess oil lamp (MAC-BCN)
- 7. Hunter and panther oil lamp (MAC-BCN)
- 8. Gladiator oil lamp (MAC-BCN)
- 9. Cloister of the Old Cathedral of Lleida (DGPC)
- 10. Cloister of the monastery of Santa Maria de Vilabertran (DGPC)
- 11. Chapel of Saint George (Palau de la Generalitat)
- 12. Saint George keystone (Palau de la Generalitat)
- 13. Door of the Apostles of the Old Cathedral of Lleida (DGPC)
- 14. Moja Palace (DGPC)
- 15. Hall of "El Vigatà" (DGPC)
- 16. Patera (Museu d'Història de Cambrils)
- 17. Lamp rest (Museu d'Història de Cambrils)
- 18. Villalbí motorcycle (MNACTEC)
- 19. Planell calculator (MNACTEC)
- 20. Puppet (Museu de les Arts Escèniques)
- 21. Dress worn by Margarida Xirgu for Doña Rosita (Museu de les Arts Escèniques)
- 22. The First Cold (MNAC)
- 23. Chameleon (MNAT)
- 24. Weight from Santa Coloma (MAC-BCN)
- 25. Maquette of The First Cold (MDA)
- 26. Medieval pot (MAC-OLE)
- 27. Tile (Museu de Guissona)
- 28. Stand (Museu d'Història de Cambrils)
- 29. Bronze stand I (Museu d'Història de Cambrils)
- 30. Bronze saucepan or strainer (Museu d'Història de Cambrils)
- 31. Bronze stand II (Museu d'Història de Cambrils
- 32. Saint Roch (MDA)
- 33. Saint Louis (MEV)
- 34. Virgin Mary from Boixadors (MEV)
- 35. Virgin Mary from Veciana (MEV)
- 36. Lead object (MAC-ULLASTRET)
- 37. Incense burner (MAC-Ullastret)
- 38. Female figure from La Roca dels Moros (ACdPC)
- 39. Descent from the Cross of Erill la Vall
- 40. Descent from the cross-Dismas (MEV)
- 41. Descent from the cross-Nicodemus (MEV)
- 42. Descent from the cross-Saint John (MNAC)
- 43. Descent from the cross-Joseph of Arimathea (MEV)
- 44. Descent from the cross-The Virgin Mary (MEV)



- 45. Descent from the cross-Christ (MEV)
- 46. Descent from the cross-Gestas (MEV)
- 47. Ballerina (MNAC)
- 48. Against the invader (MDA)
- 49. Sphinx (MAC-Ullastret)
- 50. Aneto chair (Museu del Disseny)
- 51. Rocking chair (Museu del Disseny)