An End-User Oriented Building Pattern for Interactive Art Guides

Augusto Celentano and Marek Maurizio

Università Ca' Foscari Venezia
{auce,marek}@dsi.unive.it

Abstract. A primary issue in the design of interactive art guides is the effort to build them as a synthesis of several cultures and skills concerning content editing, multimedia production, application structuring and interaction design. The communication between the actors of the development process can be boosted by involving the cultural domain experts in the whole life cycle, providing them with proper design environments for extending and modifying the guide structure and content, to refine the initial design without the intervention of computer specialists. We have developed a framework for End-User Development (EUD) of interactive multimedia guides based on experiences in art exhibitions held at Ca' Foscari in the last two years, culminating in the project of a multimedia guide for the François Pinault contemporary art collection at *Punta della Dogana* in Venice. The guide features dynamically generated tours personalized on the user answers to a set of questions asked during the tour, prepared by a domain expert as part of the guide content. In this paper we present a methodology for designing end-user oriented software environments based on open and portable standards, and discuss the development of a content management systems for domain experts able to generate personalized tours.

Keywords: Building pattern, end-user development, interactive multimedia guides, web application.

1 Introduction

Multimedia interactive guides are replacing at fast pace the old-fashioned audio guides in city tours, museums and temporary exhibitions. The development of powerful mobile devices, fast wireless communication and rich interaction styles boost the production of mobile applications devoted to tourism and art, available not only on-site but also in large on-line markets.

Pioneering experiments with devices based on Microsoft Windows Mobile and Apple iOS have been made in the last decade by prominent cultural institutions like the New York Moma, the Tate Liverpool Gallery, the Barcelona Ship Museum, the San Jose Museum of Art, to cite a few [1,2,3,4]. Web sites and portals of museum offered mobile-specific sections with the possibility of downloading multimedia content. The Apple AppStore and Android Market are changing the landscape of applications available to tourists and museum visitors, which are delivered not only as a support to on-site tours, but also (and sometimes primarily) as an independent product of the issuing institution "brand". The AppStore returns hundreds of titles as answers to the queries "art

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guide" and "museum guide". Many of them are electronic versions of traditional touristic guides, and the quality is sometimes questionable, but the growth of interest in this market is evident.

Among the most interesting examples we cite the MoMA iOS application [1] that allows users to access information about the artworks of the New York MoMA collection, informs users on current and future events, and lets them to access a series of tours. The application is available also for Android devices. Other similar applications have been developed in Europe by Versailles Gardens, with an interesting view of the castle's garden by proposing discovery paths; by Tate Trumps in UK, with games and puzzles to learn about the Tate Modern Gallery artworks; by the Vatican Museum of Rome, with a detailed view on some of the most important masterpieces of Italian art. Temporary exhibitions complete the scenario with guides increasingly based on interactive multimedia rather than on bare audio; a balance between the greater effort to produce them and the improved attractiveness for the public is leaning towards the new technologies.

Critical issues in the design of mobile guides are the choice of the amount, detail and style of information, the design of the proper access and navigation paths and the adaptation of a potentially huge set of multimedia material to a wide spread of visitors; as a consequence, new methods and tools to design, implement and evaluate the new applications are needed and, indeed, are emerging [8,15,16]. We argue that, mainly when such applications are conceived as the outcome of interdisciplinary research environments, it is important to devise not only a set of final products, but also a set of frameworks where programmers, designers and domain experts can cooperate in the development and extension of the software artifacts. Following this principle, the Indianapolis Museum of Art released *TAP*, an open-source tool to create and deliver mobile tour applications in a museum setting [9]. The *TAP* system is based on a content management system that exports data into an intermediate format, *TourML*, which can then be used as a pluggable bundle for mobile applications.

In this paper we describe the *Punta della Dogana* project (hereafter referred to as *PuD*), an academic research project aiming to set up a modern critical instrument to understand contemporary art with a double focus: at one hand, to provide visitors with comprehensive information about an art collection, an institution, a set of artists, with rich multimedia material prepared by experts in the domain: researchers, art critics, collectors, etc.. At the other hand, to provide not only designers and programmers but also domain experts (e.g., art critics) with a system in which they can gather, organize and tailor multimedia content of heterogeneous nature, instantiating a set of predefined templates on actual "visit paths" for a wide range of users of mobile devices. The project outcomes are, at the first stage, a Content Management System (CMS) oriented to domain experts and a mobile guide on Apple iOS devices with comprehensive information about a sample of the art collection of the François Pinault Foundation at Punta della Dogana in Venice.

We have developed a structure for multimedia art guides that departs from the classical menu based application and is, instead, based on a directed graph of visits built on top of selected topics. We argue that such approach, if paired with an accurate selection of multimedia content by domain-experts, leads to an interesting and new way of presenting contents to art visitor. In particular, in situations where a large set of multimedia items is available, our model allows domain experts to categorize it and lets the user to choose, more or less transparently, a personal selection to experience.

The *PuD* project takes inspiration from our previous work with multimedia installations and with mobile guides on Apple iOS devices, designed for several art exhibition held at Ca' Foscari in Venice in 2009 and 2010 [5,6]. The *PuD* project is the culmination of those experiences: as an improvement with respect to the past projects, it aims to give the visitor the ability to create a personalized tour through a sequence of questions that progressively builds the tour's steps based not only on the visitor's background and general interests but also on the attention and curiosity developed during the tour itself. The development system to be used by domain experts to define the guide structure is based on a multimedia repository on which multiple perspectives, multiple navigation paths and multiple interaction styles can be adapted and dynamically composed, fulfilling the requirements of different categories of users. The resulting experience is thus built upon a spread of cultural and emotional feedbacks coming from the user background and also from the reaction to the actual exhibition contents.

In developing the CMS and the *PuD* mobile guide we followed the end user development principles presented in [7,10] and produced a framework where programmers, interface designers, and domain experts can cooperate in the development and extension of the software artifact. We built our framework to be as much re-usable as possible for future projects with similar characteristics. Research in this area usually seeks to develop domain-specific or graphic modeling languages that allow users to easily express the desired functionalities [14]: we initially used a simple text-based *domain-specific language*, but later we also developed a web-based environment to shorten the conceptual gap between the technical view of programmers and the more abstract view required by the end-user development principles [12].

2 The PuD Mobile Guide

Even a well informed public may find difficult to access and to understand contemporary art. Contemporary art is not yet historicized and in continuous development; it lacks a consolidated criticism and escapes fixed classification schemes, resulting in a very complex field of investigation. We believe that a way to develop knowledge in contemporary art is to make appealing to explore, with a user-friendly approach, its different contexts to understand how they contribute to build its cultural value; the possibilities offered by new devices to interact with engaging audiovisual content can attract the user much more than simple traditional, often boring, audio narrations.

The *PuD* project focuses on a selection of artists and artworks from the collection of the François Pinault Foundation in the exhibition *Mapping the Studio* at Punta della Dogana in Venice. The *PuD* project retraces the course of each art piece, from its conception in the studio up to its integration within the private collection, analyzing the artist's conception of art and the social and historical events occurring during the artist's work.

The experts in contemporary art that are following this project have selected a small group of artists: Jake & Dinos Chapman, Takashi Murakami, Rachel Whiteread, Huang Yong Ping and Rob Pruitt. They are representative of the Punta della Dogana collection, and showed much enthusiasm for collaborating to the project; moreover, some of their artworks are highly suitable for a multimedia interpretation, because rich of miniaturized figures like Jake & Dinos Chapman's *Fucking Hell* and Huang Yong Ping's *Football Match*; their reading could be facilitated by a close visual investigation, not possible on the original artworks.

The art experts collected the basic critical documentation, mainly audio-video resources. They interviewed the artists to build a consistent picture of each artist and artwork to build the guide skeleton. The interviews consisted in a series of questions based on a standard pattern touching similar subjects for all cases, to anticipate the possibility of comparing them during the guide exploitation: a presentation of the artist made by him/herself; reasons for deciding to be an artist; a personal view of the role of the artist in contemporary society; a description of the studio and of the artistic creation process; a commentary about the specific artwork; general comments about own's work; finally, the relationship with the Pinault Collection and with the city of Venice. More specific themes were addressed to consider the artist's personal history and ideas. The collected material was completed with commentaries of the exhibition curators and a sample from a lecture series about the Punta della Dogana collection organized by the Venice Universities in 2010.

A complementary section of the project is devoted to the architecture of the Punta della Dogana building, from its origins until the recent restoration by the Japanese architect Tadao Ando, and to a selection of interesting viewpoints used in the guide as environments for general discussions. The collection of the material produced a very large set of heterogeneous files, that were processed and organized to build a multimedia repository, a project database on which experts, interface designers and application programmers could work together to progressively refine the mobile guide content.

To avoid a cognitive overload on the visitor with so much material we based the guide conceptual architecture on a structured set of questions, multiple choice criteria that allow the visitors to enjoy a dynamic tour based on their own interaction with the system, making them active users building their own interactive journey in the exhibition [11].

2.1 The PuD Guide Model

The guide structure is defined by an abstract model based on the notion of *topic* and *visit*. A topic represents a subject of interest in the exhibition: it can be abstract, like an historical period, or concrete, like a painting. In the *PuD* project, for instance, the topics are five artworks and four architectural points of interest. Each topic of the guide is composed by a set of related contents. A visit, instead, represent the path a user experiences through the set of proposed contents about a specific topic. The structure of each topic is described by a *deterministic finite automaton* $M = (Q, \Sigma, \delta, q_0, F)$ where:

- Q is a finite set of states; each state is the abstract representation of a content;
- Σ is a finite set of inputs, which are atomic user interactions like pressing a button, selecting an image, tilting the device, etc.;
- δ is a transition function $(Q \times \Sigma \rightarrow Q)$;
- q_0 is the starting state, marking the beginning of a visit;
- F is a set of final states, each representing a possible end of a visit.

In state q_0 a summary of the topic is presented to the visitor (the artwork's title, the author's name, etc.). The remaining states $Q - q_0$ are partitioned in two disjoint subsets Q_c and Q_q, called *contents* and *questions*, respectively. When the guide is in a content state the visitor is presented a node containing a multimedia piece of information. Each content state is associated with only one transition: after experiencing the content, the visitor goes to the next state without any explicit interaction. Question states, instead, present the users a node containing two or more alternatives to choose from: the visitor interaction (the answer to the questions) is used to select the next state, i.e., the next node shown. When the system reaches a final state in F the visit ends: the guide presents the user a summary of the experienced contents and allows him/her to select a new topic.

A visit is therefore the sequence of states $q_0, q_1, \ldots, q_n$ experienced by the visitor. Visits are used immediately to give the user a summary of the experienced contents, but are also stored persistently on the device for subsequent analysis of the paths followed: our experience with mobile guides proved that such analysis is a valuable evaluation tool for tuning the guide design [6].

2.2 The PuD Guide Implementation

According to [10] the goal of human computer interaction is evolving from just making systems that are easy to use to systems that are easy to develop. This is of particular importance in the field of computer science applied to cultural heritage, where different areas of expertise require different approaches, and often data is biased by some degree of subjectivity. For this reason we departed from the simple solution of developing an ad-hoc structure for our contents, but produced instead a framework where domain experts can participate in the development of the guide.

The navigational structure of the guide is quite trivial, composed by a set of pages and menus. We focused our development process on the creation and presentation of contents and questions. A guide page corresponds to a node of the abstract model, and is generated starting from a tuple (T, D, St, Sc, F), where:

- T is an HTML document that contains the node's markup. This document works as a template and defines the general structure of the node.
- D is a document containing the node's data (actually, a JSON text document).
- St is a CSS document containing styles to apply to the node markup.
- Sc is a Javascript document to be executed after the node has loaded.
- F is a set of external files that can be linked by the node, like images, videos, and so on.

When a specific node is requested the application fetches the required files and combines them to create the actual content that is presented to the user.

The design of such a product, however, tends to become fairly quickly outdated or insufficient because of changing requirements. The conventional view of *design before use* is challenged by a new approach of *design during use* [12,13]. Our system has been designed to be *adaptable* by end-users of different classes and skills, following the principle of *gentle slope*: modifications and personalizations can be carried out at different

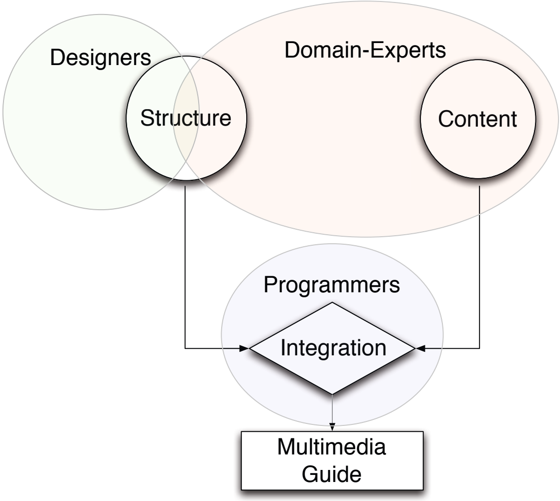


Fig. 1. The guide development architecture

levels of increasing complexity. Our architecture allows us to extend and modify the guide at three different levels:

- at the lower and most complex level a *programmer* can act on the application source code to modify or extend the basic behavior of the guide: this level requires a deep knowledge of the Javascript programming language, Ajax calls, and knowledge of the development framework, but allows also the programmer to include completely new functionalities, like, for instance, the possibility of controlling a shared, large screen with the portable device;
- at the middle level a *designer* can act on T, St, and Sc to create new node templates: this level require knowledge of HTML, CSS and, optionally, some Javascript to attach dynamic behavior to the new types.
- at the higher level a *domain expert* with little or no prior knowledge of HTML, CSS, or Javascript can act on D and F, the node data and the external multimedia files, to create content that will be applied to the pre-existing templates to generate new node instances. This solution requires only the knowledge of some simple syntactical conventions to format the content and familiarity with the available node templates, which are part of the framework's documentation.

The system is thus organized according to three different perspectives corresponding to the development team roles, in three levels of increasing complexity. Domain experts can compose data files to insert new nodes and, defining relationships between them, creating new thematic, spatial, or logical organizations of artworks in the guide. There is no need of intervention by specialized actors to perform common tasks such as inserting data, organizing catalogs, defining multiple relationships between contents. Should the need of new, unforeseen, extensions arise, our building pattern takes into account two different levels of intervention: on a first level designers (actors with knowledge of web design technologies) can create new templates, different only in aesthetics or provide advanced behavior obtained through the Javascript programming language; on a second level programmers can extend the system by implementing new components.

Our modular approach, summarized in Figure 1, provides a gentle slope by allowing successive decomposition and reconfiguration of software entities that are themselves built from smaller components [7,10]. We produced a framework where different actors can cooperate in the development and extension of the software artifact, and the produced modules are re-usable as much as possible for new projects.

3 The Content Management System

The domain experts play a role in two cases: the design of the guide conceptual structure and the organization of the multimedia material from which the guide content is built. In the former case experts must work in strict cooperation with the interface designers and the programmers, to exchange feedback about templates and interaction styles. In the latter case they could be more independent, if provided with a set of software tools easy to use and oriented to their needs. General purpose databases and digital library systems provide rich classification functions but are too general and, often, scarcely suitable for handling large multimedia documents. Content management systems (CMS) for web sites and portals are targeted to web masters and need to be customized to be user friendly, but are a better alternative to design a usable system.

In our early experiences with interactive multimedia guides we managed data about artworks and multimedia files in ad-hoc ways, collecting them in a shared structure of files and folders suited to the application logical structure. While this approach has the advantage of immediacy and efficiency, it might introduce ambiguities and inconsistencies; dealing with large quantities of data can hinder the entire project in terms of development speed and error detection. For the multimedia guide designed for the exhibition *Nigra sum sed formosa; sacred and beauty of the christian Ethiopia* held at Ca' Foscari in 2009 we developed a very simple CMS whose purpose was primarily the organization of the artworks in several collections, to be used as indices in the guide to browse the exhibition content according to different perspectives: themes, rooms, artwork type. The CMS proved to be useful mainly in managing the changes needed to reflect late decisions by the curators about what objects to select and how to place them in the exhibition spaces.

In the PuD project, to archive, classify and query multimedia content we have developed our own CMS (a web application with a tailored interface), whose main goal is to boost cooperation and integration between domain experts and application designers; multimedia content is collected, archived and organized according to the guide conceptual structure defined by the domain experts, leaving them the possibility of attaching comments, tags, taxonomies, etc.; at the same time the application designers are free to access data in an efficient way to build the application. The multimedia files uploaded by domain experts are accessible not only through the CMS but also through a regular filesystem accessed by the mobile application. Names and structure of the files and folders are generated automatically by the application to avoid conflicts. This approach can be seen as a sort of low-level API: the possibility of accessing contents through a filesystem allows developers to use consistently also other applications, batch processing, backup procedures, and so on.

3.1 Overview of the CMS

The CMS is an online storage space with the following characteristics:

1. it is accessed through a web-based application, requiring neither a specific installation nor specialized plugins, with a graphical interface based on common knowledge and clear action feedback, allowing domain experts to easily operate it;
2. the CMS data model is basically hierarchical. This is a direct consequence of the initial constraint requiring all the uploaded contents to be finally accessible through a filesystem. The model can represent entities (authors, artists, or conferences), multimedia contents (video, audio, images or texts), and their relationships;
3. to enrich the classification system and to allow domain experts to trace non hierarchical relationships, the CMS introduces a set of vocabularies to organize contents among different categories. Vocabularies may represent taxonomies, i.e., catalogs of predefined terms, or folksonomies, i.e. catalogs dynamically built on free terms. Different content types can relate to different vocabularies. Such a flexible classifications allows the CMS users to have different views of the data, e.g., to visualize the items related to a certain topic independently from their location in a standard hierarchical schema.

When multimedia content is added to CMS, it has a double representation: an abstract representation and a concrete representation. The abstract representation can be accessed from the web application. The content can be explored by keyword, relations can be visualized in a graphical way, and so on. The abstract representation is useful for domain experts to access, categorize, and discuss the contents. The concrete representation, instead, is represented by the underlying filesystem generated by the CMS. The resulting structure can be handled without any need of external applications but, at the same time, is not polluted by subjectivity. The concrete representation is mainly useful to computer scientists that need a formal, self-describing, structure to develop complex software constructs with contents coming from disciplines their are not expert in.

3.2 The CMS Abstract Data Model

The CMS abstract data model has two different classes of objects: *entities* and *multimedia content*. An entity can be, for instance, an author, an artwork, or an event (e.g., a talk, a lecture). Multimedia content can be a text, a video, an audio or an image. Each object has a set of attributes (a name, a short description, a creation/modification date, etc.) and can be in relation with other objects. The types of relationships involved, however, are limited by the constraint of implementing a hierarchical, meaningful underlying filesystem. For this reason we designed the data structure based on assumptions shared with the domain experts. In the context of the *PuD* project the assumptions derive from the structure of a the visits; being based on guided tours, not on free exploration, the connections among data items can be classified in advance according to a few main perspectives.

The entities can be related as shown in Figure 2. Boxes are content types and arrows represent relations between types. Content types are further categorized in entities and multimedia contents. An arrow from a type A to a type B means that objects of type A

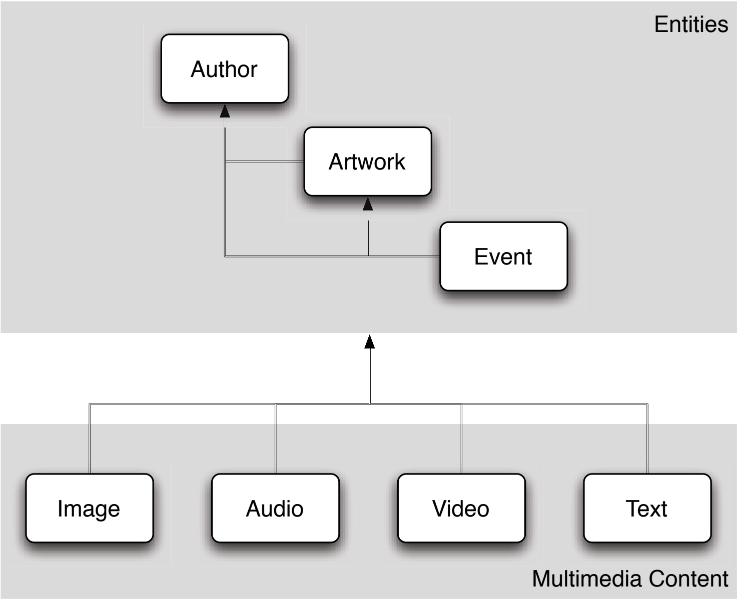


Fig. 2. The CMS abstract data model

maintain a reference to an object of type B. An event like a lecture, for instance, has a relation with either an artist (the one giving the lecture) or an artwork (the subject of the lecture). Each multimedia object can be in relation with any entity, either artists, artworks or events.

Multimedia contents are organized in groups: each group has a *master* element and a set of *derivates*. In a video object, for instance, the master element can be a whole interview with an artist, while the derivates can be meaningful clips of the same interview, technically refined and commented. In a text element, the master can be the transcript of a lecture and the derivates translations of the same text in different languages. The semantics of the master/derivate structure is left to the content authors by using description fields.

Images behave in a slight different way: since it's common to have a large number of images with the same subject without a specific master/derivate relation, we opted to drop this structure and to group images in simple collections.

3.3 Implementation

The CMS has been implemented in Drupal 6, a popular open-source content management system. We decided to use Drupal mainly for the time constraints given by the project: the development from scratch of a full-fledged content management system would have been too much time-consuming. Since the system must be used online by researchers without a computer science background it had to be secure and easy to use, with an intuitive interface. All these requirements could be met with a careful ad-hoc design, but not when developing from scratch in the short time required by our project. For this reason we found a good trade-off in adapting an already consolidated open source system to our needs.

The Drupal system allows users to create contents, also called *nodes*, based on predefined templates called *content types*. Each of these templates has a title, a description, and a set of typed *fields*. Fields can contain, for instance, text, dates, or files. Contents can be classified through vocabulary entries, both fixed terms or free tags, and can be related each other using a simple referencing mechanism. With these abstract blocks we built a web application where users can insert data about artists, artworks and conferences of the *PuD* project, classify them, add metadata, upload related multimedia files. The Drupal system features a fine-grained control on *permissions*: different classes of users can be allowed to edit, delete, comment, or view each type of content: all users, for instance, are allowed to view the contents and participate the discussions, while only editors can create or edit contents.

We are aware that using a general purpose software like Drupal can limit the innovation in the development process. Even if open source and easily extended, the Drupal system is still limited in its underlying structure. The major limitation, in our opinion, is the lack of an object-oriented design. The alternative, to be taken in consideration when writing a more general system, is to use an ad-hoc web application with a more complex data model based on object oriented principles. The physical filesystem representation does not have to be discarded, but it should not influence the data model: it should be possible to express a richer set of relationships, including many-to-many ones.

Another module of the CMS allows domain experts to browse between the different guide's node types and presents dynamic web forms to let users input the required data. Nodes are linked together to build the visit graph and the result is compiled in a *bundle*, a set of data and multimedia files, that can be used directly by the guide application.

4 A Case Study

In Figure 3 an example of an abstract topic graph is given: questions are represented by diamonds and contents are represented by circles. Each circle is labeled with a letter to denote the content type and a sequence number: *a* for audio, *t* for text, *i* for image, and *v* for video. Arrows represent the possible transitions between nodes. It is important to note that the topology of the graph, defined by domain experts, has a direct influence on how visitors can explore the exhibition with the assistance of the guide.

The graph in Figure 3 is the abstract representation of the topic related to the Rachel Whiteread's artwork *"Untitled"* (*One Hundred Spaces, 1995*). Figure 4 shows an instance of the abstract topic graph of Figure 3 with selected screenshots that represent a visit; each screenshot is labeled as the corresponding node in the abstract representation.

In state s and i_1 introductory contents are shown; in state q_1 the user is presented with a first visual question, asking to choose between information about the author, about the artwork, or about the atelier. When the user selects the first option another question q_2 is presented in text form, prompting the visitor to guess the motivation behind the artwork's title out of three possible answers. Figure 4 shows a specific point of view leading the visitor to a sequence of nodes about what the domain experts called

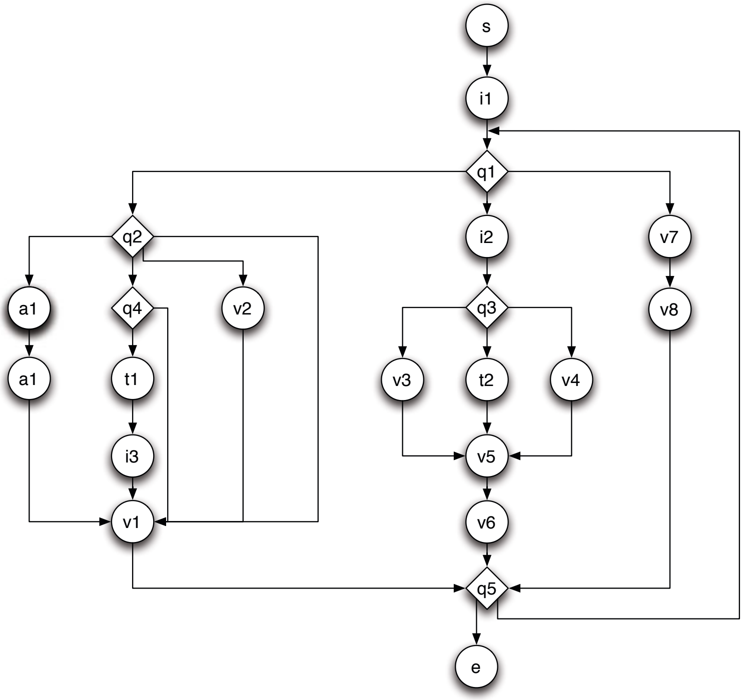


Fig. 3. Example of an abstract topic graph

"Building an invisible city". This part of the visit is characterized by a comparative approach to the artwork: the casts of chairs that compose the artist's installation look like the urban blocks of an imaginary city. Investigating the relationship between the sculpture and the architecture in Whiteread's artwork, the visitor is guided to explore this perspective. In state i_4 the concept is visually introduced by a graphic view of the City skyline in London behind the transparent surface of one of the artist's blocks; in state i_3 the user can read or listen to quotations of poetic and literary sources (e.g., excerpts from Italo Calvino's *Invisible cities*); in state v_9 the visitor can explore other Whiteread's installations where the concept of space is investigated in a progressive size reduction, from a city to a room. In the final state v_1, the user can listen to an excerpt of an interview where the artist directly describes and comments her work.

The guide subsequently asks the visitor if he/she wants to receive more information about this topic. A positive answer brings the user back to the artwork/artist/atelier selection, while a negative answer presents the visitor with a summary of the part of the visit just completed (represented by the chosen path of nodes) and let he/she to select another topic to continue. In the example of Figure 4 the visitor chooses to continue the visit with more information about the same artist. State i_2 features a brief introduction to the artist; in state q_3 three aspects of the artist's life are proposed, asking the visitor to select one: a spoken interview, where she speaks about herself, a biography (pictured

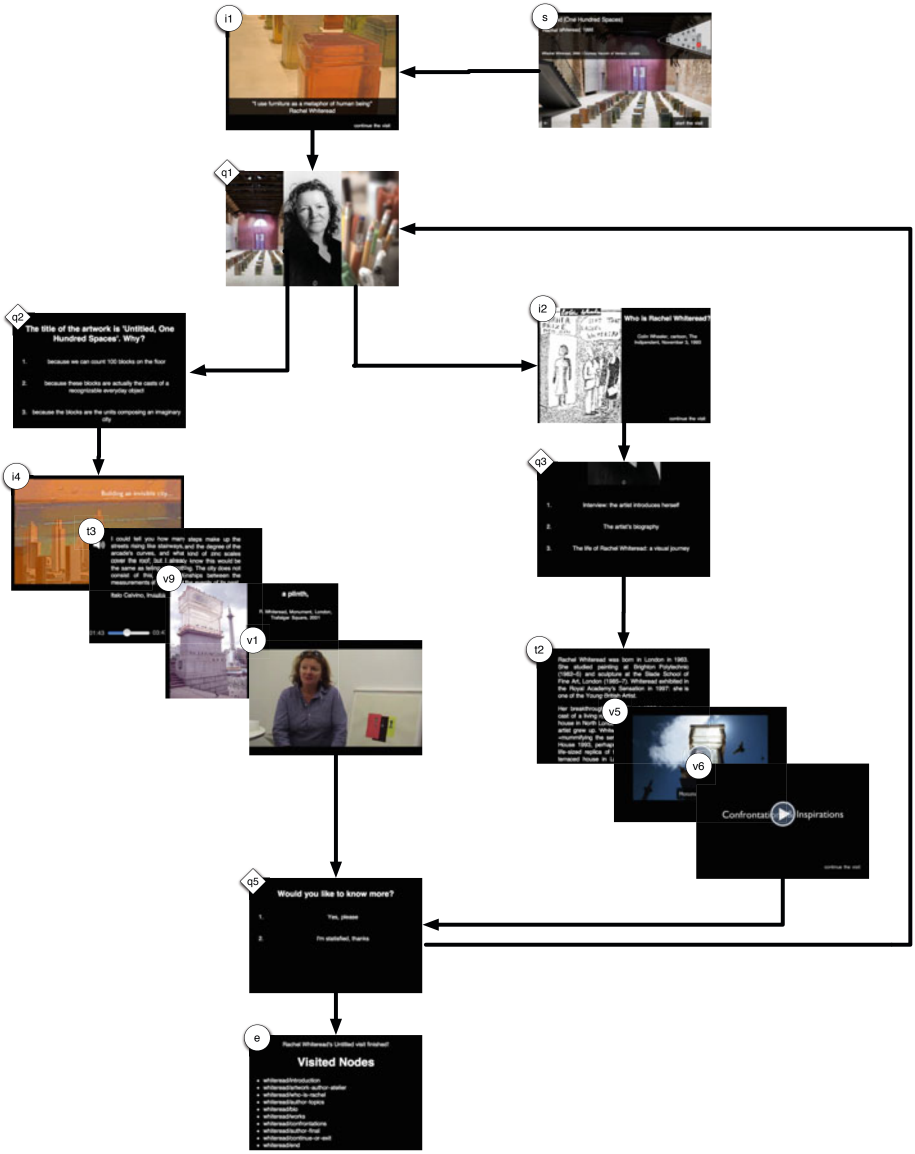
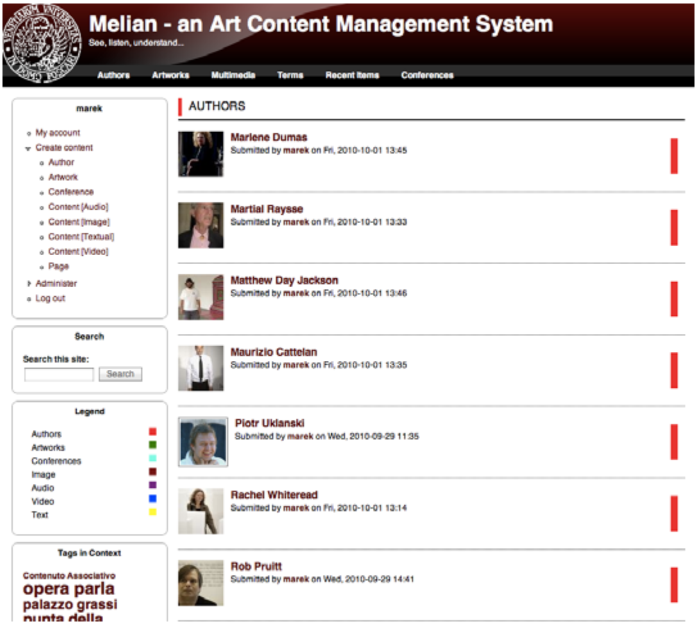

s
...d (One Hundred Spaces)
Rachel Whiteread, 1995
start the visit
i1
"I use furniture as a metaphor of human being"
Rachel Whiteread
continue the visit
q1
q2
The title of the artwork is 'Untitled, One Hundred Spaces'. Why?
1. because we can count 100 blocks on the floor
2. because these blocks are actually the casts of a recognizable everyday object
3. because the blocks are the units composing an imaginary city
i2
Who is Rachel Whiteread?
Colin Wheeler, cartoon, The Independent, November 3, 1993
continue the visit
q3
1. Interview: the artist introduces herself
2. The artist's biography
3. The life of Rachel Whiteread: a visual journey
i4
Building an invisible city...
t3
I could tell you how many steps make up the streets rising like stairways, and the degree of the arcade's curves, and what kind of zinc scales cover the roof; but I already know this would be the same as telling you nothing. The city does not consist of this, but of relationships between the measurements of its space and the events of its past
Italo Calvino, Invisible...
01:43
03:4
v9
a plinth,
R. Whiteread, Monument, London, Trafalgar Square, 2001
v1
t2
Rachel Whiteread was born in London in 1963. She studied painting at Brighton Polytechnic (1982–5) and sculpture at the Slade School of Fine Art, London (1985–7). Whiteread exhibited in the Royal Academy's Sensation in 1997: she is one of the Young British Artist.
Her breakthrough ... cast of a living ... house in North London ... artist grew up. White... «mummifying the se... House 1993, perhap... life-sized replica of t... terraced house in L...
v5
Monum...
v6
Confrontations Inspirations
continue the visit
q5
Would you like to know more?
1. Yes, please
2. I'm statisfied, thanks
e
Rachel Whiteread's Untitled visit finished!
Visited Nodes
whiteread/introduction
whiteread/artwork-author-atelier
whiteread/who-is-rachel
whiteread/author-topics
whiteread/bio
whiteread/works
whiteread/confrontations
whiteread/author-final
whiteread/continue-or-exit
whiteread/end

Fig. 4. A visit instantiated on the abstract topic graph of Figure 3



Legend	
Authors	🟥
Artworks	🟩
Conferences	🟦
Image	🟫
Audio	🟪
Video	🟦
Text	🟨

AUTHORS

Marlene Dumas
Submitted by marek on Fri, 2010-10-01 13:45

Martial Raysse
Submitted by marek on Fri, 2010-10-01 13:33

Matthew Day Jackson
Submitted by marek on Fri, 2010-10-01 13:46

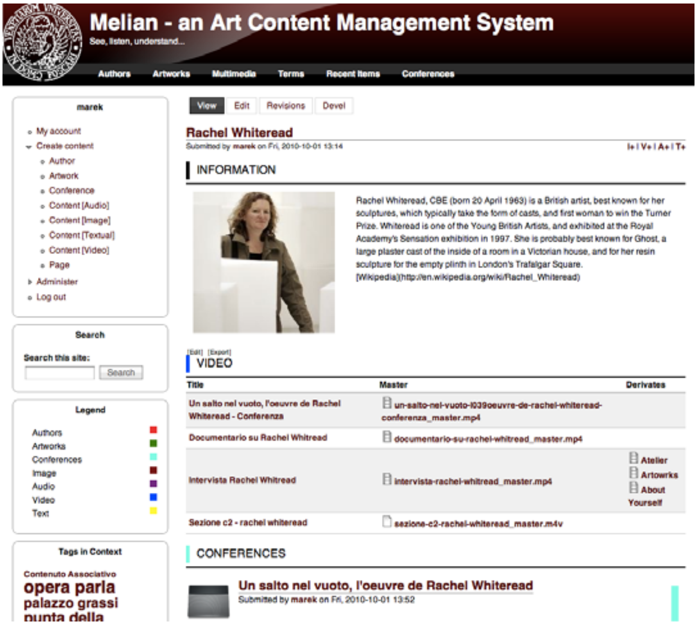
Maurizio Cattelan
Submitted by marek on Fri, 2010-10-01 13:35

Piotr Uklanski
Submitted by marek on Wed, 2010-09-29 11:35

Rachel Whiteread
Submitted by marek on Fri, 2010-10-01 13:14

Rob Pruitt
Submitted by marek on Wed, 2010-09-29 14:41

Fig. 5. The *CMS* artists page



Rachel Whiteread
Submitted by marek on Fri, 2010-10-01 13:14

INFORMATION

Rachel Whiteread, CBE (born 20 April 1963) is a British artist, best known for her sculptures, which typically take the form of casts, and first woman to win the Turner Prize. Whiteread is one of the Young British Artists, and exhibited at the Royal Academy's Sensation exhibition in 1997. She is probably best known for Ghost, a large plaster cast of the inside of a room in a Victorian house, and for her resin sculpture for the empty plinth in London's Trafalgar Square. [Wikipedia](http://en.wikipedia.org/wiki/Rachel_Whiteread)

VIDEO

Title	Master	Derivates
Un salto nel vuoto, l'oeuvre de Rachel Whiteread - Conferenza	un-salto-nel-vuoto-l039oeuvre-de-rachel-whiteread-conferenza_master.mp4	
Documentario su Rachel Whitread	documentario-su-rachel-whitread_master.mp4	
Intervista Rachel Whitread	intervista-rachel-whitread_master.mp4	Atelier Artowrks About Yourself
Sezione c2 - rachel whiteread	sezione-c2-rachel-whiteread_master.m4v	

CONFERENCES

Un salto nel vuoto, l'oeuvre de Rachel Whiteread
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Fig. 6. The *CMS* page about Rachel Whiteread

in state t_2), and a visual journey of her early years as an artist. Two videos about her works (v_5) and a comparison with other artists (v_6) are finally presented.

To archive and classify data about the authors and artworks the domain experts used the *CMS* described in Section 3. A large quantity of contents have been inserted during the course of the project: our preliminary internal tests shows that the web application has been not only a way of storing the contents remotely, but also an instrument useful for sharing and collaboration. In Figure 5 a screenshot of the artists catalog (called *Authors* in the guide) of the *CMS* is shown. The page presents a view of all the nodes of type *Author* created during the project. In Figure 6 a screenshot of the page relative to Rachel Whiteread is presented. In the upper part the artist is introduced by a picture and a short biography. In the lower part a summary of the relationships with other content is shown: in the example the artist is in relation with four items of type *Video* and an item of type *Talk*. Note, in the lower part of the figure, the master/derivate organization of the multimedia files: the master video is the full interview, while the derivates focus on specific parts.

To create new nodes for the guide the domain-experts have to work with a data file that can be either prepared by hand, using a domain-specific language, or compiled with the aid of the *CMS*. In the data file the user specifies a set of *key-value* pairs. Each key identifies an element of the node template to be instanced with the given value. Different elements are instantiated in different ways: text is written in the file as a string, multimedia content is linked by specifying a URL, and so on. By writing a few simple statements the domain-experts can define the contents and questions nodes, specify their relationships, and select the multimedia files to include in the guide.

5 Conclusion

In this paper we have discussed our experience in designing a system for producing multimedia art guides for mobile devices as a joint effort of domain experts, interface and web designers and programmers; using the principles of End User Design, they can collaborate, each one according to own's expertise. We followed the *design during use* principle, setting up a system *adaptable* to end-users of different expertise, following the principle of *gentle slope*: modifications and personalizations can be carried out at different levels of increasing complexity involving domain experts at the simplest level and programmers only for substantial structural revisions.

We used the system to develop an interactive guide on the Apple iOS platform for the contemporary art collection of the François Pinault Foundation at Punta della Dogana in Venice. We have gained the evidence that articulating knowledge according to the user mood and need raises interest, curiosity and amusement, without diminishing the importance of art or trivializing its cultural value.

The web-based Content Management System we developed allows the project partners to archive, share, classify, and query multimedia contents enforcing a set of predefined guidelines: the process eliminate subjectivity and make the whole process less error-prone. The stored contents are accessible both through the web and a remote filesystem, resulting in an effective data representation for all the project participants, both of humanistic and scientific background.

The vast majority of art guides face the visitors with classical hierarchical menus to select contents: in this scenario the users have complete freedom to choose their tours. This approach, however, can be confusing to many, mainly in contemporary art that is, in general, considered an arduous topic. The *PuD* guide allows the visitors to create dynamic tours based on their interaction with the system. The user is solicited with a set of questions, in the form of text, images, gestures, etc., collectively defining the shape and the theme of the tour. In the proposed interaction model visitors are guided by the domain-experts choices toward a gradual learning and understanding process, according to their individual sensibility, curiosity, and feelings.

Embracing the end-user development principles we developed a three-level framework where domain experts, web designers and programmers can successfully and seamlessly cooperate to extend the guide features and contents. We plan to extend this concept by creating a more advanced *CMS*, where end-users can exploit a fully graphical interface to easily construct and visualize the topic graphs through touch or point and click events. The use of open standards ensures future portability on different devices. We would like that the *PuD* Project guide could be understood as a conceptual instrument that encourages the exploration of the art world from an inner view, particularly from the look of the artist creator.

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