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Homm-sw
Networks-of-stories to value tangible and
intangible heritage in museums

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ABSTRACT

Social inclusion, lifelong learning and the regeneration of competence networks are key processes which foster innovation. Museums may play an important role in these processes and ICT can strongly support the effectiveness of the interventions required. Among them, digital tools used to tell stories are becoming increasingly popular. Narratives in new dimensions enable the formation of personal and community identities, and the construction of meanings [1] [2]. Homm-sw supports multimedia narratives which enhance tangible and intangible heritage in education and cultural mediation, as well as in tourism. Developed by Officina Emilia (Italy) and Crafts Museum (India), the application is online at www.homm-museums-software.org. So far, it implements the engine for creating and managing the activity 'networks-of-stories', to create a nonlinear and open multimedia narration. [3],[4]

In the last decade, digital storytelling has spread rapidly due to the growth and possibilities offered by new ICT devices [5] [6]. Together with crowd sourcing it can enrich the understanding of tangible and intangible heritage. Digital storytelling still faces some critical challenges: creation of content on tangible and intangible heritage, classification and re-use of existing documents and clips, cooperative and coordinated production of new content. Moreover, for effective exploratory paths and a more analytical approach to browsing material, contents must be set in the overall perspective of the narrations, to ensure narration is coherent. Finally, validation and dissemination of related outcomes must respect scientific standards.

Homm-sw has tools that: support educators, also in contrasting learning difficulties, in developing inclusive and collaborative educational practices; support curators; facilitate crowd sourcing; create a personal web repository of contents and connections; share contents to be published, if approved by the administrator; create a network of contents and applications, at different levels for different users and specific needs.

Homm-sw extends the museum experience. Before the visit: users can have a general look at museum contents and note, in their online personal desktop, what they are interested in. During the visit: users can retrieve their notes and add what is available on the museum's exhibits and augmented reality, hands-on activities and multimedia contents, living laboratories, demonstration programs. Homm-sw in the onsite-mode allows only notes and memos, to fully enjoy what the museum uniquely offers. After the visit: users access their online workspace to retrieve and explore their notes, and any other content, as much as they wish.

Beyond those common to other ICT tools in use in museums, Homm-sw has two key innovative functions. First, recording and retrieval of users' activities: during the visit in a museum, the visitor accessing her account may browse and take notes in her personal workspace and then retrieve and explore them, and many more, as much as she likes after the visit. Second, narratives presented through a set of related clips (videos, albums, texts) are easily seen in the conceptual map proposed by the curators. Homm-sw can be shared with non-profit organizations which intend to develop new features and share the upgrade with previous users and with new users, on the same conditions. Other engines will be implemented according to the demands of users, together with multi-channel and multilingual extension. As a tool for digital storytelling, integration with other software applications is welcome.

Keywords—personalized workspace; storytelling; multilevel use; social inclusion; education; lifelong learning; crowdsourcing, social innovation, museums

JEL classification: Z1 cultural economics

SHARING AND INCREMENTING CREATIVE COMMONS

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 at the same conditions. The website www.homm-museums.org presents updated information on the software development and on the initiatives promoted by using Homm_sw

I. INTRODUCTION

Museums, places of informal education *par excellence*, have great potential in supporting the education activities in schools and fostering lifelong learning. Moreover, through online information, museums may become key actors in valuing and sharing tangible and intangible heritage.

Through a set of interactive tools, Homm-sw allows visitors to a museum (students, teachers, public) to process (before, during and after the visit) information on tangible and intangible heritage, to use museums' multimedia content in a personalized way, as well as to support the many experiences offered by museums (hands-on activities, living laboratories, demonstration programs).

Homm_sw's designers and developers aim at building greater awareness of the importance of cultural heritage in supporting sustainable social development. It encourages active involvement of users, also as contributors, to increase collective resources shared through the museums websites. Homm-sw is a tool for online information crowd sourcing: it allows the creation and sharing of relevant knowledge on tangible and intangible culture, along dimensions not often available through the scientific and academic literature. Through crowd sourcing and sharing of non-linear narratives, it increases the effectiveness of museums in developing inclusive and collaborative educational practices, contrasting learning approaches and creating connections between people.

Developed by Officina Emilia (Italy) and Crafts Museum (India), the application is online at www.homm-museums-software.org and at present implements the engine for creating and managing the activity 'networks-of-stories', to create a nonlinear and open multimedia narration. [1],[2]

For any activity, the elementary digital documents are 'clips' of three types: videos, texts, images. The engine for networks-of-stories allows one to build a personal sequence to explore and play the clips of the story, according to the sequence triggered by the personal curiosity and interest of the user. The personal path is recorded and then retrieved by the user. Clips may also be viewed according to their main subjects. Metadata, texts and images of each clip can be printed.

When the relevant engines are developed, the contents of the clips may also be re-used online for creating other activities, such as timelines, maps, or serious games.

In museums, Homm-sw links activities before, during and after the visit. Before the visit, it allows the creation of personal workspace and a preliminary self-assessment; during the visit, ICT interaction supports the storing of information in a personal workspace through multi-channel extensions; after the visit, access to the 'memory' of the personal workspace allows the user to continue the exploration of content online.

The application is now in use with administration permissions to upload multimedia contents and their metadata. Public access is available both for the registered users (who can thus create their personal workspace) and for guest users (who approach the applications just for occasional use). Public access is now for browsing of the networks-of-stories.

It has been used to create two networks-of-stories (so far available in English and Italian) available for online access. One network-of-stories runs along eight main themes and consists of 43 clips, including 33 video (about 2-4 minutes, for a total of 100 minutes), 6 photo albums (with almost 300 photos), and 4 clips with only text and images. Other networks-of-stories are under review.

Further applications where development is in progress are: back office tools to facilitate uploading of contents and to design networks-of-stories through 'objects'; managing of multilingual contents; serious games, timelines, maps, self-assessment; tools for coordination of group work and submission of group work for publication in the museum online content repository. Together with sharing through social media and a multichannel version, all these functionalities will be developed and submitted as a complementary storytelling tool in some applications in progress in EU projects on digital heritage, such as Athena-plus, by adopting the standards of online virtual exhibition [3].

II.   WHY DO WE NEED DIGITAL TECHNOLOGIES IN MUSEUMS?

Context of the experience and motivation of the project

Currently, the promoters are Crafts Museum (New Delhi, India) and Officina Emilia (University of Modena and Reggio Emilia, Italy). Crafts Museum, set up in 1956, has embarked on a major restructuring programme to upgrade facilities and also to 'open up' in every sense, its extensive collection of artifacts, so as to better appreciate and value the wealth of traditional skills. The monthly Crafts Demonstration Programme where 40-50 artisans are invited from across the country, offers a unique opportunity for research and documentation of craft traditions. Officina Emilia (OE) offers hands-on workshops on science, technology, history and society so students (as well as their teachers and families) can better understand the social context in which they live. It is a "meeting place" of schools and businesses, where processes of production and innovation and social transformation are examined in a global context.

Although quite different in terms of their collections, the two museums share certain interests and concerns. First, the craft sector in India and the mechanical industries in Italy are both repositories of abundant skills and knowledge that need to be tapped for future growth. Second, the regeneration of competence networks in these sectors is crucial to sustain employment and livelihoods. Third, exposure to skills and practices in these sectors is an important instrument for education and innovation.

Both organisations aim for a new identity for museums as agents of social and economic change. By offering support to education and training systems, Crafts Museum and Officina Emilia hope aim to reach a much wider range of citizens, complementing the knowledge gained in more formal centres of secondary and tertiary education with the unique inputs and approach that museums can provide.

Goals of Homm_sw

Through Homm-sw museums may offer interactive applications ("Activities") to visitors, build tools to assemble Activities, and organize a community around the museum. By proposing Homm-sw to museums and education institutions, we intend: (a) to use ICT to support interactive workshops in museums; (b) to improve the use of the museum on the part of academic and education institutions,

of training centers and in programs of adult education; (c) to promote social inclusion, strengthening the identity of museums as places of learning and to support relationships between individuals, groups and institutions; (d) to encourage the sharing of Homm-sw in networks of museums and research centers interested in its development and use.

III. METHODOLOGIES

ICT for users

Homm-sw uses ICT in five ways: (a) to enhance a large amount of multimedia materials already available for museums' visitors (onsite, in the museums, and on the web); (b) to suggest mental maps that connect information through a semantic navigation and an open nonlinear narrative; (c) to enhance the personal memories of themes and experiences acquired by interacting with the museums' heritage; (d) to support a collaborative environment for communities of practice involved in the processes of teaching - learning and processes of social inclusion and cohesion, i.e. the museums' operators, teachers, literacy centres for migrants, local educators, social workers and operators in social rehabilitation, facilitators in communities of elders; (e) to create a storage of multimedia content produced through the activities and interactions in communities of practice; (f) to produce and disseminate original materials for educational use, in any educational institution, on the salient features of the area (the cultural, historical, institutional, social, economic, technological and environmental).

Software achitecture

To meet these aims, the software architecture adopted in the development of Homm-sw is based on four pillars: (1) a web system for creating and managing community of users, authors, administrators of the sw platform and of contents; (2) ICT information points in the museum that integrate multimedia activities with the hands-on activities; (3) a website with a personal workspace that allows you to 'continue the visit after the visit'; (4) a working group for the production and content management, and a set of collaboration tools used to expand the storage of content.

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. as school classes accompanied by teachers) will set the conditions to create a personal workspace and a group's workspace. A self-assessment test prior 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 information 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 following Figg. 1-7 outline the main features of the software architecture: multimedia clip repository, activity authoring and use of clip repository; activity engines and custom activities; personal space and activity instances, user interaction state, generalization; user lifecycle by using Homm_sw; user identification and user role.

The most original parts of the architecture of Homm-sw are: 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; 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 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.

Software functionalities so far designed

To date, three types of software tools have been designed.

The first relates to the user in the context of the visit. A selection of digitized information, such as text, photos, video and voice comments made during the visit can be stored. All this information can be retrieved and used in subsequent activities to be shared by classmates and by others selected from the groups of registered users. The teachers accompanying the class can re-elaborate the texts, build narratives, browse storytelling of their students, share activities and collaboration with peers, and more others.

A second type of functionality concerns potentials of personalization of information for the individual user. The elementary unit in the network-of-stories is the clip (a video, a photo album, a text). Each clip is a narrative with a nucleus around which develops a beginning and an end. Through the connections between clips, individual narratives form a network-of-stories. The connections between the clips are a trace for an open narrative, non-unique. Each object (media clip) is included in a network of content and applications at different levels (for specific users and different needs). In the network-of-stories, some of the objects will be connected according to the narrative logic proposed by the author who created the navigation between those contents. Links or other items can be added by users. Other networks-of-stories are possible: following the links between clips proposed by the author, the explorer ("user"/"navigator", as we call it) can change the order in which to read, listen to, view the clips; but also new links can be defined by the explorers, depending on their perspectives/ interests/ skills in exploring and analyzing the individual clips (verbal and textual content, images, sequences, music and sound). This constitutes an important tool for teachers that can build original tracks of multimedia documents in support of the proposed activities to their students, taking into account the needs of their specific educational programming, as well as skills in starting and learning goals that characterize each class. It is then possible to produce, with little effort, different documents and stories,
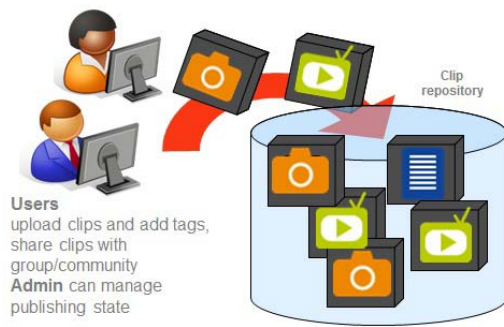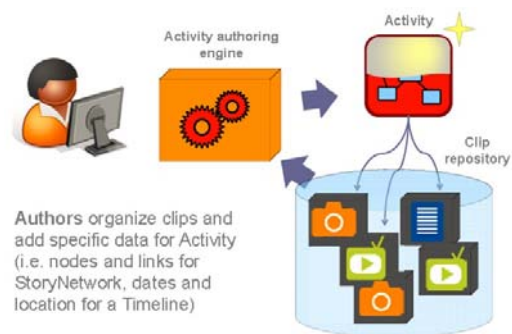
Fig. 1. Multimedia clip repository
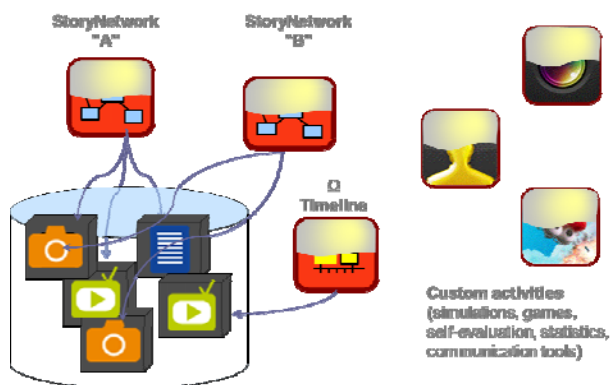

Fig. 2. Activity authoring and use of clip repository

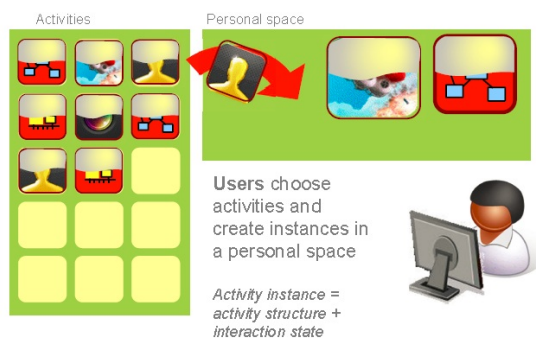Fig. 3. Activitiy engines and custom activities

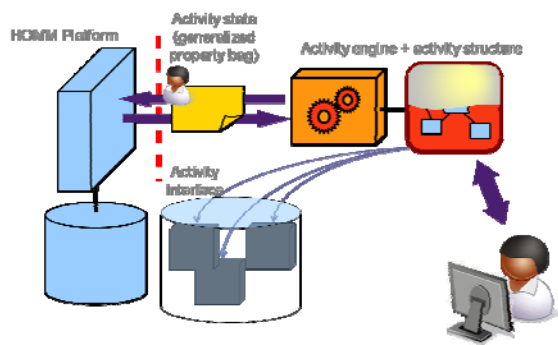Fig. 4. Personal space and activity instances

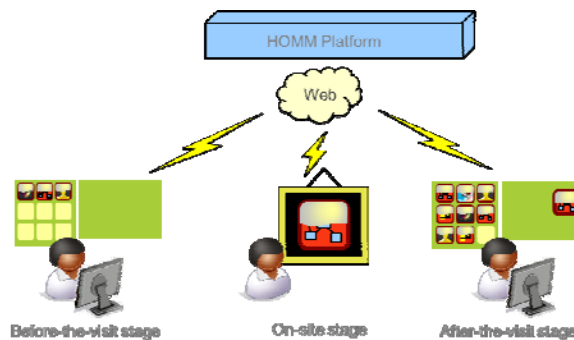Fig. 5. User interaction state_generalization
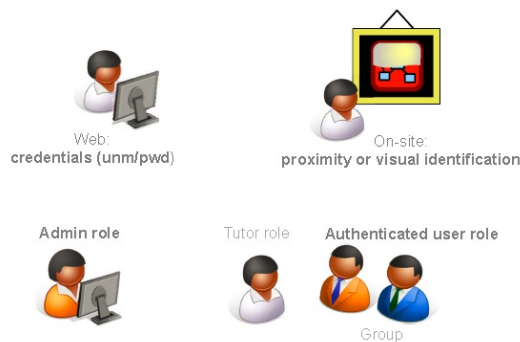

Fig. 6. User lifecycle by using Homm_sw

Fig. 7. User identification and user roles

customized to suit the needs of students who have special educational needs.

A third type of functionality is the validation of the contents created by users. This feature will allow the users to create a customized network-of-stories, to be shared with a selected group of users (e.g. a team of students in the class working on a specific subject). The contents implemented on the web with Homm-sw are then validated by the administrator of the activity undertaken who can authorize online sharing of the authored contents, or highlight restriction to the individual communities or individuals.

In schools, this application creates platforms to share information and specific contents between colleagues in the same level of class, or who teach disciplines in the same area or the same discipline. Given the strong acceleration of scholarly publishing in the creation of online tools, let us imagine a production of tools

more effective and efficient (also monitored by relationships with the universities) which can exploit the potential of creating documents by professionals in the field of education, and by teachers. Homm-sw is an excellent example of a platform that allows you to build pathways of multidisciplinary contents, scientifically validated and monitored by professionals working in museums, in order to support learning processes linked to an active knowledge of the local context.

The opening of the tool we have designed is high and allows one immediately to "manipulate" contents so far poorly disseminated, poorly known, printed in a few copies, too specialized or even outdated, but still appropriate in their educational usage. The manipulation of texts, the use of agile images and videos, the ability to create free connections and to implement the filing of documents are exactly what a new generation of educational staff and teachers expect to find in a toolbox to support them in the common work at school and in museums.

Digital storytelling: functionalities so far implemented

At present, there are two browsing environments of the networks of stories. The first one, play-mode, helps in building a personal sequence to exploring videos, albums of photos, and reading the texts of the story according the sequence spurred by the personal curiosity and interest of the user [Fig. 8]. In the second one, browse-and-print-mode, the clips are ordered according the main thematic area and type. In this consultation, text and images of individual clips can be easily printed, video can be played and album browsed [Fig. 9]. The webpage of each clip can be shared through social media.

Clips in the "play-mode"

  a) *Clips in the story-net*

Each thumbnail on the screen represents a clip: a story. The lines are links to netting them. It is a mind map you can navigate as you like. What we get on the screen it is not the entire storynet, but a local map, showing only the stories with connection of degree-2 to a particular focus, in the center. By dragging any other clip to the center, you will change the focus and explore other clips. In fact, all the clips can be moved around and the links act like springs to keep boxes connected while you perform some manipulation. Anytime you put a clip in the center, in the viewfinder, that story enters your playlist, displayed on the right of your screen, and your choice is recorded and an orange triangle appears in the right corner of the thumbnail. You can always reset the view and start a new browsing. For every line connecting two clips, a caption appears by pulling each of the clips connected with the one in the viewfinder.

  b) *The playlist*

On the right of your screen there is the playlist and the panel to visualize your story. The software memorizes your path in the story net transforming your selection in a sequence of clips to be viewed. You can change the order in your playlist, by dragging clips in a different position: to play them immediately or to come back to what you visited before. Clips are not only videos, but also photo albums and text documents, as highlighted by the icon on the left of the title. Media type will be presented in different players to allow specific control (for instance you can download the documents). A button allows you to play the story in full screen. By clicking on the icon (video/text/album) at the left of each title, you can enter the "browse-and- print-mode" of information on each clip.

Clips in the "browse-and-print-mode"

A graph offers an overview of the clips according the links proposed by the authors of the narrative. Clips are also listed according the section (eg. the thematic areas) they belong and the type (video, album, text). Clips in the list can be browsed by accessing to detailed information on the content of each clip. The graph you find in the page of each clip highlights the specific connections of the clip considered. You can view the clips connected, by browsing the graph or by clicking them in the table of links for each clip.

Fig. 8.   Screenshot of the play-mode

Fig. 9.   Screenshot of a clip viewd in the "browse-and- print-mode" mode

Where can we go from here?

So far we have produced a modular activity. This is just the starting point of a more complex project. The software could be developed for many different contexts, languages and so on. Current ideas on the functionalities to be developed are presented in a narrative form in a set of five stories (see narrating functionalities)

Target

Students, teachers, tutors, educators territorial, social workers visiting a museum (and visitors to the museum in general).

OE and CM wish to explore the use of Homm-sw and its full development through a network of museum experiences that promote learning through workshops on technology, culture, art and society, such as the network European Virtual Museum Transnational Network (V-MUST, http://v-must.net) and the Asia-Europe Museum Network (ASEMUS, http://asemus. museum), and the network created by the Inclusive Museum Community (http://onmuseums.com/about-the-community), the networks of eco-museums (http://www. ecomusei.net) and the international network of museums of industrial heritage (TICCICH , www.ticcih.org).

The strengths

Beyond ones common to other ICT tools in use in museums, Homm-sw has two key innovative functions. First, recording and retrieval of users' activities: during the visit in a museum, the visitor accessing her account may browse and take notes in her personal workspace and then retrieve and explore them, and many more, as much as she likes after the visit. Second, information offered by a set of related clips are easily seen in the conceptual map proposed by the authors. Crowd sourcing and sharing of non-linear narratives may enhance the effectiveness of museums in developing inclusive and collaborative educational practices, contrasting learning difficulties and creating connections between people. ICT can enhance learning, both informal learning, that is typical of traditional museums, and non-formal learning (increasingly important in museums through hands-on activities aimed at creating practical skills and know-how). Homm-sw can improve the usability of museums to enrich the knowledge acquired in formal education and support dissemination of learning processes associated with the knowledge of the local context and its relations with the rest of the world.

Through the creation of knowledge and of opportunities for interaction, Homm-sw may help to enhance historical, cultural, social heritage of a territory, strengthening the museums as agents that promote social inclusion, community cohesion and sustainable development.

Results of the evaluation and training needs revealed

The functionality of the prototype Homm-sw was evaluated by two groups of users: this has allowed us to refine the back office tools and features to highlight what further developments could be useful both in the administration that during the consultation phase of the content.

To deepen and broaden the knowledge acquired in museum visits need appropriate content, various media, from a comparative perspective, and a collaborative spirit in which individual contributions can be valued.

ICT can facilitate the connections between the visit to the museum and the different learning contexts. In this perspective, it is important, in the case of activities with schools, which prepare the visit with teachers, to choose the appropriate activities for the group of pupils or students and teachers by providing practical tools to monitor the process, which includes the learning-visit in the

museum. It is important to consider that this learning process does not necessarily develop, before and after the visit, in a linear and a priori defined way. The visit to the museum and hands-on activities, that take place there, must foster care, creativity, interaction and critical knowledge, but always require mediation, reinforcement and monitoring the ongoing processes and ex-post evaluation.

The quality of the narrative produced in the application of network-of-stories requires a design that needs multidisciplinary skills.

In addition, collaboration between museums and universities, might ensure the necessary specific skills useful for multimedia production, not available in schools, but more and more accessible to young people, and rarely aggregated around publishing projects.

Why it can be considered an innovative tool?

We believe that there are some important aspects not yet explored in the use of ICT in museums. In particular, we propose to connect Homm-sw with activities normally kept separate: individual paths of users' interaction before, during and after the visit to the museum, evaluation of the effectiveness of individual activities and hands-on programs, sharing of resources. In a network perspective, we focus on the modularity and replicability in the use of ICT on different scales. There is also the need to encourage the involvement of communities in hands-on laboratory in museum and outside the museum.

The use of ICT to accompany hands-on activities in the museum opens a space for innovation in lifelong learning practices. This would make it possible to provide appropriate solutions to the needs of a large group of people ("from the cradle to adulthood"), while maintaining a high accuracy and scientific rigor.

Moreover, the creation of tools for dissemination and collaboration between communities, may support and develop the possibility that school teachers take advantage of educational materials related to the local area and contribute in strengthening awareness about the connections between the local and the global level. The slow replacement of traditional teaching materials with online and multimedia teaching materials is an irreversible process, though not without uncertainties and dangers of non-effective use of resources, an area that we consider with great attention.

Finally, storytelling is widely recognized as an effective natural means of communication and transmission of knowledge. An outstanding promoter is the British Museum with the challenging goal of telling the history of the world through the stories of 100 objects [8]. Narratives on the web may enhance many unexplored dimensions. An area that we think we can contribute to enriching with Homm_sw, as recently supported by the comparative analysis on ICT platforms currently available for content sharing in museums [6]. In particular, Homm-sw addresses the issue of connections of contents in a conceptual map and the classification of contents, hardly solved by current sw applications (adopting hierarchical navigation [9] or sub groups of themes [10])

REFERENCES

[1] Czarniawska-Joerges, B., 2004. Narratives in social science research, London; Thousand Oaks, Calif.: Sage Publications.

[2] Hazel, P., 2008. Toward a narrative pedagogy for interactive learning environments. Interactive Learning Environments, 16(3), pagg.199–213.

[3] Crawford, C., 2013. Chris Crawford on interactive storytelling, Berkeley, Calif.: New Riders. Available at: http://proquest. safaribooksonline.com/?fpi=9780133119671

[4] R. Aylett Paolo Petta, Mei Yii Lim, Sandy Louchart, Mark Riedl, eds., 2010. Interactive Storytelling. ICIDS 2010, Edinburgh, UK, November 1-3, 2010: proceedings, Berlin ; New York: Springer.

[5] BBC - A History of the World - List of Objects. Available at: http://www.bbc.co.uk/ahistoryoftheworld/ exploreraltflash? Time region=7

[6] Brouillard, J., Dierickx, B. & Loucopoulos, C., 2013. Report on existing tools and devices related to narrative approaches and requirement functionalities. EU CIP-PSP Project AthenaPlus. Available at: http://www. athenaplus.eu/getFile.php?id=178.

[7] INDICATE (International Network for a Digital Cultural Heritage e-Infrastructure), 2012. Handbook on virtual exhibitions and virtual performances,8 M. T. Natale, S. Fernandez, & Lopez, eds.., Available at: http://www.indicate-project.eu/getFile.Php? id=412.

[8] BBC - A History of the World - List of Objects. Available at: http://www.bbc.co.uk/ahistoryoftheworld/exploreraltflash? timeregion=7

[9] MACE : Browse by Classification : LOM Category 9 Classification. Available at: http://portal.mace-project.eu/Browse ByClassification#/?locale=en&page=1&query=classification,,root,LOM%20Category%209%20Classification.

[10] Fondazione Fitzcarraldo - LabforCulture.org, CASE STUDIES. Available at: http://casestudies.labforculture.org/flash/main.php.