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## **3D #DigitalInvasions: a crowdsourcing project for mobile user generated content**

**Elisa Bonacini, Laura Inzerillo,  
Marianna Marcucci, Cettina Santagati, Fabrizio Todisco**

### **Abstract**

This paper introduces the *#InvasioniDigitali* project which is an online crowdsourcing initiative started in Italy in 2013 with the aim to promote the value of and engagement with local heritage. The paper focuses on two case studies of pilot 'invasions' using 3D data capture by students at museums and heritage sites in Sicily.

**Keywords:** Crowdsourcing, 3D, user generated content, digital technology, cultural heritage

## Introduction

### **#InvasioniDigitali: birth and results of a bottom-up digital project**

Inspired by the increasingly widespread use of smartphones, tablets and social networks, #InvasioniDigitali (#DigitalInvasions) is an Italian bottom up project started in 2013 (Bonacini, 2014; Bonacini, Marcucci and Todisco, 2014).

The #InvasioniDigitali initiative was a reaction to the cancellation, for economic reasons, of the “Culture Week” event, promoted by the Italian Ministry of Culture since 1998. Culture week aimed to increase visits to museums through free entry.

The first Invasion (April 20-28 2013), Was a bottom-up initiative across Italy through networks of people and partners leading to 330 “digital planned invasions” were organized (fig. 1). Each ‘invasion’ was a mini-sociodigital event in itself with its own poster, Facebook event and hashtag. Groups of people organized independent events all around the country during the given time frame. Social and digital communication were the key to the invasions: ‘invaders’ were bloggers, amateur archaeologists artists, photographers, Instagrammers, communication experts, but also common people with a wide range of backgrounds, all with the same desire to promote their cultural heritage through social media. By joining the *Manifesto* ([www.invasionidigitali.it](http://www.invasionidigitali.it)), people decided to support Italy’s cultural institutions by “invading” them with cameras, smartphones and tablets and share their cultural experiences through the web and social media.

During the second Invasion (April 24 - May 4, 2014), 407 invasions were organized in other European countries and overseas. The most recent invasion (April 24 - May 3, 2015) had 474 invasions, some organized in other European countries (fig. 2).

To date, over 1,200 invasions has been organized and about 40,000 people were involved across the countries; nearly 39,000 pictures on Instagram and 85,000 tweets with the tag #invasionidigitali and thousands others with the hashtags of every invasion.



Fig. 1: #InvasioniDigitali 2013 edition



Fig. 2: #InvasioniDigitali 2015 edition in Italy and Europe

#InvasioniDigitali is a project unique in its kind for its scale, interactivity, novelty and effect on cultural digital communication: becoming both a sort of “national-territorial lab” for new social and digital communication products and models, and a tool to enhance visitor’s experience and museum/cultural site performance, it has been recognized as best practice (Symbola and Unioncamere 2013: 201), in that it fits the *participatory museum model* (Simon 2010).

#InvasioniDigitali has become a popular and strong example of users’ involvement and proactive participation in co-creation, sharing and dissemination of cultural values and

contents, creating new forms of conversation about arts and culture and helping to transform Italian cultural heritage into something open, welcoming and innovative.

Thanks to #InvasioniDigitali, hundreds of Italian museums and cultural institutions have overcome their reluctance to allow visitors freedom to take photographs and use social media. It has also forced a profound change: after the second Invasion, the Italian Ministry of Cultural Heritage and Tourism introduced a law (L.106, 29<sup>th</sup> July 2014, called *Culture Decree*) to regulate Italian cultural heritage items reproduction rights. Taking pictures and sharing them on the web - considered now by the Ministry both as a private and non-profit use of cultural heritage digital reproduction and as a way of dissemination of knowledge - has been partially liberalized.

Since the first Invasion, many cultural institutions have become organizers of digital invasions; for example, during the last Invasion, the Superintendence that locally manages and protects the cultural heritage of Agrigento organized 11 invasions in archaeological and cultural sites normally closed to the public (fig. 3).



Fig. 3: The advertising flyer for local invasions organized by Agrigento Superintendence of Cultural Heritage.

#InvasioniDigitali is a great example of digital cultural inclusion: leading to increase pride, awareness, interest and curiosity about cultural sites, and contributing to create new forms of living and promoting heritage through participatory co-creation of cultural values.

Jenkins' (2009: xi) definition of *participatory culture* corresponds with the InvasioniDigitali vision of the future of *participatory culture* within cultural heritage.

### **3D #DigitalInvasions: engaging young generations in the co-creation of cultural heritage**

3D #DigitalInvasions was a pilot experiment that took place in Sicily. Since the first edition, #InvasioniDigitali has been endorsed by the Sicilian Department of Cultural Heritage and Identity, ensuring access to cultural sites and liberalizing cultural heritage

photographic documentation (well in advance of the *Culture Decree*).

126 invasions were planned in Sicily: 33 in 2013, 45 in 2014, 48 in 2015. #InvasioniDigitali in Sicily has become a major event for cultural institutions: with the most important regional museums and archaeological parks in Sicily joining the project.

For the third Invasion, we proposed an innovative educational experiment by involving engineering students from Palermo and Catania Universities during planned invasions in the “Antonino Salinas” Archaeological Museum (Palermo) and the Archaeological and Naturalistic Park of Santa Venera al Pozzo in Acicatena (near Catania).

Two introductory workshops took place before each invasion, to ensure students understood the project’s significance and social impact.

A huge number of students captured 3D models of high-cultural value archaeological objects. We wanted to analyze the response in terms of creativity, sense of identity and affiliation to the 3D cultural heritage they wanted to achieve. The creation of virtual replicas has become an important emerging area within cultural heritage: each 3D model has become a bridge between the original artwork and its knowledge.

Students created 3D digital replicas of several archaeological works by using image-based techniques, allowing them to obtain 3D textured models of an object sourced from an appropriate photo dataset taken from cameras, smartphones and tablets (Inzerillo and Santagati, 2013; Santagati, Inzerillo and Di Paola, 2013; Galizia, Inzerillo and Santagati 2015).

In order to analyze the impact of these experiences, students filled in a final questionnaire. The questionnaire aimed to understand their relationship with cultural heritage and digital reproduction of artwork (whether or not they had the habit of going to museums and taking photos); to understand perceptions of #InvasioniDigitali project; to understand their relationship and degree of involvement with 3D models of artworks; to understand whether or not they were aware of the utility of a 3D model in encouraging users to physically go to a museum; to understand their relationship with art images and social media and if they considered social media useful for cultural heritage knowledge and enhancement.

This experimental approach has been designed to create new experiences for cultural visits allowing visitors to be personally involved in a specific process to create user generated content and increasing an artwork’s cultural value in its own context.

These 3D models have been given to the involved public administrations so that, according to the open access paradigm, they will share them on websites and through social media. The 3D#DigitalInvasions will be illustrated through two examples.

### 3D #DigitalInvasions at the “Antonino Salinas” Archaeological museum in Palermo

The first location was the “Antonino Salinas” Archaeological museum in Palermo, one of the most important archaeological museums and the oldest public museum in Sicily. The invasion focused on the exhibition “*Like - Restoration and shots. Salinas’ unreleased face*” (fig. 4), a selection of newly restored archaeological objects from the museum’s collections.



Fig 4: event leaflet and engineering class students at the museum.

About forty students from the Environmental Engineering School, University of Palermo, as part of the Geometrical Drawing Course, enthusiastically participated, to create the data set and carry out the 3D models of the artworks inside the Salinas Museum.

The entire collection of the Salinas museum consists of archaeological artworks no more than one metre high with the exception of a statue of Zeus from Solunto, which is more than 2 metres high.

The data was created from both reflex and cell cameras over a two hour period. The 3D models obtained were satisfying, and the resolution was acceptable. In the figures below (figures 5-6), you can observe the 3D models created. Variations in the wireframe and 3D model scans can be observed depending on which camera was used.



Fig 5: 3D models obtained by data set made with reflex camera.

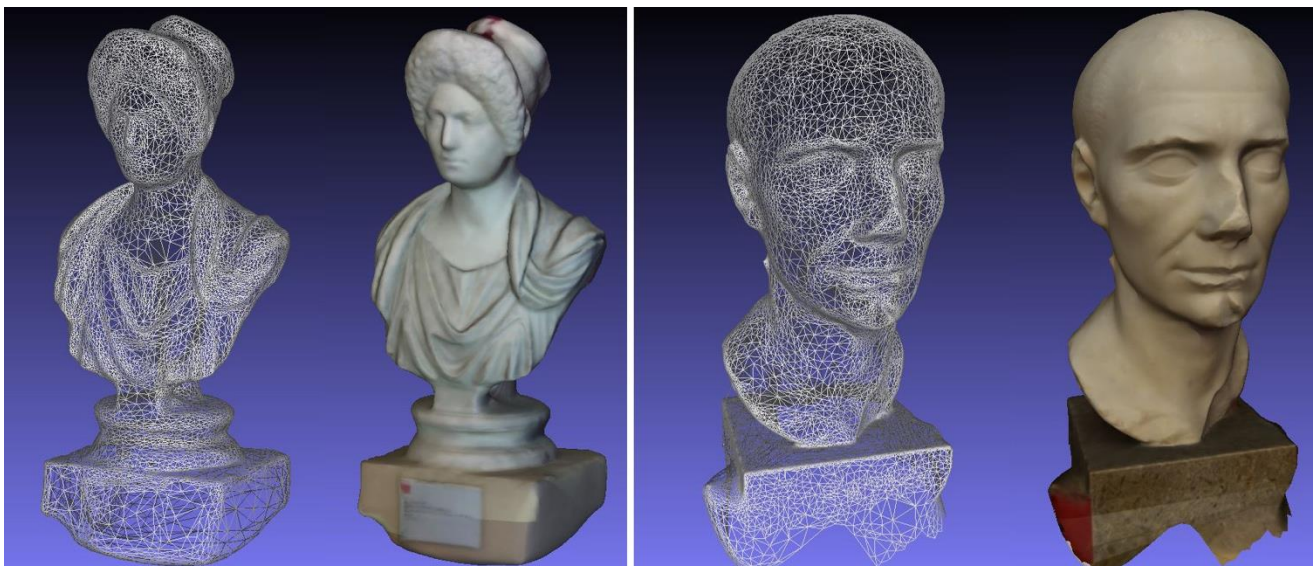


Fig. 6: 3D models obtained by data set made with cell camera.

The results of the questionnaire show that the students had a significant interest in the reconstruction of the artwork and all of them thought that making the 3D models freely available is fundamental to stimulate people to visit the museum. Many of the students affirm that the 3D model will never substitute the reality, nevertheless they recognize that 3D models are very useful to promote cultural heritage on the web and to investigate the artwork closer than in the museum.

### 3D #DigitalInvasions at Santa Venera al Pozzo park in Acicatena.

The second location was the 9 hectares state-owned archaeological and nature park of Santa Venera al Pozzo (fig.7) in Acicatena. This area was a Greek and Roman rural cult-centre, on which the remains of a Roman bath overlies a Greek sacred area, and a factory with kilns that produced brick, tiles and pottery (Amari, 2007, 2008). The area was used well into the late 19th century, is still a wonderful natural reserve with water springs, and plants, trees and flowers of Mediterranean scrub. A modern church, which is in use, is located a few metres east of the well where St. Venera was martyred.



Fig.7: the event leaflet and engineering class students at the end of the 3D digital invasion.

About thirty students from the Building Engineering-Architecture degree course, University of Catania, were involved. The event was planned among the activities of the Digital Drawing course as a practice exercise on Structure from Motion Techniques for 3D documentation of cultural heritage.

After a brief presentation of the archaeological area by the scholars and the architects that are currently work on this site, the students started to acquire their photo datasets of the Antiquarium artefacts and the monuments (thermal baths, cisterns, Santa Venera's church). Large scale buildings (fig. 8) were recorded with the difficulty given that many were obscured by a rich vegetation.





Fig. 8: view of the two buildings in the archaeological area.

The students carefully worked for about three hours in order to obtain at least one small object and one monument dataset. They used reflex, bridge and compact cameras with various images resolutions. Several problems linked to the specific features of the objects (too small, too big) arose during the acquisition. However, the 3D models obtained were of high quality except for the parts that were impossible to shoot from the ground.

In the figures below you can observe the buildings (fig. 9) and the artefact 3D models (fig. 10).



Fig. 9: 3D models of the thermal baths exterior and the second cistern both in textured and in wireframe mode.

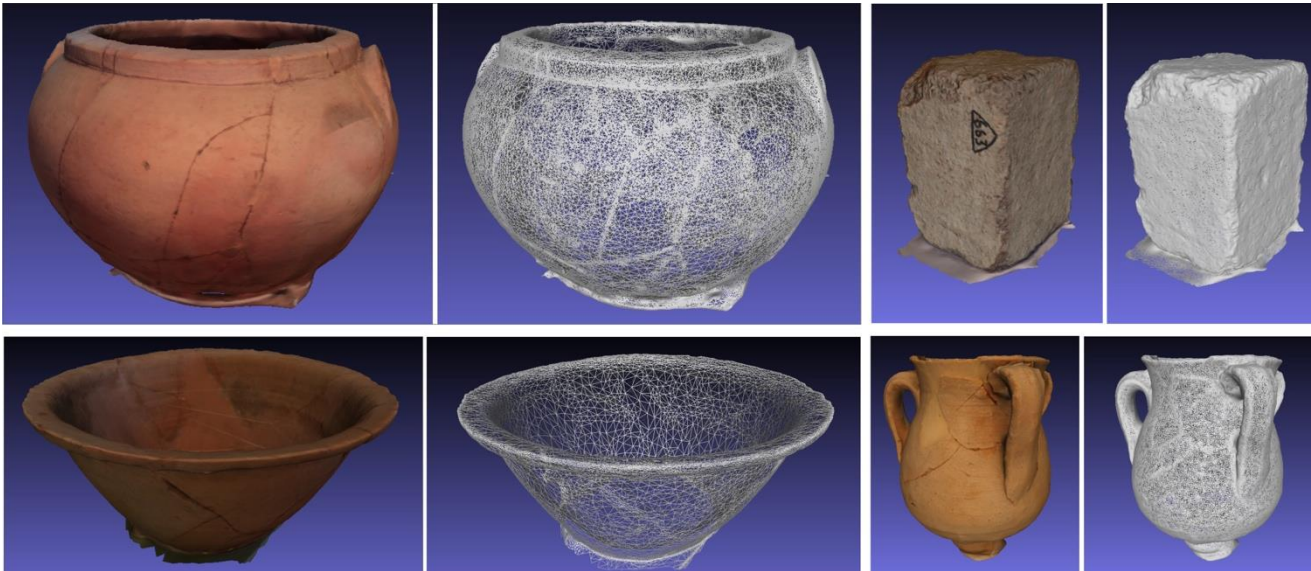


Fig. 10: 3D models of the artefacts both in textured and in wireframe mode.

Most of the students had an immersive and holistic experience in shooting and creating a 3D model of the chosen artwork, many of them critically approached the possibility given by 3D technologies for visits to the cultural site. For all of them this experience was particularly engaging and productive because for the first time in their lives they created cultural content during the visit to a museum.

### Conclusions.

With this bottom-up and didactic experiment of 3D acquisition, the #DigitalInvasions project in Sicily opens a new phase of the whole project which, according to the results produced, will be repeated on a larger scale.

In the light of the achieved results, we can confirm recent academic conclusions: “3D digital replicas of artifacts as more effective means to digitally preserve tangible cultural heritage, since 3D multi-visualization augments the perception of physical characteristics of the artifacts allowing a more embodied experience with these objects. Our experiments also suggest that multi-visualization (i.e., point cloud, mesh, and color information) helps the viewers to overcome their personal conceptualization of specific objects” (Galeazzi et al., 2015).

This bottom up experiment is the first step to demonstrate how a new technology is easy to access and to use, not only for professionals; to demonstrate how experiencing a cultural site is no longer passive but active, how knowledge is not only transmitted but also built, how the visitor is involved and able to produce their forms of art. That is why the regulations concerning the access and the reuse of the Cultural Heritage’s data should be simplified in order to encourage digitization and participation of people to the valorization of a nation’s cultural heritage.

## How to get involved in #InvasioniDigitali

Becoming a Digital Invader is easy, and fun. Go to [invasionidigitali.it](http://invasionidigitali.it) and subscribe to have access to your personal page on the site, here you can “build” the page of your invasion. We communicate the dates of the Invasioni Digitali event months before the beginning, so you have time to organize yours. When you are ready; spot a museum, an art venue, an archaeological site, a historic center, a square or any other place that you love and that you think has it has got a story to tell. Plan your invasion and be creative. Promote the invasion among friends: bloggers, people active on social media but also enthusiasts of art, travel and culture. Try to involve not only local people but also those who do not know you directly, social media is perfect for that. Spread the initiative through blogs, social media, press releases, but also contacting radio journalists and TV. As long as an invasion is planned we start promoting it through all our online and offline channels.

Now go and invade! During the invasion, you have the chance to tell your personal story, or feeling, about that place, in your unique way. Always use the tag #digitalinvasions, or #InvasioniDigitali for content in Italian, together with the specific hashtag of your invasion so as to enable those who follow you online not to miss a tweet/post/pin.

As we say in our Manifesto, we believe that the application of the new forms of communication and shared multimedia to the cultural heritage is a fundamental opportunity to boost the transformation of the cultural institutions into open platforms for the circulation, exchange and production of value, capable of ensuring an active communication with the public, and the fruition of cultural heritage free of geographic boundaries wherein the sharing and the model of open access will be the best formulas.

### The Authors

Elisa Bonacini, Sicilian Coordinator for Digital Invasions’ project; Department of Humanities, University of Catania; Euro-Mediterranean Institute of Science and Technology of Palermo (IEMEST). E-mail: [e\\_bonacini@hotmail.com](mailto:e_bonacini@hotmail.com), [elisa.bonacini@unict.it](mailto:elisa.bonacini@unict.it).

Laura Inzerillo, Department of Architecture, University of Palermo; Euro-Mediterranean Institute of Science and Technology of Palermo (IEMEST). E-mail: [laura.inzerillo@unipa.it](mailto:laura.inzerillo@unipa.it).

Marianna Marcucci, Vice-President of Digital Invasions Association. E-mail: [marianna@invasionidigitali.it](mailto:marianna@invasionidigitali.it)

Cettina Santagati, Department of Civil Engineering and Architecture, University of Catania; Euro-Mediterranean Institute of Science and Technology of Palermo (IEMEST). E-mail: [cettina.santagati@dau.unict.it](mailto:cettina.santagati@dau.unict.it).

Fabrizio Todisco, Designer of Digital Invasions’ project and President of Digital Invasions Association. E-mail: [info@invasionidigitali.it](mailto:info@invasionidigitali.it).

All the images are author's own.

### References

Amari, S. 2007. A late Roman pottery and brick factory in Sicily (Santa Venera al Pozzo). In S.Y. Waksman (ed.). *Archaeometric and Archaeological Approaches to Ceramics, EMAC '05, 8th European Meeting on Ancient Ceramics, Lyon 2005*. Oxford: BAR 1691. 121-128.

Amari, S. 2008. A Late Roman Amphorae Production in Eastern Sicily. In O. Menozzi, M.L. Di Marzio & D. Fossataro (eds). *SOMA 2005, Proceedings of the IX Symposium on Mediterranean Archaeology, Chieti (Italy), 24-26 February 2005*. Oxford: BAR 1739. 473-479.

Bonacini, E. 2014. *Dal Web alla App. Fruizione e valorizzazione digitale attraverso le nuove tecnologie e i social media*. Catania: Maimone.

Bonacini, E., Marcucci, M. and Todisco, F. 2014. #DIGITALINVASIONS. A bottom-up crowd example of cultural value co-creation. In S. Orlandi, R. Santucci, V. Casarosa & P.M. Liuzzo (eds). *Information Technologies for Epigraphy and Digital CH, Proceedings of the First EAGLE International Conference 2014, September 29-30-October 1 2014, Paris*. Sapienza Università Editrice: Roma. 265-284.

Jenkins, H. 2009. *Confronting the Challenges of Participatory Culture. Media Education for the 21<sup>st</sup> Century*. Cambridge-London: Massachusetts Institute of Technology.

Galeazzi F., Di Giuseppantonio Di Franco P., Matthews J.L. 2015. Comparing 2D pictures with 3D replicas for the digital preservation and analysis of tangible heritage. *Museum Management and Curatorship*.

Galizia M., Inzerillo L., Santagati C. 2015. Heritage and technology: novel approaches to 3D documentation and communication of architectural heritage. In C. Gambardella C. (ed). *HERITAGE and TECHNOLOGY Mind Knowledge Experience Le vie dei Mercanti XIII Forum Internazionale di Studi*. Napoli: La Scuola di Pitagora. 686-695.

Inzerillo L., Santagati C. 2013. Il progetto del rilievo nell'utilizzo di tecniche di modellazione dense stereo matching. *Disegnare Idee Immagini*. 47. 82-91.

Santagati C., Inzerillo L., Di Paola F. 2013. Image-based modeling techniques for architectural heritage 3d digitalization: limits and potentialities. *International Archives of Photogrammetry, Remote Sensing and Spatial and Information Sciences*, XL-5/W2. 550-560.

Symbola and Unioncamere. 2013. *Io sono cultura. L'Italia della qualità e della bellezza sfida la crisi*. Roma.