3D Digital Dossiers – a new way of presenting cultural heritage on the Web

Anton Eliëns[*]
VU Amsterdam
Netherlands

Yiwen Wang[†]
TU Eindhoven
Netherlands

Chris van Riel[‡]
VU Amsterdam
Netherlands

Tatja Scholte[§]
ICN Amsterdam
Netherlands

Abstract

In this paper we give a comprehensive overview of our work on digital dossiers for the presentation of cultural heritage, in particular contemporary art, on the web using standard 3D technology. Digital dossiers allow for navigation using concept-graphs, and use 3D in an essential manner to present artwork installations, as 3D models, as well as all the relevant information needed for understanding the artwork, and, for curators, for the preservation and possible re-installation of the artwork(s). Our discussion encompasses requirements, implementation issues, and the realization of guided tours in digital dossiers, that provide a narrative facility as well as tools to experiment with exhibition parameters in virtual space.

CR Categories: H.5.1 [Multimedia Information Systems]: — Hypertext navigation and maps   H.5.4 [Hypertext/Hypermedia]: Navigation, User issues—

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1 Introduction

Contemporary art is an intrinsic part of our cultural heritage. Installations, performances, video and other forms of media art, have the interest of a small group of adherents, but are in comparison with more traditional art forms, far more difficult to present to a general audience. Another problem is that, due to the type of materials used and the context-specific aspects of these art forms, the conservation of the works is difficult and require of the conservator an intimate knowledge of the original intentions of the artist as well as details of the materials used and the procedure of construction.

In this paper, we report on our work in developing digital dossiers, with a special focus on the *abramovic* dossier. The *abramovic* dossier was developed in 2004 as a collective student project at the Vrije Universiteit, Amsterdam. The digital dossier presents itself as a digital archive in 3D space, containing information about the artworks of the performance artist Marina Abramovic by presenting media content and relational structures. In this particular case, the digital dossier presents the artist Marina Abramovic's artworks, serving as an information source for museum curators to conserve and install the artworks.

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[*]e-mail: eliens@cs.vu.nl
[†]e-mail: y.wang@tue.nl
[‡]e-mail: cvriel@few.vu.nl
[§]e-mail: tatja.scholte@icn.nl

Our digital dossier introduces innovative features with respect to navigation and presentation in 3D environments. For navigation, we designed a concept graph, that links multimedia elements, supporting arbitrary, that is non-taxonomic, relationships. These relationships are shown in a hierarchic way, as parent-child relations. This structure is dynamic, i.e. the selected information determines the presented hierarchy and visualizes parent-child relationships between information nodes. For the presentation of media content, we designed a content gadget consisting of three windows positioned in a way that allows to deal with multiple media items simultaneously.

The structure of this paper is as follows. After discussing research issues in cultural heritage information presentation (section 2), and the background and requirement of our digital dossiers (section 3), we give an overview of the realization of the *abramovic* dossier (section 4). We then discuss usability and presentation issues (section 5) and, the construction of guided tours (section 6), after which we present our conclusions (section 7).

2 Research problems in cultural heritage information presentation

Similar to many other cultural heritage projects, see for example in the Dutch arena the projects within the CATCH[1] (Continuous Access to Cultural Heritage) framework, we encountered many problems which, taking our *abramovic dossier* as a reference, may be summarized as below:

- big volume – information and media items related to artworks

- wide diversity of media – including images, videos, as well as 3D models

- multiple relationships – artworks may belong to multiple categories and link to many items

- context enrichment – artworks must be placed in a proper context, also aesthetically

- range of users – from museum curators to kids, and everything inbetween

As an example of *volume* and *diversity* the *abramovic* dossier already contains over 40 texts, 10 reports, 8 interview clips, 82 pictures, a description of 23 types of (art) material, as well as 3D models of an installation.

For information visualisation there are too many options to discuss in this limited space, see [Ivan et al. 2000] for an overview. For our dossiers we used concept graphs following the example, among others, of the Visual Thesaurus[2]. The Visual Thesaurus allows for invoking Google image or document search from any of the elements of the concept graph, thus giving access to related information albeit in a non-immersive, disruptive, manner. In constructing our digital dossier(s), we explicitly strived for presenting additional information in an immersive, non-disruptive manner. Immersive,

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[1]www.nwo.nl/ew/catch
[2]www.visualthesaurus.com

here, means that the user experiences no abrupt change of context by having to focus on a different window. Cf. [Grau 2003] and [Bolter and Grusin 2000].

3 Background and requirements of digital dossiers

The digital dossier(s) described in this paper were developed in a series of student projects in the *multimedia casus*[3] course, in close collaboration with the Netherlands Institute for Cultural Heritage (ICN[4]). ICN is a leading, government-funded knowledge institute for the preservation and management of so-called moveable cultural heritage. ICN is coordinator of International Network for the Conservation of Contemporary Art (INCCA[5]).

The first group (2004 spring) developed a virtual atelier for the Dutch artist Marinus Boezem, which included an agent for presenting information, [[_Agents]]. For the 2004 autumn group, we decided to take the work of Marina Abramovic, a Serbian-Dutch artist who became wellknown in the seventies with performances with her partner Ulay, and has since then produced numerous installations, videos and performances with 'high existential impact'. The directive with which the students where set to work was, quoting Ted Nelson: *everything must be highly intertwinkled.* Since virtual museums are by now a common phenomenon, and the virtual atelier for Marinus Boezem (that was realized in a previous casus) may be considered to be just a variant of this, the 2004 autumn group decided to explore alternative ways of presentation and navigation.

As material for the *abramovic dossier* there was an interview with Marina Abramovic from ICN, made in cooperation with the Dutch Foundation for the Conservation of Contemporary Art, and a number of videos from the collection of the Institute for Time-based Arts (Montevideo[6]). In addition, a transcription of the contents of the interview made by Michela Negrini, a student of media art at the University of Amsterdam, who also provided an interpretation as well as a categorization of the works of art. Given the material and the categories along which this material was classified, the students decided to explore the use of concept graphs as an instrument for navigating the information space.

In summary, the digital dossier[7] for the artist Marina Abramovic had to satisfy the following requirements:

- It must serve as an information source for conservators and curators of contemporary art,

- It must present rich media recordings of all artworks, and,

- It must provide background information for the general public (non-expert users).

4 Realization of the *abramovic* dossier

The *abramovic* dossier was created with VRML (Virtual Reality Modeling Language), which allows for creating virtual worlds and present them on the web.

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[3] www.cs.vu.nl/∼eliens/casus

[4] www.icn.nl

[5] www.incca.org

[6] www.montevideo.nl
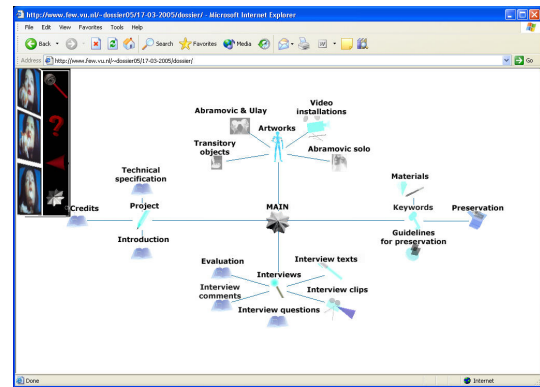
[7] www.few.vu.nl/∼dossier05

Fig. 1: Concept graph

As a user interface for navigating the digital dossier, we created a concept graph (see fig. 1) that represents arbitrary information structures in a hierarchical way, [Eliens et al. 2006]. The concept graph allows the user to detect relations and search for information. Unlike the 3D cone tree, [Robertson and MacKinlay 1991], where the complete hierarchical structure is presented, only a subset of the hierarchy is shown, three levels deep. The concept graph is implemented as a star-structured hierarchy diagram representing related information objects. By star-structured we mean that relations between information objects are visualized by lines, displaying a parent-child relationships structure, showing a centered information object surrounded by related information objects. This structure is dynamically generated when selecting an information object. The selected object will be translated to the center of the screen, involving movement in the X and Y direction. It then becomes a parent node showing its children around it. So, the presentation is dynamic and actually determined by the user's choice. To compensate for the lack of an instant overview, where all information is shown at once, the user may, as already indicated in the previous section, also use keyword search instead of navigation.

Information objects shown in the concept graph are represented by 3D icons. These 3D icons visualize a certain type of information. The icons tell the user what information s/he can expect when clicking on it. We distinguish between two information types:

- conceptual information – that represents categories

- content information – that represents actual (media) content

Content information may itself refer to different kinds of media, such as text, providing for example interview transcriptions, pictures, to represent artworks by images, videos, for presenting interviews and recordings of performances, and 3D models, to display artwork installations in an interactive way.

4.1 Presentation of media content

Presentation is an essential part of the digital dossier but is separated from navigation. The digital dossier contains different presentation facilities for 2D and 3D content. For 2D media content a visualization facility is needed that is able to present video, images or textual information. This is implemented as a content gadget with three windows. In each of the three windows the user can view either text, image or video content. The windows are positioned in such a way that the user can inspect the information simultaneously (see fig. 2). In our experience, three views can be presented at the same time without much visual distortion.

Below the three windows a list of all content related to the selected information object is displayed.
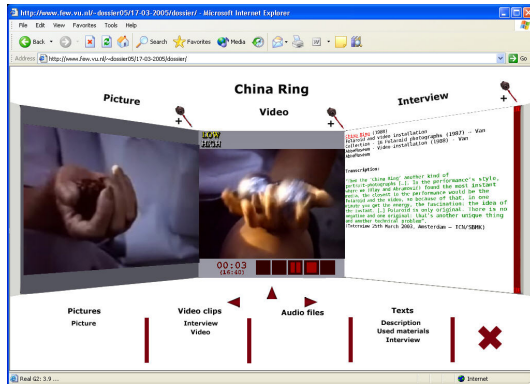
Fig. 2: Content gadget

The available content is presented in lists for each content type. The user can control on which of the three windows the content selected is displayed, by using drag-and-drop to the window of choice. This functionality gives the user some freedom for customization instead of being bounded to a fixed display. If necessary, the user can focus on a particular window with a zoom option, to avoid distraction from the other windows.

4.2 Incorporating 3D models of artwork installations

Since we adopted 3D technology, we could easily accommodate a 3D model for one of the installation art works by Marina Abramovic. the installation Terra della Dea Madre (see figure 3) The 3D environment demonstrates the interactive exploration of the installation of an artwork. By manipulating position and/or angle of objects, museum curators can get insight into how the artwork could be exhibited.

Using the concept graph in conjunction with the presentation gadget resolves the duality of information and presentation that is inherent for (multimedia) digital dossiers, and thus promotes what may be called the immersive experience of digital artist's dossiers.
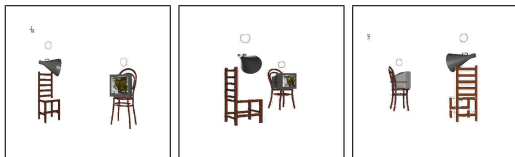

Fig. 3: Reconstruction of *Terra della Dea Madre*.

The installation for which the reconstruction was made is *Terra dea degli madre*, an installation with two chairs and a television, which was exhibited in the Stedelijk Museum of Amsterdam, in 1986. As a starting point, we took a video produced at the time of the exhibition, which shows the installation in an exposition room in the Stedelijk Museum, and which contains, apart from comments from Abramovic, also the video shown on the televison in the installation. Based on this video we constructed a 3D model of the installation.

As a follow-up on the *abramovic* dossier, the 2005 Casus group developed a digital dossier for the artist Jeffrey Shaw[8]. One interesting aspect of the dossier for Shaw is the availability of a tool environment to learn about the construction and de-construction of the Revolution installation and to experiment with the exhibition space parameters of the artwork, such as the lighting conditions, and the color and texture of the walls and the floor.

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[8]www.few.vu.nl/~casus05

4.3 Data representation and content management

For creating the digital dossier we developed a web-based content management tool to generate the VRML structures needed for creating the concept graph and the content nodes. We later extended this tool to generates XML (eXtendible Markup Language) structured data which can be converted to VRML or any other suitable format.

XML is independent of formatting information and therefore suited for multiple presentation forms. The tool has initially been created for non-expert VRML users that want to create a 3D digital dossier in a relatively quick and easy way, without programming or adjusting existing code. By using style sheets, the generated XML output can be presented in various ways by giving it formatting information.

We based the XML representation originally on Dublin Core[9], since it is the standard used in the INCCA initiative, to record meta-information about existing information sources. However, in the future we will explore alternative representations, such as CIDOC[10], which provides more refined ways to express structural information.

5 Usability and presentation issues

As a first review of the digital dossier we conducted a cooperative evaluation with potential end-users. A cooperative evaluation is a variation of a think-aloud evaluation, [Dix et al, 1998]. In particular, we were interested in explorative tasks. The evaluation gives a first indication of the usability of the digital dossier.

As positive results we found that the concept graph makes it easy to detect relations between information and that using a concept graph for navigation appeared to be intuitive for all users. In addition, the close relation between the concept graph and presented media seems to reduce disorientation.

As negative results we found, however, that the meaning of 3D icons was not well understood. Also all the users expressed the wish to customize the visual appearance of the concept graph and the icons used.

In general, we conclude that the concept graph supports both intuitive navigation and relationship detection. However improvement of the visual appearance of the digital dossier is definitely desired. In summary, when demonstrating the application to the interested parties, that is ICN and Montevideo, a number of issues came along, that we will here summarize as a list of questions:

- what icons should be used to identify the elements of the concept graph?
- what categories and relationships are most appropriate?
- how should the information be displayed, simultaneously or more focussed?
- how do we allow the user to choose between multiple information items?
- how do we avoid visually disturbing elements?

Obviously, although the *abramovic dossier* was very positively received, these issues must be dealt with to make it a success.

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[9]www.dublincore.org

[10]cidoc.ics.forth.gr

With the Casus 2005 group there was, interestingly, a strong resistance against using 3D for the concept graph navigation mechanism. So we explored a mixed approach, using 2D for the concept graph, and 3D only for the representation of the Revolution installation, in the tool environment mentioned in section 4.2. Nevertheless, although the dossier for Shaw does realize many of the goals set for the next generation dossier, it did fail in providing an immersive application, in the sense indicated in section 2. It did not, as we discussed more extensively in [Wang et al. 2006], achieve a natural transition between browsing the concept space and inspecting/experiencing the media recordings of the artwork, thus disrupting the natural flow of attention, as we may call it of the user of the dossier. Nevertheless, as we observed in [Schonhage et al. 2000] with regard to the visualization of business processes, the effective use of 3D visualizations does require a certain degree of literacy, that is visual literacy, from the side of the user.

6 Guided tours in digital dossiers

Apart from the presentation gadget, which allows for the simultaneous inspection of multiple media items, in a variety of formats, we explored the use of guided tours as a means to present the information in a story-like way, relieving the user of the often cumbersome task to interact, [van Riel et al. 2006a] and [van Riel et al. 2006b].

Guided tours, in the digital dossier, may take one of the following forms:

- automated (viewpoint) navigation in virtual space,
- the (narrative) presentation of a sequence of concept nodes, or
- an animation explaining, for example, the construction of an artwork.

In practice, a guided tour may be constructed as a combination of these elements, interweaving, for example, the explanation of concepts, or biographic material of the artist, with the demonstration of the positioning of an artwork in an exhibition space.

In its most basic form, guided tours operate by a sequence of events, mimicking user interaction (e.g. mouse clicks or key strokes), that communicate with functions with specific pre-defined values, fired at specific pre-defined times.

A special case of a guided tour is the tool environment constructed for the *Revolution* installation of Jeffrey Shaw, discussed in section 4.2, which allows for experimenting with the (de-) construction of the installation and exhibition parameters.

7 Conclusions

Digital dossiers provide an efficient means to present cultural heritage on the web, including media-rich representations of artworks as well as 3D models of artwork installations and the information needed for understanding the artwork in the context of its production and (re-)installation. Digital dossiers provide support for navigating the information space by means of concept graphs. Instead of presenting a complete view of the hierarchy, the concept graph shows only a subset of the information, and allows in this way for arbitrarily complex information structures.

The results of an initial evaluation look very promising for using the concept graph as a navigation paradigm. Evaluation indicates that it is relatively easy to use and that it supports exploratory tasks rather well. Additional tools, such as an interactive model illustrating the

de-construction of an artwork installation, may support curators in their task of preservation and re-installation of artworks.

Clearly, digital dossiers are not only useful to present information about contemporary art, but also in for example the domain of scientific communication, which also requires that users may experiment with models to gain better insight in the functionality and ideas underlying for example systems in physics. Recently, we have submitted a research proposal to extend the application of digital dossiers to the domain of scientific communication and to continue our research on guided tours in digital dossiers under the name I-GUARD[11] (Intelligent Guidance in Archives and Digital Dossiers).

For those interested to experiment with the creation of digital dossiers, a minidossier is available for download[12].

References

BOLTER J.D AND GRUSIN R. 2000, *Remediation – Understanding New Media*, The MIT Press

DIX A, FINALY J, ABOWD G, BEALE R, 1998, *Human Computer Interaction*, Prentice Hall 2nd edn.

ELIENS A., VAN RIEL C., WANG Y. 2006, Navigating media-rich information spaces using concept graphs – the abramovic dossier, In *Proc. InSciT2006*, 25-28 Oct. 2006, Merida, Spain

GRAU O. 2003, *Virtual Art – From Illusion to Immersion*, The MIT Press

IVAN H., MELANCON G. AND MARSHALL M.S. 2000, Graph visualization and navigation in information visualization: A survey, *IEEE Transactions on Visualization and Computer Graphics*, 6(1):24-43

HOORN J., ELIENS A., HUANG Z., VAN VUGT H.C.,, KONIJN E.A., VISSER C.T. 2004, Agents with character: Evaluation of empathic agents in digital dossiers, Emphatic Agents, *AAMAS 2004*, New York 19 July - 23 July, 2004

RIEL C. VAN, WANG Y. AND ELIENS A. 2006A, Concept map as visual interface in 3D Digital Dossiers: implementation and realization of the Music Dossier, In *Proc. CMC2006*, Costa Rica, Sept 5-8 2006

RIEL C. VAN, ELIENS A., WANG Y. 2006B, Exploration and guidance in media-rich information spaces: the implementation and realization of guided tours in digital dossiers, In *Proc. InSciT2006*, 25-28 Oct. 2006, Merida, Spain

ROBERTSON G.G. AND MACKINLAY J.D. 1991, Cone trees: animated 3D visualizations of hierarchical information, In *Proc. of the SIGCHI Conference on Human factors in computing systems: Reaching through technology*, pp. 189-194, New Orleans, Louisiana, USA

SCHONHAGE, B., VAN BALLEGOOIJ, A., ELIENS, A. 2000, 3D gadgets for business process visualizations, In *Proc. of the fifth symposium on Virtual reality modeling language* (Web3D-VRML), pp. 131-138, Monterey, California, USA

WANG Y., ELIENS A., VAN RIEL C. 2006, Content-oriented presentation and personalized interface of cultural heritage in digital dossiers, In *Proc. InSciT2006*, 25-28 Oct. 2006, Merida, Spain

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[11]www.cs.vu.nl/~eliens/research/i-guard.html
[12]www.few.vu.nl/~cvriel/casus05/