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Authors (organisation)	Barbara Dierickx (PACKED vzw), Julien Brouillard & Claire Loucopoulos (Dédale)
Contributors (organisation)	Joris Janssens (PACKED vzw), Mercè Lopèz (i2cat), Dov Winer (Digital Heritage)
Reviewers (organisation)	Maria Teresa Natale (ICCU)

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This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

Project Coordinator: Istituto centrale per il catalogo unico delle biblioteche italiane
Address : Viale Castro Pretorio 105 – 00185 Roma
Phone number : +3906 06 49210 425
E-mail : info@athenaplus.eu
Project WEB site address : <http://www.athenaplus.eu>

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1 EXECUTIVE SUMMARY

This deliverable, coordinated by Dédale and PACKED, provides 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 that will be developed in the AthenaPlus WP5.

The report is composed of three parts: it starts off with a theoretical introduction to the concept of narrative and digital storytelling. This is followed by an overview of common features for data, tools and supports that are needed in the realisation of digital stories, and ends with an overview of relevant components that might be implemented in the online AthenaPlus application environment.

The results of this deliverable will directly inform task and deliverable D5.3 First release of the AthenaPlus tools, foreseen in month 11. A second version of this deliverable will be released after the project plenary meeting in October 2013. During this meeting, the AthenaPlus WP5 Working Group will, together with the technical team, will determine the functional requirements for these tools to be developed. The results will also serve the pilot actions of WP6 that will be run in relation to digital storytelling, virtual exhibitions, educational use and GIS applications.

2 INTRODUCTION

2.1. Role of this deliverable in the project

Europeana content may be employed creatively for the development of stories and narratives in many domains: curatorship, education, tourism, genealogy, university teaching, scholarly research and more. The potential for such applications is enhanced by the Europeana procedures for content enrichment that are creating an abundance of contextual information. The new EDM data model of Europeana explicitly includes the perspective of enrichment of the resources uploaded by the content providers, and is better able to attend to the demands of storytelling.

The Athena Plus project proposal included provisions for experimenting with these potential uses of Europeana content for storytelling in a variety of settings. For this purpose the following tasks were included in the Description of Work:

- WP4: Terminologies and semantic enrichment
 - o Task 4.3: The main objective of this task will be the creation of a semantic repository for the AthenaPlus project that will include all the AthenaPlus metadata in a semantic rich representation devoting special effort to the linking process.

- WP5: Creative applications for the re-use of cultural resources
 - o Task 5.3: Prototyping creative applications for cultural content. The aim of this task is to realise a system that incorporates AthenaPlus generated and Europeana data to create virtual exhibitions, cultural tourist routes and educational usage. This task will result in D5.3 First release of the AthenaPlus tools (M11).

- WP6: Pilots for testing the creative use of cultural contents
 - o D6.2: Report describing the pilot on storytelling: This deliverable will document the structure of the platform, describe its practical applications, the involvement of the user groups, possible further exploitations (M27).

With the survey of existing components (included in this D5.2) and the results of user testing (included in D5.1) at hand, the AthenaPlus Working Group¹ will discuss with the WP5-leaders and the technical team:

- what kind of infrastructure and user components are desired and required;
- what implementations and integrations are technically feasible.

¹ The thematic working group created to support the WP5 activities is composed of experts of the partner institutions, but also from other memory institutions cooperating with the AthenaPlus consortium: Brouillard, Julien (Dedale, France); Dierickx, Barbara (PACKED vzw, Belgium); Florin, Filip (BAR, Romania); Gerasimou, Panagiota (HMCT, Greece); Grady, Anne (NMI, Ireland); Janssens Joris (PACKED vzw, Belgium); Kamierczah Olivier (NMI, Ireland) Karman, Laszlo (Monguz, Hungary); Katona, Julia (Magyar Nemzeti Galéria, Hungary); Kotlida, Maria (HMCT, Greece), Lopez, Mercè (i2CAT, Spain); Loucopoulos, Claire (Dedale, France); Natale, Maria Teresa (ICCU, Italy); Ongaro, Paolo (META, Italy); Palko, Gabor (PIM, Poland); Raggioli, Alberto (META, Italy); Rohde-Enslin, Stefan (SPK, Germany); Sinclair, Catriona (EAJC, UK); Stein, Regine (FOTOMAR, Germany); Szigethy, Zsófia (Hungarian Open Air Museum, Hungary); Wouters, Peter (OKV, Belgium); Zsolt, Banki (PIM, Hungary). This working group, open to enlargement, will also work together with the thematic working group on digital exhibitions originated in Linked Heritage and with WP6, whose activities will start at a later stage of the project.

The combinations of these two answers will allow to successfully develop and customise the application environment to accommodate digital cultural heritage content from Europeana and AthenaPlus.

Preparation for this discussion will start at the time of issuing this deliverable (M6). The actual decisions will be made during the plenary project meeting that is planned in M8. Based on the outcome of this meeting, a second version of this deliverable will be issued, containing the functional requirements for the application environment. This meeting will also kick off the technical work, to be completed in a first version in M12 (First release of AthenaPlus tools). The pilot action that will run based on the developed services, will take place from then on, to result in a report in M27 that will allow final re-iterations for improvement to the developed infrastructure.

3 Theoretical framework

3.1. Narratives and storytelling

Narratives are ubiquitous in human experience. We use them to educate, communicate, convince, explain, and entertain. As far as we know, every society in the world has narratives, which suggests they are rooted in our psychology and fulfill an important cognitive function: narratives do something for us. Although the methods have changed, the desire to tell and hear stories remains, and still impacts our perception. It is clear that, to fully understand and explain human intelligence, beliefs, and behaviours, we will have to understand why narrative is universal and explain (or explain away) the function it serves.² This section provides an introduction to the theoretical framework concerning narratives and (digital) storytelling.³

3.1.1 *The narrative turn in social science*

Narratives are ubiquitous in human experience. We use them to educate, communicate, convince, explain, and entertain. As far as we know, every society in the world has narratives, which suggests they are rooted in our psychology and serve as an important cognitive function: narratives do something for us. Although the methods have changed, the desire to tell and hear stories remains, and still impacts our perception. It is clear that, to fully understand and explain human intelligence, beliefs, and behaviours, we will have to understand why narrative is universal and explain (or explain away) the function it serves.⁴ This section provides an introduction to the theoretical framework concerning narratives and (digital) storytelling.

Matti Hyvärinen [2006] and Barbara Czarniawska [2004] have reviewed the narrative turn in social science in their different ways. The distinct approaches to narratives they identify are very relevant for the framework that is outlined in this document. The extraordinary development of social networking and mobile applications increased the interest in interventions that make use of these technologies for storytelling. Due to their characteristics, constructivist approaches to storytelling became increasingly relevant in contrast with a previous almost exclusive focus on structuralist approaches. Both approaches will be highlighted in this section.

3.1.2 *Digital storytelling*

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 Association⁵ 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.

² Mark A. Finlayson, Pablo Gervas, Erik Mueller, Srin Narayanan, and Patrick H. Winston (2010). Preface: Computational Models of Narrative. In Papers from the 2010 of the Computational Models of Narrative AAAI Fall Symposium. Technical Report FS-10-04. Published by The AAAI Press, Menlo Park, California. Retrieved on May 27th 2013 from <http://www.aaai.org/Library/Symposia/Fall/fs10-04.php>

³ References for this chapter can be found on page 63 and following.

⁴ Mark A. Finlayson, Pablo Gervas, Erik Mueller, Srin Narayanan, and Patrick H. Winston (2010). Preface: Computational Models of Narrative. In Papers from the 2010 of the Computational Models of Narrative AAAI Fall Symposium. Technical Report FS-10-04. Published by The AAAI Press, Menlo Park, California. Retrieved on May 27th 2013 from <http://www.aaai.org/Library/Symposia/Fall/fs10-04.php>

⁵ See <http://storycenter.org/>

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.

3.1.3 *Structuralist approaches to digital narratives*

The formal study of narratives goes back to the Russian structuralist school⁶, paradigmatically represented by Vladimir Propp's 1928 study *Morphology of the Folktale*⁷. In the framework of the DECIPHER project, researchers sought to model the curatorial process in museums employing a structuralist approach.⁸ They hypothesized that curatorial presentations are in the form of narratives and therefore contain the properties found in other types of narrative such as novels and films. This led them to consider how structuralist accounts of narrative in general could inform the study of curatorial narratives. Second, they hypothesized that curatorial narratives are not only a presentation but also the product of a process of inquiry, in which heritage objects and other materials are sources of evidence. Narrative inquiry suggests how research can be conducted that makes use of, or produces, narratives. Structuralist theories identify story, plot and narrative discourse as components of narrative. Chatman distinguishes between story (what can be told) and narrative (a way of telling the story). One story may be realised in many different narratives. Both story and narrative discourse have their own time. Story time is the actual chronology of the events and narrative time is the order in which the events are revealed to the reader.

Structuralist theorists such as Tomashevsky [1965] also make a distinction between story and plot. The story (or *fabula*) and plot (or *sjuzhet*) contain the same events. In the story, the events are ordered chronologically. In the plot the events are reorganized in order to explain the relationships between them and structure them as a coherent whole. The plot therefore transforms a pure chronology of events to a form that highlights for example the conflicts in the story, how they came about and how they are resolved by the characters. A similar distinction is found in narrative inquiry in which the process of research, in particular historical research, can involve imposing some interpretation on the chronology of events and then presenting the result as a narrative. Story, plot and narrative are therefore not only types of description but also stages in a narrative-based process of research. Hazel [2008] argues that story, plot and narrative discourse constitute three primary elements of narrative in which a story constitutes the events, the plot is their organization that imposes some interpretation on events, and the narrative discourse (or narrative) is the communication of the story and plot to the reader.

3.1.4 *Constructivism*

Social constructionism⁹ is a sociological theory of knowledge that considers how social phenomena or objects of consciousness develop in social contexts. A social construction (also called a social construct) is a concept or practice that is the construct (or artifact) of a particular group. When we say that something is socially constructed, we are focusing on its dependence on contingent variables of our social selves rather than any inherent quality that it possesses in itself.

⁶ Bod, Fisseni, Kurji, & Lowel, 2012

⁷ Propp, 1958

⁸ Mulholland, Wolff, Collins, & Zdrahal, 2011

⁹ See http://en.wikipedia.org/wiki/Social_constructionism Retrieved June 5, 2013

Structuralism¹⁰ is a theoretical paradigm emphasizing that elements of human culture must be understood in terms of their relationship to a larger, overarching system or structure. It works to uncover the structures that underlie all the things that humans do, think, perceive, and feel. Czarniawska¹¹ suggests that one of the reasons for an eager espousal of a narrative approach both in the humanities and social sciences might be that it is useful to think of an enacted narrative as the most typical form of social life. It is then assumed that social life consists of actions and events where the difference between the two is an assumed intentionality of actions. She follows authors interested in grasping human conduct via the notion of narrative: e.g. Alfred Schutz [1973] cited in Czarniawska [2004] pointed out that it is impossible to understand human conduct while ignoring its intentions and it is impossible to understand human intentions while ignoring the settings in which they make sense. Such settings may be institutions, sets of practices or other contexts created by humans. Particular deeds and whole histories of individual actors can thus be context situated in order to be intelligible.

Thus actions acquire meaning by gaining a place in a narrative of life. 'Life is like writing a book' is a saying known in many languages. This sounds as if people could tell stories as they please and in so doing shape their lives as they see fit. She indicates that this is a typical criticism of social constructivism: that it conceives the world as a collection of subjectively spun stories. She counters this by saying that we are never the sole authors of our own narratives; in every conversation a positioning takes place which is accepted, rejected, or improved upon by the partners in the conversation.

Polkinghorne [1987] followed Bruner's¹² lead brining in the basic concepts of literary theory. Plot, he says, is the basic means by which specific events otherwise represented as lists or chronicles are brought into one meaningful whole. He also discusses a special type of explanation within a narrative, where the 'motives' can be reconciled with 'causes' in an interpretation of action. Within the logico-scientific mode of knowing an explanation is achieved by recognizing an event as an instance of a general law or as belonging to a certain category. Within the narrative mode of knowing an explanation consists in relating an event to a human project. (Bruner, *Acts of Meaning*, 1990) points out that in narrative it is the plot rather than the truth or falsity of story elements that determine the power of the narrative as a story. There are no structural differences between fictional and factual narratives, and their respective attraction is not determined by their claim to be fact or fiction. The attractiveness of a narrative is situationally negotiated – or, rather, arrived at, since contingency plays as much a part in the process as esthetics or politics.

Narrative thrives on the contrast between the ordinary, what is 'normal', usual, and expected, and the 'abnormal', unusual, and unexpected. It has effective means at its disposal for rendering the unexpected intelligible: 'The function of the story is to find an intentional state that mitigates or at least makes comprehensible a deviation from a canonical cultural pattern' (Bruner, 1990). This is possible because the power of the story does not depend on its connection to the world outside the story but in its openness for negotiating meaning. 'This is a true story' and 'This never happened' are two ways of claiming genre affiliation, but genre affiliation does not decide whether a story is found interesting or not. There is no way of deciding between different stories except by negotiation: between the writers (as in a public debate), between the writer and the reader, or between various readers, as in a private conversation. Stories, claims Bruner, are 'especially viable instruments of social negotiation'. This 'method of negotiating and renegotiating meaning by the mediation of narrative interpretation', it seems to Bruner, 'is one of the crowning achievements of human development in the ontogenetic, cultural and phylogenetic sense of that expression (Bruner, 1990).

¹⁰ See <http://en.wikipedia.org/wiki/Structuralism> Retrieved June 5, 2013

¹¹ Czarniawska, 2004 citing McIntyre, 1981 / 1990

¹² Bruner, *Actual Minds, Possible Worlds*, 1986

Ralf Klamma [2005]¹³ has consistently pursued a constructivist approach in his research program and many projects. (Klamma, Spaniol, & Jarke, 2005) argue that Communities of Practice (CoP) are characterized by common conventions, language, tool usage, values and standards (Wenger, 1998). The development of a common practice which defines the community comprises the negotiation of meaning among the participants as well as the mutual engagement in joint enterprises and a shared repertoire of activities, symbols, and artifacts. A CoP is inseparable from issues of (individual and social) identity. Identity is mainly determined by negotiated experience of one's self in terms of participation in a community and the learning process concerning one's membership in a CoP. Three elements should be considered when supporting such CoPs:¹⁴

1. The mutual engagement that defines the CoP; the storytelling process engages both storytellers and story listeners as two basic stereotypes that enables the derivation of a role model to help the storytelling process.
2. A joint enterprise requires the setting of common regulations in the community. The storytelling process is based on a number of rules for ubiquitous multimedia organization. Such underlying rules can be represented or realized in various story templates and their adaptation operations.
3. Shared repertoire: the CoP results in resources, multimedia, stories, tools etc that can be shared among the members. The storytelling process among community members can enrich the resources in the shared repertoire.

In the next chapter, we will highlight some consequences of digital storytelling on our current conception of and interaction with digital cultural heritage.

3.2 Context and implications of digital storytelling for cultural heritage

The use of augmented reality and geo-localised digital content 'on the go', just with a smartphone or a tablet, is becoming increasingly important. The digital worlds that are virtually surrounding us deliver precise information, helping us out in a very practical way – but can do a lot more with that abundance of information: especially in the sectors of cultural heritage and cultural tourism. This section aims to present the context and the main implications of digital storytelling on the cultural heritage field.

3.2.1. From digitisation to cultural content editorialisation

The term of editorialisation indicates here the modalities of structuration and arrangement of web contents. It refers to tools, services, techniques able to produce digital storytelling. We can use the definition proposed by Sens Public and IRI (Institut de Recherche et d'Innovation), which describes editorialisation as "the whole of organization and structuration practices of contents on the web". These practices are the principles of the current production and circulation of knowledge. The concepts of edition and editorialisation are different, editorialisation emphasizes the technological devices which determinate the context of a content and its accessibility.

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

¹³ Ralf Klamma papers: <http://rwth-aachen.academia.edu/RalfKlamma> Retrieved on June 6, 2013

¹⁴ Cao, Klamma, & Jarke, The Hero's Journey - Template-Based Storytelling for Ubiquitous Multimedia Management, 2011

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.*¹⁵

It 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.

3.2.2. Digital storytelling implications

3.2.2.1. An enriched space visit

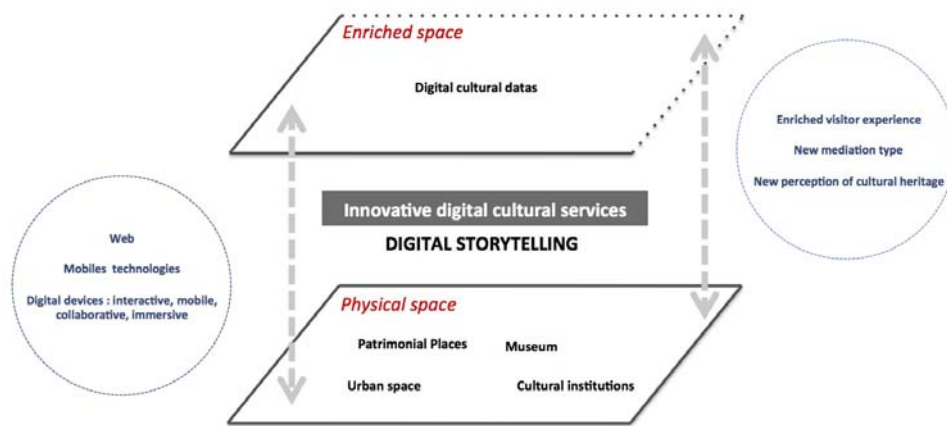
Mobile and locative media, new editing forms, collaborative tools, transmedia and immersive experiences and projects using artificial intelligence have infiltrated our cities, our everyday life as well as our heritage and cultural activities. Smartphones, which have come to be real everyday life tools, 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 networks¹⁶, communicating objects¹⁷, close field communication¹⁸ ...), aiming at enriching his visit experience.

¹⁵ Aubin, Sophie, The digitalization of the cultural heritage, Conservatory of Arts and Crafts, on 2003.

¹⁶ 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.

¹⁷ 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).

¹⁸ 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.



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.

3.2.2.2. 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.

3.2.2.3. 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.

3.2.2.4. 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 classrooms.¹⁹ 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 way.²⁰

Among some educational goals for digital storytelling, we can identify the following:²¹

- 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

¹⁹ See <http://digitalstorytelling.coe.uh.edu/page.cfm?id=27&cid=27&sublinkid=30>

²⁰ See <http://digitalstorytelling.coe.uh.edu/page.cfm?id=27&cid=27&sublinkid=30>

²¹ Fran Kompar, Greenwich Public Schools Library Media and Technology Program Curriculum Framework.

Online 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

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 surroundings.²²

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 construct.²³

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.

²² Interactive Storytelling and Gaming Environments for Museums: The Interactive Storytelling Exhibition Project.

Michael Danks, Marc Goodchild, Karina Rodriguez-Echavarria, David B. Arnold, and Richard Griffiths ; CMIS,

University of Brighton, Moulsecoomb, Brighton, United Kingdom (2007). Available online at <http://barmonger.org/speciale/Referencer/Interactive%20Storytelling%20and%20Gaming%20Environments%20for%20Museums%20-%20The%20Interactive%20Storytelling%20Exhibition%20Project.pdf>

²³ Destination Services: Tourist media and networked places ; Goodman, Elizabeth, UC Berkeley, 2007

4 DATA, TOOLS AND DEVICES FOR DIGITAL STORYTELLING

4.1 State of the art and implications on digital data for storytelling

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"²⁴.

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)²⁵, 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 concepts.²⁶

4.1.1 Narrative ontologies

Ontologies concerning narratives and storytelling have a central role in enabling the flexible classification of the events, contents, and plot elements that are employed in the actual production of narrative expressions. Callaway (2000)²⁷ refers to the background information required by authors or computational models of narrative prose generation as the story ontology. The ontology includes simple facts as well as concepts of generic characters, generic events and generic objects. Below we outline some projects that illustrate the use of ontologies in relation to cultural heritage materials.

The Stories Ontology

The Stories ontology is being developed as part of the Contextus initiative for Describing Narrative in the Digital World²⁸. The Stories ontology was developed in collaboration with the BBC, with an aim to creating an ontology for narrative representation that could be applied across a diverse set of cases. The Stories Ontology is built upon the often-used Event and Timeline²⁹ ontologies. The Story class is the primary class of the ontology. It represents a story that may be conveyed, and provides a set of

²⁴ 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>.

²⁵ Subjective metadatas are a different level of indexing, with word, tags in free fields (as indexation of content on Vimeo). We specify "subjective" because these tags allows to create story thanks to indexing and assembling rules.

²⁶ 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.

²⁷ Callaway, C.B (2000). Narrative Prose Generation. Ph.D. Thesis, North Carolina State University, Raleigh, NC. Retrieved on 26.5.2013 from <http://homepages.inf.ed.ac.uk/ccallawa/papers/aij02.pdf>

²⁸ See <http://www.contextus.net/node/1>

²⁹ See <http://motools.sourceforge.net/event/event.html> and <http://motools.sourceforge.net/timeline/timeline.html>

properties for this purpose. A Story has one or many subject properties, being OWL Things³⁰ that are the focus of the narrative. In the case of the Battle of Britain this could be the Event of Eagle Day, the concept of Evacuation, or the person of Winston Churchill. Each Story may contain further sub story properties, providing for a hierarchy. A Story instance then has an EventList — an ordered list of Events — represented using the Ordered List Ontology (OLO). EventSlot is provided to restrict the list to containing Event instances, with the item and slot sub-classing those of OLO. Finally, a ‘tells’ property is provided for OWL Things, which indicates a binding between the item which relates the story and the Story instance. This may be, for example, a television programme, movie, book, or painting.³¹

The CURATE Ontology

The aim of the Curate ontology is to provide a way of describing museum narratives such as physical and online exhibitions. Existing metadata schemes focus on the objects of the collection, allowing description of object properties such as the artist, when it was made and its dimensions. Museums communicate through narratives that encompass multiple objects and express more than the object in its singularity. The Curate ontology aims to provide a way of describing and searching for narratives in terms of what they mean as well as the objects they contain. The Curate ontology uses CIDOC CRM and DUL as upper level ontologies. Stories and plots are propositional objects in CIDOC CRM³². A narrative is an information object. Stories, plots and narratives are modeled as Description in DUL³³. The Curate ontology distinguishes between two types of narrative (and two types of underlying plot and story):

- a heritage object narrative tells a story about a heritage object;
- a curatorial narrative thread across a number of heritage object narratives. It makes conceptual relationships across a set of objects, yielding more complex insights than could be made from the objects’ individually.

Linking Open Descriptions of Events (LODE)

LODE is a quite basic ontology for publishing descriptions of historical events as Linked Data, and for mapping between other event-related vocabularies and ontologies.³⁴ It defines one class (‘Event’) and seven properties of this event.

User Generated Content and collaborative indexation

Web 2.0 is mainly characterised by the development of social networks, exchange platform of pictures and videos content, and blogging and micro-blogging spaces. But also by the corollary of the creation and multimedia content sharing services: the boom in the quantity of data and metadata produced by users themselves, in the framework of a convergence between semantic web, social web and mobile web. The reuse of data produced by users is an important factor in relation to digital storytelling services. Tagging content in order to link it together or create new connections between them can also be done by content users rather than necessarily remaining a task of content producers. This is how ‘folksonomy’ is created: a system of classification derived from the practice and method of collaboratively creating and managing tags to annotate and categorise content.³⁵ Information created by folksonomy can then again be indexed in space (becoming ‘folksotopy’). Digital storytelling services

³⁰ ‘OWL Things’ is the most general building block in the OWL web ontology. Its reference can be found here <http://www.w3.org/TR/owl-ref/>

³¹ See http://www.contextus.net/stories#term_Story

³² See <http://www.cidoc-crm.org>

³³ See <http://www.loa.istc.cnr.it/ontologies/DUL.owl>

³⁴ See <http://linkedevents.org/ontology/>

³⁵ Definition taken from Wikipedia, <http://en.wikipedia.org/wiki/Folksonomy>

allow valorisation of the overabundance of information created via these informal data structuration systems.

4.1.2 Intelligent aggregation of digital data + Open and Linked Data

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 services.³⁶ 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.

4.2 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.

4.2.1 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

³⁶ 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 non-commercial 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/>

are Omeka³⁷ and Collective Access³⁸. 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.

4.2.2 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 Pro³⁹, Adobe Premiere Pro⁴⁰) 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 audio-visual 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 Klynt⁴¹ and Storyplanet⁴².

4.2.3 Content editing linked to 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 markers⁴³, 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).

4.2.4 Augmented reality

³⁷ See <http://omeka.org/about/>

³⁸ See <http://www.collectiveaccess.org>

³⁹ Video editing software edited by Apple <http://www.apple.com/fr/finalcutpro/>

⁴⁰ Video editing software edited by Adobe <http://www.adobe.com/fr/products/premiere.html>

⁴¹ Klynt application: <http://www.klynt.net>

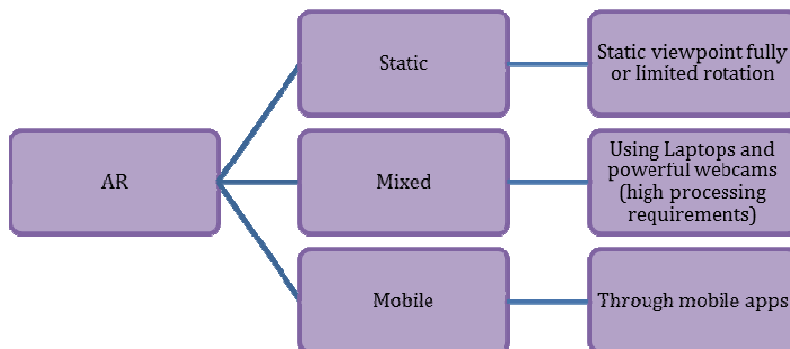
⁴² Storyplanet application: <https://www.storyplanet.com/index>

⁴³ .kml ou .kmz files http://en.wikipedia.org/wiki/Keyhole_Markup_Language

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 worlds.⁴⁴

*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 world.*⁴⁵

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 example⁴⁶ 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.

⁴⁴ 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_0. 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).

⁴⁵ Source: Wikipedia http://en.wikipedia.org/wiki/Augmented_reality

⁴⁶ See <http://www.themovie.org/es/15/16/prismaticos-turisticos-realidad-aumentada.html>



Fig 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 assignments⁴⁷, 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.



Fig 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.

⁴⁷ See http://www.youtube.com/watch?v=Ulij99gYQgM&feature=player_embedded

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.”*⁴⁸

Examples applied to tourism:

- Valladolid Aumentada: AR app that lets you discover the city of Valladolid through resolving a mystery (detective game)⁴⁹
- AP app designed for tourism purposes: lets you discover the city of Segovia through an app that includes museum, event and sightseeing information⁵⁰
- AR app designed to promote tourism in the countryside of Malaga, it provides a lot of touristic information as hotels, restaurants, sightseeing, etc...⁵¹
- Layar - AR app that is mostly used in the editorial world (magazines), creating a 'layer' which can bring extra content to the magazine. It is being employed in tourism as well, in the form of a layer you can lay over a landscape which will provide extra information about the landscape, and Wikitude - AR app which provides more information about monuments or points of interest as you point and focus your smartphone on the point of interest.⁵²

Examples applied to cultural heritage and museums:

- Beyond Cool: Making Mobile Augmented Reality Work for Museum Education (Museums and the Web paper)⁵³
- StreetMuseum: an iPhone app for the Museum of London⁵⁴
- Presentation of AR applications in use in museums, that have been created by the company Virtualware⁵⁵
- iPhone app for the Asian Civilisations Museum, used in its special exhibition on the famous Terracotta Warriors⁵⁶

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.

⁴⁸ See <http://www.museum-id.com/idea-detail.asp?id=336>

⁴⁹ See <http://www.androidpit.es/es/android/market/aplicaciones/aplicacion/com.telvent.valladolid/Valladolid-Aumentada>

⁵⁰ See <http://www.turismodesegovia.com/es/noticias/hemeroteca/343-presentacion-guia-turistica-de-segovia-en-realidad-aumentada>

⁵¹ See <http://www.wayerless.com/2012/04/espana-una-aplicacion-de-realidad-aumentada-para-hacer-turismo-en-malaga/>

⁵² See http://www.pcactual.com/articulo/laboratorio/especiales/8756/aplicaciones_realidad_aumentada_para_smartphon_es.html

⁵³ Available online http://www.museumsandtheweb.com/paper_keywords/augmented_reality_0

⁵⁴ See <http://www.youtube.com/watch?v=qSfATEZiUYo&feature=related>

⁵⁵ See <http://www.youtube.com/watch?v=EEpRCZnBcGk&feature=related>

⁵⁶ See <http://mwa2012.museumsandtheweb.com/cherry-thian/>



Fig 3. An ancient building comes back to life by virtually displaying it over the current location of its ruin⁵⁷
Augmented reality as the focus of European (project) research

Some European projects are currently working on virtual environments and developing pilots experimenting with AR apps for heritage and tourism:

- I AM, International Augmented Med: Multimedia and interactive technologies for the promotion of cultural and natural heritage⁵⁸
- ARtSENSE – Augmented Reality Supported adaptive and personalized Experience in a museum based on processing real-time Sensor Events⁵⁹
- ARCHEOGUIDE: Augmented Reality-based Cultural Heritage On-site Guide⁶⁰
- V-MusT: Virtual Museum Transnational Network⁶¹

4.2.5 Producing virtual and digital exhibitions

The realisation of virtual⁶² and digital exhibitions⁶³ 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;

⁵⁷ See <http://arqueologiacomputacional.blogspot.com.es/2012/04/realidad-aumentada.html>

⁵⁸ See <http://www.iam-project.eu/>

⁵⁹ See <http://www.artsense.eu>

⁶⁰ See http://cordis.europa.eu/projects/rcn/60831_en.html

⁶¹ See <http://www.v-must.net>

⁶² "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>.

⁶³ "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/>.

- 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.

4.3 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.

4.4 Presentation of relevant tools

In this part we have selected a range of relevant tools in line with the digital storytelling requirements. Some major tools for use in the context of digital storytelling are presented in detail. These eight tools are representative of the current requirements for creating a digital storytelling project:

- 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 .

⁶⁴ Exchangeable Image File Format (Exif) is a standard that specifies the formats for images, sound, and ancillary tags used by digital cameras (including smartphones), scanners and other systems handling image and sound files recorded by digital cameras. Source : Wikipedia http://en.wikipedia.org/wiki/Exchangeable_image_file_format

These tools have been investigated by the technical team of WP5 in order to see how they could play a role in the construction of the AthenaPlus application environment.

Project title	Link	Type of project
3WDoc	http://www.3wdoc.com/fr/	Web documentary editor
Adobe Edge Animate CC	http://html.adobe.com/edge/animate/	Interactive content editor
Adobe Edge Reflow CC	http://html.adobe.com/edge/reflow/	Responsive web content editor
Closr it	http://www.closr.it/	Image zoom widget
CollectiveAccess	http://www.collectiveaccess.org	Collection management system
Djehouti	http://www.djehouti.com/12-HOME.htm	Web documentary editor
Flixmaster	http://www.flixmaster.com	Interactive video editor
Homm	http://www.homm-museums.unimore.it/	Multimedia narration editor
Imagespike	http://www.imagespike.com	Interactive picture editor
Jet photo studio	http://www.jetphotosoft.com/	Geolocated photo album editor
Korsakov	http://korsakow.org/	Interactive video editor
Omeka	http://omeka.org/about/	Web-publishing platform
OpenPhotoVR	http://openphotovr.org/	3D photo album editor
Pixeet	http://www.pixeet.com/fr/	Mobile app for 360 pictures
Popcorn JS	https://popcorn.webmaker.org/	Web documentary editor
Prezi	http://prezi.com	Dynamic presentation editor
Projeqt	http://projeqt.com/	Web content aggregator for storytelling
Pundit	http://thepund.it/index.php	Semantic annotations for web content
SIMILE Widgets	http://www.simile-widgets.org/wiki/Main_Page	Web widgets for data visualisation
Storyplanet	https://www.storyplanet.com/index	Web documentary editor
Thinglink	http://www.thinglink.com	Interactive picture editor
Videolicious	https://videolicious.com/	Video editor
Vuvox	http://www.vuvox.com/	Interactive video editor
YouTell	http://role-widgetstore.eu/bundle/youtell-story-viewer	Collaborative nonlinear storytelling/ Story Viewer
Zeega	http://zeega.com/	Web documentary editor

Some of above mentioned tools (Collective Access, Homm, Klynt, Memoways, Movio, Omeka, TimelineJS and Tripline) are described in more detail in the forms below.

CollectiveAccess

Project leader: Whirl-I-Gig

Type: public

Country: USA

Website: <http://www.collectiveaccess.org>

The screenshot shows the CollectiveAccess web interface. At the top, there's a navigation bar with 'New', 'Find', 'Manage', 'Import', and 'History' menus. Below that, a sidebar on the left contains 'Descriptive Information' (selected), 'Administrative Information', 'Representations', 'Summary', and 'Log'. The main content area displays a record for 'Award Competition Artist Presentation Interactive, Technologies to the People: phoney™ (C165_1)'. The record is in an 'Editing Audio' state. The form includes fields for 'Inventory Number' (C165_1), 'Title of work' (Award Competition Artist Presentation Interactive, Technologies to the People: phoney™), 'Locale' (English), 'Actor' (Andújar, Daniel G. (Author)), 'Festival year & carriers' (a05sh (carrier), e165 (carrier), tm01 (award)), and 'Keywords' (Media Art - Media Art). The footer shows the user 'Baruch Gottlieb' and the year '© 2013 Whirl-I-Gig'.

Typology: Collection management software – web based

Sector(s): Cultural heritage

Audience: cataloguers, museum professionals, archivists

Description
 CollectiveAccess is an open source collection management system. It is primarily used to describe digital collections, but it can be extended to provide online access to the collection. It is very flexible by nature which means all kinds of objects (museum, library, archive, ...) can be described according to domain-specific standards (e.g MODS, EAD, CDWA, SPECTRUM, ...). Although CollectiveAccess is not a DAM, it provides some basic digital object management features.

Strengths

- Very flexible data model
- Support for vocabularies
- Good API
- Free and open source

Weaknesses

- Limited dam functionalities, it is however possible to link CA to a digital repository
- Interface is quite complex, can be confusing to end-users

HOMM ICT supporting hands-on & multimedia laboratories in museums

Promoting institutions: Officina Emilia (University of Modena and Reggio Emilia, Italy), Crafts Museum (New Delhi, India)

Type of operator: museums

Country: Italy and India

Web site: <http://www.homm-museums.unimore.it/>

Date of the project: starting November 2011

Typology: Crowd sourcing of relevant knowledge on digital tangible and intangible heritage

Sector (s): Cultural heritage – education

Audience: students, teachers, tutors, educators territorial, social workers visiting a museum, visitors to the museum in general

Description

HOMM is a tool of information crowd-sourcing: it allows the accumulation and sharing of knowledge on local dimensions, very often not available through the scientific and academic literature. The demo available on line shows the application of the network-of-stories to create a non-linear and open multimedia narration of clips with video, text, image.

There are two browsing environments of the networks of stories. One helps in building a personal sequence in exploring and playing the videos, albums of photos, and reading the texts of the story according the sequence spurred by the personal curiosity and interest of the user. In the other one, the clips are ordered according to the main thematic area in which they are classified and clips' metadata can be browsed. The latter consultation of text and images of individual clips can be easily printed and video played.

The software architecture is built around the needs of the end users of the activities of the museum. Before the visit to the museum, the enrollment of individuals and the group to which they belong (e.g. school classes accompanied by teachers) will set the conditions to create a personal workspace and a group's workspace. A prior self-assessment test can be implemented (customizable by the teacher, in the case of classes of students), related to the aspects that are specifically explored in the activities of the museum. During the visit, the users will be identified by a proximity card. The time for interaction with ICT tools will be limited, during the visit, since the museum is a unique place to make the real visit and the hands-on activities. The personal workspace will be enriched by various informations and may be extended through many channels (tablets, mobile phones with custom applications). After visiting the museum, each user will be able to navigate freely through the homm_sw application indefinitely. The personal web space may be adapted to the specific needs (for example, the level of knowledge effective) and to user's preferences.

The most original parts of the architecture of homm_sw are: (a) the tools for the work groups of students (coordinated by teachers and tutors) and for the groups that will be created for the sharing of digital resources; (b) the tools to validate the work of each group and for the publication of the output produced by their work (new clips, additional metadata, new links between clips). These outputs, produced by the original elaboration of information which emerged from the interaction with the heritage of the museum, its artifacts and through the hands-on activities offered by the museum, may be shared through the web in the wider community.

Strengths

- It offers: interactive applications (“Activities”) to museum’s visitors, tools to assemble Activities, and to organize a community around the museum.
- It improves the use of museums on the part of academic and education institutions, of training centers and in programs of adult education.
- It supports social inclusion, strengthening the identity of museums as places of learning and fostering relationships between individuals, groups and institutions.
- The institutions which developed homm_sw encourage its sharing in networks of museums and research centers interested in its development and use. Through a MoI between the institutions interested in its adoption, homm_sw is available to non-profit organizations who intend to develop a new feature and share the upgrade with previous users and with new users, on the same conditions.

Weaknesses

- So far the application is not available to be easily used on mobile devices.

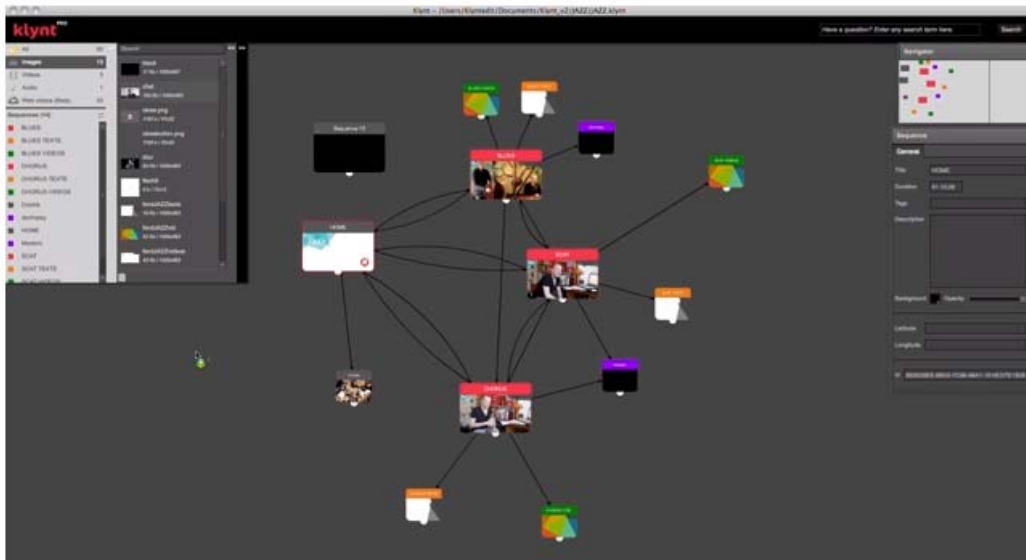
Klynt

Project initiator: Honkytonk Films

Type: private

Country: France

Web site: <http://www.klynt.net/>



Typology: tool for interactive digital storytelling

Sector(s): journalism, photography, filmmaking

Audience: Professionals and amateurs from journalism, photography, filmmaking

Description

Klynt is an editing and publishing application dedicated to interactive visual storytelling. It was designed originally for Honkytonk Films in-house production, to create an affordable and easy-to-use

solution to explore new narrative formats on the Internet, and is now available to any content producer. The community gathers NGOs, Media portals, training organisations. Klynt gives the opportunity to edit rich narratives, connect the story to the web and publish it anywhere.

Strengths

- Rich media projects production without computer programming with an integrated interactive media editor.
- Production of connected editing and Mashup logical: software is connected to video/photo sharing platforms, the goal is to promote reuse, editorialization and enrichment of User Generated Contents.

Weaknesses

- No monitoring tool for author rights related to reuse and sharing of existing contents.

Memoways

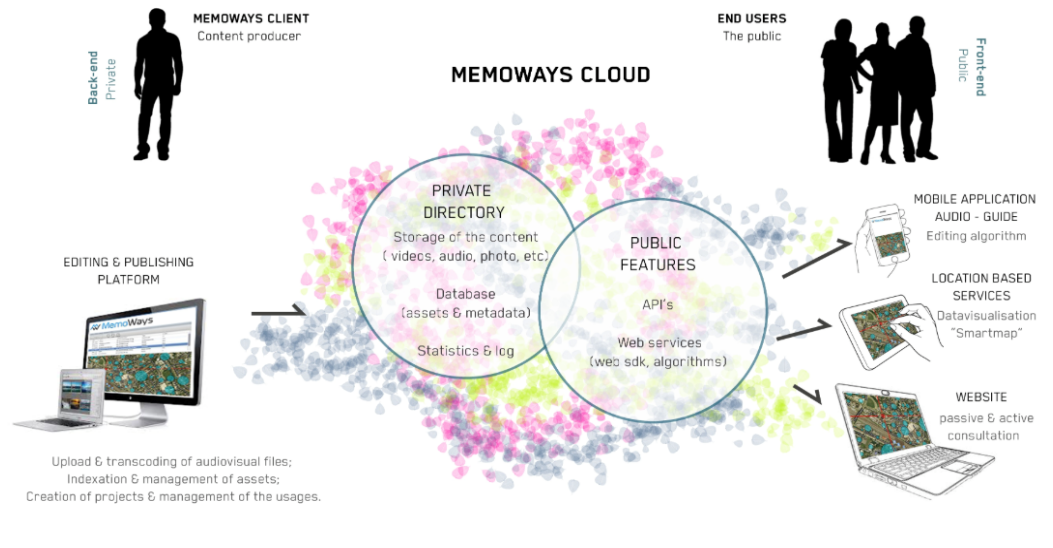
Project leader: Memoways

Type: private

Hosted within C-side productions

Country: Switzerland

Website: <http://memoways.com/en/>



Typology: tool for interactive digital storytelling – Mac OS application

Sector(s): Cultural heritage, tourism

Audience: content producers, content mediators, local authorities

Description

Memoways is a web application, allowing to upload, manage, deliver and dynamically distribute audiovisual content for mobile computing uses. It provides the following features: spaceline editing: territory augmented by the data for narrative uses in mobility; magic metadata: indexing data adding thematic descriptors, affiliation to uses scenario or editing rules; editing engine: from a uses logic, generate

narrative combinations between documents; mobile creation: using smartphones to create content (text, pictures, videos) and decide how this content can be combined, aggregated and broadcasted.

Strengths

- Innovative use of metadata: thematic tags add, use case affiliation.
- Indexing dedicated to narratives combinations of digital resources.
- Temporal editing concept (time line) and spatial editing (space line).
- Distribution of data on several supports: smartphones, tablets, PC...

Weaknesses

- No integrated functionalities of picture processing and video editing: necessity to use editing software in a parallel operation.

Movio

Project initiator: Italian Ministry of Cultural Heritage

Type: public

Country: Italy

Co-financed by Fondazione Telecom Italia
Developed by Meta s.r.l

Website: <http://www.movio.beniculturali.it/>

Typology: tool for interactive digital storytelling

Sector(s): cultural heritage

Audience: professionals from museums, libraries, archives

Description:

Movio is a kit for the realisation of online virtual exhibitions, based on a PHP framework. The semantic Content Management integrates an ontology builder: pages content may be defined as an entity of an ontology that is built within the CMS. The editor of entities and relationships becomes a tool for creating information sheets.

Several tools are available for editing content: timeline, slider, Map Management, storytelling, photo gallery.

A microsite for mobile, an App version and online tutorials and training are also available.

Strengths

- Integrates the possibility to manage and modify the contents of a website and a mobile APP with the same editing environment
- It is one of the few content management systems verticalised for being used in the cultural environment
- It has been developed according to guidelines edited by experts in digital cultural heritage, with the objective to integrate tools for highlighting digital cultural heritage
- It is one of the first multimode Content Management which allows the creation of semantically annotated contents and the native support of an ontology manager
- It is open source for the web and the mobile applications for iOS and Android
- It can be easily integrated with new components and plug-ins which allows it to be expanded with new functionalities and features
- It is easy to use and to configure
- It is based on a framework which respects the rules of model view controller applications (MVC). For this reason, the participation of external developers in its enrichment is not difficult

- It integrates several tools which allows an efficient and multimedial use of the online digital contents, in line with the new paradigms of web and mobile development
- It integrates a component for the management of storytelling, which allows the curators of virtual exhibitions to narrate stories in an innovative way, connecting the element of the stories also to the results obtained through the ontology.
- The back-office is multilingual.
- It supports multilingualism.

Weaknesses

- It is an autonomous project. It is not a fork of existing open source projects, like WORDPRESS, DRUPAL or PLONE
- The community of MOVIO is still very young and needs further involvement and a greater support from European partners
- It does not support Windows mobile
- It should be natively distributed and installed also on the cloud with an easy configuration system
- It should integrate a greater number of templates and graphic layouts, customised for specific uses

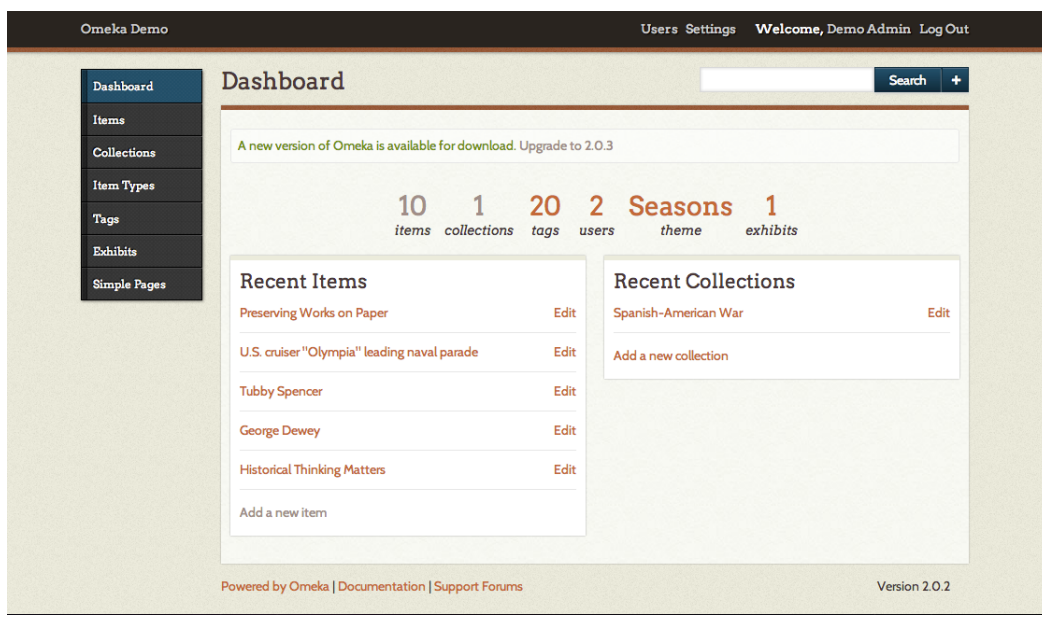
Omeka

Project leader: Roy Rosenzweig Center for History and New Media, George Mason University.

Type: public

Country: USA

Website: <http://omeka.org/>



Typology: Tool for publishing digital collections and creating virtual exhibitions – web based

Sector(s): Cultural heritage

Audience: cataloguers, museum professionals, archivists

Description

Omeka is a free, flexible, and open source web-publishing platform for the display of library, museum, archives, and scholarly collections and exhibitions. Omeka falls at a crossroads of Web Content Management, Collections Management, and Archival Digital Collections Systems. Museum Professionals, for example, can use Omeka to share collections and build online exhibits with objects you cannot display in the museum. Invite your visitors to tag and mark items as favorites, or to contribute content. Start a blog to publish museum news and podcasts. Several plugins have become available that support the use of vocabularies.

Strengths

- Very easy to set up
- User friendly
- Good plugin system

Weaknesses

- Focused on publishing collections, not managing them
- Metadata standards support limited to Dublin Core (qualified)

TimelineJS

Project initiator: Northwestern University Knight Lab, VeritéCo

Type: private

Country: USA

Website: <http://timeline.verite.co/>

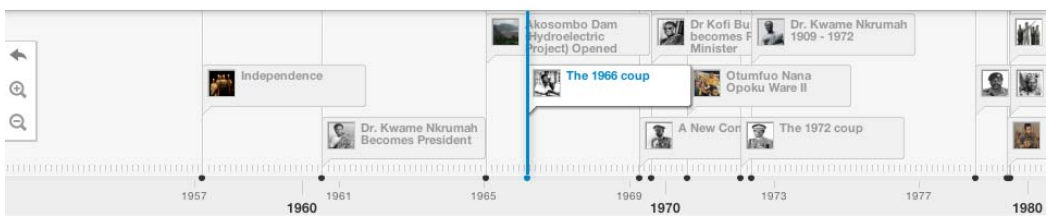
February 24, 1966

The 1966 coup

While Nkrumah is in China, army stages widely popular coup. National Liberation Council(NLC), led by General Joseph Ankrah, comes to power. Russian and Chinese technicians expelled.



At the press conference after mounting the 1966 coup that overthrew Kwame Nkrumah. On the far right is Lieut. Gen J.A. Ankrah



Typology: interactive digital storytelling

Sector(s): all

Audience: General audience

Description:

Timeline JS is an open source tool enabling to build visually rich interactive timelines. It can pull in media from different sources (Twitter, Flickr, Google maps, Youtube, Vimeo...) and more media types are regularly added. It is available in 40 languages.

Strengths

- Open source tool: enrichment and customization of default template.
- Easy and shared creation of time line thanks to use of spreadsheet Google Docs.
- Embedded code for time line integration in any web page.
- Strong pedagogic potential of interactive and rich media timeline.

Weaknesses

- Possible links to medias from: Youtube, Vimeo, Soundcloud, Dailymotion, Instagram, Twit pic, Twitter status, Google plus status, Wikipedia, Google Maps; but impossible to integrate other HTML codes.

Eliminato:

Tripline

Project initiator: Tripline

Type: private

Country: USA

Website: <http://tripline.net/>

Livingstone's Travels



David Livingstone was a Scottish missionary who spent nearly thirty years in Africa and gained great renown for his travels and explorations in regions which had never before been seen by Europeans. Livingstone arrived in South Africa in 1841 to work as a missionary. He traveled west through Zambia and Angola until he reached the Portuguese settlement of Loanda near the coast. Upon returning to Britain in 1856 he wrote a book based on his experiences called Missionary Travels that created a sensation (Heritage History).

Followers

Rick
Los Angeles, CA, USA

Typology: Tool for interactive digital storytelling

Sector(s): tourism, cultural heritage

Audience: General audience, tourists

Description:

Tripline is an online application for creating and sharing maps. It enables the user to tell any story with map-based content, by creating personalized maps, with an animated line moving across the map with a soundtrack. Pictures, videos and texts can be added.

It uses several third-party services such as: Google Geo APIs, Facebook, Instagram, Flickr, Beatsuite...

Strengths

- Connection and import of geolocated contents from social networks: Facebook, Foursquare, Twitter, Instagram, Tripit.
- Realization of rich media animated maps for a visit tour (on web site and on mobility).
- Exportable maps.
- Collaborative and *in situ* documentation of a trip or a visit tour.

Weaknesses

- Maps are developed with Flash technology: no iOS devices compatibility.

5 DIGITAL STORYTELLING SERVICES FOR USERS

5.1 Table analysis

This table analysis presents a classification of the digital storytelling services based on the user experience type. The situation or environment of 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

<p>Digital storytelling <i>Keywords: digital content</i></p>	<p>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...)</p>
<p>Interactive digital storytelling (IDS) <i>Keywords: hypertextual narration, nonlinear narrative, interactive stories, rich media, new forms of editorialization, virtual exhibitions</i></p>	<p>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.</p>
<p>Collaborative storytelling <i>Keywords: web 2.0, user-generated content, content sharing, social network</i></p>	<p>Digital storytelling type, based on a participatory model, in which the user has the necessary tools to create and put into narrative his/her own contents.</p>
<p>Mobile / Locative storytelling <i>Keywords: mobile devices, locative medias, GPS, real places, urban space, mobile social network, interactive mapping</i></p>	<p>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.</p>
<p>Transmedia storytelling <i>Keywords: responsive design, user experience, UX design</i></p>	<p>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.</p>
<p>Immersive storytelling <i>Keywords: augmented reality, mixed</i></p>	<p>Digital storytelling type based on a blurring of borders between fiction and reality. The construction of a narrative is</p>

<p><i>reality, video games, Alternate Reality Games (ARG)</i></p>	<p>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.</p>
<p>Generative storytelling <i>Keywords: artificial intelligence, data base, metadata, data</i></p>	<p>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 algorithms 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).</p>

6 RELEVANT PROJECTS AND APPLICATIONS

This section describes several projects and applications or tools that will inspire the development of the application environment in the AthenaPlus project. This review complements previous work carried out concerning such matter⁶⁵.

6.1 Projects mapping

Within the framework of the AthenaPlus project, a watch on digital storytelling was launched, contributing to the definition of the digital storytelling services typology, presented above in paragraph 5.1. It is organized around six categories: Interactive digital storytelling (IDS), Collaborative storytelling, Mobile / locative storytelling, transmedia storytelling, Immersive storytelling, Generative storytelling.

From this typology, a mapping of European and international projects of digital storytelling with a cultural heritage dimension was realised and 90 projects were identified. They are all recent projects, developed since 2010. This project mapping attempts to present the main stakes of digital storytelling devices for three sectors of interest in the AthenaPlus project: tourism, education and cultural mediation (e.g. through digital exhibitions). This mapping reveals the trends in digital storytelling services:

Active users for a new vision of digital heritage: sensitive and collaborative

In the age of digital storytelling, many services (videos and photos sharing platforms, social networks) are based on the personalization of the user experience, engagement and participation by “User Generated Content”. In this context the main stake is to create tools for structuration and reuse of this important volume of data and metadata from users, sensitive and collaborative, giving a new vision of museum collection, digital heritage objects, art works...

Immersive and responsive devices for a complete user experience

Immersive audio and video guides (for tourism or museums), interactive maps (getting historic information out of a given place), transmedia web documentary (with a story adapted and declined on several medias) accompany users all along their visit experience with a lot of documents, resources and information. With digital storytelling the challenge is the contextualization and personalization of these data in order to present to the user digital content which makes sense for him/her in a given context.

Mobile and generative storytelling devices for a real enriched visit space

The user does not have to click on his device to receive content – the device just “listens” to his behavior and translates in real time this pattern in a story stream. Being engaged and immersed with the geolocated content, the user can interact with the content of the story by changing and adjusting his/her trajectory and / or behavior. As users of mobile devices, we are familiar with getting content just by touching an interface (touchscreens). We begin to play with natural speech interfacing (Siri), but now we can also take the whole human body as input command for data retrieval, on the scale of the human body (meters, not pixels), within this natural context (the city, the visit space... not the track pad or the mouse).

⁶⁵ Dov Winer, Review of Ontology Based Storytelling Devices: available online http://www.judaica-europeana.eu/docs/Winer_Ontology_Storytelling_svt.pdf

Interactive digital storytelling (IDS)

Project title	Link	Type of project
The Aatsinki season	http://aatsinkiseason.com/	Web doc
Time Line JS	http://timeline.verite.co/	Time line interactive rich media
Walk the dig	http://commonboston.untravelmedia.com/	Sound tour
Innovation and Expansion	http://localprojects.net/types/page/7/?type=multi-touch-touchscreen	Interactive installation
La Maison Carrée	http://www.maisoncarree.eu/ http://www.leweboskop.fr/webdocumentaire-et-valorisation-du-patrimoine/	Web doc
The Gallery of Lost Art	http://galleryoflostart.com/	Virtual exhibition
Musée du Louvre / Louis-François Bertin	http://musee.louvre.fr/oal/bertin/indexFR.html	Virtual exhibition
MVC - Musée Virtuel du Canada	http://www.museevirtuel-virtualmuseum.ca/index-fra.jsp	Virtual museum
Europeana Exhibitions	http://exhibitions.europeana.eu/	Virtual exhibition
Au cœur du quotidien d'un poilu	http://www.museedelagrandequerre.eu/au_coeur_du_quotidien_dun_poilu	Social network
Machine à remonter le temps / Rue 89	http://www.rue89.com/rue89-culture/2013/03/24/paris-1914-2013-en-photos-grimpez-dans-notre-fabuleuse-machine-remonter-le	Web site

Collaborative storytelling

Project title	Link	Type of project
Creating Book Trailers	http://digitalis.nwp.org/resource/4341	Workshop
The silent History	http://www.thesilenthistory.com/	Novel / iOS app
Mapping main street	http://www.mappingmainstreet.org/	Web doc
Musetrek	http://www.musetrek.com/	Mobile app
We are data	http://wearedata.watchdogs.com/	On line map/ Open data
History Pin	http://www.historypin.com/	Mobile app / Augmented reality

Storify	https://storify.com/	Web Site
Erlly	http://erly.com/	Web Site
Make history	http://localprojects.net/types/page/8/?type=collaborative-storytelling	Web Site
Cinemacity	http://cinemacity.artetv/	Map + mobile app
Austin music map	http://austinmusicmap.com/#	Interactive map
Kaleidomix	http://kaleidomix.com/	Experimental tour
CitéRepères	http://francaiseapps.fr/iphone-ipad/education/citereperes-arfaacv.html	Multimedia guide
Museu da pessoa	http://www.museudapessoa.net/_index.php/v2013/home	Collaborative virtual exhibition
Brooklyn Museum	https://www.brooklynmuseum.org/opencollection/tag_game/start.php	Collaborative platform
Google Art Project	http://www.google.com/culturalinstitute/user-galleries?hl=fr&projectId=art-project	Collaborative virtual gallery
SepiaTown	http://www.sepiatown.com/	Interactive map
Map The Museum	http://mapthemuseum.org.uk/	Interactive map
1001 stories of Denmark	http://www.kulturarv.dk/1001fortaellinger/en_GB	Web site
Musetrek	http://www.musetrek.com/	Mobile app

Mobile / Locative storytelling

Project title	Link	Type of project
Wanderlust	http://popupcity.net/featured/wanderlust-location-based-storytelling/	Mobile app
On the road	http://www.ontheroad.to/	Mobile app / Geoblogging
Every Trail	http://fr.everytrail.com/	Mobile app / Geoblogging
7scenes	http://7scenes.com/	Mobile app
What was there	http://www.whatwasthere.com/	Mobile app
Animoto	http://animoto.com/	Mobile app
Voices	http://voices.com/	Mobile app / Audioguide for geolocation route
MobExplore	http://www.mobexplore.com/	Mobile app / Geolocated games editor

Geoquestour	https://itunes.apple.com/fr/app/geoquestour-parcours-touristiques/id400922785?mt=8	Mobile app / Interactive route editor
Paris Avant, Histoire de la Ville en Photos	https://itunes.apple.com/fr/app/paris-avant-histoire-la-ville/id439646989?mt=8	Mobile app / Augmented reality
Tap	http://tapintomuseums.org/	Mobile app / Mobile guide editor
Parkmanmurder	http://www.parkmanmurder.com/	Mobile app / Interactive geolocated route
Memory loops	http://www.memoryloops.net/en#!/start/	Website + mapping
SmartMap	http://www.smartcity.fr/smartmap/	Website + mapping
Moveable feast	http://www.mvabl.com/index.php	Map + mobile app
My Hystro	http://www.myhistro.com/	Website + mobile app / Timeline + maps
Map box	http://www.mapbox.com/	Map editor
Cartodb	http://cartodb.com/	Map editor / Data visualisation
Promenades urbaines SmartCity	http://www.smartcity.fr/ciup/projet/promenades-urbaines-smartcity-visites-enrichies-du-territoire.html	Enriched location visits
Les sentiers numériques Arles	http://www.lessentiersnumeriques.com/	Interactive routes / QR codes
Google Goggles	https://play.google.com/store/apps/details?id=com.google.android.apps.unveil&hl=fr	Mobile app / AR
Walking through time	http://www.walkingthroughtime.co.uk/	Mobile app
[Qr]iosité	http://www.griosite.com/	Mobile app / Interactive QR code route
Field trip	https://play.google.com/store/apps/details?id=com.nianticproject.scout&hl=fr	Mobile app / Geolocation
Château de Vincennes	https://itunes.apple.com/us/app/chateau-de-vincennes/id414480877?ls=1&mt=8	Mobile app / Audioguide
Thotle	http://www.thotle.fr/applications/thotle-revelateur-de-patrimoine	Mobile app / Multimedia guide
Audioguide Louvre	http://www.louvre.fr/l-audioguide-du-musee	Audioguide Nintendo 3DS XL
King's Cross, London - Streetstories Extra	https://itunes.apple.com/gb/app/kings-cross-london-streetstories/id504574433?mt=8	Mobile app / Audioguide
Geo Culture	http://geo.culture-en-limousin.fr/Domaine-culture-occitane--16.html	Online map creator
Autumn 10	https://itunes.apple.com/fr/app/autumn-10/id396897725?mt=8	Mobile app / Cartography + sound
Cluny Vision	http://clunyvision.com/	Mobile app

Transmedia storytelling

Project title	Link	Type of project
Le défi des bâtisseurs	http://cathedrale.arte.tv/	Web doc
In situ	http://insitu.arte.tv/fr/#/home	Web doc

Immersive storytelling

Project title	Link	Type of project
Layar	http://www.layar.com/	Mobile app / Augmented reality
CultureClic	http://www.cultureclic.fr/	Mobile app / Augmented reality
Éditions volumiques	http://volumique.com/v2/portfolio/dungeon-crawling/	iPad app / Virtual + Augmented reality
Maquette numérique CIUP	http://www.macite-u.com/la-maquette-numerique/	
Streetmuseum	http://www.museumoflondon.org.uk/Resources/app/you-are-here-app/home.html	Mobile app / Augmented reality
Google Glass	http://www.google.com/glass/start/	Augmented reality
Aurasma	http://www.aurasma.com/#/whats-your-aura	Mobile app / Augmented reality
Collectrium	http://collectrium.com/	Mobile app / Augmented reality
Fenêtre augmentée	http://www.thierryfournier.net/fenetre-augmentee/	Augmented reality
Imayana	http://www.bordeaux-tourisme.com/pl/coup_coeur.pl?lg=fr&id=1133	Mobile Augmented reality
Blinkster	http://www.blinkster.eu/fr	Mobile app
Visite guidée 360° de l'exposition Bohèmes, Grand Palais, Paris	https://itunes.apple.com/fr/app/visite-guidee-360-lexposition/id565074464?mt=8	Mobile app / 3D
Complot à la Corderie	http://www.corderie-royale.com/visite/corderie-royale/complot-a-la-corderie/	Mobile app / Game
Toile de Jouy : la manufacture virtuelle d'Oberkampf	http://amisdelatoiledeljouy.fr/concours-du-ministere-de-la-culture/	Virtual tour
Vatican - Chapelle Sixtine	http://www.vatican.va/various/cappelle/sistina_vr/index.html	Virtual tour

Nécropole égyptienne du plateau de Giza	http://giza3d.3ds.com/en-experience.html?L=en	Virtual tour
Grand Palais Paris	http://sisso.fr/grandpalais/	Virtual tour
Smithsonian National Museum of Natural History	http://www.mnh.si.edu/vtp/1-desktop/	Virtual tour
Love is in the air	http://www.mu.asso.fr/Love-Is-In-The-Air-Singapour	Mobile app / immersive sound walk
Wild	https://itunes.apple.com/fr/app/sound-delta-wild-01/id377017107?mt=8	Mobile app / immersive sound walk
MyCityBefore	http://www.mavilleavant.com/	Mobile app
MTL Urban Museum	http://www.mccord-museum.qc.ca/en/mobile/MTLUrbanMuseum/	Mobile app
TimeShutter	http://www.timeshutter.com/	Mobile app

Generative storytelling

Project title	Link	Type of project
Heritage Experience	http://heritage-experience.fr/fr/	Mobile app / multimedia guide
Walk with me	http://www.strijbosvanrijswijk.com/cms/index.php?option=com_content&view=article&id=69&Itemid=83	Mobile app / sound walk
Serendipitor	http://serendipitor.net/site/	Mobile app / serendipity walk

6.2 Detailed projects presentation

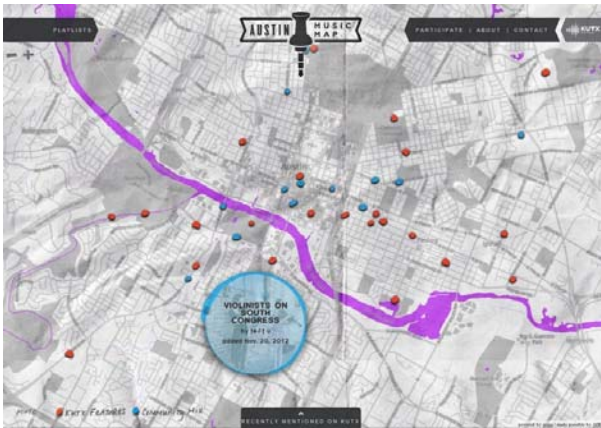
17 particularly representative projects have been chosen from the mapping and are presented here with the following information:

- Project identity: name of the project, the structure i.e. who launched the project and its type, country, possible other partners and producers, website
- Typology of storytelling, according to the one defined in paragraph 5.1
- Sector(s) of application
- Audience to which the project is dedicated
- Brief description of the project
- Strengths and weakness of the project for the users' experience

The selected projects reveal the trends in digital storytelling services and provide a good overview of current needs for valorisation of digital heritage. This selection shows that:

- A lot of services are based on user involvement
- Most of the projects are also available on mobile devices
- It is appropriate to adapt storytelling to several complementary devices
- Immersive devices are increasingly rich
- Indexing processes added to sophisticated algorithms allow to produce generative and mobile devices

6.2.1 Collaborative storytelling

Austin Music Map	
Structure: KUT- Experience Austin Texas	
Type of operator: Music Station, University of Austin – Texas	
Country: USA - Texas	
Producers: KUT, Localore, a national initiative of the Association of Independents in Radio (AIR); and Zeega.	
Web site: http://austinmusicmap.com/#	

Typology: collaborative storytelling - platform – mobile application

Sector (s): Culture – music

Audience: general audience, inhabitants, music lovers, musicians

Description:

The Austin Music Map is an interactive public media story that gives music lovers around the world a chance to experience some of the city's official and unofficial music venues and artists. The website is also a platform where people can share photos, videos, sounds, all kinds of media from those

experiences thanks to a collaborative approach: people are invited to contribute to the map by taking a picture or making a video or recording a story with their cellphone about one of their favorite musical moments in Austin and post it to the platform thanks to mobile application. It creates an ever-growing playlist.

Strengths

- Sound map interface: contents display, preview, easy crossing from map to sound contents.
- Richness of users stories: sharing of musical personnel experiences, coming enrich the map.
- Use of social networks for map enrichment (Flickr, Instagram, Soundcloud, Youtube): contents creation, add of tags, sharing.

Weaknesses

- Difficulties in separating contents from service provider and user generated contents.

Brooklyn Museum

Structure: Brooklyn Museum

Country: USA

Web site:

https://www.brooklynmuseum.org/opencollection/tag_game/start.php

Type of operator: Museum



Typology: collaborative storytelling - tagging

Sector(s): Museum - Art

Audience: general audience, tourism, art lovers, regular audience of this museum

Description:

Brooklyn Museum has permanent collections ranging from ancient Egyptian masterpieces to contemporary art.

It believes in community and in the importance of the visitor experience. They go further than the simple space of on-line contact, by the creation of a "posse" allowing the creation of a community of debate within the audience about the online collection. (posse: a large group, often with a common interest). People have to Register or log in to the Brooklyn Museum Posse and work with the online collection. Their favorites, comments and tags will display on their Posse profile. Posse members can play collection-based tagging games.

Strengths

- Indexing and annotation system of objects open to users: comments, talk, and tags.
- Possibilities to create a personal virtual exhibition space.

- Functionalities available to users to reuse and share contents.

Weakness

- Weakness of design and ergonomomy.

Cinemacity

Structure: Arte

Country: France

Co-producers: Small Bang studio and Arte

Partners: Mairie de Paris, Forum des Images, CNC, Arte VOD, Univers Ciné, francetvpluzzvad, Internet Archive

Web site: <http://cinemacity.arte.tv/>

Type of operator: European Audiovisual Media



Typology: collaborative storytelling - mobile application – cartography

Sector (s): Culture – cinema

Audience: general audience, urban and cultural tourism, cinema lovers, Arte audience

Description

Cinemacity is a project of cinewalks in Paris thanks to a free and collaborative application for smartphone.

Cinemacity geolocates film excerpts throughout Paris, exactly where they were shot. Different cinewalks are available to users, enabling them to discover the city through the lens of cinema. Navigation is based on a cinemap that offers some spots and some possible walks.

It's a collaborative approach thanks to the possibility for anybody to contribute to the Cinelab - laboratory of content created for Cinemacity – through a "sweded" version of a film scene shot in Paris.

Strengths

- Possibility for users to enrich the project within a section dedicated to movie creation.
- With a playful approach, the collaborative part proposes an original mode of mediation of the subject matter.

Weaknesses

- Very high level of user involvement, for a complete experience the user must be involved at several levels: exploration through the map and mobile app, discovery via urban promenades, participation in competition for creating movies.

7 scenes

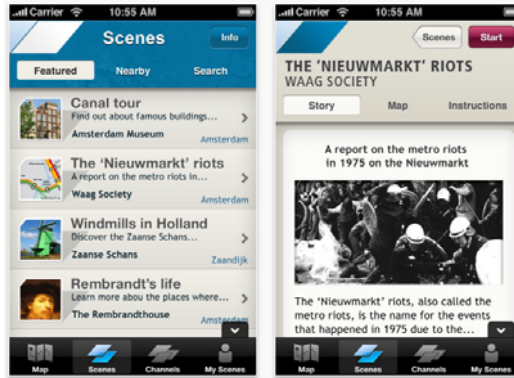
Project producer: 7 scenes (mobile storytelling company)

Type: private

Country: the Netherlands

Site web : <http://7scenes.com/>

Date of the project : launched in 2007



Typology : collaborative storytelling – mobile app

Sector (s): cultural heritage (museums, archives, cultural institutions), tourism, education, cities, events

Audience: general and specific audiences

Description

7 scenes is a mobile storytelling platform, providing tools to create location based tours and games for smartphones ("Scenes"). It offers the opportunity to create scenes: drag and drop media and challenges on a map, and to add game mechanics; to play scenes, using the Apps for iPhone and Android, to navigate places, discover stories, perform challenges and upload media; to share Scenes with the Scene community: to explore available Scenes online and contribute personal experience, and share scenes and embed them in a website; the admin tools allows to manage Scenes online.

Strengths

- Personal experience of the city, of heritage, of museum through game creation and personal visit tour.
- Possibility to connect area and medias to create stories.
- Mobile upload of contents and sharing on social networks.
- Alert system for contents reading in mobility.

Weaknesses

- Difficult viewing of little pictures with a pop up system in mobile app: no full screen option.
- Default map does not present all contents and tour possibilities: difficulties to view the abundance of contents at first sight.

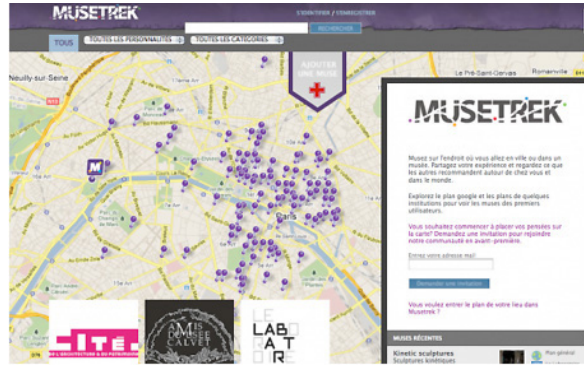
Musetrek

Project initiator: Idea Translation Lab – Harvard University

Type: private

Country: USA

Other structures/people involved: Le Laboratoire – Paris; Boston Public Schools; Cashman Andrus – Developer; Shilpa Gupta – Artist (participated in the experimentation led at the Louvre museum in Paris).



Web site: <http://www.musetrek.com/>

Typology: collaborative storytelling - mobile app

Sector (s): culture, tourism

Audience : Museums visitors, general audience, inhabitants, tourists

Description:

MuseTrek is a mobile application and a website that allows to create, share and access “muses”: text, picture and audio track referring to the places users visit. Muses can be registered all over the world. Anyone can create own path (“trek”) to propose personalized visits of museums, cities or places. People invite their friends and the Musetrek community to share their thoughts, trips and explorations, creating an interactive visit experience. There are also “thematic maps” as the future of water, where people can give ideas on a topic and link it to a place in the real world.

Strengths

- Richness of the collaborative contents shared by users on a place, an art work...
- Sensitive and personal vision of heritage.
- Articulation between contents in public space and contents inside museums.
- Filtering of information by “personalities”, “categories” and “users profiles”.

Weaknesses

- Unequal quality of users contents.
- No cartographic view on mobile app.

History Pin

Project initiator: We are what we do

Type of operator: non profit

Country: England

Partners: Google

Website: <http://www.historypin.com/>

Date of the project: 2011



Typology: collaborative storytelling

Sector (s): culture, tourism

Audience: General audience, families, neighborhoods, museums, schools, universities

Description:

History Pin is made up of photographic images, videos, audio clips and descriptive and narrative text. Photographic images can be pinned directly to the History map by users. These images can be of any location – outdoors or indoors – at any time in the past.

Some of these images, if they are taken outdoors, at street level and at certain angles, can be layered onto Street view.

Audio and video content can be pinned to the map by users. These should be pinned to the location and date where they were recorded.

Any kind of descriptive or narrative text can be added to images, audio or video.

Strengths

- Wide community of users sharing archive of historical photos, videos, audio recordings and personal recollections.
- Contributions from personal archive material and from museums, local history societies, newspaper archives...
- Possibility of overlaying pictures (archive material) on the view of camera image to compare it with the contemporary context and location (mobile app).
- Display on Google Maps and Google Street View.

Weaknesses

- Archive documents notices: reference and links to original documents.
- Reuse of HistoryPin services and technologies: no API, access and visibility of metadata

6.2.2 Mobile / Locative storytelling

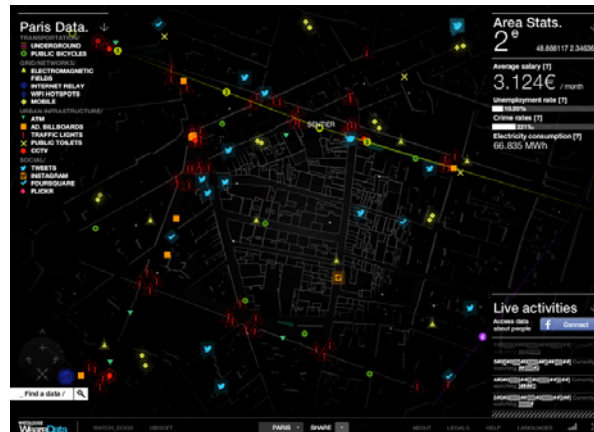
Watch Dogs – We are Data

Project initiator: Ubisoft

Type of operator: private

Country: France

Website:
<http://wearedata.watchdogs.com/>



Typology: Locative storytelling – interactive mapping

Sector (s): entertainment, video games

Audience: General audience

Description:

Watch_Dogs WeareData is the first website gathering in the same place public data from Paris, London and Berlin. Each city has been re-created on a 3D map, in order to enable website users to discover in real time how modern cities organise and treat these data. The website also gives access to various informations on the inhabitants of these cities, through their activities on social networks.

Strengths

- UX design and graphical interface.
- Reuse of open data and User Generated Contents.
- Discovery and immersion in the digital “open” data world.
- Editorialization and mix of heterogeneous information.

Weaknesses

- Demo tool, real uses for digital storytelling and digital heritage still have to be invented.

Streetmuseum

Structure: The Museum of London

Country: United Kingdom

Partners: TV Channel History tm

Project: Streetmuseum-Londinium

Website:
<http://www.museumoflondon.org.uk/Resources/app/Streetmuseum->



[Londinium/home.html](http://www.museumoflondon.org.uk/Resources/app/you-are-here-app/home.html)

<http://www.museumoflondon.org.uk/Resources/app/you-are-here-app/home.html>

Type of operator: Museum

Sector(s): Culture – Museum

Audience: general audience, urban tourism, education, archeology lovers

Typology: Locative storytelling – mobile application

Description:

Streemuseum-Londinium is an immersive storytelling about Roman London thanks to a free application for mobile. It's an advanced version of Streetmuseum.

It offers to the users several possibilities: a guided walk in Roman London thanks to a map, it directs users to locations across the capital where they can immerse themselves in the sights and sounds of Roman London, possibility to digitally excavate Roman artefacts, to see scenes of Roman London through augmented reality video.

Strengths

- Temporal filtering of the map.
- Discovery of contents by playful approach.
- Sharing functionalities on social networks of visit information (finding objects...).

Weaknesses

- Visualization of archeological object is not optimal (blinking, full screen...).
- No personalization of the proposed route.

Walking Through Time – Edinburgh

Structure: Edinburgh College of Art and the University of Edinburgh

Country: United Kingdom

Development: Edinburgh College of Art, University of Edinburgh

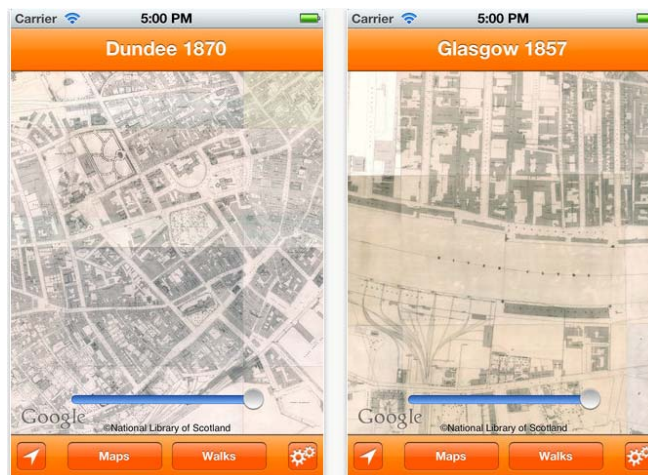
Partners: National Library of Scotland, the Visualising Urban Geographies research group, and EDINA mapping services
A JISC funded project.

Project: Walking Through Time

Website: <http://www.walkingthroughtime.co.uk/>

Date of the project: 2010

Type of operator: Educational sector



Typology: Locative storytelling

Sector(s): Culture – History – Urban tourism - Heritage

Audience: general audience, cultural tourism, students, experts

Description

Walking Through Time – Edinburgh is a mobile application that combines GPS technology with old and modern day maps.

The Map set is for central Edinburgh although now features maps for Dundee, Glasgow and Perth. The application allows the user to see Historic maps from 1765 to 1939 and reveal the changes of the cities over time.

The application also comes with a set of narrated walking tours from the Edinburgh College of Art and Edinburgh World Heritage.

Strengths

- *In situ* location and navigation on historical maps.
- Time cursor allowing the display of archives map background from several historical periods.

Weaknesses

- All the maps are unequally treated: no zoom, difficulties to read texts and information.

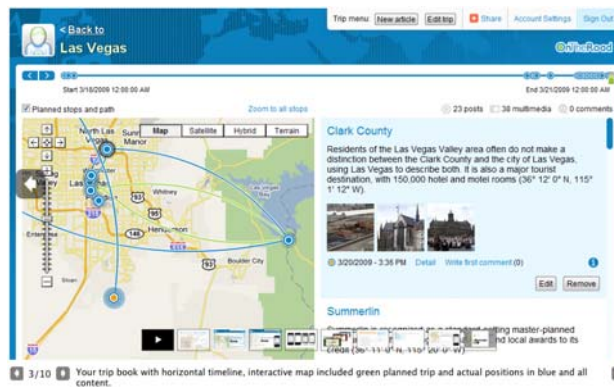
OnTheRoad

Project leader: OnTheRoad Inc

Type: private

Country: Czech Republic

Site web: <http://www.ontheroad.to/>



Typology: locative storytelling – web site and mobile app

Sector(s): Tourism

Audience: Travellers and their friends

Description:

OnTheRoad is an online trip book, which gives the possibility to users to share their journey at every step of the way. It provides an interactive map, to track locations and plan next destination. Photos and videos can be easily published and shared. Personal notes can be uploaded. It is also possible to

connect with other travelers. Every account is accessible through web interface or email. Email contacts can be accessed, and an application is available for iPhone, Android or Windows mobile.

Strengths

- Complementarity between web site and mobile app, rework of contents posted on mobility: moving of interest points, media add, cross-contribution of mobile and sedentary users.
- Multi-user contribution allowing interesting possibilities for animation and mediation during the visit.
- Embedded code for path and associated media sharing.

Weaknesses

- No video functionalities
- Free version limited (number of path).

6.2.3 Transmedia storytelling

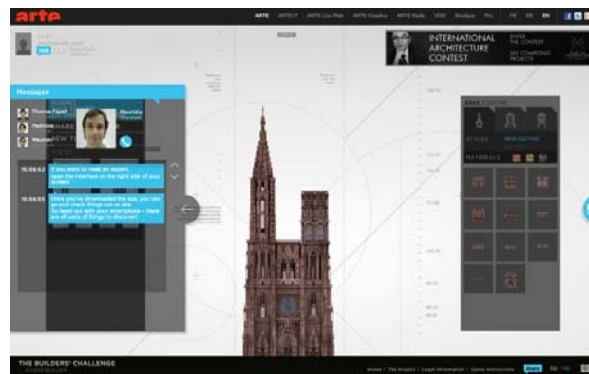
The builders' challenge

Project producers: SEPPIA, Indi Film, ZDF, Arte GEIE
Type: private

Country: France, Germany

Web site:

<http://cathedrale.arte.tv/index.php>



Typology: transmedia storytelling

Sector(s): cultural heritage, tourism

Audience: tourists in Strasbourg, general public

Description:

The builders' challenge is a transmedia project, in the heart of gothic cathedral of Strasbourg. It consists in 4 media platforms which are all linked up: a 3D film, about the craftsmanship of gothic master builders, telling the story of the building; a doc-game, in which the user builds a second tower to the Strasbourg cathedral, accessing to 3D documents, archives and design tool; a mobile app: providing an interactive tour guide.

Strengths


- The project aims at providing users with the possibility to do research in an interactive way, on the web or by using smartphone on site. All stories elements form a complete whole, each media component referring to the other components of the project.
- Richness of the user experience: playful approach thanks to the architecture competition and mobile game, *in situ* augmented visit, crossing of information (experts meeting and historical documents), 3D movie.

- Complementarity of stories on the different supports.

Weaknesses

- Very difficult for the user to follow all the possibilities of the project experience in the time.

6.2.4 Immersive storytelling

ArtCapture	
Structure: Collectrium	
Type of operator: private entreprise	
Country: USA	
Producers: Collectrium	
Web site: https://itunes.apple.com/us/app/artcapture-by-collectrium/id377459865?mt=8	
Date of the project: 2013 (last updated version)	

Typology: immersive storytelling - paying mobile application

Sector (s): Culture - art

Audience: general audience, cultural tourism, students

Description:
ArtCapture is a mobile application for artwork recognition and instant information. Informations are displayed by museums, artists or galleries that have joined the Collectrium Network. This application offers to users to take a photo of an art piece in a museum, gallery or in the street and to receive all information about it. You can register your favorite works of art and add notes. The application will also store the image.
Thanks to an additional paying application, you can share with other peoples your own art gallery.

Strengths

- Lightness of the device: access to contents without going through particular signage as QR codes: principle of « Shazam for Art ».
- Facility of deployment of the solution for contents owners (galleries, collectors ...).
- Enrichment of the visit tour and immersion into contents: good articulation between physical tour and digital contents.
- Enrichment possibility of the database by users.

Weaknesses

- Too much restricted functionalities on the free app version.

Complot à la Corderie

Structure: La Corderie Royale –
Centre international de la mer

Type of operator: Museum

Country: France

Partners: Furet Company and
Quadrants Edition

Project fselected under the framework of
the french ministry of Culture programm
2012 « Services numériques culturels
innovants.



Project: Complot à la Corderie

Website : <http://www.corderie-royale.com/visite/corderie-royale/complot-a-la-corderie/>

Typology: immersive storytelling - mobile application - roleplaying

Sector(s): Culture – History – Heritage

Audience: general audience, cultural tourism, young people

Description:

Complot à la Corderie is a role playing about the Royal Rope factory and the arsenal of Rochefort. Thanks to a smartphone, the visitor is plunged into a role-play mixing the universe of the naval dockyard in the 18th century and that of an historic BD. The museum offers 2 kinds of "role games": the "Prologue" in the day and the big game in the evening. The mobile application is free of charge.

Strengths

- Original, playful and immersion approach: gameplay mechanics allows a strong involvement of visitor within the universe of La Corderie.
- Richness of contents associated to the game: maps, definitions, objects.

Weaknesses

- No iPad app.
- Limited customization and no interaction with external users.

CultureClic

Structure: i-Marginal

Type of operator: Private agency

Country: France

Editor: youARhere

Partners : Réunion des Musées Nationaux (RMN), Bibliothèque Nationale de France (BNF), Ministère de la Culture et de la communication français

Website: <http://www.cultureclic.fr>

Date of the project: 2010

Typology: Immersive storytelling - mobile application

Sector(s): Culture – art - heritage

Audience: general public, urban tourism

Description:
 CultureClic is a free application on mobile (iOS) giving access to pieces of art - via catalog of the French museums – geolocation based on Paris, Bordeaux, Lyon, Marseille and Avignon. It allows the user to have access to visual elements of the places where he is via the increased reality and to enrich it as he walks in the city. CultureClic uses for it the catalog of the RMN and the Galica de la BNF archives. The application also allows having access to the cultural offer of closeness area.

Strengths

- Aggregation of rich contents from several catalogs: Réunion de musées nationaux, Gallica, Bibliothèque nationale de France.
- Intuitive Navigation through contents.
- Access to the contents by mapping and augmented reality.

Weaknesses

- Contextualization and information about historical contents.
- No possibility to display archives resources as an additional layer on reality image.
- No functionality of sharing and no interaction with content.

Guided tour 360° of exhibition “Bohèmes”

Structure: Réunion des Musées Nationaux (RMN)

Type of operator: museum

Country: France

Editor: RMN

Partners: French Ministry of Culture and Communication

Website:

<https://itunes.apple.com/fr/app/visite-guidee-360-lexposition/id565074464?mt=8>

Date of the project: 2012



Typology: immersive storytelling - Free mobile application 3D

Sector (s): Culture – History – Art

Audience: general audience, cultural tourism, experts, education

Description:

“Guided tour 360° of exhibition “Bohèmes”, Grand Palais, Paris is a free Ipad application. It allows the user to make a visit in chapters commented by a speaker of the RMN-Grand Palais filmed in panoramic 360°. It uses a new technology combining panoramic recording and video. The exhibition is available in 5 languages.

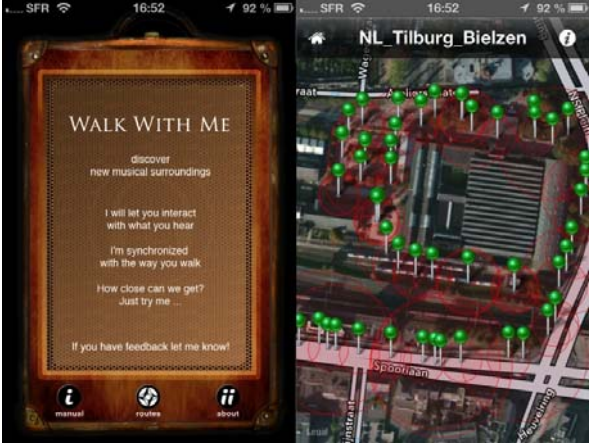
Strengths

- Living Virtual exhibition and strong immersion of the visitor in the place thanks to the integration of video elements inside 3D interface (mediation by a speaker).

Weakness

- No information about art works when the speaker does not present them
- No interaction with other users.

6.2.5 Generative storytelling

Walk With Me	
Structure: Strijbos & Van Rijswijk	
Type of operators: composers - producers	
Country: Netherlands	
Programming by: Elephantcandy	
Web site: http://www.strijbosvanrijswijk.com/cms/index.php?option=com_content&view=article&id=69&Itemid=83	
Date of the project: 2011	

Typology: Generative storytelling - mobile application – sound walk

Sector (s): Culture – music – sound walk

Audience: general audience, urban tourism, music lovers

Description:
Walk With Me is a free application for iPhone and iPad. It's a sound walk. It offers to the users a topographic compositions sound experience linked to the "travel" of the users between the installation of spots in a specific area.
It offers a new perception and experience of the area thanks to the variety of sounds that is provided by the app.
Location of the work: nationally and internationally in London, New York, San Francisco, Amsterdam, Berlin, Shanghai, Belgrade, Istanbul, Ljubljana...

Strengths

- Dynamic generation of a story during the visit.
- Each visit path leads to a singular experience.
- Personalization of experience and sound contents according to visit path.

Weaknesses

- No recording of visit path.
- No sharing options.

Heritage Experience

Structure: C-side Productions

Type of operator: private

Country: Switzerland

Producers: C-side Productions, Dédale, Cité internationale universitaire de Paris, French Ministry of Culture and Communication



Web site: <http://heritage-experience.fr/>

Date of the project: 2010 - 2013

Typology: generative storytelling - locative storytelling

Sector (s): Culture – tourism

Audience: general audience, inhabitants, tourists

Description

Heritage Experience is a digital cultural service dedicated to the promotion of the territory and heritage. Based on an innovative iPhone application, it allows users to explore the territory and to access in mobility a set of audiovisual content LBS (archive footage, interviews with land users, views of experts, stories of people ...).

Along the path, the iPhone app compiles these contents according to the movements and behavior of the user. A film is generated in real time, thanks to a dedicated editing engine, allowing a narration of the territory.

Strengths

- Technical and use innovation: editing engine allowing to generate an original and personal visit path.
- Sensitive approach of material and immaterial heritage proposing a variety of viewpoints: experts, curators, users, inhabitants...
- Sophisticated analysis of user's behavior.
- Capacity of the device to reveal the "audiovisual memory" of a place.

Weaknesses

- Graphic interface of mobile app does not allow to visualize the editing process of movies during the visit.
- No information about the archives resources.

7 RECOMMENDATIONS

Based on the survey work documented above and as a conclusion of this deliverable, we can highlight the following emerging and current recommendations for the creation of a digital narrative project:

1. 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);
2. 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);
3. 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.
4. 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) ;
5. Investigate the possibility to use Europeana as one of the main sources of such external data, thereby exploring the functionalities Linked Open Data offers;
6. The use of GIS should be encouraged so that interactive cartography or maps can become part of the narrative story;
7. 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, ...) ;
8. These tools should allow editing also of the separate content pieces – which might be 2D as well as text or sound documents;
9. 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 ;
10. 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 behavior;

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.

Together with the general recommendations from the user's perspective, as they have been given in D5.1 Report on the user needs and requirements (see chapter 4.2.5.), the technical team of WP5 will keep these recommendations in mind when developing the AthenaPlus application environment and the tools that will serve the pilots in WP6. More specifically, they concern:

- A tool allowing for the creation of virtual exhibitions and cultural tourism routes which will be useful for Task 6.3 (BNCRM, ICIMSS, ILS, LAM, RA, PIM, ICCU, HMTIC);
- An environment that will facilitate digital storytelling (made by Dédale) to be used in Task 6.2;
- A tool involving GIS components applied to digital cultural heritage for Task 6.3 (made by IPCHS).

A second version of this deliverable will be released after the project plenary meeting in October 2013. During this meeting, the AthenaPlus WP5 Working Group will, together with the technical team, determine the functional requirements for these tools to be developed. The results will also serve the pilot actions of WP6.

8 RESOURCES

8.1 Educational resources

8.1.1 List of editing tools

- Audacity (sound editor), <http://audacity.sourceforge.net/>
- iMovie (Apple)
- iPad Apps for Digital Storytelling (Apple)
- KidsVid (storyboarding tool), <http://kidsvid.4teachers.org/>
- Mixbook, <http://www.mixbook.com/>
- Movie Maker (Windows), <http://windows.microsoft.com/it-it/windows-live/movie-maker>
- MyBrainshark, <http://www.brainshark.com/mybrainshark>
- Photo Story 3 (Microsoft), <http://www.microsoft.com/en-us/download/details.aspx?id=11132>
- VoiceThread, <http://voicethread.com/>
- Yodio, <http://www.yodio.com/>

8.1.2 Teacher resources

- Art and Digital Storytelling in Education, <http://www.jasonohler.com/storytelling/index.cfm>
- Digital Quill, <http://jonorech.wikispaces.com/>
- Digital Storytelling Cookbook, <http://www.storycenter.org/cookbook.html>
- Digital Storytelling Guide, <http://langwitches.org/blog/wp-content/uploads/2009/12/Digital-Storytelling-Guide-by-Silvia-Rosenthal-Tolisano.pdf>
- Down and Dirty with Digital Storytelling, <http://jonorech.wikispaces.com/Down+and+Dirty>
- KQED's Digital Storytelling Initiative, <http://dsi.kqed.org/>
- Microsoft's Digital Storytelling eBook, http://www.microsoft.com/education/teachers/guides/digital_storytelling.aspx
- Sample Rubrics and Storyboards for Digital Storytelling (Discovery Education), <http://hubforteachers.discoveryeducation.com/taking-it-digital/rubrics-storyboards.cfm>
- VoiceThread 4 Educators Wiki, <http://voicethread4education.wikispaces.com/>
- VoiceThread Digital Library of Projects, <http://voicethread.com/community/library/>
- Web 2.0 Storytelling: The Emergence of a New Genre, <http://web2storytelling.wikispaces.com/>

8.2 Further resources

- Digital Storytelling Important Resources, Calvin College, <http://www.calvin.edu/~dsc8/digital-storytelling.htm>
- Digital Storytelling 2.0 (From Discovery Education), <http://web2012.discoveryeducation.com/blog/index.cfm/2011/4/27/Digital-Storytelling-20-Connect-create-and-collaborate>
- Digital Stories: Designing and Implementing eLearning, http://designing.flexiblelearning.net.au/gallery/activities/digital_story_telling.htm
- Digital Storytelling: Tips and Resources by Gay Matthews-De Natale, Simmons College Boston, <http://net.educause.edu/ir/library/pdf/eli08167b.pdf>
- Digital Storytelling by Marc Cardinale, , ED 5670 *Literacy and Technology* – online. From the presentation: <http://www.slideshare.net/mcar5427/digital-storytelling-7746755>
- The University of Houston, <http://digitalstorytelling.coe.uh.edu/index.html>
- 7 Things You Should Know About...Digital Storytelling by Educase, <http://net.educause.edu/ir/library/pdf/ELI7021.pdf>
- Digital Storytelling by Electronic Portfolios, <http://electronicportfolios.com/digistory/>
- Educational Uses of Digital Storytelling by Bernard Robin, <http://digitalstorytelling.coe.uh.edu/powerpoint/Educational-uses-of-DS.ppt>

- Introduction to Digital Storytelling (Resources) by Dr. Alec Couros couros@gmail.com reviewed July 2012, https://docs.google.com/document/d/15iHScDVI_0ioxw7vR39Tpd0VI5n6lXQUgop7a6bWBVw/mobilebasic?pli=1
- The Educational Uses of Digital Storytelling Website - Digital Storytelling Hands-On Lab by Bernhard Robin (April 12, 2011, <http://faculty.coe.uh.edu/brobin/TLA/pages/02.htm>)
- Robin, B.R., & McNeil, S.G. (2012) What educators should know about teaching digital storytelling. In: Digital Education Review, 22, 37 - 51. [Accessed: June, 4 2013], <http://greav.ub.edu/der/index.php/der/article/view/212/394>
- Educational Uses of Digital Storytelling Website, <http://digitalstorytelling.coe.uh.edu>
- Lambert, J. (2010). Digital storytelling cookbook. Berkeley, CA: Digital Diner Press. Retrieved on June 4, 2013 from <http://www.storycenter.org/cookbook.pdf>
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- Jason Ohler handouts for storytelling, <http://www.jasonohler.com/resources/handouts.cfm#storytelling>
- Cyberbee Digital Storytelling, http://www.cyberbee.com/storytelling_sites.html

8.2.1 Digital storytelling in practice

- Library Technology Reports, ALATechSource, American Library Association, October 2009, Author: Kelly Czarnecki, Link to the purchase page: <http://www.alatechsource.org/library-technology-reports/digital-storytelling-in-practice>
Chapter Contents: 1: Storytelling in context 2: Storytelling in the Context of Modern Library Technology 3: How Digital Storytelling Builds 21st Century Skills 4: Digital Storytelling in Different Library Settings 5: Software for Digital Storytelling 6: Resources.
In this issue of Library Technology Reports the author shows the way that digital storytelling has emerged from the timeless practice of traditional storytelling. It explores how digital storytelling has been used in different contexts to aid educators and how librarians can effectively implement digital storytelling programs. Included there is a review of the technological tools that can be used to tell a digital story.

8.2.2 Websites

- Center for Digital Storytelling, <http://www.storycenter.org/>
- The Art of Telling Digital Stories / DigiTales Storymaking Steps, <http://digitales.us/resources/digitales-storymaking-steps>
- A Guide to Digital Storytelling by members of the BBC Capture Wales Team. March 2008. <http://www.bbc.co.uk/wales/audiovideo/sites/yourvideo/pdf/aquidetodigitalstorytelling-bbc.pdf>
- Digital Storytelling (Adobe) <http://www.images.adobe.com/www.adobe.com/content/dam/Adobe/en/education/pdfs/digital-storytelling.pdf>
- Resources for Digital Storytelling from the Stony Brook University Libraries <http://guides.library.stonybrook.edu/content.php?pid=198963&sid=1664003>
- Stories for Change Resources Page <http://storiesforchange.net/resources>
- The National Archives Experience(NARA) <http://www.digitalvaults.org/>

8.2.3 Conference proceedings

- STEG'09: Story-Telling and Educational Games
Proceedings of the 2nd International Workshop on Story-Telling and Educational Games (STEG'09)RWTH Aachen University, Aachen, Germany, August 21, 2009
in conjunction with the 8th International Conference on Web-based Learning 2009 (ICWL 2009)
RWTH Aachen University, Aachen, Germany, August 19-21, 2009
<http://ceur-ws.org/Vol-498/>
- STEG'08 Story-Telling and Educational Games
Proceedings of the First International Workshop on Story-Telling and Educational Games (STEG'08)The power of narration and imagination in technology enhanced learning, September 16, 2008 in conjunction with the 3rd European Conference on Technology Enhanced Learning (EC-TEL'08), Maastricht School of Management, Maastricht, The Netherlands, September 18-19, 2008.
<http://ftp.informatik.rwth-aachen.de/Publications/CEUR-WS/Vol-386/>

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