# CREATING NEW LINKS AMONG PLACES THROUGH VIRTUAL CULTURAL HERITAGE APPLICATIONS AND THEIR MULTIPLE RE-USE

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## ABSTRACT

The valorisation of the Italian cultural hotspots to enhance the tourism industry has always been at the heart of the local policies. Advanced computer applications can crucially contribute to this aim. In such a conceptual framework, an apparently "endless" series of ICT applications, sharing 3D assets, sprang into life in Bologna thanks to an Open Source background. The sequence of projects, that are going to be presented in the article, was initiated by the creation of the stereoscopic 3D medium-length movie "Apa the Etruscan". As an immediate consequence, four other projects have started, re-using some of the 3D models from "Apa ", and more are following.

Our experience proves that a non possessive stance towards ones own products, speeds up and optimises time and costs, improving different end-products. The continuous transfer of models, adapted to new requirements, speeds up the productions, allowing to focus more on aesthetics, without damaging neither the source project nor the recipient, and reaching the widest audience possible. The multiplication of references can be seen even in the short term as much more fruitful than creating expensive projects closed in themselves. The rapidity of development and the increasing quality of the final product allows, hence, a distribution able to reach an increasingly wider audience, bringing the promotion of cultural heritage to a newer and higher awareness.

## 1. INTRODUCTION

The valorisation of the Italian cultural hotspots to enhance the tourism industry has always been at the heart of the local policies. As stated by Francesco Antinucci (Antinucci, 2007), advanced computer applications can crucially contribute to this aim. In such a conceptual framework, an apparently "endless" series of ICT applications sprang into life in Bologna thanks to an Open Source background.

The sequence of projects, that are going to be presented in the article, was initiated by the creation of the stereoscopic 3D medium-length movie "Apa the Etruscan", on behalf of the recently opened Museum of the History of Bologna. The movie, integrating previous researches, is now giving birth to further realisations, always aimed at attracting and engaging new audience. The 3D models, created from scratch or as an evolution of previous applications, have been released as Open Data on the site of the Municipality of Bologna (http://dati.comune.bologna.it/3d). This choice can be considered as a sort of letter of intent about the desire to promote the re-use of 3D contents for new cultural creations. As an immediate consequence, four other projects have started, re-using some of the 3D models from "Apa the Etruscan":

- an archaeological narration in Machinima;
- an augmented reality application coupled to an on-line video game set in the Roman era and in the Middle Ages;
- an additional scene to be connected to the first part of "Apa the Etruscan" and to be show at the National Etruscan Museum of Villa Giulia in Rome, in order to explain something about the Roman Etruria;
- a project supporting the UNESCO candidacy of the network of porticoes of Bologna.

In all four cases, the goal is always to attract the attention of the public and visitors. The fourth project is particularly significant in this effort to virtuously recycling resources: the resources for the initiatives related to the Porticoes project, aimed at attracting new tourists, come from the tourist tax. The third project, combining the narration about northern and southern Etruria, opens a window between museums and territories. As Pascal Brackman says (Brackman, 2011), creating and multiplying links between places and events, allows, as on the web, to multiply the possibilities that people have to get in touch with these realities. Any set of references increases the visibility of the connected points; in our case the elements to be highlighted are the city of Bologna and its cultural resources.

The new links are also part of an effort to show what is already known, or little known, from new perspectives. The augmented reality project, for example, will allow citizens to discover parts of Bologna unknown to most people, such as the Roman remains buried beneath the road surface. At the same time, users themselves should be able to participate in a shared narrative. In the project about the Porticoes of Bologna as UNESCO Heritage, for example, the digital platform will collect and provide visitors with a virtual environment, geo-referencing whatever documentation is available about the porticoes; users would engage with the proposed contents and add their personalised ones (Guidazzoli, 2013; Apollonio et al., 2013).

Storytelling, gaming and wide participation (Anderson and Rainie, 2012), anything can converge towards the aim of raising the general level of attention to the many and beautiful cultural resources at our disposal.

## 2. "APA THE ETRUSCAN", AN OPEN EXPERIENCE

ICT solutions applied to Cultural Heritage can really improve the valorisation of local cultural hotspots (Bellotti et al., 2013). By adopting such an approach, the creation of links and the re-elaboration of digital resources become simpler and quicker. Engaging contents, designed for citizens and tourists, can be easily deployed. Projects

must not remain as isolated monads, but should become nodes in expanding networks. The experience started with the project "Apa the Etruscan" fits perfectly in this type of process (Fig. 1).



**Figure 1 "Apa the Etruscan": the main character inside the Bolognese Archaeological Museum.**

"Apa the Etruscan", a 15 minute stereoscopic 3D movie about the history of Bologna, was developed as an integrated part of the tour in the Museum of the History of Bologna (Boetto Cohen et al., 2011). While waiting for research results about the impact of the new generation of museums, including the Museum of the History of Bologna, it is currently possible to get a superficial yet effective overview of the opinions expressed by visitors on Tripadvisor.it. By October, 2013 - taking into account that the museum opened in late January 2012 - on 125 reviews available, 36 make explicit reference to "Apa", and all in positive terms.

The movie, consisting of 100 shots, about 20 locations, 380 blender files, 8500 textures and 1000 data files, was created by Cineca

with a production pipeline based on open source resources for more than 95%. This choice has stimulated the development of a fruitful approach which considers the re-use, and the intensive exploitation of produced assets, the best way to maximize results (Fig. 2).
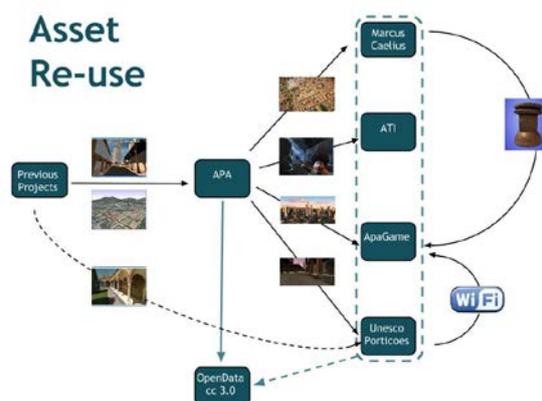


**Figure 2 Asset re-use in the "Apa" pipeline.**

The philosophy of "re-use" was adopted while the movie was still under development: from the beginning, the creation of a repository supported the collection of the already available assets and the new ones created from scratch. "Apa" itself had started from the re-use of elements coming from previously developed projects: a situation that headed to the definition of a specific production pipeline. The principle that drove us towards these choices and set aside the fear of the hypothetical harmful *déjà vu* effect is the certainty that single elements, when used in different contexts, can express other meanings and other cultural contents, eliminating the danger of repetition. Once the project was concluded, it seemed a natural consequence to make the 3D models available through the OpenData website of the Municipality of Bologna under a Creative Commons 3.0 cc-by-nc-sa license, asking users for attribution, sharing alike and non commercial use of the models (creativecommons.org/licenses/). In October 2013, among all data made available through the portal, one of the models produced for "Apa", related to the segment of porticoes reaching the basilica of St. Luke, was ranked 12th among the most popular con-

tents and other four 3D models, again from "Apa", were located from the 30th to the 33rd place.

The decision to release 3D models under Creative Commons license was also supported by a strong commitment to the Open Source vision. In particular, as we will see in the next pages, the adhesion to the community built around the Blender modelling software proved particularly fruitful, both for the excellent characteristics of the software and for the resources made available, even in this case, under various Creative Commons licenses.

## 3. PROMOTE LOCAL REALITIES THROUGH COMPUTER APPLICATIONS FOR CULTURAL HERITAGE: SOME EXAMPLES

### 3.1 Marcus Caelius, the value of memory

Even before the creation of the film "Apa" was over, some of its assets have been re-used in another project: "Marcus Caelius, the value of memory", realised by NoReal, upon suggestions by Cineca, on behalf of the Civic Archaeological Museum of Bologna (Bentini et al., 2012). "Marcus Caelius" is an experiment to assess the feasibility of creating a short educational film with Machinima technique and in an OpenSim environment (opensimulator.org). The goal is to be able to contain the costs of 3D productions by reducing at least the effort in the animation. Set in Roman Bologna in the Augustan era, it aims to highlight some findings pertaining to the collection of the Archaeological Museum by narrating the death of the Bolognese centurion Marcus Caelius in the Battle of the Teutoburg and his brother's decision to dedicate him a tombstone, currently preserved at the Museum of Bonn, Germany. The environments, set up in Open Sim, and the use of avatars, allow to "shoot" the scenes in real-time, directly in the multiverse. The story-telling gains a position of dominance with respect to the final aesthetic result. For this project, which will be shown at the Archaeological Museum of Bologna, some assets made for "Apa", such

as the procedural Roman Bologna, have been exploited. At the same time, assets made for this short film, such as various objects of daily use, have become part of the production pipeline of the video game "ApaGame", presented in this article.

Therefore, even before its conclusion, "Apa" had been already deeply involved in the philosophy of re-use in the framework of virtual cultural heritage applications: "Apa" had been taken advantage of researches and 3D models created by other projects and was now offering digital resources to another project commissioned by another museum. "Marcus Caelius" would have provided, in turn, 3D models to a new video game production aiming at the promotion of the city as a whole.

### 3.2 "Ati" and Southern Etruria

"Apa" has proved extremely fertile and, after less than a year, the production of its spin-off, "Ati", started (Delli Ponti et al., 2013). "Ati" aims to enhance the collections of the National Etruscan Museum of Villa Giulia in Rome, a city other than Bologna, but telling also of Bologna during Etruscan times. The movie has been conceived as a bridge between Bologna and Rome, between Northern and Southern Etruria, borrowing directly a few minutes from the "Apa" movie. At the end of the sequence narrating the Etruscan Bologna, the version for the Museum of Villa Giulia goes on driven by another character, "Ati", briefly narrating about Southern Etruria and the temple of Veii and taking a cue from some relics preserved in the Museum itself.

In this case, there is not a re-use of assets but, rather, the re-use of a rendered shot used as an introduction to something completely new. Even the narrator changes and, if on the one hand, this choice was inevitable after the death of the Bolognese singer Lucio Dalla, who had lent his voice to "Apa", on the other hand the creation of a customised mascot for the Roman museum is, obviously, a precious opportunity.

This kind of solutions for the dissemination and promotion of cultural hot spots

can also be successfully joined to merchandising activities. Moreover it is possible to foresee, in addition to the sale of a DVD, containing the 3D movie and its making-of, different gadgets such as "Ati"'s action figures in order to create not only economic outcomes, but also communication ones (Fig. 3).



**Figure 3** "**Ati**": **3D printing test for hypothetical merchandise.**

As for the Museum of Villa Giulia, despite its rich and wonderful collection, the number of visitors is still inadequate. Transforming the image of the museum in something more familiar and closer to common people, thanks to mascots and souvenirs, can pay dividends. Moreover, as we all know, the enormous wealth of Italian Cultural Heritage do not seem to have been adequately exploited yet (ISTAT, 2012) and this area of opportunity is ideal for flexible, cross-media ICT applications and, why not, can also give economic returns.

### 3.3 "ApaGame"

In the creation of the educational video game "ApaGame", developed by CINECA, CNR-ITABC and Fraunhofer Institute, there is a more intensive use of the assets deriving from "Apa the Etruscan".

Set in the Medieval era and in the Roman Bologna during the Augustan age, "Apagame" is a test-bed within the V-Must project (www.v-must.net) to assess the practicability of passing on to different platforms, such as on-line games and aug-

mented reality Mobile apps, assets born for being rendered (Fig. 4).



**Figure 4 "ApaGame": the Medieval market level (under construction).**

As for "Ati", the main character is a total novelty compared to "Apa" and largely relies upon the increasingly vast resources made available by the Blender community, such as those coming from Blender Cookie (http://cgcookie.com/blender/) or Blend Swap (http://www.blendswap.com/) and from the wide selection of avatars that, inside an Open perspective, can be customized according to the various needs (Fig. 5).



**Figure 5 "Ati": from the CookieFlexRig character to "Ati"**

The Medieval and Roman architectures used in the game are largely drawn from "Apa" (Fig. 6), while Roman objects relies upon some findings of the Archaeological Museum of Bologna reconstructed, as men-

tioned before, for the "Marcus Caelius" project.

"ApaGame" is designed as a small magnet for locals and tourists, transmitting, on the one hand, knowledge about the city and its daily life in the past and, on the other hand, trying to attract people to the nowadays city.



**Figure 6** "**ApaGame**": the Roman bridge level seen in Blender while setting the bounding boxes.

In particular, the Augmented Reality app will allow the viewers strolling in the center of Bologna to enjoy the view of historical overviews through their own mobile devices. Roman vestiges in Bologna are scarcely considered also by the citizens themselves, who are undoubtedly more familiar with the medieval city and with an urban landscape still strongly characterized by buildings pertaining to that era. The information about the city and its daily life in the two periods will be transmitted through various cross-references between the two platforms – on-line game and mobile app. The UNESCO Porticoes Project will offer an important contribution to the Mobile app, since it will provide free Wi-Fi areas along the extension of the porticoes in the city center.

### 3.4 The Porticoes Project for a UNESCO candidacy

The porticoes of Bologna are an excellent test for the potentialities of digital technologies. First of all, of course, they are architectural elements, reflecting an evolution lasting for a thousand years and they contain works of art, which are part of the city's heritage, and hundreds of plaques (ready to become hotspots!) telling the story of Bologna. Moreover, porticoes are a place for socialisation, trades, crafts, civil participation; they are a space for teenagers' social life, a meeting point for housewives, informal clubs for intellectuals. Porticoes are the generous nest for those relationships for which Bologna is famous in the world. To give an account of this vitality is the declared challenge of the project, launched by the Municipality of Bologna in support of the nomination proposal for the UNESCO's world heritage list. The Municipality will try to get the inclusion by asking the city to take on the project as a collective work. Not only professional work, then, but many volunteers (students of engineering and technical institutes, ICT enthusiasts, traders and craftsmen) will be called upon to contribute to the effort, while the independent associations will be offered virtual porticoes to stage their free expressiveness.

The project includes, in addition to an effective management and maintenance of the porticoes, the implementation of a Web based geographic platform. The platform will collect, display and deliver 3D models within historical and artistic data related to Bologna porticoes. This feature is useful to describe and promote the whole porticoes system.

The platform will be accessible through social platforms in order to allow users a direct participation by means of personal contents (photos, drawings, posts, etc..) and making available to a general public the updates from the Events section (Guidazzoli et al., 2013; Apollonio et al., 2013).

**Figure 7 X3DOM testing for the on-line 3rd Cloister of the Bolognese Monumental Cemetery linked to its database.**

The 3D models will partly come from the work done by students of the department of Architecture, University of Bologna, partly from previous projects, such as the Medieval Bologna from "Apa" and "Apa-Game" or the Virtual Museum of the Certosa (http://www. certosadibologna.it). The Virtual Museum of the Certosa, undertaken by Cineca always on behalf of the Municipality of Bologna, had already contributed to "Apa" with terrain models (DTM). Other 3D models will converge towards the porticoes platform from the work of high school students and volunteers that can contribute in compliance with a set of requirements. The 3D models will be navigable online in X3D and will be linked to fact sheets (Fig. 7).

## 4. CONCLUSIONS

The involvement of the general audience in a collective effort for the enhancement and preservation of cultural assets is an increasingly popular goal, as evidenced also by the CreativeCH project (http://www.creative-heritage.eu/). Our experience proves that a non possessive stance towards ones own products, speeds up and optimises time and costs, improving different end-products. In our case, the involvement of two institutions such as CINECA and CNR- ITABC, two museums (the Archaeological Museum and the Museum of the History of Bologna) and a local authority, in an on going collaboration that has been lasted for years, has allowed positive virtuous synergies that will now embrace even the National Etruscan Museum of Villa Giulia. Undergoing a first amendment, a previous work made by CNR-ITABC on Roman Bologna had become part of "Apa"; models that have been further re-used in "Marcus Caelius" and "ApaGame". Given the low budget availa-ble for the development of "Apa", for example, it would never have been possible to create a movie capable of getting many awards without starting from an important core of available assets. Similarly, if "Ati" had not had access to the resources of the Blender community, the time needed to create the main character would have been at least twice and required higher economic resources, jeopardizing the entire project.

The continuous transfer of models, adapted to new requirements, speeds up the productions, allowing to focus more on aesthetics, without damaging neither the source project nor the recipient, and reaching the widest audience possible. The desire to draw attention to their own contents should not close cultural institutions and local authorities in a jealous isolation. The multiplication of references can be seen even in the short term as much more effective than creating expensive projects closed in themselves. The rapidity of development and the increasing quality of the final product allows, hence, a distribution able to reach an increasingly wider audience, bringing the promotion of cultural heritage to a newer and higher awareness.

## 5. ACKNOWLEDGEMENT

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