

# Experience Etruria: a cross-media platform for e-culture and tourism

A. Guidazzoli<sup>1</sup> G. Bellavia<sup>1</sup> D. De Luca<sup>1</sup> M.C. Liguori<sup>1</sup> L. Castiello<sup>2</sup> and A. Pirrotti<sup>2</sup>

<sup>1</sup> VisitLab Cineca  
<sup>2</sup> Parrot Films

## Abstract

*Experience Etruria aims at promoting the Italian Latium, Tuscany and Umbria regions starting from their common Etruscan roots, their landscape and food and wine wonders. The project includes a web portal, a downloadable and printable map with 4 sensory routes, related to local food and Etruscan sites and museums, and an emotional video. The video merges Computer Graphics and real-life shootings, joining a trend that is spreading among the educational productions.*

Categories and Subject Descriptors (according to ACM CCS): [Human-centered computing]: Collaborative and social computing - Collaborative and social computing systems and tools - Open source software; [Computing methodologies]: Computer Graphics

## 1. Introduction

Thematic routes [PRS07] are, at present, touristic products aiming at the promotion of areas beneath unifying cultural and/or environmental themes. These paths can actually take advantage of already historically defined routes (such as the route of Santiago de Compostela), or can be defined from scratch, based on new ideas. These solutions are receiving attention at European level as well, as evidenced by the CERTESS project - Cultural European Routes (<http://certess.culture-routes.lu/>). Moreover, thematic routes are a perfect opportunity for the promotion of sites and areas. As stated by Pascal Brackman [Bral1], the creation and multiplication of links between places and events enables a concurrent multiplication of the possibilities that people have to get in touch with these realities and, similarly to the web, each set of references increases the visibility of the connected points [GLFP13]. In this context is placed the Experience Etruria project that, starting from their common Etruscan roots, aims to unite the landscape and food and wine wonders of Latium, Tuscany and Umbria regions. The project, conceived by the Superintendency of Archaeology of Southern Etruria and Lazio, involved 17 municipalities in the area, and entrusted to VisitLab Cineca the construction of a cross-media platform, including a web portal ([www.experiencetruria.it](http://www.experiencetruria.it)), a downloadable map with 4 sensory routes related to local food and Etruscan sites and museums and an emotional video.

## 2. Multisensory Territorial Marketing

Presented on September 23 at Expo 2015, Experience Etruria was immediately considered as a successful experience. The project

saw the joint effort of 17 municipalities belonging to 3 different regions under the guidance of the Superintendency of Archaeology of Southern Etruria and Lazio and three leading municipalities - Viterbo, Chiusi and Orvieto. This teamwork allowed the funding of a project that would otherwise have been too expensive for individual local authorities, which contributed in proportion to the number of their inhabitants. As for the project development, Expe-



**Figure 1:** A still from *Experience Etruria: Ati at the Etruscan banquet closing the movie*

rience Etruria was built around a Web portal. Powered by Cineca, the portal introduces the 4 multi-sensory routes inspired by food resources related to the Etruscan period - wheat and oil, wine and salt, water and woods. An interactive map presents the towns and their wonders, the four routes, exhibitions and sensory experiences. A printable version of the map can be downloaded. The portal hosts also a 20 minute video, presenting the routes from an archaeological point of view, a video teaser and two slightly different trailers.

The main character of the video is Ati, the Etruscan maiden already protagonist of "Ati discovering Veii", a popular 3D cartoon created in 2014 for the exhibition "The Etruscans and the afterlife" (<http://glietruschielaldila.it/>) [GDPDL\*13].

The video created for Experience Etruria merges Computer Graphics and real-life shootings, joining a trend that is spreading among the educational productions and that, in a creative eclecticism, is harvesting different production techniques.

### 3. Eclectic documentaries

Nowadays, historical documentaries rely upon very different techniques in order to both engage the interest of the spectators and keep the production costs at an affordable level. In Italy there are several interesting examples, often driven by small local realities working autonomously for promoting their territory, such as the crowd-funded "Sunrise at Janas", by Muvis and Renderingstudio (<http://www.associazionemuvis.org/en/>), in CG and live action shooting, that brings to life legends of the region of Sardinia. Instead, "MARTA tells. Hidden treasures's virtual stories", in CG and live action, is a commissioned and scientifically based project on behalf of the Archaeological Museum of Taranto and dedicated to the Roman necropoleis of the area ([https://www.youtube.com/watch?v=S5\\_G6uq8gIE](https://www.youtube.com/watch?v=S5_G6uq8gIE)). The movie "Marche: Land of Magic", made by Rainbow for the promotion of the region Marche at EXPO2010, had moved already in 2010 in this direction (<https://www.youtube.com/watch?v=-XZ9g0Zg0qQ>). Their famous Winx characters, modeled in a 3D version, lead the viewer into some live action shootings presenting some characteristic places of the region. This mix is particularly well exploited when, besides trying to highlight the beauty of the landscape, perfectly conveyed by live action, you may want to promote also cultural aspects, where a virtual reconstruction may aptly contribute to its presentation, such as with archaeological contexts. While not fully taking advantage of this possibility, this is the ratio that was placed at the base of the Experience Etruria movie.

### 4. Constraints as a creative opportunity: directing Experience Etruria

The video for Experience Etruria was conceived as an emotional journey through historical sites and beautiful landscapes thanks to a balanced mix of live shootings via drones, indoor/outdoor shootings on a tripod or flycam - in order to avert a monotonous visual result - and the animated character of Ati. The necessity to stick to the client's requirements, namely, the realization of a video promoting a territory with a multitude of well-defined locations set within the boundaries of the scientific guidelines given by cultural experts, defined an interesting challenge. At the same time, however, there was complete freedom in choosing the type of shooting, in how to present the places and, finally, how and where to place Ati, the 3D character, in the documentary.

The project sprouts from the website platform ([www.experiencetruria.it](http://www.experiencetruria.it)), characterised by a precise visual identity, a logo, and a presentation of the territory divided into four routes: water, wine and salt, oil and wheat and the woods, each one defined by its own identifying logo and a detailed historical and evocative description. Each one of these aspects had

to be presented in the video, which had to cover a promotional communication role, on the one hand, and an emotional-evocative one, on the other. A precise directorial choice made the video and the web platform as a perfectly coordinated ensemble, with the four thematic routes dictating the storyboard as well as the narration delivered through Ati's voice. In this way the video became a sort of animated version of the Web site.

The video shootings were condensed in an 8 day intensive session in mid 2015 with over 50 different locations to be recorded - from museums to rugged and wild necropoleis - scattered in a stretch of land 150 km long. Due to the tight schedule, shootings took place in any weather condition and from sunrise to sunset. As part of a scientific work, the shootings received a continuous support by archaeologists who selected the sites of interest and the objects to be recreated in CG. Some problems, such as cornfields not yet ripe, hazelnut plantations without hazelnuts and vineyards with nonexistent grapes, were solved in CG, with hazelnuts and grapes modeled in 3D and set inside the live action shooting, or in some lucky turn of the events, as for the cornfield, suddenly turned in a golden sea by the low incidence of light at sunset. For the shots that would have hosted the CG character different actions were taken keeping in mind what kind of interaction Ati would have had within the real world (movements of the character as a descent of stairs, movements of leaves, rippling water, collecting items or fruits). We opted for a light, non-invasive CG presence, just to show Ati performing simple actions or admiring sites and archaeological finds, as a common visitor.

Music was entrusted with the delicate role of supporting the entire video system. The choice fell upon extracts taken from 14 open source tracks and the selection was guided by the four thematic paths creating four themes: introspective and spiritual (water), easy-going / dreamy (wine / salt pan at sunset), solar (oil / wheat), magical (woods). The final result presents intermingling rhythms with a strong emotional charge that help the viewer to live the multi-sensory experience in a surround mode.

### 5. Shooting and Editing

Shooting and editing phases were necessarily carried out together, as a consequence of the animation style chosen. Camera operators had to stand shoulder to shoulder with the CG artist and study together the solutions in every shot. The shooting car was provided with modular cases containing two Canon DSLR, six lenses, a fully equipped drone, tripods, stabilizers, audio recorders, microphones and various accessories suitable for quick set ups. Of the two cameramen, one used a flycam stabilizer equipped with a wide angle lens and the other one used a tripod interchanging a fixed 50mm focal length and a zoom lens. Later, this setup allowed to merge still and close-up images with steadycam shots in a dynamic way. Very low diaphragm value (wide aperture) lenses were fundamental while shooting in low light conditions, such as in Etruscan tombs or museums.

Whenever the virtual character had to interact with the scene some tricks were adopted. For example, in a scene where Ati collects a bunch of grapes from a tree branch, the branch moves in a realistic way thanks to a thin rope tied to it, pulled and released at the right time during the shot and removed in the editing phase. Aerial shots were performed by a hexacopter, a six motor drone al-

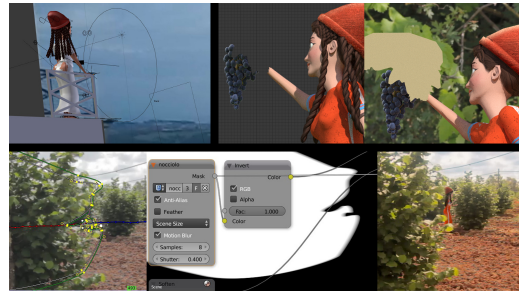
lowing more stability and better resistance to the wind. The drone was equipped with a Naza M-V2 flight controller and a three axis gimbal which held and moved the camera while flying. The electronically stabilized gimbal allowed a smooth reverse movement opposite to the hexacopter natural vibrations, in order to get the steadiest image possible. The drone featured remote video transmission to a 7" screen, monitored by the director. Every day four batteries, powering 15 minutes of flight time each, were used. We had two different GoPro cameras: a standard GoPro fisheye lens, very good for panoramic shots although requiring barrel correction in post-production; a 35mm-like giving better close-up possibilities. Installing a new lens on a GoPro was part of the preparation of the project (lenses by <http://www.peauproductions.com/>). Following the director's guidelines, the large amount of the material collected was organised in four different sections, one for each thematic route. The clips were cut on music for a dynamic flow. For the clips too shaky and calling for a digital stabilization, manual adjustments and careful choice of the auto-stabilization method were needed clip by clip. Finally, color correction was applied to boost all the emotional shots, such as the sunset on the salt pan, or to correct light and saturation where they didn't match the overall style. The ending title music was composed on purpose rather than taking a royalty free tune, to better drive into the conclusion the feelings and emotions arising from the whole movie.

## 6. Computer Graphics

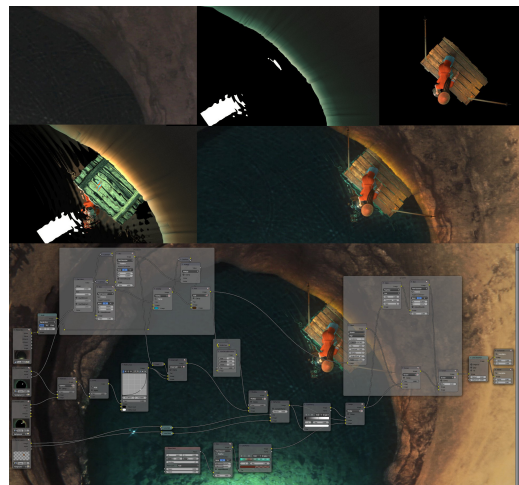
The computer graphics 3D elaboration was mainly grounded on Blender (<https://www.blender.org/>). For a correct integration of 3D elements into real footage we had to do: motion tracking; undistortion; creation of the 3D elements of the scene; integration with the compositing and masking tools; and, if needed, stabilization of our final shot. Every shot involving Ati was imported into the movie editor bundled with the software and precached into RAM to work flawlessly even with a 4k resolution. For the motion tracking, once inputted the camera sensor information and the lens parameters (<http://vfxcamdb.com/>), we automatically searched for feature points on the footage and calculated them, deleted the incorrect and incomplete trackings and refined the most imprecise points in order to contain the reprojection solving error (average distance between reconstructed 3D position of tracks projected back to footage and original position of tracks) in a range between 0.0 and 3.0. We managed to have from 3-10 points with a Location-Rotation motion model for tripod scenes that doesn't have 3D information to reconstruct, to a maximum of 30-40 Perspective or Affine points, notwithstanding 8 is the minimum number that Blender accepts in order to solve the 3D camera, for the most difficult shots, as for the GoPro fisheye ones, that suffer of extreme distortion. A massive feature point placement and error free tracking is functional also for a correct undistorted matrix calculation (see: <https://cloud.blender.org/p/track-match-blend/>; <https://cloud.blender.org/p/track-match-2/>). The distortion compensation was an unavoidable phase, since Blender render engine provides a classical perspective camera with straight parallel lines, that mismatch any real footage because a minimum lens distortion is always present. Blender, with the solving process, returns also the  $k_1, k_2, k_3$  distortion factors, allowing us to live show the undistorted footage from the DLSR in the movie editor and

work into the 3D scene with it. On the contrary, the GoPro fisheye footages were undistorted into the composition phase, after the 3D insertion, because the undistortion process was too destructive and mismatched the Blender perspective camera. So, to match correctly the fisheye footage with the 3D geometry, we decided to use a panoramic distorted camera that ships with the most recent Blender releases. For both motion tracking and undistortion process, a continuous exchange of lens information and focal aperture (e.g. 50mm 1.4f or 24mm 2.8f) with the videographers was crucial to allow Blender to generate correct results.

Some peculiar scenes needed a much more complex re-



**Figure 2:** Masking examples with: 3d modeled railing, reconstructed foliage elements, 2d tracked animated masks



**Figure 3:** Real footage, 3d elements, foreground rendering, reflection rendering, composited rendering, compositing nodetree

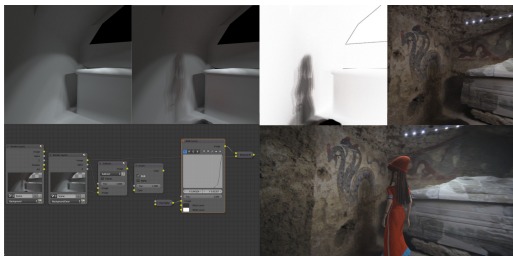
construction involving various techniques, such as photogrammetry, classical geometric modeling or the placement of masking planes to hide some footage imperfection or better integrate our character (for some suggestions: <https://cloud.blender.org/p/tears-of-steel/>) (Fig. 2). We inserted our character and a plane-shaped surface that represents the ground and catches the character's shadows. The 3D scene was then aligned with the motion tracking geometry reconstruction tools, by defining the floor geometry using 3 feature points from the footage. In some cases the geometry was animated

or morphed to better match the footage.

The most delicate stage of the insertion of the mesh in the tracked scene is the creation of shadows and global illumination that has to guarantee a credible effect. To achieve this goal we placed 3D lamps that follow the light condition of the corresponding footage and we created meshes mimicking the natural shadows over our character (e.g. from trees and clouds). To better blend and tonemap the 3D elements we also used, when needed, an equirectangular map as a world background light. Besides the integrated shots merging live-shootings and CGI, the prologue was mostly computer generated, involving the character walking into a tomb characterised by an heavy amount of polygons and 4k textures. For the reconstruction scene were used 3 different quality level tombs, the less defined one for the b/w imagery, the second one is identical but used as a stencil mask for the transformation and the most detailed one for the colourful final tomb.

The merging of 2D and 3D passed through the compositing process with compositing nodes (Fig. 3). In every footage integration we calculated the shadows by enabling two renderlayers where we respectively enabled the total 3D geometry and just the 3D geometries set to receive shadows without the objects generating them. By subtracting those two renderlayers we had our negative shadows that could be inverted and added to the final render. Tonemapping and color correction were used to integrate the character, but also to match the shadow intensity and color (Fig. 4). Into the composition, after the insertion of the character and the light, we also undistorted and linearized our GoPro fisheye shots for whom we calculated the coefficients in the tracking process. To enforce the integration with the live shots of the closing scene, completely in CG, we composited into it a lot of flares and several lens aberration, such as distortion, grain and chromatic errors.

When in need to clean the shot with a stabilization process we



**Figure 4:** 3d elements, shadow calculation, extrapolation and merge, compositing nodetree with the subtract technique, composited rendering

recycled some already good tracked points to define a stabilization location, usually taking some fixed element on the background. With another fixed point we could also compensate the scale and the rotation. To apply the stabilization process we added the compositing node (*Stabilize 2D*) to our nodetree.

## 7. Conclusions and future perspectives

Several key factors have been taken into account during the design and implementation of the Experience Etruria project: open framework and open pipeline, cross-media approach, capacity of digital

assets re-use, including the main character Ati, philological accuracy together with the attention to storytelling for edutainment purposes. The results achieved so far, after the launch of the platform in May 2015, are encouraging. The website has registered more than 450.000 accesses for the first 10 months and even gained e-Content Award 2015 Italy for the section e-Culture and Tourism. Moreover, the project has been presented as an example of good practices at the European Parliament for its ability of successfully involve 3 Italian regions and 17 different city councils.

The challenge is both to increase the number of tourists and visitors of the Etruscan area and its sites and to reach new and different audiences, besides those who are routinely involved with classical territorial promotion activities. [Bol14]. In order to engage and enrich artistic and cultural experiences, a step forward with respect to the mere presentation of local beauties, the public must become source of the action. See, for example, the activities designed to promote a participatory candidacy for UNESCO World Heritage of the Bologna porticoes system (<http://www.comune.bologna.it/portici/>). After a phase of *reach*, that is, once the contact with the audience has occurred, it is possible to move on to *engage* it, which may also include the activation of virtual communities that operate, for example, by sharing and personalising contents (as, for example, through social tagging activities). Social sustainability and innovation are two cornerstones of "Creative Europe" projects [BW12], but economic sustainability is not to be overlooked, and economic development must be part of the aims of audience development and territorial marketing. The involvement of a broad audience, connected to local economic realities thus enables the activation of a sustainability mechanism. Therefore, the next steps in the Experience Etruria project should head towards an open platform, to host and share contents ensued from people both as tourists and visitors and as economic local stakeholders; social and communitarian inputs that could lead to an increased involvement of people, on one side, and improved visibility of the territory.

## References

- [BW12] BRAMFORD A., WIMMER M.: EENC short report on audience building and the future creative Europe program. EENC (2011). 4
- [Bol14] BOLLO A.: 50 sfumature di pubblico e la sfida dell'audience development. In *I pubblici della cultura. Audience development, audience engagement* (2014), di Biase F., (Ed.), Franco Angeli, Milano. 4
- [Bra11] BRACKMAN P.: Talk. In *NOKIA-UNESCO Roundtable on Heritage, Tourism, and Sustainability, 14 to 15 March 2011* (2011), UNESCO, Paris. 1
- [GDPDL\*13] GUIDAZZOLI A., DELLI PONTI F., DE LUCA D., IMBODEN S., LIGUORI M. C.: 3D computer graphics short movies for communicating cultural heritage. an open source pipeline. In *Proceeding of 2013 Digital Heritage International Congress, 28 Oct – 1 Nov 2013 Marseille, France* (2013), Alonzo C. Addison Livio De Luca G. G. S. P., (Ed.), vol. II, pp. 325–328. 2
- [GLFP13] GUIDAZZOLI A., LIGUORI M. C., FELICORI M., PESCARIN S.: Creating new links among places through virtual cultural heritage applications and their multiple re-use. In *Mediterranean Archaeology and Archaeometry* (2013), vol. 14, pp. 17–24. 1
- [PRS07] PUCZKO L., RATZ T., SMITH M.: Old city, new image: Perception, positioning and promotion of Budapest. In *Journal of Travel & Tourism Marketing* (2007), vol. 22, pp. 21–34. 1