The *abramovic* dossier – *presentation and navigation of contemporary art in 3D digital dossiers*

Anton Eliëns, Chris van Riel, Yiwen Wang

Intelligent Multimedia Group
Vrije Universiteit, Amsterdam, The Netherlands
{eliens,cvriel,ywang}@few.vu.nl

Abstract. In this paper, we describe a case study of creating a digital dossier to present a collection of artworks of the Serbian-Dutch performance artist Marina Abramovic, together with the art related information for the preservation and re-installation of these artworks. For the presentation of information we choose a 3D environment which facilities the presentation of text, pictures and video as well as 3D models of artwork installations. For navigation we developed a concept graph that allows for choosing inter-related concepts, artwork-related information and media recordings of artworks in a unified intuitive fashion. The Abramovic dossier, developed as a collective student project, was based on a set of video recorded interviews with the artist. The outcome of these recordings can also be accessed by using the concept graph as a navigation paradigm.
keywords: concept graphs, relation visualization, contemporary art, VRML.

1 Introduction

The *Abramovic dossier*[1] 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.

Our digital dossier introduces some innovative features with respect to navigation and presentation in 3D environments. For navigation, we designed a concept graph that links multimedia elements in a structured hierarchy. The hierarchal structure is dynamic, i.e. the selected information determines the presented hierarchy and visualizes parent-child relationships between information

[1] www.few.vu.nl/∼dossier05

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 simultaneously.

The structure of this paper is as follows: In section 2, we give some general background concerning the development of the digital dossier and in section 3, we give an example of using the digital dossier. In section 4 we describe the realization of the *abramovic dossier*, and in section 5 we discuss initial user experiences. In section 6, we discuss issues with respect to data representation and content management and, finally, after looking at related work in section 7, we draw our conclusions.

2 Background and requirements

The digital dossier described in this case study was developed in close collaboration with the Netherlands Institute for Cultural Heritage (ICN[2]). ICN is a leading, independent 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[3]).

After a first round of the *multimedia casus*, in which the students produced an application giving an overview of the INCCA information archive, but only incidental information about the artists and their artworks, we decided to focus on case studies of individual artists, and we introduced the notion of *digital dossier*. Like a medical dossier, the *digital dossier* was meant to give the information about the artist and the works of art readily at hand, so that it could effectively be used for the task of conservation and the re-installation of the artworks.

Since we were in doubt whether the phrase *dossier* actually existed in the English language, we looked it up in a dictionary:

Webster New World Dictionary

- dossier (dos-si-er) [Fr < dos (back); so named because labeled on the back] a collection of documents concerning a particular person or matter
- archive – 1) a place where public records are kept ... 2) the records, material itself ...

We chose for the phrase *digital dossier*, and not for archive or library, to stress that our focus lies on presentational aspects. Although issues of data representation and content management, as will be discussed later, are clearly important, our primary interest was with issues of presentation and navigation.

The first group (2004 spring) developed a virtual atelier for the Dutch artist Marinus Boezem, which included an agent for presenting information, Hoorn et al. (2004). 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

[2] www.icn.nl
[3] www.incca.org

performances with her partner Ulay, and has since then produced numerous installations, videos and performances with what I would like to call '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 Visual Arts, and a great collection of videos from the Institute for Time-based Arts (Montevideo[4]). 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 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,
- In addition, it must provide background information for the general public (non-expert users).

3 A scenario of using the digital dossier

In this section, we give an example of using the digital dossier illustrating how to find information related to the artwork 'China Ring'. When starting the dossier, it loads the concept graph that is used to navigate through the available information. In the center of the concept graph, a shining star is shown to illustrate the root of the information hierarchy, which is used as the start object. When clicked, a star structure spreads and child objects appear surrounding the center star object (see fig. 1).

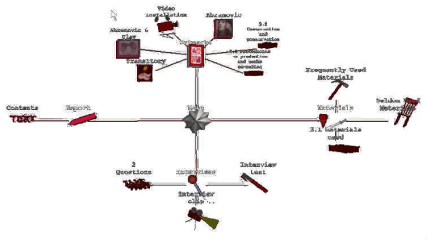

Fig. 1: main node

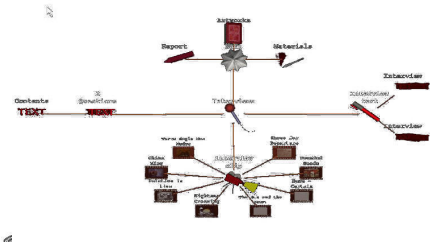

Fig. 2: interviews

[4] www.montevideo.nl

Clicking on the Interviews node gives an overview of all interview fragments (fig. 2), then going back clicking on the information node Artworks and then on China Ring will bring the node for China Ring into focus. Alternatively, using the keyword search function, the artwork China Ring can be easily found without concept graph navigation. When clicking on the center node China Ring, a content presentation environment appears. which has three windows to present different types of information, grouped into the categories text, pictures and video. If desired, the user can focus on any window by using a zoom function.

When the presentation of media content is finished, clicking on the close button will result in going back to the concept graph. Alternatively, the home function of the tool bar may be used to return directly to where we started: the original shining star.

4 Realization of the digital dossier

In this section we will indicate how the *abramovic dossier* was realized, We will discuss the way media content is presented and how 3D models of artworks may be incorporated, and we will then describe the implementation of the concept graph in somewhat more detail.

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

As a user interface for navigating the digital dossier, we created a concept graph that represents hierarchical information structures. The concept graph allows the user to detect relations and search for information. Unlike the 3D cone tree, discussed in section 7, 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, getting a parent-child relationships structure by 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 can, 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 he user what information s/he can expect when licking on it. We distinguish between two information types:

- Conceptual information: that represent categories
- Content information types: that represent actual (media) content

The content information type itself consists of different media types. These are:

– Text content type: representing textual information
– Picture content type: representing static visual information
– Video content type: representing digital video recordings

4.1 Presentation of media content

Presentation is an essential part of the digital dossier but is separated from navigation. The presentation facilities are deployed when media content is selected for view. 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 facility is implemented as a content gadget with three windows. In each of the three windows the user can view 2D media content. These windows are positioned in such a way that the user can inspect the information simultaneously (see fig. 3). In our experience, three images can be presented at the same time without much visual distortion.

Fig. 3: Presentation of video clips from Marina Abramovic

Below the three windows a list of all content related to the selected information object is displayed. The content is categorized lists for each content type. The user can control on which of the three windows content is displayed. By using drag-and-drop the user can view content on a 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 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.

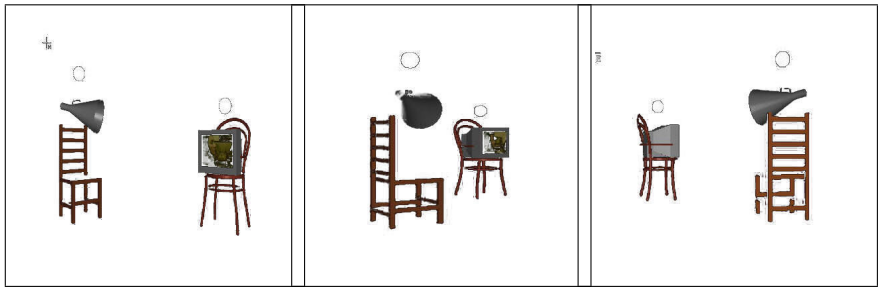

Fig. 4: Reconstruction of Terra dea degli Madre *in VRML.*

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.

At this point, we can only speculate how useful such a reconstruction can be as a tool for the conservator responsible for the re-installation, to play around with the presentation parameters, the positioning in space, the overall size, light and ambient effects.

4.3 Data structures

For developing the *abramovic dossier*, we have a fixed number of record-like structures:

- Video – to display video fragment, including interviews
- Picture – to present pictures of the artwork
- Artwork – contains all information connected to a work of art
- TextItem – to present text, from the interview or any other source
- MaterialItem – to present information about material(s) used
- GroupNode – to combine nodes in the concpet graph
- Information – acts as the outer container for all nodes

All these structures support a set of common attributes, including *shortName*, *longName*, *ID*, *connectedNodesIDs*, and *description*. In addition the *Video*, *Picture* and *Picture* have fields allowing to show a preview image. And the *Video*, *Picture* and *TextItem*, also have a *url* field giving access to the actual information item.

The *Information* and *GroupNode* structures are used for creating the top-levels of the concept graph, whereas the other structures, such as the *Video*

and *TextItem* give access to for example a fragment of an interview and its transcription.

Below an example is given of the data underlying the concept graph of the *abramovic dossier*:

```
Information {
 informationNodes [
  GroupNode {
       ID "MAIN"
       shortName "Main"
       longName "Main"
       urlModel "models/conceptGraph/main/modelMain.wrl"
       description [ "Central information node" ]
       connectedNodesIDs [ "ARTWORKS", "KEYWORDS",
                           "INTERVIEWS", "REPORT" ]
       }
  GroupNode {
       shortName "Artworks"
       longName "Artworks"
       description [ "Node that connects to all the artworks" ]
       ID "ARTWORKS"
       connectedNodesIDs [ "MAIN", "TRANSITORY",
                  "ULAY", "VIDEOINSTALLATION", "ABRAMOVIC" ]
       urlModel "models/conceptGraph/artworks/artworksGroup.wrl"
       }
       # # ...
 ]
}
```

The *Information* node collects all available nodes, and takes care of connecting the individual nodes, based on the information specified for each node.

As an example of an *Artwork* node, that is an element of the list of nodes in the *Information* node, look at:

```
Artwork {
  shortName "Terra degla Dea Madre"
  longName "Terra degla Dea Madre"
  description ["15:40 min, colour, sound."]
  ID "AV24"
  connectedNodesIDs ["VIDEOINSTALLATION", "DTV24",
          "TTV24", "PV24", "CV24", "VV24", "G0"]
  urlPreviewImage "images/previewImages/AV24.jpg"
  widthPreviewImage 479
  heightPreviewImage 349
}
```

This node is connected to many other nodes, giving access to the information items that belong to it, such as the video clips of the interview, shown below.

```
Video {
  ID "CV24"
  shortName "Interview clip Terra degla Dea Madre"
  longName "Interview clip showing Terra degla Dea Madre"
  url "interviewclips/interview_terra_degla.avi"
  width 320
  height 360
  urlPreviewImage "images/previewImages/interview_terra_degla.jpg"
  widthPreviewImage 320
  heightPreviewImage 240
  description [""]
  connectedNodesIDs ["CLIP", "AV24"]
}
```

In the *url* field of this declaration, the actual video file is indicated, which should be displayed at a resolution of 320x360, as specified in the *width* and *height* fields.

And finally, as an example of a *TextItem*, consider:

```
TextItem {
  shortName "Instruction"
  longName "Green Dragon Lying instructions for the public."
   description ["Text explaining the way the public has to interact with the
     artwork."]
  ID "ITO05"
  connectedNodesIDs ["AO05", "INTERACTION"]
  url "text/AO05_instruction.txt"
}
```

For constructing the actual *abramovic dossier*, we developed a content management tool, that allows the user to browse and edit existing nodes, and to insert new nodes into the graph.

4.4 Drawing the graph

This section describes how the concept graph is drawn. When a new node has been chosen to become the center of the concept graph, we could say that the state of the graph changes. This is where the computation of the new positions of nodes in the concept graph starts. The positions of the nodes are computed as positions on a 2D plane. The process can be described in 5 steps:

Step 1: First the node that is selected is placed in the center of the space. We call this node the center node. The node represents the information the user is focusing on.

Step 2: Next, the available radius for the center node is set. In our application this value was kept constant for each state. The radius available must be larger than the space taken in by the center itself otherwise there is no room for drawing other nodes.

Step 3: In this step the radius that is available for each surrounding node of the center node is computed. The surrounding nodes of the center node will be called the child nodes. The children of the center node are the nodes with information related to the information of the center node. The circle around the center node is divided into sectors. The number of sectors is equal to the amount of children of the center node. The space available for a child is the circle that fits inside a sector. However, the circle around the child may not intersect with the center node, this puts a minimum on the distance from the center to the child. If this is the case, the circle available for the child node is decreased to not intersect with the center node (i.e. the radius is derived from the minimum distance and the available space/radius of the center node).

Step 4: Now the actual radius that will be used by a child node can be computed as follows: First for each node surrounding the child node (which can be regarded as grandchild nodes relative to the center node) we compute the distance it will be placed from the child node. We must make sure that the nodes do not intersect each other, so we arrange them around the child node. The distance to the child node is equal for each node, where each surrounding node has the same sector size to be drawn in. The distance between a surrounding node and the child node is taken as small as possible such that the surrounding node just hits the borders of the sector. But in the case the center node and surrounding node would intersect, the center node and surrounding node are put next to each other. The required radius of a child node is the radius of the circle with the same center as the child node in which all its surrounding nodes fit. However in case this radius exceeds the available space of the child node, the available radius is taken as the required radius. Also the child node and its surrounding nodes will be scaled down to fit inside its available radius.

Step 5: In this last step the position of all the nodes in the concept graph are computed. The child nodes are arranged around the center node like in step 4. The distance between the child node and the center node is minimized such that the their required space of the child nodes fit in the sectors without hitting the center node. The positions of the child nodes can now easily be derived from the distance and the angle each sector is taking. In case the available radius is smaller than the required radius, the child node will be drawn smaller and the distance of the surrounding nodes to the child node are scaled down to fit the available radius. If the available radius for a child node is smaller than a predefined minimum, the children will not be drawn. The positions of the surrounding nodes relative to their child node are computed in the same way as the child nodes. In our application the concept graph could fill a rectangle space. The locations of the nodes are scaled/modified to make optimal use of the entire available screen space.

Resolving conflicts Because of the (inter) relations of the data, sometimes multiple locations are possible for data items to be placed. (for example both as center node and as surrounding node of a child node). We have chosen to draw only one node for a data item: If a node is already present for an information

item, the other possible locations will be left open. Since the center node will be drawn first, and subsequently the children nodes and its surrounding nodes, as a result, most open locations are around the child nodes.

The child node is always related to the center node because all relations are symmetric. Therefore there is always one gap in the surrounding nodes of a child node. The locations of the surrounding nodes are rotated such that this gap is in the same direction as the center node from the child node. To indicate relationships, lines are drawn between related nodes. If a node has a relation to a node that is among its children, a colored line is drawn. If the node is not among its children, because the node with the related information was already elsewhere, a visually less apparent line is drawn. The surrounding nodes of the child nodes are drawn slightly transparent to make the center node and the child nodes visually more apparent

Animations When the concept goes to a different state (because the focus has changed) the concept graph is animated to show the transition of the old state to the new. Nodes that represent information that is also needed in the new state, move to their new locations. Nodes that represent information that is no longer needed disappear from the screen with a fade out effect and new nodes that are needed appear with a fade in effect.

5 Usability evaluation

As a first review of the digital dossier we conducted a cooperative evaluation with potential end-users. The cooperative evaluation is a variation of a think-aloud evaluation and has as advantages that it is easy to conduct, and involves no extra costs and that it delivers test results in a relatively short time, Dix et al, (2001). In general, we were interested in explorative tasks, where the evaluator has a passive role.

The test results give 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 seem to reduces 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 possible and 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. Having a first prototype, we needed to rethink our application, not only with regard to its style of presentation but, as we will discuss in the next section, also in terms of its underlying data representation.

6 Data representation and content management issues

To preserve the information stored in the digital dossier for future use, we must reconsider the data representation i.e. how the information is stored and structured. To use the information presented by the digital dossier, taking into account future developments in 3D technology or other application contexts, it has to be independent of formatting information. This means that the same information instance can be used for other presentations in a relatively easy way. In particular, in case of the digital dossier the presented information has to be VRML independent.

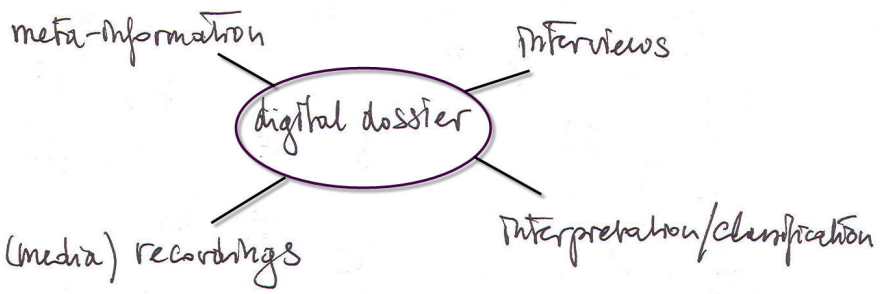

Fig. 5: Primary data sources for constructing the digital dossier

As an extension to the digital dossier we created a web-based content management tool that generates XML (eXtendible Markup Language) structured data output from textual information input. 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. In case of the 3D digital dossier a style sheet conversion is needed from XML to VRML format.

In re-thinking the *abramovic dossier*, we needed to re-establish what were our goals in developing this application and what our primary data sources. The goal,

first of all, is to support conservators in their task of preserving contemporary art, and to assist them with the re-installation of such artworks.

Our primary data sources are, as indicated in fig. 5, *meta-information*, coming from the INCCA initiative, and video-recorded artist *interviews*, which were initiated by ICN as a means to record information about contemporary art that would otherwise be lost. In addition we media-material, including images and video, that may be regarded as *recordings* of the works of art, as well as the textual *interpretations* and classifications that exist, or may be constructed from this material.

At this point, we may remark that one of the pitfalls in creating a dossier is to get trapped in the visually salient features of the dossier, the presentation of the artworks themselves, and forget about the primary focus of the dossier, to make all information accessible in an adequate manner.[5]

For the next generation of digital dossiers, we stated the following requirements:

1. adaptation of representation to Dublin Core
2. XML-based content management, with php forms
3. there should also be a possibility to present the information and material in a 'plain' web format
4. as well as in (a new version of) 3D dossiers, and
5. we should think about the proper presentation parameters.

Dublin Core[6] is the standard used in the INCCA initiative, to record meta-information about existing information sources. For the *abramovic dossier*, a collection of record-like structures was developed, together with a simple content-management tool, written in PHP. This content-management system must be adapted to be compatible with the Dublin Core-based resource descriptions, augmented with annotations needed for presentation.

Further, we decided that, along with the 3D presentation of the dossier, it would be worthwhile to develop a conversion tool that produces standard web-technology based presentations as well. This approach allows us to assess the usability merits of the 3D dossiers in a comparative way.

Finally, as indicated before, an important issue that must be resolved concerns the proper presentation parameters. What do we present to the user? And how do we allow the user to interact with the material presented?

7 Related work

Concept-relation graphs are a familiar tool in linguistics and have also been used for a long time in Artificial Intelligence to describe the semantic relationships in

[5] For many cultural heritage applications, which aim to present art to the layman, presenting the artwork is the primary focus, and giving access to the information context generally comes second.

[6] www.dublincore.org/

complex domains. As a navigation instrument it is, for example used in a kanji learning tool[7] and the Visual Thesaurus[8].[9]

Concept graphs or concept maps are also increasingly being deployed for educational purposes, as testified by a special interest group at the Dutch Digital University[10]. For a more general overview of concept graphs and concept mapping tools, see the concept mapping portal[11].

Many different visualizations have already been proposed to navigate hierarchical information structures, Schonhage et al. (2000). A wellknown example of a 3D information visualization is the 3D cone tree, Robertson and MacKinlay (1991). The 3D cone tree visualizes hierarchical structures and consists of cone objects. The motivation of using 3D over 2D cone trees is that 3D visualizations make optimal use of screen space and provides the opportunity to visualize larger hierarchical structures. With respect to usability, however, we observe that the cone tree presents all information at once. In case of a large amount of highly inter-related information structures this could lead to an information overflow. This observation led us to implement our concept graph in a dynamic fashion, giving only a partial view of the concept information space.

8 Conclusions

We have argued that a concept graph implemented as a star-structured diagram, where the presentation of the structure is dynamic, as used in the digital dossier, may provide intuitive navigation when dealing with highly inter-related information structures in 3D space. Instead of presenting a complete view of the hierarchy, the concept graph shows only a subset of the information. Presentation of content is separated from navigation but the digital dossier indicates a strong relation between them.

So far, the results of the 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. As such, the digital dossier can be a solution for dealing with presenting highly interrelated information structures in 3D space. However, to get a more accurate view of the usability of the digital dossier, and in particular concept graphs as a navigation paradign, we wish the explore more real world applications in the domain of cultural heritage, that may reveal new issues for further development.

---

[7] www.rikai.com/perl/KanjiMap.pl?

[8] www.visualthesaurus.com

[9] The Visual Thesaurus allows also for invoking Google image or document search from any of the elements of the concept graph.

[10] www.du.nl/digiuni/index.cfm/site/C-maps/

[11] ltsnpsy.york.ac.uk/conceptmapping/

Acknowledgements

We gratefully acknowledge the contribution of the following people to the development of the digital dossier:

- Vrije Universiteit Amsterdam : Tim Verweij, Olav van Zon, Eric de Boer, Pascal Snijders Blok, Olaf van Zon
- Universiteit van Amsterdam : Abeer Mahdi, Jina Menke, Michela Negrini
- Technische Universiteit Delft: Jurgen Koster
- The Netherlands Institute for Cultural Heritage : Tatja Scholte, Ijsbrand Hummelen
- Montevideo : Bart Rutten, Gaby Wijers

References

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

Dix A, Finaly J, Abowd G, Beale R, (2001) , *Human Computer Interaction*, second edition, 2001.

Robertson G.G. and MacKinlay J.D. (1991) , Cone trees: animated 3D visualizations of hierarchical information, Proc. of the SIGCHI Conference on Human factors in computing systems: Reaching through technology, 189 194, New Orleans, Louisiana, United States, March 1991.

Schonhage, B., van Ballegooij, A., Eliens, A. (2000), 3D gadgets for business process visualizations, Proc. of the fifth symposium on Virtual reality modeling language (Web3D-VRML), 131 - 138, Monterey, California, United States, February 2000.