



Francisco Juan-Vidal (orcid 0000-0002-1582-5545) is an architect (1988) and PhD in architecture (1999) from the Universitat Politècnica de València (UPV). Full Professor in the Department of Architectural Graphic Expression (DEGA) of the UPV. He is currently director of the Universitat Institute for Heritage Restoration (IRP) of the UPV and a member of the Spanish National Committee of ICOMOS.



Jordi Díaz-Maiquez My professional career is divided into two periods. First, as a technological and innovation consultant in a large multinational company for 10 years managing national and international projects in the sectors of tourism, telecommunications and public administration, leading multidisciplinary teams of up to 50 people. Secondly, managing technological-based startups in the tourism, marketing and gaming sectors for 14 years.



Gianna Bertacchi Architect, PhD in Cultural and Environmental Heritage at the University of Bologna in cotutelle with the Universitat Politècnica de València. Her research focuses on the use of digital technologies for the documentation, management, dissemination and enhancement of Cultural Heritage, both in architectural and archaeological contexts, often in sites included in the UNESCO World Heritage List.

The fruition of Intangible Heritage through gamification: accessibility, inclusiveness, and transmission of values in the HERIVERSO project

The article illustrates the methodology and the first experimentation of the “HERIVERSO project”, which aims to create a gamification platform for the digitisation and representation of Intangible Cultural Heritage (ICH). The workflow used is defined by the study of the criteria for the conservation of intangible values. This methodology was designed to be applicable to different examples of ICH, based on the experience of the pilot case. The project also aims to test a new way of managing tangible and intangible Cultural Heritage through blockchain technology, implementing a heritage management system that will work by tokenizing digital assets to enable their reinterpretation and sale.

Underlying the project is therefore the question: how to digitise ICH and use it in gamification, without distorting its meaning or losing its values, but allowing a full fruition and accessibility? The methodology used to answer this question is

described using the example of the chosen case study: the Corpus Christi celebration in Valencia (Spain).

To achieve these objectives, an agnostic, scalable and flexible platform for the digitisation of spaces, artifacts and instruments has been developed, composed of six technological modules. The contents must be introduced by the cultural agent and are based on two essential elements for the functioning of the system: the geolocation of ICH in the territory and the geolocation of digital content and gamification dynamics within real environments. In addition, the use of NFTs ensure the authenticity of the intangible asset and facilitating the generation of economic benefits for it.



Adolfo Ibáñez-Vila Phd in progress in Civil Engineering at PUC Rio in Rio de Janeiro and Master Degree in Heritage Restoration in Universidad Politecnica de Catalunya UPC. Graduate in Architecture at UPV in Valencia. Working for more than 15 years in Heritage Restoration, Digitalization and Virtualization and currently working in a Digital Heritage and Cultural Tourism startup-based company.



Gersón Beltrán-López Phd University of Valencia in local development and territory. Geographer, specialist in Geolocation, Technology and Tourism. Graduate in Geography by the University of Valencia. +25 years of experience in Education and Consulting. Teaching collaborator at Universitat Oberta de Catalunya (UOC) and Màsters. Senior Project Manager in play-and-go experience.

Keywords: Intangible Heritage; Gamification; Accessibility; Digitisation; HERIVERSO project.

1. INTRODUCTION

In the field of conservation and enhancement of Cultural Heritage, digital documentation and the use of 3D models for specific actions are now a normal procedure. Digital documentation allows cultural artefacts to be conserved and studied more effectively, while 3D models can be used for restoration, research and dissemination purposes. Many cultural institutions and heritage organisations are adopting these technologies as a standard to preserve and enhance Cultural Heritage in a more comprehensive and accessible way, as well as using gamification to increase user engagement and guide learning (Marques et al., 2023). The use of digital tools is also effectively applied to Intangible Cultural Heritage (ICH), where the lack of physical objects is compensated by enhancing through digital techniques what characterises ICH, such as performances, dances, rituals. The article describes the process of creating a specific platform (the HERIVERSO project [1]) for the transposition of ICH into serious games, which can be applied to different practical cases from different administrations. The prior analysis of the cultural values that characterise the chosen case study (Fig. 1) and the careful transposition of these values to the content of the created applications, allow validating the systematic use of the platform for other cases, making the ICH accessible and usable by a large number of different users, thus promoting the preservation and valorisation of the ICH.

The platform, which is divided into 6 modules (see section 4.2), is currently under development, with the modules completed, the data input for the pilot case study inserted, and the two applications set up and developed (see section 5). The next phase will concern the collection of usage data of the two applications.

2. STATE OF THE ART

2.1 INTANGIBLE CULTURAL HERITAGE (ICH), DIGITISATION AND GAMIFICATION

ICH according to the 2003 UNESCO Convention is

<http://disegnarecon.univaq.it>



Fig. 1 - The Corpus Christi celebration in Valencia (Spain), pilot case study of the Heriveroso project. Ph.: Ignasi Girones.

defined as “practices, representations, expressions, knowledge and know-how, transmitted from generation to generation within communities...is what communities today recognize as part of their cultural heritage” (UNESCO, 2003). This type of Cultural Heritage is rooted in various aspects that are not necessarily related to physical objects. ICH consists of cultural expressions such as traditions, customs, rituals, music, dance, language, narratives, festivities, which are part of the identity and history of a community.

Digital modelling, virtual and augmented reality technologies are increasingly used to enable the dissemination and fruition of Cultural Heritage,

as they allow for greater user participation. However, while the digitisation of a cultural asset is expressed in the creation of a digital twin inserted in a virtual environment, in the field of intangible heritage, digitisation is confronted with the co-presence of real objects and intangible expressions, which together form the ICH. Therefore, it is necessary to outline the values that characterise the specific intangible asset and to search for digitisation strategies that fit the specific typology, integrating methodologies to recreate everything related to ICH in a virtual environment. Thus, examples of ICH digitisation studies simultaneously use different digital objects, such as 3D models,

audio and video files, which, placed in virtual environments, contribute to the valorisation and preservation of ICH [Carrozzino et al., 2010; Yu, 2023, Suárez et al., 2014; Skublewska-Paszowska et al., 2022]. In particular, 3D models are a versatile tool in the valorisation and conservation of ICH. They can be used to digitally document and preserve elements of the ICH, creating digital representations not only of objects and artefacts, but also of cultural spaces or practices and expressions, allowing remote access and use as educational and virtual exploration tools in an interactive and accessible way. In addition to UNESCO,

European projects have also paid great attention to the preservation of ICH in recent years through digitisation techniques [Baskerville and Hulubas, 2023].

Serious games are digital applications designed with the purpose of educating and increasing knowledge about a specific topic, while maintaining playful elements for the user, thus being an effective tool to further engage users in the understanding and preservation of ICH [Checa and Bustillo, 2020], thanks to the interactive exploration and first-person participation of the user.

Museums, cultural centres and cultural heritage

managers make extensive use of educational apps, although the application to ICH has few examples [Chatsiopolou and Michailidis, 2023]. However, serious game applications bring benefits not only in terms of user involvement and personal learning, but also have a certain return on the specific place of culture, fomenting so-called “videogame tourism” [Cipriani et al., 2018].

2.2 3D MODELS FOR TOKENS AND NFTs

Heritage tokenisation is emerging as a new way to disseminate, manage and protect cultural assets. It is based on blockchain technology, which allows the creation of unique digital assets. These assets or tokens can be held and transferred in a secure and transparent manner.

Essentially, tokens act as surrogates for real assets or information, lacking inherent value or purpose beyond data security [DeJesus, 2022]. Blockchain technology, used in tokenisation, provides a secure and reliable infrastructure to guarantee the authenticity and ownership of digital assets. Each token carries with it specific and semantic information about the piece of wealth it represents, facilitating its traceability and ensuring that rightful owners can prove ownership.

Through tokenisation, anyone anywhere in the world can own a virtual part of the asset, broadening the base of people who can appreciate it [Stublic et al., 2023]. Furthermore, with the proposition of fungibility, it creates opportunities for monetisation and leveraged crowdfunding for conservation, restoration, research and heritage management projects [Valeonti et al., 2021].

On the other hand, tokenisation poses challenges in relation to the protection of intellectual property of cultural property or copyright of works of art [Bamakan et al., 2022]. It also presents risks with fraud and counterfeiting actions, through unauthorised replication or alteration of the original assets. To avoid this, it is possible to implement digital certification systems or seals that support the authenticity of digital souvenirs. Such systems can include detailed information on the origin, history and authenticity of the assets, giving both in-

Fig. 2 - One of the most famous dances of the celebration is that of the Moma. Ph.: GB



vestors or collectors and the holders responsible for their safekeeping greater confidence.

This new technology requires its own systems of governance and regulation. A DAO is a decentralised autonomous organisation that relies on smart contracts to define and execute its operating rules without the need for intermediaries or central authorities. A DAO works with digital contracts that are encrypted and stored on the blockchain. They automate the agreements between creator and receiver, making them immutable and irreversible. A specific type of decentralised organisations are Collection DAOs that focus on the management and acquisition of art collections, objects or digital assets (Patrickson, 2021). These DAOs allow participants to collaborate in the selection, purchase, conservation and display of various elements of the art collection. There are also Entertainment DAOs, which focus on creating or investing in entertainment-related projects, such as music, films, games or virtual reality experiences. These DAOs raise funds from their members to invest in or produce entertainment content, and members have a voice in the decision-making process to select projects and allocate funds (Bhalla, 2022).

Among the possible governance models for these DAOs is the JuiceboxDAO (JCB), which provides an unaudited platform for decentralised fundraising. This governance model is ideal for organisations seeking to reward their members for their contributions (Bhalla, 2022). Projects can easily create a fundraising page, set up funding structures, allocate funds and distribute tokens to community members (Howell, 2022). The JuiceboxDAO has a governance approach suitable for application to “projects” associated with specific tangible and intangible assets. Each project would have its own governance structure, would be designed to be flexible and customisable, and would allow creators and community leaders to design their own governance structures.



Fig. 3 - The figures of the giants represent the continents and dance during the procession. Ph.: FJV

3. CASE STUDY: THE CELEBRATION OF THE CORPUS CHRISTI IN VALENCIA (SPAIN)

The case study is the celebration of Corpus Christi in Valencia (Spain), recognised as an Intangible Cultural asset in 2010 (Ministerio de Cultura, n.d.). This Christian religious celebration commemorates the real presence of Jesus Christ in the Eucharist and consists of three distinct processions. The first is popular and includes dances and depictions of Christian mysteries. The second features themed floats called *Rocas*, and the third is more solemn and involves religious congregations and civil authorities. The festival dates back to the 14th century and it's considered the most important celebration



Fig. 4 - The *Roca del Sant Calze* and the *Roca de la Mare de Déu dels Desamparats* parading during the 2023 celebration. Ph.: FJV

in Valencia (Cortés and Rey de Arteaga, 2009).

The first of the processions that take place throughout the day is the *Caualcada del Convit*, a parade of characters dancing traditional dances and acting out biblical mysteries. These are represented by the characters in costumes and stage props that clearly distinguish them. Among the six typical dances, the most famous is that of the *Moma*, in which the main figure represents Virtue who fights against the *Momos*, the seven deadly sins, who in the end surrender to divine grace (Fig. 2).

The parade has other outstanding moments of theatricalisation, such as the procession of the Giants (Fig. 3), papier-mâché figures almost four metres high representing the continents, and of



Fig. 5 - The monstrance containing the Corpus Christi in one of the streets of the itinerary. Ph.: FJV

interaction with the public, such as the *Poalà*, during which buckets of water are thrown from the balconies at the figures representing the soldiers charged by King Herod with beheading all the two-year-old children of Bethlehem.

In the afternoon, the religious procession takes place, preceded by the parade of the *Rocas* accompanied by the main dances (*Moma*, *Gegants*). The nine processional floats each have a specific theme or saint of reference. They date from different periods and are kept in the Museum of the *Rocas*. Due to specific conservation requirements, in 2023 only two floats were used in processions, the *Roca de la Mare de Déu dels Desamparats* and the *Roca del Sant Calze* (Fig. 4).

The last procession includes the parade of the characters of the mysteries, fantastic animals, symbolic objects, emblematic characters, religious congregations, parishes, civil and military authorities and closes with the monstrance containing the Corpus Christi, welcomed by the population with the throwing of petals from the balconies along the route (Fig. 5).

Each act of the *Fiesta* is accompanied by manual ringing of the cathedral bells, which themes only occur on the occasion of this celebration.

The aspects related to the festival are loaded with symbolism linked to traditions, both Christian and pagan, art and decoration, dances, music, bells, the Valencian language, aspects whose digitalisation and gamification must be carefully considered so as not to incur in transposition errors, but at the same time preserve its memory and increase its dissemination.

4. METHODOLOGY

In order to use gamification in the conservation and valorisation of ICH, three main themes have been carried out simultaneously:

- (1) Analysis and study of intrinsic values.
- (2) Development of mobile applications on a specific platform.
- (3) Digitisation of elements that are closely related to the festival.

4.1. ICH VALUES ANALYSIS

The phase of analysis of the Intangible Cultural Heritage values was carried out starting with the analysis of the state of the art and the pilot case and collecting video and photographic material during the celebration of 2023. With all these materials, the contents to be included in the platform were elaborated and a methodology was outlined to identify the cultural values associated with the festival and to prepare a specific survey. This methodology is necessary to achieve two main objectives:

- To identify and correctly transpose the cultural values of the ICH into the applications to be created, without distorting the meaning of the festival.
- To understand which values and aspects of the celebration are not considered as important as others or are not known to the public and are therefore at greater risk of disappearing.

Photographs taken during the 2023 celebration were used for the survey. These were previously selected and subdivided by typology, using a total of nine categories, each of them related to key aspects of the festival, which make it unique among the celebrations of other cities: 1. *Rocas*, 2. *Dances*, 3. *Gegants and Cabezudos*, 4. *Mysteries and Degollà*, 5. *Urban environment*, 6. *Symbols*, 7. *Bestiary*, 9. *Characters, 9. Guilds, Parishes and Chapter*. Each group is linked to the popular, religious or both parts of the festival.

The survey (created and developed online with the SurveyMonkey service) was divided into four sections:

(a) Respondent profile

<http://disegnarecon.univaq.it>

(b) Visual preference

(c) Rating

(d) Evaluation of aspects of the celebration

In the profile section (a), the questions refer to general characteristics of the respondent, such as age, gender, origin, area and level of education, as well as two questions to determine interest in the *Fiesta* and participation in or knowledge of the celebration (to exclude from the survey those who have never participated in the celebration, so as not to distort the results). Out of the total of 800 responses, 30% were excluded because they stated that they did not know anything about the Corpus Christi.

In section (b), users are given three compositions each consisting of nine photos (one representative of each category) and have to choose the three most representative images for them and the least representative of the festival.

In section (c) users evaluate a series of photos by choosing the most relevant among six values. The values to choose from are: History, Art, Tradition,

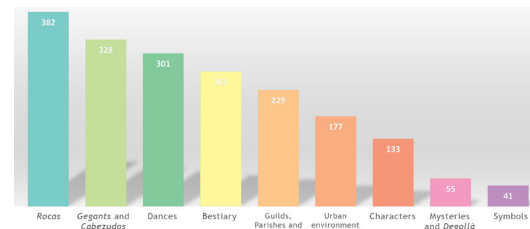
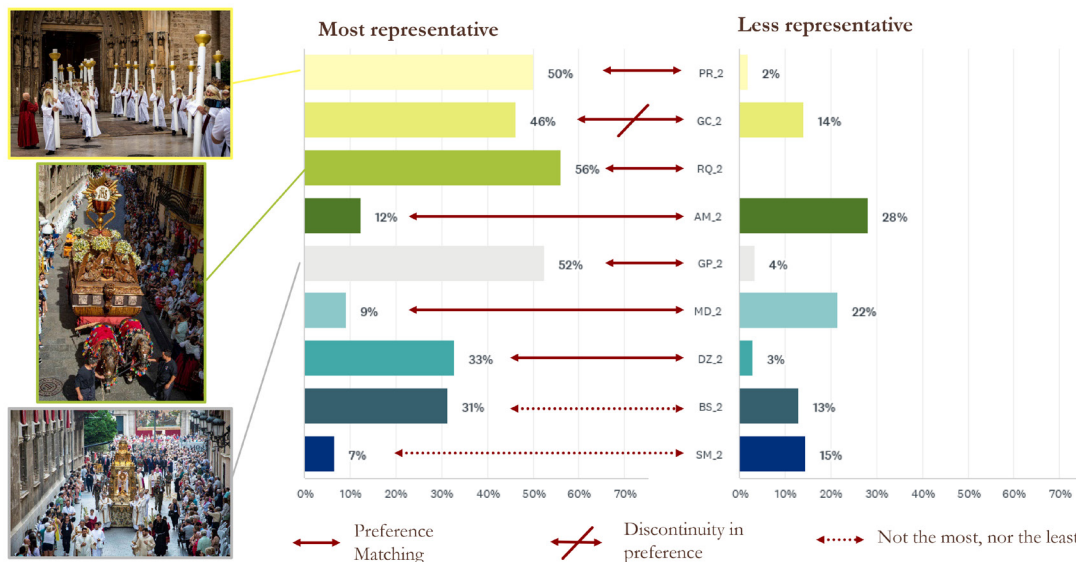


Fig. 6 - The *Rocas* are considered the most representative symbol of the celebration, along with the special characters such as the giants and *cabezudos*, carnival figure with oversized head. The number refers to the preferences expressed. Image: GB.

Fig. 7 - In the image, the preferences expressed for each image in the relevant group are compared to the corresponding preferences expressed for the least representation. The analysis investigates the possible motivations behind the preferences expressed by the users. Image: GB



Beliefs, Identity, Emotion. In addition, there is an open question in which other possible values can be proposed if they are appreciated in the photos. Finally, in section (d) some more general aspects of the festival are evaluated according to a numerical scale (from a minimum of 1 to a maximum of 5), such as: Relevance (importance of the festival); Dissemination (degree of knowledge by the public); Participation (relative number of participants); Conservation (absence of deterioration and/or threats); Fruition (quality and intensity of the experience). Finally, users are asked to report any possible threats to the festival.

User responses in sections (b) and (c) were analysed by grouping the results according to the nine categories previously created. The first analysis evaluates the 560 complete responses, without distinguishing according to the different profiles identified in section (a).

In section (b), the preferences expressed for the most and least representative photos were analysed both in total per group and individually (Fig. 6). It was observed that, although some categories are not considered globally representative, there are photos that individually received a high number of preferences (or were chosen as less representative) (Fig. 7). The interpolation of the data made it possible to highlight lesser-noticed aspects of the festival, which are at risk of being forgotten by the public. For example, few users related the pictures of the bells to their importance in the celebration.

For section (c), the results were grouped according to the nine categories, resulting in a list of the main values found for each of them. In most of the photos, Tradition and Beliefs were found to be the main values, together with History and Art.

The results of section (d) show how the festival is considered important, but also threatened by a lack of knowledge and low enhancement by public administrations.

In conclusion, the survey results point to some critical issues in preserving the values of celebration that are undervalued or ignored by the general public. The content used for the development of the apps takes some of these aspects in an attempt to engage the user in discovering or rediscovering them.

Intangible Cultural Heritage

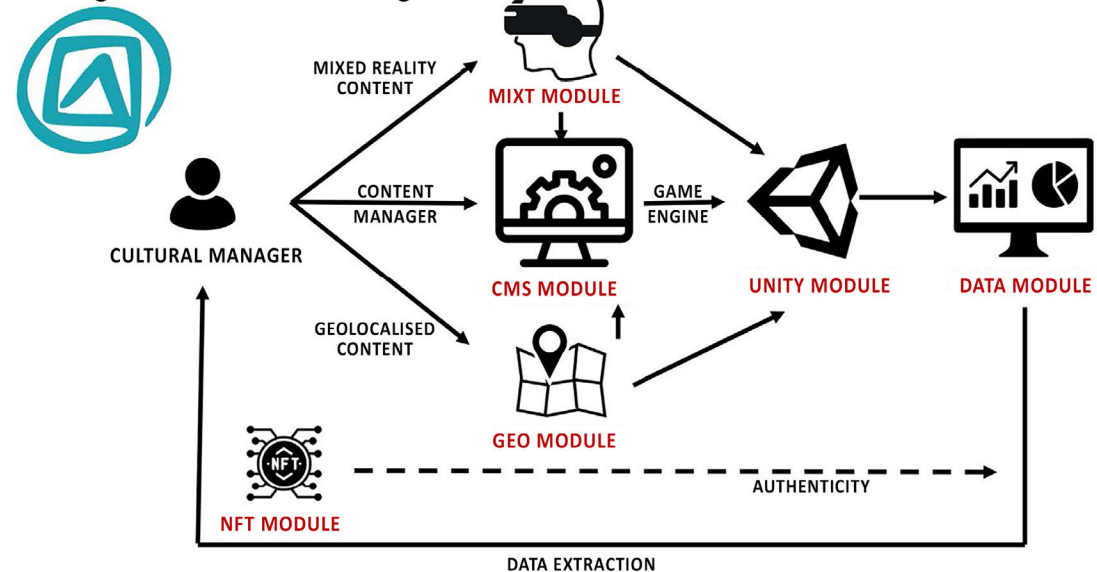


Fig. 8 - Structure of the HERIVERSO platform and interrelation between technological modules. Image: JDM, GBL.

4.2 DEVELOPMENT OF THE PLATFORM AND NFT MODULE

An agnostic, scalable and flexible platform for the digitisation of spaces, artefacts and instruments has been developed, composed of six technological modules: CMS, UNITY, MIXT, GEO, DATA and NFTs, which integrate different interrelated technologies (Fig. 8).

The CMS module is the central structure of the system; it is designed for local cultural agents to autonomously manage digital content related to a specific cultural asset. This ensures the authenticity of the content, avoiding the loss of its distinctive context during digitisation.

The UNITY module (based on the same software) allows the development of digital content without the need to programme common features. Uni-

ty® was chosen because of its large community of developers, which makes it easy to obtain third parties to develop content once the platform and technology modules have been licensed.

The MIXT module manages elements of Mixed Reality, which combines digital elements on reality with a virtual representation through viewers. The module integrates the SDK "Mixed Reality Toolkit" and ensures compatibility with UNITY. In addition, it is compatible with leading viewers such as Microsoft HoloLens.

The GEO module is responsible for the geolocation of Points of Interest on a map, showing the exact position of objects or people and associating information from the CMS module in different formats (text, photo, video, audio, etc.).

All the data generated in the serious game will be structured and organised in a dashboard (DATA

module) that will help the cultural agent to know the users in order to evaluate the system and improve their experience.

The NFTs module focuses on the tokenisation of objects and includes the following functionalities, developed in collaboration with the company BauKunst, specialised in historical heritage:

- Management of the specific formats of the most appropriate digital assets for their subsequent conversion into Non-Fungible Tokens (NFTs) or Re-fungibles.
- Management of tokenised digital assets associated with the immersive gamified experience through a proprietary methodology.
- Management of tokenised digital souvenirs associated with the digital assets.

The use of NFTs guarantees the authenticity of the ICH and allows it to generate economic benefits. The development of this module is still in progress and involves the digitalisation and use of 3D models of objects related to the festival, such as the processional floats (both the *Rocas* and the smaller ones related to the saints and fantastic animals), the costumes, the masks used by the participants and the symbolic objects (Fig. 9). As a proposal for the present project, the model shown in the following diagram is presented (Fig. 10).

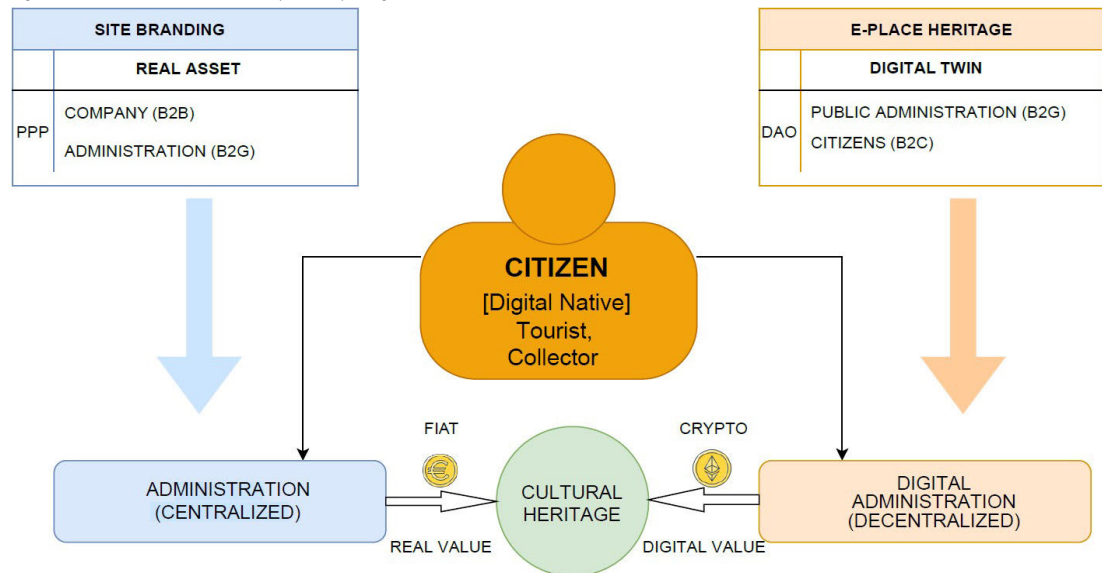
5. RESULTS

The project involves the development of two different applications: one focused on a playable narrative experience with 360-degree interactive videos, and the other based on geolocation, thus involving a wide audience of users with different levels of familiarity with digital applications. Both applications share resources and are linked to each other, either through informational pop-ups or specific links. Furthermore, the establishment of the values that must be preserved allows the results of the survey to be used for the creation of guidelines, which turns the platform into a product that can be applied to other similar cases, guaranteeing full respect for the essence of the ICH.



Fig. 9 - The *cabezudos* (left) and the mythological beast (right) are some of the physical elements closely linked to the intangibility of the celebration that can be digitised. Ph.: GB.

Fig. 10 - It contains two sides to consider: the left side refers to the physical value of the asset managed by a centralised organisation under a government or public administration; the right-hand side refers to the digital value of the same asset managed by a decentralised organisation under a decentralised government (DAO). The citizen is in the centre, because he or she is the subject that finances both the government and the DAO, either by paying taxes or by buying digital souvenirs of the cultural assets (NFT, RFT). Image: AI.



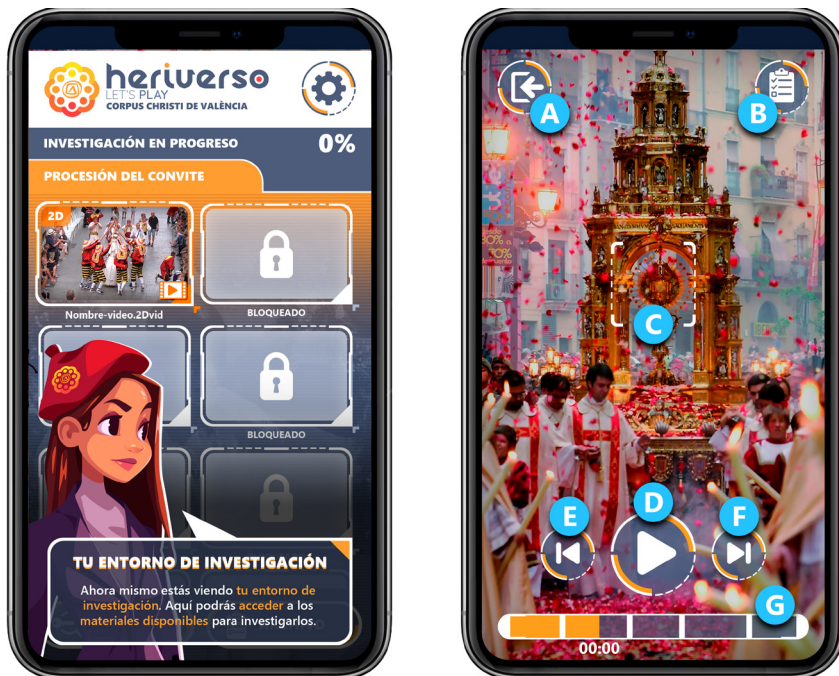


Fig. 11 - The researcher Heri guides users through the investigation and helps them find the interactive clues in the videos. Image: JDM, GBL.

5.1 HERIVERSO PLAY

The main objective is to explain the festival in a pleasant and entertaining way for learning through play. For this, simple and effective design decisions have been applied. In the research experience, users will be able to interact with HD videos, high resolution images, 360° videos and images in a game that combines the Hidden Object system with the classic Point and Click adventures (Fig. 11).

For the playable narrative experience, a variety of materials collected during the festival and processed to touch and interact with specific elements have been used (Fig. 12).

In the videos and images, the player's interaction is complete, and they can also touch/interact with those interactive elements that have been pre-established in advance following the rule of being a point of interest that serves to explain the Corpus Christi celebration. The interactive elements are indicated by Interactive Tracks and are of various types:

- Digital Key: by tapping an interactive item with a key, automatically a digital key is added to the user's inventory;
- Digital Document: by touching an interactive element, a digital document is automatically saved to the user's inventory for later reading;
- Locked and/or coded digital door: contain information, digital keys, digital documents or coordinates and can only be opened with a digital key;
- Interactive element information: provides details about the interactive element that has been touched (Fig. 13);
- Mix: Some elements can combine several options, such as offering information followed by a locked digital door with a code that, when opened, reveals a new digital document.

Users, through the guidance of Heri (Fig. 11a), an expert researcher from the HERIVERSO research group, have to investigate and solve the case, following the investigation thus composed:

- Introduction: HERIVERSO is looking for new members to investigate the national heritage.



Fig. 12 - A 360° photo used to track specific elements for the application. Image: JDM, GBL.

INTERACTIVE RESEARCH

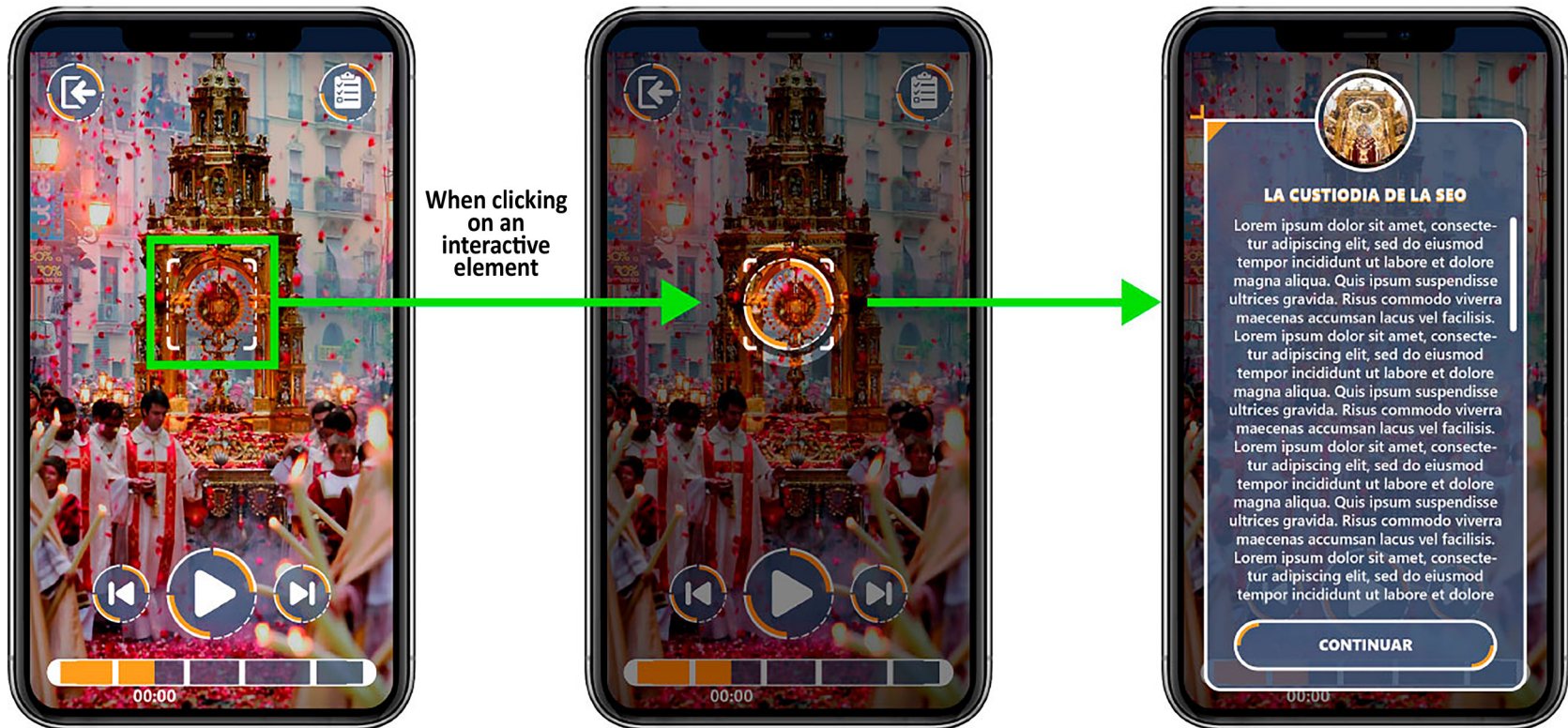


Fig. 13 - When touching an interactive element, specific information is provided. Image: JDM, GBL.

Applicants must pass a wit test and interact with videos and photos to solve puzzles.

- Search for the *Moma*: Players must find *Moma*'s costume, lost after the General Procession. By solving clues and riddles, they will reach the coordinates that reveal the whereabouts of her dress in the *Casa de las Rocas* Museum.

- Lines of investigation: line of the *Cavalcada del Convit* with which you will obtain the Latitude coordinates; line of the *Rocas/Procession* with which you will get the coordinates of Longitude.

Once the user obtains the last coordinate, a cutscene would immediately begin where a map of the historic center of Valencia would be displayed. The coordinates that the user has obtained are automatically entered, resulting in the location of the *Casa de las Rocas* Museum in Valencia. This will be zoomed in and the user will be informed that they have found the *Moma* costume. Finally, a dialogue window offers information about the Museum and its exhibitions

5.2 HERIVERSO GO

The second application (geolocated) proposes an augmented reality experience where the user, being physically in Valencia, will be able to interact with Points of Interest (or POIs) related to the festivity, distributed through an interactive 2D and 3D mapping that faithfully represents the city of Valencia (Fig. 14). The user, when moving around Valencia in the reality, will also do so on the app's interactive map using geolocation. To make the

application as accessible as possible, it begins with a tutorial on using the 3D and 2D map and with the creation of a personalized profile. Among the various profiles to choose from, some are unlocked only after you have completed the other application, HERIVERSO Play. When the user is close enough to a POI, they are notified within the app and an interactive box is displayed superimposed on the map with various information about the area in which the user is currently located. In each POI there may be different types of information and multimedia resources: informative text; contact information; 2D or 360° images; videos; 360° videos; question and answer quiz about the celebration; POI assessment; comments from other users about the POI. Multiple POIs are also inserted in pre-established routes that guide the user to discover the festival. The application also has a link to the digital store that is accessed to purchase the tokens (Fig. 15).

6. CONCLUSIONS

The study presents the development of a specific platform for the transposition of Intangible Cultural Heritage (ICH) to serious games, in order to make this heritage accessible and usable by a wide spectrum of users. Through a careful analysis of the intrinsic cultural values of the case study and its subsequent transposition to the applications created, the systematic use of the platform for other similar cases is validated, thus promoting the preservation and valorisation of the Intangible Heritage and providing a tool to cultural managers. The methodology used has involved the analysis of the intrinsic values of the ICH, the development of mobile applications on a specific platform and the digitization of related elements. Thanks to the interdisciplinary nature of the project, the collaboration between application developers, architects and experts of the celebration, it was possible to deepen the digitization of the pilot case, while defining guidelines for subsequent uses of digitisation of ICH. The two applications created offer playable, geolo-

cation-based narrative experiences, engaging users with varying levels of familiarity with digital technologies. The use of gamification applications and digital documentation make it possible to increase user participation and learning and, at the same time, guarantee the conservation and valorisation of the ICH, making it more accessible and inclusive. As a result of the project, guidelines have been

established for the proper preservation of the ICH values in gamification, allowing the platform to be applied to other similar cases in the future, also to better define the guidelines for the proper digitization of the ICH. These guidelines will be verified by collecting data from the use of the two applications developed from the platform.

Fig. 14 - A snapshot from the application Heriverso GO. Image: JDM, GBL.



Fig. 15 - From the main menu of the Heriverso GO app, many additional features are available. Image: JDM, GBL.



NOTE

[1] The HERIVERSO project is aimed at the “Development of an Innovative Platform for Digitising Intangible Heritage based on Video Game Technologies and Methodology for Safeguarding Cultural Values”. The project is financed by the funding from the Centre for the Development of Industrial Technology (CDTI), in the 2022 call Plan for the Promotion of the Audiovisual Sector Spain Audiovisual Hub of Europe, the “España Digital 2025” Agenda, Plan de Recuperación, Transformación y Resiliencia y el Plan Estatal de Investigación Científica, Técnica y de Innovación 2021-2023 / BOE-A-2022-6991. The HERIVERSO project is currently finalising the platform by incorporating the materials collected during the 2023 and 2024 celebrations into it. The two applications currently being created will be tested on users to analyse the results of the case study application.

[*] Authors contribution:

- 1 - FJV
- 2.1 - GB
- 2.2 - AIV
- 3 - FJV
- 4.1 - GB
- 4.2 - JDM, GBL, AIV
- 5.1 - JDM, GBL
- 5.2 - JDM, GBL
- 6 - FJV

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