



DIGITAL STORYTELLING

AND CULTURAL HERITAGE:

STAKES AND OPPORTUNITIES



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edited by

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for the reuse
of cultural resources”

texts by

Julien Brouillard
& Claire Loucopoulos,
Dédale (France)

Barbara Dierickx,
Packed (Belgium)

AthenaPlus

general coordinator
Simonetta Buttò

AthenaPlus

technical coordinator
Maria Teresa Natale

design

mt milani,
geo graphic sdf

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Foreword

One of the aims of the AthenaPlus project has been to experiment with enriched metadata their re-use adapted for users with different needs (tourists, schools, scholars) by means of tools that support the development of virtual exhibitions, tourist and didactic applications and digital storytelling.

This booklet is dedicated to digital storytelling.

During the project life-cycle, an overview of existing tools and applications that may serve as examples for the development of the creative applications for the (re)use of digital cultural heritage content has been produced.

*The Report on existing tools and devices related to narrative approaches and requirements functionalities** was composed of three parts: it started off with a theoretical introduction to the concept of narrative and digital storytelling, then it was followed by an overview of common features for data, tools and supports that are needed in the realisation of digital stories, and ended

* <http://www.athenaplus.eu/getFile.php?id=178>

with an overview of relevant components that might be implemented in the online AthenaPlus application environment.

Starting from the results of the above mentioned report, this booklet intends to inform cultural institutions on stakes and opportunities given by digital storytelling.

The first three chapters are devoted to explain what digital storytelling is, and to inform about tools, devices and services in this field. Finally, recommendations are given to GLAMs willing to implement digital storytelling projects as well as technical guidelines for the implementation of digital storytelling projects.

Simonetta Buttò

AthenaPlus Project Coordinator

Introduction

In recent years, cultural heritage stakeholders have launched major digitisation plans for cultural objects, mainly starting out of concern for the objects' long-term preservation and storage.

The issues of access to the digital objects have only become apparent later on, by working on indexing of the digital assets and the definition of interoperability standards for the databases in which these assets were held. Today, digital cultural heritage stakeholders have to embrace ICT to ensure cultural content attractiveness through the creation of innovative digital cultural services, based on rich and edited contents.

The multimedia technologies offer much more than a media support to be economically exploited. They bring a new system of exchange, solidarity, educational and division (sharing) of the knowledge of the French, European and world cultural heritage.¹

Developing innovative access to digital cultural heritage is a real challenge for the heritage sector, which allows, besides valorisation of cultural heritage and development of new approaches and mediation tools for the audience, new forms of relations (between researchers, amateurs, audiences and works) through interactive new forms of documentation and debates, but also development of new forms of shared heritage. Digital storytelling is a creative way to favour access to digital cultural heritage throughout Europe and beyond to a wide public, contributing to transnational circulation of European heritage and knowledge dissemination.

1. Digital storytelling: definition and stakes

a. Definition

Digital society has opened new opportunities to tell stories, offering new tools and environments for expression, increased by the development of social networking and mobile applications. Digital storytelling is relatively a new term and refers to the use of digital tools to tell stories. It can be seen as the modern way of telling stories, combining multimedia features: the Digital Storytelling Association describes it as *the modern expression of ancient art of storytelling*.

It emerged as a practice in the early 1990s, with a series of workshops organised by the American Film Institute in Los Angeles. The first examples were video productions linked to personal stories, and evolved to interactive forms. Storytelling with digital tools dates back to the early days of personal computers and first networks. Early work on hypertext explored new ways of creating and experiencing narrative, often nonlinear and media-rich. Individual hypertext pieces offered new forms of co-creation, in which a reader would help to form the story by

shaping a path through it. As the web grew, storytelling approaches combined hypertext with rich media and user-generated content. Stories are open-ended, branching, hyper-linked, cross-media, participatory, exploratory and unpredictable, moving from the traditional conventions of storytelling. Digital storytelling is rapidly evolving, fostering innovation and creativity, while revealing new directions for narratives to flow.

b. An enriched space visit

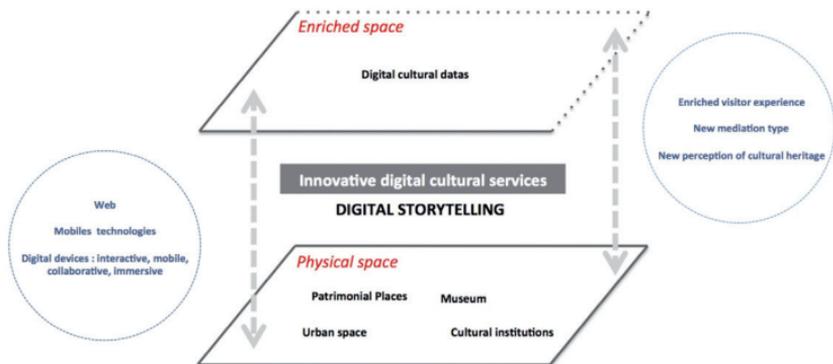
Mobile and locative media, new editing forms, collaborative tools, transmedia and immersive experiences and projects using artificial intelligence have infiltrated our cities, our everyday life as well as our heritage and cultural activities.

Smartphones, which have come to be real everyday life tools, offer mobile access to web content, but also to innovative services providing augmented reality or mixing social networks and geolocation (e.g. Foursquare).

The use of online services in mobility (located social networks, cultural and touristic guides, apps for sharing photos or videos...) is a strong component of Europe and North America, structuring public space and creating a merging, even a synthesis, between a digital and a physical space, giving body to an enriched space.

The physical space in this particular context consists of the general urban space and the galleries, libraries, archives and museums (the so-called 'GLAM' sector).

The 'enriched space' can be seen as an informational continuum, in which the user is dealing with a set of devices (ambient networks², communicating objects³, close field communication⁴...), aiming at enriching his visit experience.



Information and communication technologies in mobility contribute to change the relation to time and space, influencing individual and collective behaviours, and changing deeply the mediation, perception, and use of cultural data.

c. **Changed relationship with the heritage object and the managing body**

Whether the visit relates to a museum, a heritage site or an artwork in the public space, usually we can identify three timeframes in the access to cultural heritage on site: before, during and after the visit.

These three moments are now accompanied by ICT, which allows articulating the physical and virtual visit in a relevant way, preparing and enriching it in situ or a posteriori. But tools and services dedicated to digital storytelling tend in parallel to erase this border, making it more permeable.

Thus, the visitor enters the museum even before entering it physically, and can interact with other visitors or with the institution itself.

The visitor-user enters a connected environment in which the museum or heritage object is put into narratives through several digital devices (smartphones, tablets, touchscreens, multimedia guides, portable game devices) creating narrative realms.

This erasure of the border between digital and physical world, produced by virtual visits, social networks and the use of web services in mobility is a first modification element of the

relationship maintained between the audience and the heritage object. Digital mediation thus gets conceived beyond the physical space of the visit (before, during and after the visit) and makes use of several mediation means (Internet, mobile, physical space).

Digital storytelling as a form of digital mediation of cultural heritage allows to increase a monumental or museographic space, and to enrich the visitors' experience cycle by offering them new action and participation capacities. Managers of digital cultural heritage have to tackle these changes in order to (continue to) provide original and innovative services, able to guarantee cultural data attractiveness over time.

d. Redesigning heritage mediation thanks to digital storytelling

Tools and services for digital storytelling provide the opportunity to redesign mediation and promotion of heritage digital data in order to:

- attract the public giving it the opportunity to discover an original and rich offer;
- establish a link with the future visitor and strengthen relationships with continuous exchanges;
- provide all the necessary elements to the visit preparation;
- enable the visitor to experience cultural objects through a rich user experience, to immerse himself/herself in contents, a place, a work;
- explain, complete, make understandable a topic, a subject, or a work;
- personalise the visit making it participatory and playful;
- collect opinions and feedback on the experiences;
- create a visit context facilitating interaction with content offer, with other visitors and with professionals;
- create a narrative realm to support the emergence of users communities, to keep contact, to enrich and extend the visit.

e. **Specific application fields: education, cultural mediation, tourism**

Digital storytelling is used in a wide range of fields, from environment, health, sciences to culture and humanities... When studying digital storytelling applied to cultural heritage, three main application fields are identified: education, cultural mediation and tourism.

Education

Several researchers and professionals from the educational sector compare the process of composing a story to the process of learning, as a way of creating meaning. Research has shown that the use of multimedia in teaching helps students retain new information as well as aids in the comprehension of difficult material. Digital storytelling can provide educators with a powerful tool to use in their classrooms⁵. Storytelling offers the possibility of delivering new ways of learning and teaching in the formal learning institutions, but also through informal ways through cultural and heritage sectors. By a sensitive experimentation with the contents, it offers wide access to information and knowledge, in a user-friendly way and the opportunity provided by some tools, for collaboration on the increase of content.

Digital storytelling can also be a powerful tool for students who are taught to create their own stories. After viewing exemplary digital stories created by their teachers or

other story developers, students may be given assignments in which they are first asked to research a topic and then choose a particular point of view. This type of activity can generate interest, attention and motivation for the “digital generation” students in today’s classrooms. The process can capitalize on the creative talents of students as they begin to research and tell stories of their own, as they learn to use the library and the Internet to research rich, deep content while analyzing and synthesizing a wide range of content. In addition, students who participate in the creation of digital stories may develop enhanced communications skills by learning to organize their ideas, ask questions, express opinions, and construct narratives. It also can help students as they learn to create stories for an audience, and present their ideas and knowledge in an individual and meaningful way⁶.

Among some educational goals for digital storytelling, we can identify the following⁷:

- To integrate multimedia into the curriculum
- To increase global participation, collaboration and communication skills
- To make difficult concepts more understandable
- To promote 21st century skills: information and visual literacies, global awareness, communication and technology literacy.

Cultural mediation for cultural institutions and territories

The development of new technologies exposes cultural institutions to critical

perspectives on their collections, the engagement of new audiences and the creation of new publics. They experiment with new ways to make their collections more engaging for visitors; among them, digital storytelling has a great potential for engaging visitors with museums exhibitions and collections.

Nowadays, the focus in museums is shifting towards the use of artefacts for providing an interactive experience to visitors, in contrast to the traditional museum approach, whereby the focus was on the collection, display and storage of objects. Hence, more people are increasingly visiting museums with the expectation to learn something, while having an entertaining experience. Digital technologies, in particular interactive storytelling, have a great potential for assisting both the education and entertainment of visitors in museums, and to enhance the interaction between the visitor and his/her surroundings⁸.

Tourism

Digital storytelling also enables the creation of new relationships with the audience in the field of tourism. The growing competition among tourism destinations, the diversity of tourism suppliers, and the sophistication of the tourism demand bring new challenges to competitiveness, making it a more dynamic and ongoing process.

The tourism field exploits the potential offered by digital storytelling, taking into account specificities, such as the fact that the visitor can follow a number of different trajectories (of time, space and theme) through the monument, and can freely switch trajectories. Cultural heritage is an important component of tourist destinations, and can be strongly valorised thanks to digital storytelling. As for cultural mediation, it enables to engage audiences, and also to make them learn in a playful way things about the place they visit.

On the other hand, digital storytelling has also offered great opportunities for tourists to tell their travel stories, thanks to the development of cheaper, accessible and easily produced and distributed tools. Sites become and remain meaningful in part because of the tourist stories: representations of place that the interaction between tourist industries, tourists and inhabitants construct⁹.

In his now classic essay on tourism, Urry [1990, 2002] shows that people travel to have experiences they cannot have in any other way. It can be used for marketing applications (which will not be explored here), but also for valorisation of cultural heritage and sites.

2. Data, tools and devices for digital storytelling

a. Using digital data

Digital cultural heritage data refers to the set of heritage resources, objects, documents, digitised or born-digital, coming from cultural heritage actors (cultural and heritage institutions, national and private museums, libraries, archives, research laboratories, assignees...). The digitisation process, which is the process of transformation of original-analogue material into digital form, has been accompanied by the setup of standards and open standards ensuring accessibility, interoperability and reusability of these digital data. Open IPR, Open Access and On-going Support are the most important considerations for a potential user of a standard. These standards support different kinds of metadata, a concept which can be defined as a *structured information about any kind of resource, which is used to identify, describe, manage or give access to that resource*¹⁰.

Digital storytelling implies a creative use of this metadata, and the setup of specific descriptors, adapted to narrative applications. Integrating digital (meta)data into a (meaningful) narrative is possible

thanks to the setup of innovative indexing processes proposing a sensitive dimension, thematic descriptors and an affiliation to a specific use scenario. Digital data have to be enriched by “classical” metadata (objective metadata such as information on author, date, file type...) and metadata said “subjective” (free tags allowing to describe content with a sensitive approach)¹¹, adapted to digital storytelling and that can be qualified as “narratives metadata”, allowing new ways of editorialising content. An indispensable component in making meaningful connections between information sets is making use of an ontology. Ontologies formally represent knowledge as a set of concepts within a domain (e.g. cultural heritage) and the relationships between pairs of concepts¹².

An elaborated digital data indexing process and the use of an API (Application Programming Interface) allow the setting up of an intelligent digital content aggregation. Enriched digital cultural data can be aggregated and re-arranged in order to propose a new original piece of content, combining heterogeneous sources. The concept of intelligent aggregation refers to an elaborated indexing work, to identification of the source and to the (partial) automation of data harvesting tasks. It enables interconnecting institutional data, user generated content or other types of open data and relies on two indexing levels:

- A collaborative and decentralised indexing realised by data users themselves (e.g. collaborative tagging of the content)

- A centralised indexing, set up according to a predefined classification and realised by contents providers and service editors.

Using an API it is possible to harvest, via metadata, a set of content to edit it in an editorialised form and to propose a panel of functionalities (sharing, personalisation, data co-creation).

Making data 'open' fosters the continuous development of services dedicated to digital storytelling. Open data are published in a structured and methodological way, enabling their reuse with limited or even without technical, legal or financial restriction, in the framework of innovative digital cultural services¹³. The opportunities offered by the open data movement are reinforced by the web of data (Linked data) emergence, aiming at creating an environment favouring structured data publication on the web. Thus, the web becomes not a simple juxtaposition of pages anymore, but a set of databases linked together thanks to the use of web standards (http, URI...), making them accessible to human browsing, but above all machine-readable, allowing automatic information sharing between engines.

b. Tools for digital storytelling implementation

Putting digital cultural data into narratives requires specific tools for data indexing, structuring, media processing, editing, enrichment and publication on several digital devices. These tools can be both web and desktop applications (free or paying softwares). They provide a set of functionalities dedicated to editing multimedia content: images, sound and video in different formats.

i) Managing digital resources & unlocking through API

The implementation of a digital storytelling project requires the implementation of a system which is capable of managing digital collections. This can be a combination of a Digital Asset Management system (DAM) and a Collection Management System (CMS), or a hybrid system which (partly) combines functionalities of these two types. A DAM system is specialised in the storage and distribution of digital objects in different resolutions and formats so that they can be used by other applications. A Collection Management System (CMS) is a system which is used to create and store descriptive and administrative metadata about the objects in the collection. It sometimes offers basic capabilities for managing digital objects. Examples of open source Collection Management systems are Omeka¹⁴ and Collective Access¹⁵. These systems exchange data with client applications (websites, web applications, mobile app: platform

for sharing photos or videos, interactive mapping...) through APIs.

Apart from the data coming from these systems other (cultural heritage) data sources can be used to query for additional data. One example of such a service is the Europeana API.

ii) **Creating rich interactive documents: web documentary**

A renewed style of documentary, the so-called 'web documentary', is a new way of content editing, belonging mostly to the world of journalism but also offering great possibilities for integrating heritage content into a narrative. The creation of non-linear interactive videos, or of a rich media web environment such as a web documentary, traditionally consists of two main steps: the elaboration of video units, thanks to an editing software (such as Final Cut Pro⁶, Adobe Premiere Pro⁷) and a development work, in order to produce the web reading interface. This process remains quite heavy and is equivalent to a complete website realisation, around an important number of pages and audiovisual documents.

The needs linked to the strong growth of this kind of web product have given rise to new tools which remove the web coding step. These are web documentary publishers, which, as CMS for websites, enable the creation of an interactive multimedia story and its publication online. Narrative realms of web documentary type need to create

a multiple entries story; the editing tools must thus propose an arborescent management of the video units, enabling to offer several stages of choice to users in an arborescent scenario. Examples of such tools for web documentary editing are Klynt¹⁸ and Storyplanet¹⁹.

iii) **Content editing linked to a place: geolocation**

Cartography interfaces and mobile geolocated media offer important possibilities for digital storytelling, and also create new needs for tools. These have to enable the creation of interactive maps, to organise content on a digital territory or to publish geocoded contents live thanks to mobile devices.

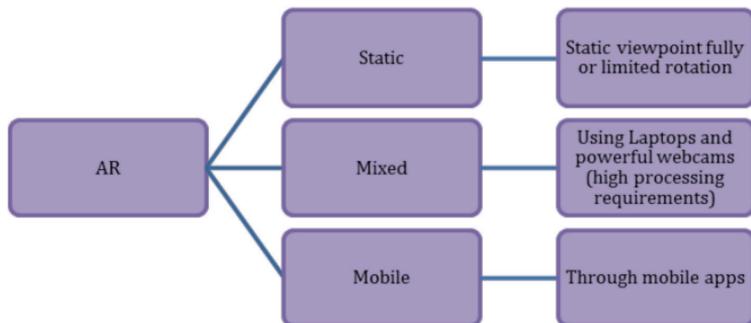
Digital cartography has undergone an important development in recent years and many web services publishers propose adapted tools integrating basic functionalities for the creation of interactive maps: creation of points of interest, drawing of outlines or forms, import and export of files containing geolocated markers²⁰, choice of the map background, layers creation, HTML markers integration enabling the publication of exportable players. Regarding geolocation, digital storytelling also requires the possibility to make users interact live during a visit. General public geolocated blogging tools can be used 'outside' of their prescribed use to enable visitors' live contribution, to record their path thanks to GPS tracking, and to associate media (video, pictures, personal texts).

iv) **Augmented reality**

Advances in technology, innovation and the application of creativity and artistic approaches offer new opportunities for heritage and tourism. One of the latest technologies, which offer great opportunities for the cultural sector, is Augmented Reality, which allows mixing real and virtual worlds²¹.

Augmented reality (AR) is a live, direct or indirect, view of a physical, real-world environment whose elements are augmented (or supplemented) by computer-generated sensory input such as sound, video, graphics or GPS data. [...] With the help of advanced AR technology (e.g. adding computer vision and object recognition) the information about the surrounding real world of the user becomes interactive and digitally manipulable. Artificial information about the environment and its objects can be overlaid on the real world²².

There are three main technological scenarios in which augmented reality can be presented to a user:



Static devices

Static devices display a real-time environment with additional multimedia information. In this example²³ augmented reality tourist binoculars with multimedia content (also known as virtual viewpoint) recall the concept of traditional telescopes at sites with panoramic views. In this case the visual information that is captured by the video camera is increased (improved) with texts showing information related to the points of interest that exist in the area.

Figure 1.
The spectator is looking at a landscape through binoculars containing augmented reality content



Mixed solutions

This solution requires, at least, a computer (laptop) and a powerful webcam. In this example of ARducation - Augmented Reality history assignments²⁴, a webcam identifies images (QR codes, signs, etc.) and displays on the screen information, 3D models or videos. This kind of solution doesn't use geo-location potential possibilities, just increases the information received by the user.

Figure 2.
*Using analog
cards containing
QR codes
to render
augmented
reality on
screen*



Mobile applications

Combining augmented reality technologies and mobile devices is one of the most promising combinations for the use of AR in cultural heritage. This allows the user to improve their cultural heritage visits and live experiences, interacting with virtual enriched geo-located content in real time and real places. The devices used to run these apps could be smartphones or tablets with 3G/4G and GPS.

Even if we can already find some successful and powerful AR mobile apps for cultural heritage and tourism, generally, the current applications are quite simple. The existing examples display geo-located information, with no remarkable interaction, if any. Mainly, they offer services on tourist information, a route planner and audio guide.

In the coming years we expect the development of innovative apps using all

this technological potential. As Shelley Mannion, Digital Learning Programmes Manager at The British Museum stated: *As a technology platform and interaction style, AR is still in its infancy. Many applications are mere proof-of-concept rather than robust solutions integrated into museums' existing programmes and interpretative strategies. But this does not diminish its potential for creating engaging and meaningful experiences for visitors. AR may have been overhyped to begin with but we are now entering a more serious phase during which its usefulness will become evident.*²⁵

Augmented reality & archaeology

One of the fields where the application of AR technologies will have a huge impact on visitors' quality of experience are archaeological sites. Visitors to archaeological sites must make a great effort of imagination to recreate the look of a site that is currently in ruins. With the emergence of augmented reality technologies the visitor will have a valuable tool to help the imagination. Using a mobile device with such technologies, users will be able to see the ruins as if the original constructions were still right there.

Figure 3.
An ancient building comes back to life by virtually displaying it over the current location of its ruin²⁶



v) Producing virtual and digital exhibitions

The realisation of virtual²⁷ and digital exhibitions²⁸ requires the use of dedicated applications, of content management systems integrating functionalities for integrating digital cultural objects into narratives, or for digital re-building of heritage or places. The needs linked to digital storytelling in this field are the following:

- To create an interface to make accessible on the web a work, a collection or the modelling of a place;
- To link together disparate resources thanks to a common treatment (editing work), according to a given subject, a topic, a period, an event...;
- To aggregate sources of external data;
- To give users all the necessary tools to read 2D, 3D images, as well as text or sound documents;

- To enrich the exhibition thanks to a dynamic update system.

For virtual/digital exhibitions, the level of sophistication varies a lot and tools have to be adapted to the complexity of the narrative. A simple web page suite promoting online an exhibition occurring in a real place of visit is not a digital storytelling project and does not require any particular functionality. The creation of a more elaborated project integrating interactive videos, content aggregation, translation or multilingual research functionalities, comment tools or interactive timeline requires the use of a specific tool.

c. Digital devices for digital storytelling implementation

Although the available number and type of devices with access to the Internet has increased, the majority of access to digital contents is still happening through a personal computer, which remains the main referring device. It is about in particular portable screens (variable screen size) with network connection, able to process and exchange data. These devices such as smartphones, digital tablet computers, laptops and micro PCs, digital readers, connected TV or intelligent street furniture, enable a continuity of use and access to content wherever you are. Smartphones and tablets host components and functionalities on which interactive content publishers can rely to create digital storytelling services:

- Cellular data and wifi connection enable these devices to remain connected; whether thanks to a wireless connection in public, private, professional space, or thanks to itinerant network of mobile telephony.
- The integrated compass able to detect magnetic North, used in geolocation based applications.
- The Global Positioning System (GPS), enables device geolocation by satellite at world level, navigation and data location. It also enables the device to inform EXIF64 metadata for a given image or sound file.

- The accelerometer, enabling the device to define its orientation in relation to the ground. It is used to calculate the device angle of inclination and detect its intensity and type of movement.
- Video camera and picture camera, enabling video recording in high definition formats, but also to superimpose information layers to the pictures filmed in real time for augmented reality applications.
- The mobile applications, distributed on a dedicated downloading space. They are applicative software developed to be installed on a device and a specific exploitation system.

3. Digital storytelling services for users

This table analysis presents a classification of the digital storytelling services based on the user experience type. The situation or use environment in which is the user have been given priority to define the type of digital storytelling service.

The observed elements are the followings:

- Interactive supports and access conditions
- Man-agent interfaces
- Functionalities and technical performances
- Mediation forms
- Nature of the content presented

Digital storytelling

Keywords:
digital content

Ways of creating a narrative, using digital tools (online and offline) editing and dissemination capacities, to create an enriched narrative process thanks to multimedia resources (pictures, texts, videos, 3D...)

Interactive digital storytelling (IDS)

Keywords:

hypertextual narration, nonlinear narrative, interactive stories, rich media, new forms of editorialization, virtual exhibitions

Type of digital story in which the reader-user can influence the narrative and its evolution in real time. The user is able to interact with the story content. The interactive story is non-linear, and re-combined permanently, according to the user's actions and preferences. Interactive digital storytelling enables to navigate, through a dedicated user interface, in a rich set of editorialised digital content.

Collaborative storytelling

Keywords:

web 2.0, user-generated content, content haring, social network

Digital storytelling type, based on a participatory model, in which user has the necessary tools to create and put into narrative his own contents.

Mobile / Locative storytelling

Keywords:

mobile devices, locative medias, GPS, real places, urban space, mobile social network, interactive mapping

Digital storytelling type, based on the use of mobile digital devices (tablets, smartphones), of their components (GPS, compass, accelerometer, data connection, camera) and functionalities (mobile applications). This type of narrative is essentially based on territorial anchorage (with multimedia content geolocation) and social networks enabling individual or collective exchanges linked to a real place.

Transmedia storytelling

Keywords:
responsive design, user experience, UX design

Digital storytelling type aiming at developing the narrative on several devices, presenting complementary uses specificities and technological capacities: PC, laptop, tablet, smartphone, TV, interactive scenography, multitouch screen, etc. The transmedia approach enables to create a continuity of uses around content with adapted design, and to immerse the user in an original narrative universe.

Immersive storytelling

Keywords:
augmented reality, mixed reality, video games, Alternate Reality Games (ARG)

Digital storytelling type based on a blurring of borders between fiction and reality. The putting into narrative is operated continuously and puts the user in a particular situation, in which the difference between the story told and the experienced reality becomes more and more tenuous. The narrative universe defines the experience in which the user is immersed.

Generative storytelling

Keywords:
artificial intelligence, data base, metadata, data

Generative storytelling relies on the analysis of a given situation to generate a story from pre-established rules and digital data organised and indexed inside a database. Computer programming and the creation of algorithm enable the gathering of digital data in real time, according to pre-defined rules. The form of the story is not determined in advance and is generated autonomously. It is based on a computer treatment using artificial intelligence notion, able to interpret the user behaviour or a set of raw data information. The rendering can be through text (generative novel), fixed pictures (digital design, data visualisation) or video (generative movies).

4. Recommendations

a. Recommendations for cultural institutions willing to implement digital storytelling projects to enhance their cultural heritage content.

i) Cultural heritage mediation – New mediation forms based on digital storytelling potential

Digital storytelling enables new mediation forms for cultural heritage:

➤ **Promote cultural heritage on every day life**

With mobile technologies every day life and the real world become two powerful elements to tell stories. We have to build storytelling projects from this observation, design innovative devices which accompany the visitor in his daily life. Project promoters have to be able to reach and to interest the general public beyond the museum space, out of the cultural place.

- **Create an enriched visit space as a new learning environment**
Create location-based stories: public space is a privileged environment for learning and cultural heritage mediation. Using the city as a new learning environment enables to ensure the promotion and valorisation of knowledge and culture.
- **Support the visitor before, during and after the visit**
Enrich the visitor's experience cycle by offering him new action and participation capacities at every time of his visit.
- **Make stories interactive and enable users to interact with the story content**
Interactive digital storytelling allows to create a new type of story in which the reader-user can influence the narrative and its evolution in real time. The story must be nonlinear and re-combined permanently according to the user's actions and preferences.
- **Combine several devices to develop a transmedia narrative universe**
It means developing projects based on several medias, presenting complementary uses specificities and technological capacities: PC, laptop, tablet, smartphone, TV, interactive scenography, multitouch screen, etc. The transmedia approach will enable to create a continuity of uses around content with adapted design, and

to immerse the user in an original narrative universe.

➤ **Strengthen the story by creating an immersive experience**

Set up a narrative process based on a blurring of borders between fiction and reality in order to create an immersive experience. In this new type of mediation, storytelling is operated continuously and puts the user in a particular situation, in which the difference between the story told and the experienced reality becomes more and more tenuous.

ii) **Strategic issues and positioning – Strategic watch on innovation, emerging technologies and key trends**

Digital storytelling projects are based on ICT devices, evolving very quickly. When designing a digital storytelling project, it is key to make a strategic and prospective watch on emerging technologies and future trends to make sure it is innovative and relevant.

➤ **Stimulate cultural heritage mediation with augmented reality devices**

Today with mobile devices and tomorrow with a user equipped with glass or contact lens.

➤ **Make stories more contextual**

Image geolocation-based services inside buildings: indoor GPS, inside geolocated guide.

- **Give users the opportunity to create their own stories**
Users can combine existing content or create new one (images, video...) to tell stories. Users can write stories based on personal experience of heritage or personal testimony in link with historical event or specific topic.
- **Development of innovative Human-Machine Interfaces (HMI)**
Offer to users new types of interaction to read and write stories with all human body. These interfaces are now tangible, multimodal using sensor (with contactless technologies), nanotechnologies, or intelligent textiles.
- **Encourage immersion into the past**
Create digital environments based on cultural heritage contents: immersive devices and 3D movies allow telling stories giving life to historical site or figure.
- **Be in line with social web and semantic web convergence**
The so-called Web 3.0 fosters the convergence between reference metadata bases (main institutional actors: Europeana, BNF, INA...) and folksonomy (integrating social networks and collaborative tagging). This is the opportunity to create specific metadata to driven storytelling and original apps based on users' work of tagging.

- **Open up to new opportunities of diffusion, partnership and funding**
New channels of production, edition and diffusion (new digital writing forms, new editorialisation forms, web doc, transmedia, connected TV...) change and expand the development of storytelling projects

iii) **Data and metadata – Creation and management of data and metadata dedicated to storytelling**

Data and metadata are at the core of digital storytelling projects: a particular attention has to be paid to their creation and management.

- **Exploit the narrative potential of cultural data**
Cultural data are by their nature narrative foundations. They represent an important vector of storytelling because they bear historical values, sociological representations, which could be used in narrative process to touch user. These contents shall be as a positive resonance between his own knowledge, the common culture and the story which is told.
- **Promote the reuse, editorialisation and enrichment of existing contents by using aggregation process**
 - Set up an elaborated digital data indexing process and the use of an API (Application Programming Interface) to allow the setting up

of an intelligent digital content aggregation. Enriched digital cultural data can be aggregated and re-arranged in order to propose a new original piece of content, combining heterogeneous sources.

- Interconnect institutional data, user-generated content or other types of open data.
- Use API to make possible the harvesting, via metadata, of a set of content to edit it in an editorialised form and to propose a panel of functionalities (sharing, personalisation, data co-creation).

➤ **Create indexing process dedicated to narratives combinations of digital resources.**

Set up of specific descriptors, adapted to narrative applications. Integrating digital (meta)data into a (meaningful) narrative is possible thanks to the setup of innovative indexing processes proposing a sensitive dimension, thematic descriptors and an affiliation to a specific use scenario.

➤ **Create storytelling services based on a participatory model**

It means developing services in which the user has the necessary tools to create and put into narrative his/her own contents. This kind of User-generated content should allow to increase attractiveness of the cultural

content through social networking,
content sharing...

➤ **Base your storytelling project on collaborative data indexing**

It means to exploit the important potential of the “folksonomy” (collaborative system of informal data structuration) to create services through the valorisation of the overabundance of information and content on the web.

➤ **Experiment the possibilities of artificial intelligence to edit content and to tell stories**

The building of analysis model of a given situation is a very interesting way to generate original and interactive stories. It implies to pre-define rules of editing and to set up a database with organised and indexed digital content. It especially means to have an important computer programming work through the creation of algorithms to enable the gathering of digital data in real time, according to these predefined rules.

iv) **Tool kit – Efficient tools to manage advanced storytelling**

Numerous tools are available to manage storytelling projects. They have to be chosen according to the type of project developed, the needs and its technical requirements.

➤ **Choose adapted solutions of digital resources management**

Choose adapted tools in link to the aimed storytelling project, from the simple web pages organisation to the management content stream or the monitoring of content combining rules, including creation of virtual exhibition.

Choose tools able to answer to current requirements for creating a digital storytelling project (Web documentary, content linked to a place / geolocation, augmented reality, virtual and digital exhibitions):

- Easy creation of interactive and enriched documents;
- Digital asset management;
- Use of API;
- Distribution of content on several applications;
- Possibilities to link data with space through interactive cartography;
- Creation of digital exhibitions with specific needs.

➤ **Use all the potential of mobile technologies to create locative storytelling**

The use of mobile digital devices (tablets, smartphones), of their components (GPS, compass, accelerometer, data connection, camera) and functionalities (mobile applications) allows to produce a

narrative type essentially based on territorial anchorage (with multimedia content geolocation) and social networks enabling individual or collective exchanges linked to a real place.

- **Use existing services and technologies when possible**
Current web services propose exportable players, embed codes or other free CSS style which could be edited and customized to create mashups. Connect your storytelling project to content sharing platform or data visualization interface in order to experiment use scenario before a real implementation and heavy developments.

v) **Project methodology – Think like a laboratory to design your storytelling services**

The Living Lab approach is a relevant methodology for digital storytelling project.

- **Develop an integrated methodology for site-specific intervention**
As we said your project must take part in real world, in every day life, and this is a key factor of success. Thus it is very important to take into account local issues, resources and populations to lead your action.

You need to develop a site-specific approach and a specific methodology:

- Needs definition and site exploration: watch, analysis, shared diagnosis for compiling knowledge database on a specific site.
- Stimulating creativity by transdisciplinarity and users' involvement: co-creation between users and producers.
- Involvement in research projects.
- Site specific experimentations with community of users (workshops, creative residencies, participatory actions).
- Evaluation with users and producers.

► **Encourage the users' involvement**

More interactivity and participation within your storytelling project means more involvement of all the stakeholders and particularly users. Projects and services which are designed answer to users' needs and requests. You need to produce a collaborative work with creatives, experts, designers, researchers, professionals, and specific partners in connection with users.

This process is made possible through the definition of target users' communities (young and professional artists, students, cultural tourists, professionals of urban planning, experts, local authorities, inhabitants, employees of cultural institution...), and to a strong work of mobilisation

to involve stakeholders and users, permanently carried out on the ground.

It is important to propose a combination of tools to encourage users' involvement: blogs and social networks, collaborative map, video and photo sharing platforms, barcamps, calls for ideas and for participation. All activities (services design, workshops, demonstration in public space, public experimentations) involve users in the innovation chain, not only for testing phase, although there is a range of different modalities of engagement in different projects.

vi) **IPR management – Ask the good questions at the right time**

- ▶ **Develop an IPR policy openness oriented and supported by a specific reflection on IPR management, accessibility and reuse of the data**
If your digital storytelling project integrates existing contents you have to be careful on the terms of reuse and diffusion. This implies documentation on Creative Commons licences and other free licences. You have to lead an on-going reflection on IPR questions and new legal forms, particularly in the framework of innovative digital projects (technologic mashup, composite services, collaborative work).

- **Bring together specific skills to answer to new right issues**
Think about the implementation of expert committees, gathering lawyers, representatives from cultural institutions, new media specialists, professionals of media and audiovisual archives.

vii) **Communication / Dissemination – Create public interest and keep your project alive**

- **Find the best way to present your storytelling project**
The term “digital storytelling” means several type of project, different forms of mediation, it uses various technologies and requires to clarify all of this to be very communicating. From virtual exhibition to mobile application, storytelling refers to a large range of projects and manner to tell digital stories: stories are open-ended, branching, hyper-linked, cross-media, participatory, exploratory... This is the reason why we have to use a basic common vocabulary and typology to label our projects (detail of the typology in section 3.1).
- **Create and animate user communities around narrative processes**
The aim is to improve the attractiveness of cultural heritage contents and to delegate a part of this work to users. It means to create

digital environments in which users could re-appropriate contents, and even more cultural places, museums, collections, exhibitions, events... In the same way, stories based on cultural heritage contents should also be supported by users that should be ambassadors of a narrative project through simple actions of sharing, commentaries writing...

b. Technical recommendations for implementing a digital storytelling project

Based on the survey work achieved in the *AthenaPlus Report on existing tools and devices related to narrative approaches and requirements functionalities*²⁹, the following emerging and current recommendations for the creation of a digital narrative project can be highlighted:

- Successful narrative results can only be attained when starting from a proper digital asset management system, which is transparent in use to the user (e.g. story creator) but also to the content contributing institution (uploading the digital material users may work with);
- The system should also allow to work with the same digital content on different devices, in different languages and with the possibility to satisfy the needs of different kind of users (generic, schools, researchers);
- The system should make use of the possibilities provided by the advent of devices which are always connected and the emergence of web services (APIs) provided by digital asset and collection management systems.
- An integration of external data sources (already available on the web) and the content contained in the digital asset or collection management system must be possible, in order to enrich the uploaded content and/or make links to a personal information stream (e.g. Facebook profile);

- Investigate the possibility to use Europeana as one of the main sources of such external data, thereby exploring the functionalities Linked Open Data offers;
- The use of GIS should be encouraged so that interactive cartography or maps can become part of the narrative story;
- Editing tools should be available in order to treat the digital content in such a way that a coherent story or unit of meaning (e.g. exhibition) can be created by an editor (e.g. general user, professional curator, ...);
- These tools should allow editing also of the separate content pieces – which might be 2D as well as text or sound documents;
- An ontology builder should be implemented as a way of meaningfully structuring the contents. The ontology in use could be an existing one, or it could be built from scratch using the keywords that fit the theme or context of the story that the user wants to develop;
- In the case of narration on mobile devices, the user should be able to interact with the content of the story by simply changing and adjusting his/her trajectory and / or behaviour.

In general, the main challenge is to create tools for the structuring and reuse of this important volume of data and metadata from users, sensitive and collaborative, giving a new vision of museum collections, digital heritage objects, art works... in order to personalize the user experience, engagement and participation.

Endnotes

- 1 Aubin, Sophie, *The digitalization of the cultural heritage*, Conservatory of Arts and Crafts, on 2003.
- 2 The ambient networks represent an environment allowing users to easily access rich and varied services through one or several wireless networks (WIFI, WIFI hot spots, 3G and 4G networks, Bluetooth communication). These networks furnishing a global connectivity are completely transparent and do not reveal a set of features accessible by a single person, on a transparent way.
- 3 Communicating devices or objects are the components of the Internet of Things which refers to uniquely identifiable objects and their virtual representations in an Internet-like structure. Internet of Things is based on the use of technologies as QR Codes or RFID (Radio-frequency identification).
- 4 Near field communication (NFC) is a set of standards for smartphones and similar devices to establish radio communication with each other by touching them together or bringing them into proximity, usually no more than a few inches. Wikipedia : http://en.wikipedia.org/wiki/Near_field_communication.
- 5 See <http://digitalstorytelling.coe.uh.edu/page.cfm?id=27&cid=27&sublinkid=30>
- 6 See <http://digitalstorytelling.coe.uh.edu/page.cfm?id=27&cid=27&sublinkid=30>
- 7 Fran Kompar, Greenwich Public Schools Library Media and Technology Program Curriculum Framework, available at http://www.greenwickschools.org/uploaded/district/Board_of_Education/meeting_materials/2008-09_meetings/1-22-09_meeting/1-22-09_MediaCurrRevWll.pdf
- 8 Interactive Storytelling and Gaming Environments for Museums: The Interactive Storytelling Exhibition Project.

Michael Danks, Marc Goodchild, Karina Rodriguez-Echavarría, David B. Arnold, and Richard Griffiths; CMIS, University of Brighton, Moulsecoomb, Brighton, United Kingdom (2007), available at <http://barmonger.org/speciale/Referencer/Interactive%20Storytelling%20and%20Gaming%20Environments%20for%20Museums%20%20The%20Interactive%20Storytelling%20Exhibition%20Project.pdf>

- 9 Destination Services: Tourist media and networked places; Goodman, Elizabeth, UC Berkeley, 2007
- 10 In: *Digitisation: Standards landscape for European museums, archives, libraries*, edited by ATHENA WP3 Working Group "Identify standards and developing recommendations", 2009, available at <http://www.athenaeurope.org/getFile.php?id=435>
- 11 Subjective metadata are a different level of indexing, with word, tags in free fields (as indexation of content on Vimeo). We specify "subjective" because these tags allow to create story thanks to indexing and assembling rules
- 12 Definition source: Wikipedia, [http://en.wikipedia.org/wiki/Ontology_\(information_science\)](http://en.wikipedia.org/wiki/Ontology_(information_science)). An ontology can be described as 'meta-metadata'; it brings structure to the level above the 'general' metadata describing an object
- 13 It should be noted that 'Open Data' does not necessarily imply that the data is always free – as in gratis – or that they might be used for any envisaged purpose. The information that is disclosed through the European Union Open Data Portal (see <http://open-data.europa.eu/en/about>) is free to use and reuse for commercial or noncommercial purposes. Other data may only be used for example when attribution is given, or results of the data use are also shared as open information. See <http://opendatahandbook.org/en/what-is-open-data/>
- 14 See <http://omeka.org/about/>
- 15 See <http://www.collectiveaccess.org>
- 16 Video editing software edited by Apple, <http://www.apple.com/fr/finalcutpro/>
- 17 Video editing software edited by Adobe, <http://www.adobe.com/fr/products/premiere.html>
- 18 Klynt application, <http://www.klynt.net>

- 19 Storyplanet application, <https://www.storyplanet.com/index>
- 20 kml or kmz files, http://en.wikipedia.org/wiki/Keyhole_Markup_Language
- 21 The last editions of Museum & the Web event have been the main selected event to showcase and present the latest news on that sector http://www.museumsandtheweb.com/paper_keywords/augmented_reality_o. See also: INDICATE project, *Handbook on virtual exhibitions and virtual performances*, Version 1.0 (August 2012), <http://www.indicate-project.org/getFile.php?id=412> (in particular 3.3.5)
- 22 Source: Wikipedia http://en.wikipedia.org/wiki/Augmented_reality
- 23 See <http://www.themovie.org/es/15/16/prismaticos-turisticos-realidad-aumentada.html>
- 24 See http://www.youtube.com/watch?v=Ulij99gYQgM&feature=player_embedded
- 25 See <http://www.museum-id.com/idea-detail.asp?id=336>
- 26 See <http://arqueologiacomputacional.blogspot.com.es/2012/04/realidad-aumentada.html>
- 27 “Virtual exhibitions: to be used mainly in the case of 3D reconstructions in which there is actually also a virtualization environment in which the works are located”: INDICATE project, *Handbook on virtual exhibitions and virtual performances*, Version 1.0 (August 2012), <http://www.indicate-project.org/getFile.php?id=412>
- 28 “Digital exhibitions: the object is not faced with any kind of reconstruction, the work of art is approached “individually”, included in a “path” that performs logical combination of materials based on different criteria: subject, author, time, technicalities, ...”. INDICATE project, *Handbook on virtual exhibitions and virtual performances*, Version 1.0 (August 2012), <http://www.indicate-project.org/getFile.php?id=412>. For the definition of ‘Digital Exhibition’, see also the Linked Heritage working group on Digital Exhibitions: “A Digital Exhibition is based on a clear concept and is well curated. It assembles, interlinks and disseminates digital multimedia objects in order to deliver innovative presentations of a theme, or series of themes, allowing user interaction to a great extent.” [2013], <http://www.digitalexhibitions.org/>
- 29 <http://www.athenaplus.eu/getFile.php?id=178>

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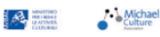
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THE AIM OF THIS BOOKLET IS TO INFORM CULTURAL INSTITUTIONS ON STAKES AND OPPORTUNITIES GIVEN BY DIGITAL STORYTELLING AND ANSWER TO THEIR DOUBTS.



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