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Design the Future!

EXTENDED ABSTRACTS DELLA MULTICONFERENZA EMEMITALIA2016

Modena, 7-9 settembre 2016

a cura di
MARINA RUI

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UNIVERSITÀ DEGLI STUDI
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Homm-sw. Networks-of-stories for digital storytelling

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Abstract

Narratives enable the formation of personal and community identities, and the construction of meanings. Although increasingly popular, 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 coherent and effective narrations. Finally, validation and dissemination of related outcomes must respect scientific standards. This chapter describes a prototype of a web application supporting multimedia narratives. So far, it implements the engine for creating and managing the activity 'networks-of-stories', to create nonlinear and open multimedia narrations. It has tools that: support educators, also in contrasting learning difficulties, in developing inclusive and collaborative educational practices; support museums' 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. Our web application has two key innovative functions: recording and retrieval of users' activities; narratives presented through a set of related clips (videos, albums, texts) are seen in a conceptual map.

Keywords
personalized workspace, storytelling, lifelong learning, crowdsourcing, social innovation.

Introduction

In the last decade, digital storytelling has spread rapidly due to the growth and possibilities offered by new ICT devices (BBC 2010; Brouillard et al. 2013). 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 coherent and effective narrations. Finally, validation and dissemination of related outcomes must respect scientific standards.

In this paper we present the prototype of a web application, Homm-sw, designed: to support educators in developing inclusive and collaborative educational practices, also in contrasting learning difficulties; to support museums' curators; to facilitate crowd sourcing; to create a personal web repository of contents and connections; to share contents to be published, if approved by the administrator; to create a network of contents and applications for different users and specific needs.

When used in museums or workshops (such as a FabLab), Homm-sw extends that experience. Before the visit: users can have a general look at museum or workshop 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 or workshop'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 and workshop uniquely offer. After the visit: users access their online workspace to retrieve and explore their notes, and any other content, as much as they wish. Homm-sw supports visitors to museums and workshops (students, teachers, public) to process (before, during and after the visit) information on tangible and intangible heritage, to use multimedia content in a personalized way, as well as to support the many experiences offered by museums, workshops, FabLab (hands-on activities, living laboratories, demonstration programs).

These features enhance a stronger integration of education practices across schools and their social and cultural environment. Homm-sw's designers and developers aim at building greater awareness of the importance of cultural heritage in supporting sustainable social development. Homm-sw encourages active involvement of users, also as contributors, to increase collective resources shared through the museums websites.

It is a tool for online information crowd sourcing: it allows the creation and sharing of relevant knowledge on tangible and intangible culture, along di-

mensions 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, supporting critical thinking and creating connections between people.

Developed by Officina Emilia (Italy) in collaboration with the former chairperson of Crafts Museum (India), the prototype of 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 nonlinear and open multimedia narrations (Crawford, 2013; Aylett et al. 2010).

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

The web 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 available for creating and browsing networks-of-stories. It has been used to create two networks-of-stories (so far available in English and Italian) available for online access (see also Katona, 2105, for a comparative analysis of HOMM-sw). Other networks-of-stories are under review. At present, authentication of users is managed by the administrator, but a federated authentication (such as the one offered by Idem-GARR) may be implemented also to manage grouping (Mantovani et al., 2016).

In the following sections of the paper, we first present an overview on the context of the experience and motivation of the project, the methodological aspects are addressed with a focus on users' perspectives, software architectures, functionalities and specific tools so far developed to implement digital storytelling. In presenting innovative aspects and critical issues in implementing Homm-sw, we will discuss strengths and weaknesses of the project and of the web applications. Hints to for further implementation conclude the paper.

Context of the experience and motivation of the project

The web application Homm-sw was developed in the Officina Emilia project of the University of Modena and Reggio Emilia (Italy) in the period 2011-2014. With a long experience on action-research in supporting the regeneration of

competence networks in the mechanical industry (Mengoli and Russo, 2000, 2009), since 2009 Officina Emilia has been offering hands-on workshops on science, technology, history and society to provide students of any grade (as well as their teachers and families) a better understanding of the social context in which they live. Conceived as a "meeting place" of schools and businesses, it was created as a hybrid space, where processes of production and innovation and social transformation are examined in a global context. During the workshops, classes of students produced a vast amount of very interesting pieces of research and documents on local history, the development of industrial districts, the changes in technologies and labour conditions by making also interviews and first hand data collection used in several reports. Those activities spurred the need not only to create digital archives, but also to retrieve, share and enhance those contents in the many forms that could be used to improve knowledge on those fields.

An analogous need was emerging in one of the most magnificent handcraft museums of India - the Crafts Museum in New Delhi - that was implementing a cultural shift in documenting a vast tacit knowledge embedded in artisanal practices all over the country. Sharing a common background in economics and development studies, two of the present authors started a joint project (launched in a series of seminars held in New Delhi and Modena in November 2011) to propose to museums and education institutions: (a) to improve the use museums on the part of academic and education institutions, of training centers and in programs of adult education; (b) to promote social inclusion, strengthening the identity of museums as places of learning and to support relationships between individuals, groups and institutions; (c) to use ICT to support interactive workshops in museums; (d) to encourage the sharing of a web application to create network-of-stories in networks of museums, education institutions and research centers interested in its development and use.

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 and learning and in 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 architecture

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 on site (in the workshops or in museums) that integrate multimedia activities with the hands-on activities; (3) a website with a personal workspace that allows 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.

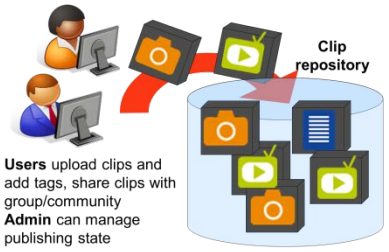
The software architecture is built around the needs of the end users of the activities of the hands-on workshop or museum. Before the visit to the workshop or museum, the enrollment of individuals and the group to which they belong (e.g. as school classes accompanied by teachers) will set the conditions 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 to be realized in the workshop or in 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 workshop or the museum is a unique place to make the real visit and the hands-on activities. The personal workspace will be enriched by a variety of information and may be extended through many channels (tablets, mobile phones with custom applications). After the visit, 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 Figure 1 outlines in the frames (a)-(g) 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.

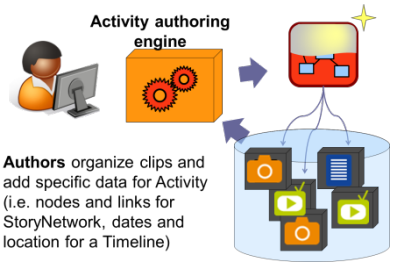
The most original parts of the architecture of Homm-sw are: the tools for the work groups of students (coordinated by teachers and tutors) and for the groups that will be created for the sharing of digital resources; the tools to validate the work of each group and for the publication of the output produced 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 and through the hands-on activities offered by the museum, may be shared through the web in the wider community.

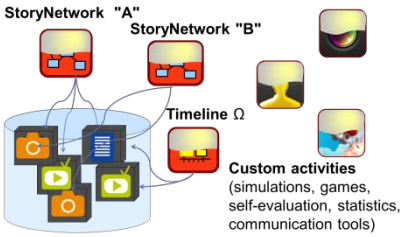
(a) Multimedia clip repository



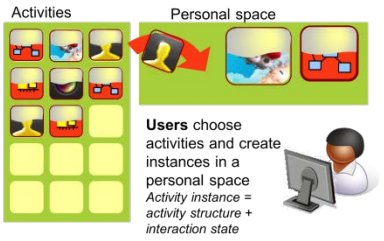
(b) Activity authoring and use of clip repository



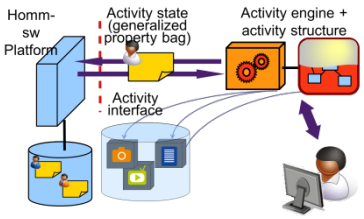
(c) Activitiy engines and custom activities



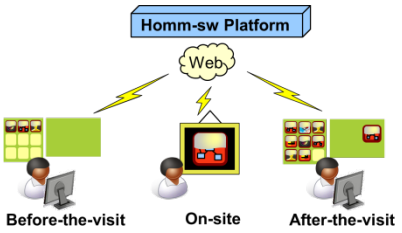
(d) Personal space and activity instances



(e) User interaction state_generalization



(f) User lifecycle by using Homm-sw



(g) User identification and user roles

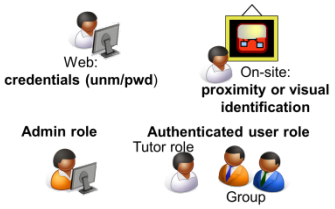


Figura 1 – Main features of the software architecture

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 in a museum/workshop/FabLab**. A selection of digitized information, such as texts, photos, videos 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. For example, 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, 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 allows 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 (e.g. in the same level of class, or with

teachers of disciplines in the same or a different 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 building 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 tool can be immediately used to work with relevant contents often poorly disseminated, poorly known, printed in a few copies, too specialized or even outdated, but 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 the prototype implements 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 [Figure 2]. 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 [Figure 3].

Clips in the "play-mode": Clips in the story-net. Each thumbnail on the screen represents a clip: a story. The lines are links to connect 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: your choice is recorded and an orange triangle appears in the right corner of the thumbnail, reminding you that you have already selected that clip. 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.

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 (Figure 3, a). The graph of the storynet is complemented by a list of all its clips ordered 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 (Figure 3, b). 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. The webpage of each clip can be printed and also shared through social media.

So far we have produced a modular activity. The software could be developed for many different contexts and languages. Current ideas on the functionalities to be developed are presented in a narrative form in a set of five stories (available in the website of the prototype): from the point of view of students, teachers, tutors, educators, visitors of a museum, workshop, FabLab.

Figure 2 Screenshot of the "play-mode": interactive browsing of the clips in the graph of the storynet (left part), interactive list of the selected clips (right part of the image)

(a) graph of a storynet with its interactive list of clips by thematic area

(b) complete set of information on a clip with interactive

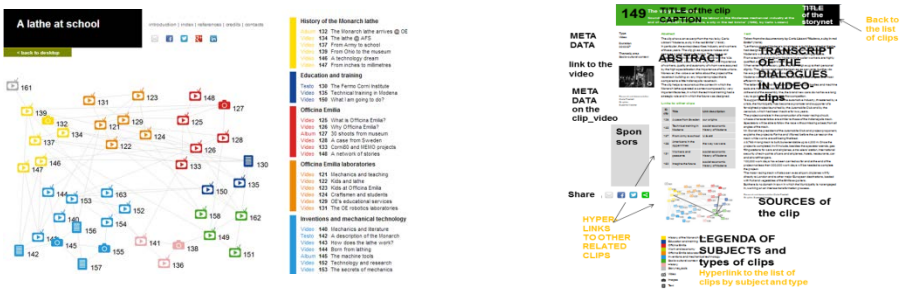


Figure 3 Screenshots of the "browse-and- print-mode"

Innovative aspects and critical issues in using Homm-sw to implement digital storytelling

Key innovative functions. Beyond ones common to other ICT tools in use in museums, Homm-sw has some 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 is easily seen in the conceptual map proposed by the authors. Moreover, 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 ac-

quired 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. In addition, the quality of the narrative produced in the application of network-of-stories requires a design that needs multidisciplinary skills. Eventually, 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.

Storytelling is widely recognized as an effective natural means of communication and transmission of knowledge (BBC, 2010). 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 (Brouillard et al., 2013). 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 or sub groups of themes).

Where do we go from here? Further steps and discussion

There are some important aspects not yet explored in the use of ICT in education, museums, workshops and FabLab. In particular, we propose to connect Homm-sw with activities normally kept separate: individual paths of users' interaction before, during and after the visit, 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 within and outside museum workshops and FabLab. The use of ICT to accompany hands-on activities such learning environments opens a space for innovation also 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. 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.

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