3D Documentation of Installations

by Gaby Wijers

Created within the framework of the European research project Inside Installations: Preservation and Presentation of Installation Art (2004-2007) this paper is the result of research on 3D installation documentation by the Netherlands Media Art Institute, Amsterdam.

Introduction

When documenting an installation work of art, different aspects play a role, like the installation's physical characteristics, its relation to and position within the architectural space, as well as its performative aspects, experience and interactivity (the audience as a participant/actor/performer).

One of the main questions thus is how to document installations and, more precisely, what to document. How to understand, capture, define and transmit the 'heart' of the art work? Do we concentrate, as in traditional art, on detailed descriptions of objects, artefacts, the physical material or do we describe the experience, the mediation of the sensory perception?

One of the most significant limitations in the representation of installations is the two-dimensional nature of the documentation material, e.g. photos, videos, descriptions: the physical experience of space is just not there. An installation often has a specific relationship with its spatial environment. Due to its three-dimensional volume it takes possession of the surrounding space and transforms it. The relationship between the work of art, the space and the viewer's own body strongly determines the perception of the work. The internal spatial relations and the position of an installation in space are difficult to represent two-dimensionally but are at the same time of essential importance when it comes to description and re-installation. Thanks to the possibilities of information technology, a great amount of data has been preserved in two-dimensional form, but in fact concern a three-dimensional reality and can be restored to a form of visual representation that provides an insight into the spatial dimension:

- 3D-techniques enable installations to be reconstructed and made accessible on the screen in such a way that researchers can obtain a much more intense experience than by studying the two-dimensional sources.
- Animations can be used to enable a more complete viewing of the works of art (e.g. rotation on screen, panoramic photos, taking objects apart).

Therefore, both 3D models and animations could be welcome additions to the existing documentation techniques.

Within the documentation section of the Inside Installation project the Netherlands Media Art Institute has conducted research into the 3D documentation of installations. In this context, Gaby Wijers presented a paper on 3D research in the prevalent documentation practice, in order to provide an overview of the currently used techniques and the experiences that the participants of the Inside Installations project had with 3D modelling so far. Within the Netherlands Media Art Institute software was tested and selected for 3D registration and production. In collaboration with the Vrije Universiteit van Amsterdam (VU) and the Hogeschool voor de Kunsten Utrecht (HKU), a model was made of the installation *Revolution* by *Jeffrey Shaw and Tjebbe van Tijen*. Starting from this case, the HKU developed a concept for a tool to represent installations using 3D modelling: the Virtual Installation Research Project. Furthermore, the installations of *Marina Abramovic* from the collection of the Institute were modelled in 3D, and information from the artist interview with *Marina Abramovic* was made accessible via a 3D interface designed by the VU.

To create 3D drawings and functional 3D environments is costly, considering money as well as time. It is rather obvious that in the future 3D modeling will develop from a high-tech application to a generally accepted tool for artists and exhibition builders in the process of making installations. As a means for practical installation instructions, the precise reconstruction of installations in 3D is however quite labour-intensive; in the day-to-day documentation practice it could hardly be applied on a broader scale.

Research approach:
Apart from having a long history in the production, presentation and documentation of installation art, the Netherlands Media Art Institute is carrying out a technical research programme with 3D modelling as one of its spearheads. The first modelling studies date back to 1996, with the realisation of The Second, Time Based Art from the Netherlands: 17 sculptures/installations exhibited and modelled on CD. One of the most recent studies was conducted in 2002 when, in co-operation with Digital ArtLab, Martin Sjardijn and the University of Amsterdam, a virtual version of the Institute was made and experiments with the modelling of exhibited installations were carried out.

In the context of the Installation Art Project B3 Documentation, the Netherlands Media Art Institute researched, between 2004 and 2007, 3D modelling of installations.

In this context the use of 3D in the prevalent installation documentation practice was researched:
- In order to provide an overview of the currently used techniques and the experiences that the participants of the Inside Installations project had with 3D modelling so far, an inventory was constructed.
- Within the Netherlands Media Art Institute, software was tested and selected for 3D registration and production. In collaboration with the Vrije Universiteit van Amsterdam (VU) and the Hogeschool voor de Kunsten Utrecht (HKU), models were made of the installation *Revolution* by *Jeffrey Shaw* and *Tjebbe van Tijen.*
- Starting from this case, the HKU developed a concept for a tool to represent installations using 3D modelling: the Virtual Installation Research Project.
- Furthermore, the installations of *Marina Abramovic* from the collection of the Institute were modelled in 3D.
- A 3D interface for research together with the information from the artist interview with *Marina Abramovic* was designed by the VU.

Research questions:
- What requirements should a 3D model of an installation meet to provide an insight into spatial and interactive aspects?
- What techniques can be used, what are the pros and cons, what do the systems cost?
- How can such techniques be implemented and linked up with existing documentation?
- From a practical point of view, what is the best way of modelling an installation?

Additional remarks:
- Case studies will be carried out by modelling different installations
- How to measure the coordinates and model them when the installations are not installed but only accessible through photographic and video information
- The coordinates have to be exact
- The output should be accessible via the Internet
- The advised technique must take full account of low tech museum experts, widely spread applications and small budget

Inventory of used 3D modelling techniques

When planning to make a 3D model and or animation a few questions come to mind that can be grouped together as: What is the role of a 3D model within the overall documentation of an installation?

This broad question can be subdivided into questions such as:
- What is the aim?
- What is possible and what are advantages?
- What requirements should be met to provide insight into the installation?
- Which features should be captured to experience the installation and to which depth?
- What should be captured to make a re-installation possible?
- How could the installation's choreography and interactivity be presented?
- What are possible scenarios?
- What technical equipment and know-how is required?

Each Inside Installation project participant was asked about their experiences with used techniques and practices regarding installation 3D modelling. 3D modelling then seen as 3 dimensional visualisation of the installation on the screen eventually with architectural settings (space and place in the space), realistic co-ordinates or the possibility to interact: walk around, walking direction given, interactivity shown.

Questions:
1. Project name and date
2. Aim/Task
3. Input/modelling used techniques
   The input for the 3D model: drawing, video, 3D camera etc.: measure techniques
   The used techniques for modelling behaviours, movements, camera angles etc. etc.
4. Rendering techniques used
   The rendering from 2D images to 3D images (or sequence of images).
5. Authoring/Output techniques used
   The modification of the 2D image(s) (post production).
   The modification of the 3D files into a (3D) environment, web based etc.
6. Target group
7. Usability

Although the outcome of the inventory was not significant with regard to used techniques and experience it gave inside information on the lack of know-how regarding 3D and its possibilities.

Software for 3D production

The NIM researched 3D within the 2 disciplines: artists projects and documentation. Within the artists projects the preference is with open source so we can exchange our research output without copyright problems. Within the documentation open source is no must, focus is on usability and public access: How to select software, how to generate knowledge and how to keep this knowledge up to date.

3D documentation of an installation can be made for different purposes, such as:
• Publication/education
• Promotion
• Documentation/research
• Re-installation

When defining the purpose it is useful to think about the intended effects of the model. For example, models and animations for publications and education for a broader audience explicitly try to show the main characteristics of the installation in an attractive fashion. 3D models and animations for promotion of the work are used to present the installation to curators and other professionals with the aim to include the work in an exhibition or festival. For documentation and research purposes, the whole atmosphere and experience needs to be captured so that the viewer experience is included. For the purpose of re-installation, it is essential to capture the exact order of actions as well as the positioning of the parts in relation to an overview of the installation.

It cannot be denied that guidance for the 3D documentation is often tailored to the available budget categories:
• Amateur or consumer budget
• Semi-professional or 'prosumer' budget
• Professional budget

These budget categories represent an increasing level of available resources, and even more so of funding, technical skills and background. With each jump to a higher budget category, the hardware and software will be more expensive and of a higher quality. The results will reflect this high level and the skills needed for the documentation will be more demanding.

Within the 3D documentation of installations there are two main categories:
A. How to experience an installation?
  • Purpose: to record the installation for the audience, to give an impression for publication or education. For example, an installation in 3D on a Website
  • Purpose: (artist) documentation; to document or promote the work.
    For example: a 3D model on preview DVD for distribution
B. How to re-install an installation?
  • Purpose: re-installation.

A static picture or model, o.i. a 3D picture or installation view gives information of the installation and the space but does not react with the changing environment. In an interactive model though, the model does react with the changing environment c.q. the user, a video is started or interaction is simulated (in case of an interactive work of art). The last example includes animation. Animation has to be made on top of the 3D model and is time consuming. A coherent set up will consist of the complete way of: model building / animation => viewing => interactive render engine.

To explore the needs and advantage of both models regarding viewer experience and to be used for re-installation Timo Breumelhof researched 3DstudioMax (standard in game industry), Maya and Blender on scripting possibilities, costs, learning curve, import and export possibilities. In the learning curve, the differences between Blender and Maya/3DS turned out to be smaller than expected and between Maya and 3DS Max larger than expected. Due to its different interface Blender is more difficult to use to begin with.
Usability score:

Blender	-	Maya	-	3D Studio
Linux	-	Windows 95	-	Mac OS 9
Programmer	-	Scripter	-	Designer

Models and animation possibilities: Blender cannot compete on production speed with the commercial software. Scripting: Hardly any difference.

Conclusion: No principle difference between the 3 software packages. For a commercial surrounding or standardised documentation Blender is not the first option. The main difficulty is the lack of import and export possibilities. Next to this Blender is a specific community. The choice between Maya and 3D studio Max is more difficult; the essential differences are small. Maya is at this moment much cheaper than 3D Studio Max. For artists projects there is no reason not to work with Blender. The commercial packages are probably too expensive for these artists anyhow.

Based on:
Software for 3D production Timo Breumelhof, 2005

VIRP : Virtual Installation Research Project

In the scope of the Inside Installation Project a group of 7 students from the HKU, faculty media and technique, researched the 3D registration and representation of installations. The focus in the project was on a standardised way of collecting documentation the representation of the collected information in a standardised way the virtual representation of installations via a 3D application on the Internet.
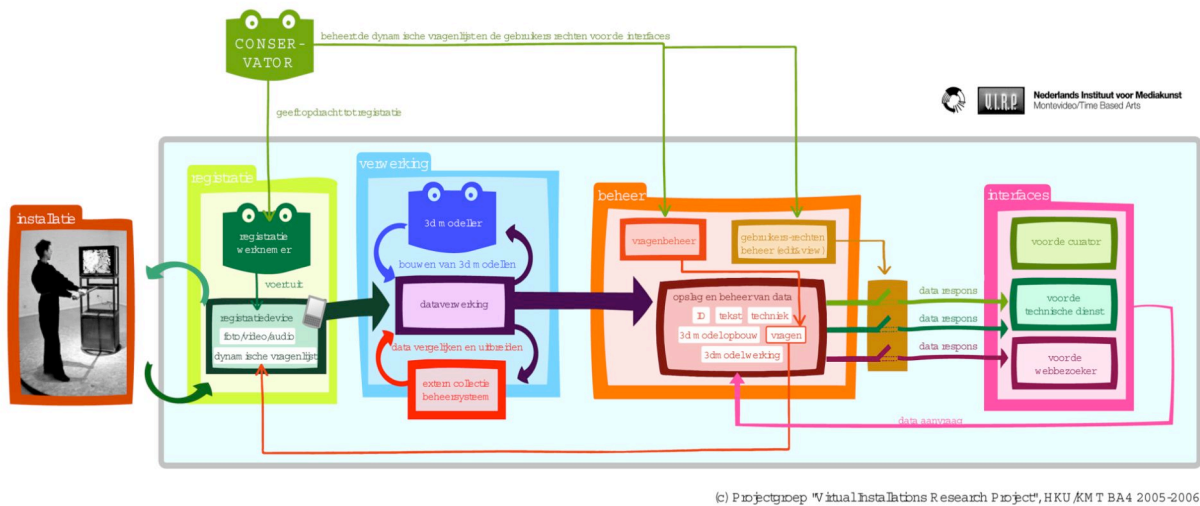
System for registration and 3D representation of installation art

Registration Methods and Tools:

To answer the research questions: What to register, what information is needed at which point in the process, how to standardise this process and documentation flow and how to communicate steps, task and information in the installation registration process were defined. The work and information flow for conservators and registrators can be communicated via a network. By this the information from the previous tasks and steps in the process is available for the next tasks and steps in the installation process. A checklist with questions for each step in the process, based on Montevideo's registration model is developed. Next to this a concept for a hand held registration device is proposed.


Registration tool kit

3D Representations:

3D representations focus on an example
1. to experience the installation and
2. the (re) installation process.

In the first option there is less need for a realistic approach, simplification can give more inside information. Technically, it is not yet possible to generate real time refractions, 3D animation is still the best option. For interactive installations where the actors awareness is needed the representation can be generated by using an avatar. Case study: *Marina Abramovic At the Waterfall*, 2003.
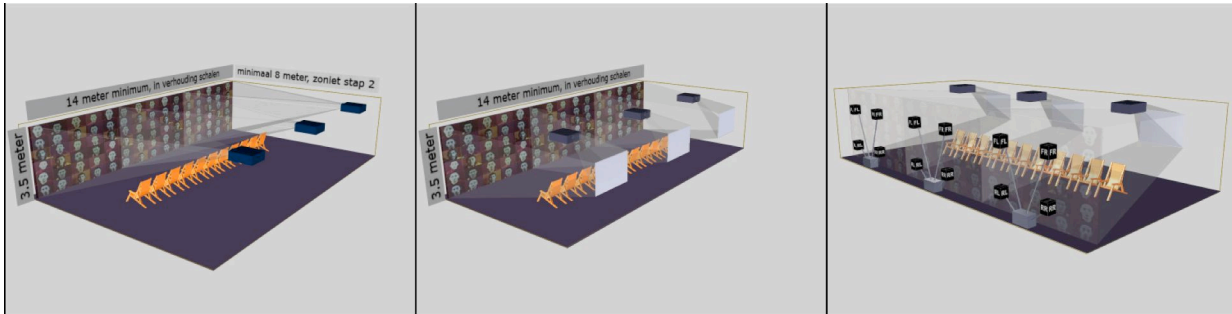
*3D installation experience of At the Waterfall by Marina Abramovic*

For the second option it should be possible to navigate through the construction elements. Zooming and rotation should possible as well as highlighting objects and being able to view through objects making use of a transparency factor. Case study: *Jeffrey Shaw and Tjebbe van Tijen, Revolution,* 1990.

The construction, deconstruction and the installation manual to construct Revolution represents the installation process and are developed aiming to provide interactive or fully automated guidance, and as such, can be interpreted as guided tours. When activated they present aspects of the construction and deconstruction process of *Revolution* (http://www.montevideo.nl/en/onderzoek/revolution3D.mov) in detail by 3D representations of each part of the work. In short, the anatomy tour provides an automated exploration of the parts of the artwork, their material, position, connection and use.
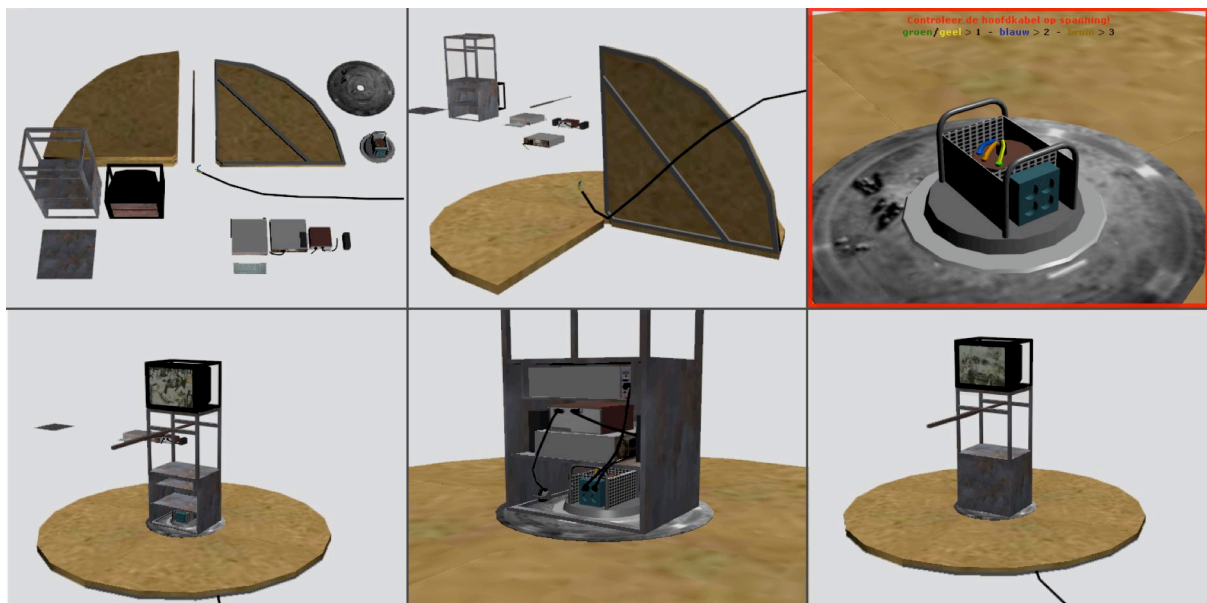
3D instruction manual of Revolution by Jeffrey Shaw & Tjebbe van Tijen

The whole process of construction with related documentation is stored in a collection information system where each step can be monitored. Registration device and collection information system should be linked. The user can choose which information is made visible. Text or image searches are possible. With each installation the necessary documentation related to the steps is given under tabs.
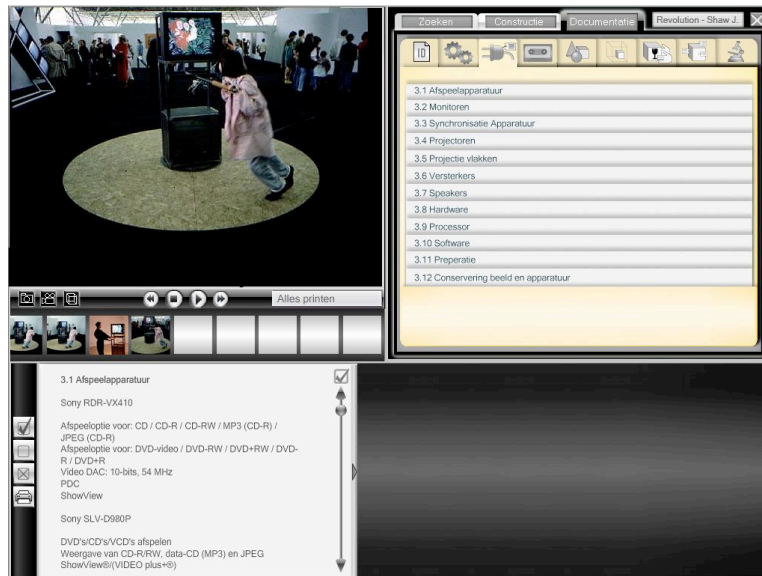
Example of Revolution as taken from the collection information system.

Software:
Various software packages are researched to be able to use the 3D representations via a Web browser with the 3 most often used plugins. In this way the software is not dedicated to one system or platform. Taken the budget, usability and efficiency in consideration 'Wirefusion' was chosen. VRML format is used and can be exported from each mid and high end 3D application.

Based on:
Virtual Installation Research Project VIRP, HKU

Digital dossiers and guided tours

For quite some time, researchers are facing the problem of cultural heritage whereby a large amount of artwork collections are separated in different institutes. By time and space, it restricts the presentation of the diverse cultural information in a more widely immersive way for education, research and tourism. As a consequence, many applications/projects are created to build a growing and evolving multidisciplinary and integrative network between archives, libraries, museums and other research institutions in Europe. Based on the demand to access the scattered collections from ICN1 and Montevideo2, we made the research of digitisation solutions and implemented a digital dossier in 3D space to present a large collection of artworks, together with the art related information for the preservation and re-installation. It is a multidisciplinary co-operation between the ICN and multimedia research students group of Vrije Universiteit Amsterdam in co-operation with the NIM in the context of international projects (INCCA3 and European Culture 2000 project).

In recent years, media-rich environments evolve with more complexity and possibilities due to technological developments in computational speed, the Internet and 3D graphics hardware. In the area of cultural heritage, these developments allow for new opportunities towards cultural communication. The developed guided tours are implemented to function in 3D digital dossiers within the domain of Cultural Heritage. A digital dossier can be interpreted as a digital media-rich archive in a 3D environment that represents particular information about a specific topic in a specific way. In more detail, it can represent architectural knowledge visually and facilitates the presentation of 2D and 3D media. The 3D digital dossier applications are created with VRML (Virtual Reality Modelling Language), which allows for creating virtual worlds and presenting them on the web. The web publication makes it possible for the interested general public to access the digital dossiers world-wide and more easily. The introduction of digital dossiers and the related guided tours started as a master multimedia student's project, based on the course Multimedia Cases lectured at the Vrije Universiteit Amsterdam in close collaboration with and initiated by the Netherlands Institute for Cultural Heritage (ICN). The increasing interest in accessing multimedia information and related 3D representation of information objects in an application has heightened the need for digital dossiers. In this perspective the digital dossier should serve as an information source for domain experts with regard to preservation, conservation and reinstallation of artworks. Because of the complexity of conceptual structures and related media, guided tours can be used to assist the user in navigation and search for information within a defined conceptual space.

Digital dossier Marina Abramovic:
A 3D interface was developed and 3D ways of presentation and navigation were explored. 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 Netherlands Media Art Institute. In addition, a transcription of the contents of the artist interview made by Michela Negrini, a student of media art at the University of Amsterdam, who also provided an annotation 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.

Objective and requirements:
Objective: To design and build a 3D virtual environment that serves as a digital dossier, *for Marina Abramovic*. Why in 3D?
- To find a way to present and structure existing information about preservation, conservation, reconstruction, presentation and materials of the artworks of *Marina Abramovic* in a more intuitive and useful way.
- Presenting 2D information in 3D can evoke new insights by making use of the 3D space. Structures and relations between objects can be presented in a glance of the eye.
- By making the information widely accessible with 3D virtual environment, we hope to add extra value to the information that already exists and to contribute to the work of the conservators of these artworks.

Requirements:
- The digital dossier must be 'intertwinkled'. This means that all information objects in the virtual environment that are already related in the existing information, must be also be related in the virtual environment by hyper linking. For example: Interview clips about a particular artwork must be linked to images of that artwork.
- The digital dossier must be suitable for professional conservators and conservator students.
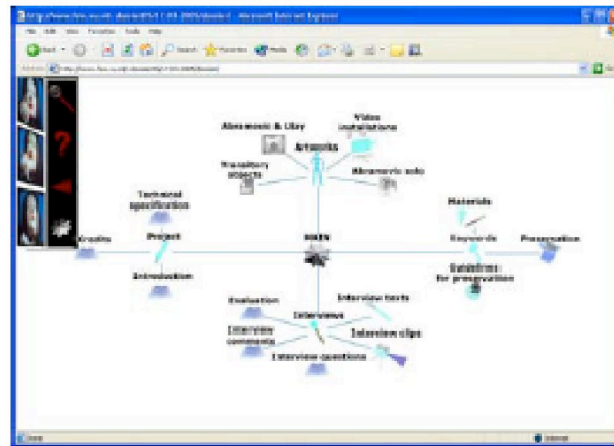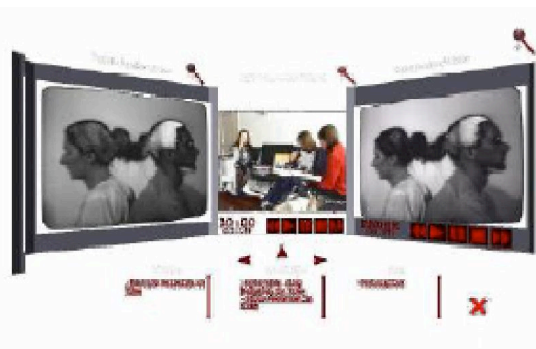

Concept graph

The abramovic dossier was created with VRML (Virtual Reality Modelling Language), which allows for creating virtual worlds and to be able to present them on the web. As a user interface for navigating the digital dossier, a concept graph is created 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. The concept graph is implemented as a star-structured hierarchy diagram representing related information objects. This structure is dynamically generated when selecting an information object. The selected object will be translated to the centre 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 installations in an interactive way.
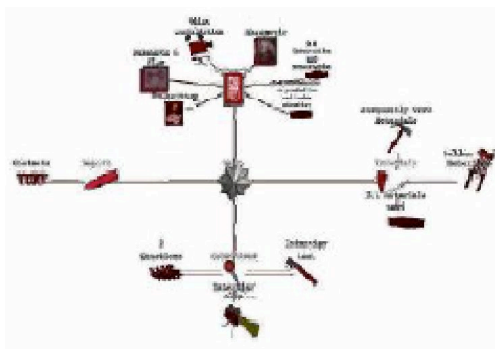
Navigation in the abramovic dossier   *Presentation in the abramovic dossier*

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. 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. Next to this data representation and content management, usability and presentation issues were researched and described.

The abramovic dossier provides support for the following features:
• Navigation in concept graph
• Presentation with 3 information windows
• Personalization and guided tour(s)

Digital dossier Jeffrey Shaw:
The dossier *Jeffery Shaw* uses the conceptual navigational paradigm of the *abramovic* dossier to locate information of interest and to access media content, and extended it with filtering options for personalization's. Besides this, a 3D tool environment is available focusing on the artwork *Revolution* of the contemporary artists *Jeffery Shaw* and *Tjebbe van Tijen*. This tool environment contains a 3D representation of the artwork itself and aims to provide exhibitors with an insight about how to install *Revolution* and how to influence its presentation by offering the following options:
• Anatomy tour,
• Construction tour,
• Deconstruction tour,
• Manual construction test, and,
• Manipulation of environmental parameters.
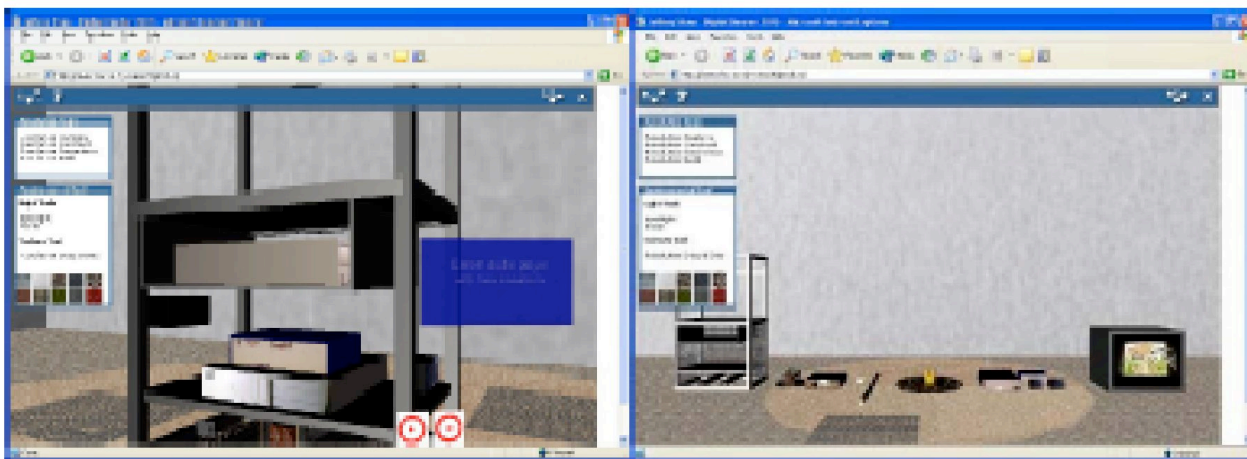
| *Detailed view artwork Revolution* | *Individual components artwork Revolution* |

The (i) anatomy, (ii) construction, (iii) deconstruction tours and the (iv) manual construction test are developed aiming to provide interactive or fully automated guidance, and as such, can be interpreted as guided tours. When activated they present aspects of the construction and deconstruction process of *Revolution* in detail by providing 3D representations of each part of the work. In short, the anatomy tour provides an automated exploration of the parts of the artwork, their material, position, connection and use. The construction tour provides an automated exploration of how the individual parts are installed, and the deconstruction tour represents the de-installation process. The manual construction test, allows for more user interactivity. The general concept of this tour has emerged from the IKEA (the Swedish home furnishing retailer) product blue-prints. The aim was to offer exhibitors a way to get familiar with the construction process of *Revolution* in a safe (i.e. virtual) environment. Especially when confronted with delicate material parts that are hard to replace or cannot be replaced when broken. This tour guides the user through the process of construction by giving textual and visual feedback when manually constructing the artwork by its parts. The tool environment also offers some manipulation of environmental parameters (e.g. light, textures) to indicate the effect it has on the exhibition, and as a consequence its experience, and can be related to the intent of the artist. In the

future, a tool environment as discussed could be improved by focusing on the artwork and its environment, which is part of the experience, allowing to extend the amount and degree of manipulating environmental parameters.

Based on:
3D Digital Dossiers: a new way of presenting cultural heritage on the Web
http://portal.acm.org/ft_gateway.cfm?id=1229418&type=pdf&coll=&dl=ACM&CFID=15151515&CFTOKEN=6184618

Exploration and guidance in media-rich information spaces: the implementation and realization of guided tours in digital dossiers
www.cs.vu.nl/~eliens/archive/papers/paper-tours.pdf

Navigating media-rich information spaces using concept graphs - the Abramovic dossier
http://www.cs.vu.nl/~eliens/archive/papers/paper-navigate.pdf

The Presentation of Media-rich Collections of Culture Heritage in the Age of Digital Reproduction
http://www.few.vu.nl/~eliens/casus/@archive/thesis/ywang/yiwen-thesis.pdf

The 'installation view' project

A collaboration between the 3D designer Ricardo Creemers and the art historian Jennifer Steetskamp (collection, Netherlands Media Art Institute), initiated by Gaby Wijers (head of collection, Netherlands Media Art Institute)

The Netherlands Media Art Institute is in charge of (almost) the complete collection of videos by *Marina Abramovic*, including the works made in collaboration with *Ulay* (*Uwe Laysiepen*). Some of them were originally performance registrations, others were 'autonomous' videoworks from the start. Both types of work have frequently been reassembled in installation settings, as for instance in the context of the *Video Portrait Gallery*, grouping together 16 single-channel works from between 1975 and 2002. The works were formally as well as thematically related, as they were all 'portraits' of *Abramovic*, showing mainly her face. The first and most famous work in the series is the 1975 performance registration *Art must be Beautiful, Artist must be Beautiful.* Installed first in a smaller setting at the Kunstmuseum Bern in 1997, including 12 channels, the extended version was realized in the context of the exhibition *Marina Abramovic Videoworks* at the Netherlands Media Art Institute in 2003. The way the work was presented resembled a classical painting gallery, where ancestor's portraits are hung next to each other, to give insight in the genealogy of family relations. In this way, the form of the installation reflected the history of *Abramovic's* oeuvre.

Video Portrait Gallery was also one one of the first works that was documented in the 'installation view' project, which started at the end of 2005 and ended in autumn 2006. Until then, there was only photographic and video documentation of the installation, which gives a first impression, but basically fails in offering a total view of the work [for the video registration see http://catalogue.montevideo.nl]. When *Video Portrait* Gallery was discussed, *Abramovic* for instance insisted that, in the documentation, the wooden pedestals on which the monitors stood should be clearly visible, as they strongly determine the atmosphere of the presentation with their 1970s aesthetics. This was not the case with the existing video registration. The question was then how the installation could be documented in a more satisfying way. Creating installation views by using 3D software (in this case Maya) appeared as an opportunity to show the work in an ideal setting, taking the preferences of the artist into account. In this way, documentation of the work reached beyond registering a current situation, providing a model that could serve as a guideline for its future presentation. When creating the installation view of *Video Portrait Gallery,* the detail of the pedestal was paid specific attention to as well as the way the monitors should be arranged in the space. But this is only one of many examples: when starting the project, *Marina Abramovic*, *Jennifer Steetskamp* and *Ricardo Creemers* discussed basically all works in the collection of the NIM -- both installations and single-channel projections – in depth, according to how they should be presented. The artist made drawings of all settings, which were later taken as the initial starting point for the models.
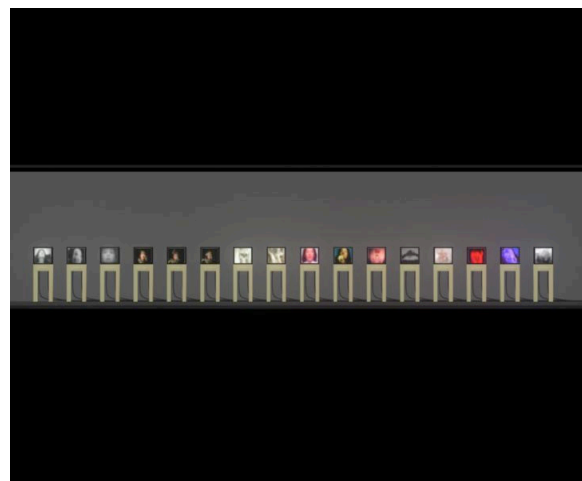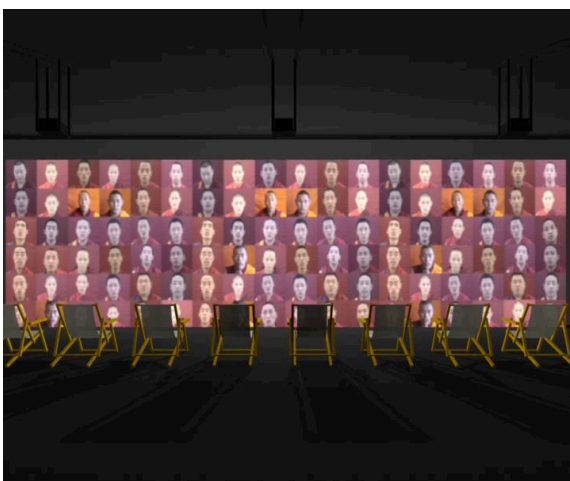
Installation view of Abramovic's At the Waterfall and Portrait Gallery

There were some basic parameters that were applicable to all situations: all walls should be painted in dark office gray, for instance. With the single-channel works, especially those which were performance registrations, it was of crucial importance to give consideration to the height and size of the projection. In an ideal situation, the projection should be just over life-size. In the case of performance registrations in which the entire body of the performer is visible, the work should be projected from the ground, whereas, in other cases, the projection should be in the middle of the wall, or, depending on the size of the wall, with at least *some* distance to the ground. In many cases, there were general guidelines for where to place speakers in the space and how they should be directed. The measurements of the (ideal) space also played an important role. With respect to some works, even the position of the DVD players (visible or hidden) was determined in advance. But these were just the more simple cases; especially from the 1990s onwards, *Abramovic's* installations became more and more complicated, including many channels, and sometimes even objects. One could think here of installations like *Mambo* from 2003, which contained a magnetic floor and shoes in different sizes, or *Balkan Baroque* with its pile of bones, which was derived from *Abramovic's* 1997 Venice Biennial contribution. A particularly challenging work for the 'installation view' project was the most recent installation she has made so far: *Balkan Erotic Epic* (2005), which consists of thirteen channels that can be shown in different combinations (often not even all together at the same time), partially on LCD monitors and partially as projections. In this specific situation, a compromise was needed, as it was impossible to make models of all possible configurations. Therefore, only a basic range of installation views was made of *Balkan Erotic Epic,* showing the most common arrangements.

Ultimately, all works from the collection were documented in this way. Now, with every order that comes in for one of the works, the distribution department sends the digital pictures to the client, including a front view and two side views of the space. Later on, documentation packages were made on request of *Abramovic* herself, including a DVD with short text information, a video signal preview and the installation views, and a CD including video stills, technical information and work descriptions.

Conclusion

To create 3D drawings and functional 3D environments is costly, considering money as well as time. It is rather obvious that in the future 3D modeling will develop from a high-tech application to a generally accepted tool for artists and exhibition builders in the process of making and presenting installations. As a means for practical installation instructions, the precise reconstruction of installations in 3D is however quite labour-intensive; in the day-to-day documentation practice it could hardly be applied on a broader scale.

References

Software for 3D production Timo Breumelhof, 2005

Virtual Installation Research Project VIRP, HKU

Choosing the Best 3D Rendering Application for Your Needs
http://www.zaon.org/showthread.php?t=299&page=1&pp=10

3D Digital Dossiers: a new way of presenting cultural heritage on the Web
http://portal.acm.org/ft_gateway.cfm?id=1229418&type=pdf&coll=&dl=ACM&CFID=15151515&CFTOK
EN=6184618

Exploration and guidance in media-rich information spaces: the implementation and realization of
guided tours in digital dossiers
www.cs.vu.nl/~eliens/archive/papers/paper-tours.pdf

Navigating media-rich information spaces using concept graphs - the Abramovic dossier
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Glossary

3D /Three-Dimensional
The term 'three-dimensional' refers to something which has three geometrical dimensions, namely width, length and depth. The abbreviation, 3D, is generally used to indicate that something can be observed spatially: 3D-foto's, 3D-film or 3D-graphics.

3D Computer Graphics
3D-computer graphics generally refers to the generation of two-dimensional images from three-dimensional representations of a geometrical object.

Animation
Animation is the rapid display of a sequence of images of 2-D artwork, or model positions, in order to create an illusion of movement. Sometimes with the addition of speech, the animation is refereed to as 4D, due to the added dimension of time.

Computer Aided Design/CAD
Computer-aided design (CAD) is the use of a wide range of computer-based tools that assist engineers, architects and other design professionals in their design activities. Current packages range from 2D vector based drafting systems to 3D solid and surface modellers.

Modeling
The model describes the shape of an object. The two most common sources of 3D models are those originated on the computer by an artist or engineer using some kind of 3D modeling tool, and those scanned into a computer from real-world objects. As a computer display is flat, making 3D models can be quite a cumbersome process. Generally a mouse can be used to twist an object so it can be viewed form all sides. Models can also be produced procedurally or via physical simulation.

Rendering
Rendering is the final process of creating an image or animation from the prepared scene. Several different, and often specialised, rendering methods have been developed. Rendering may take from seconds to days for a single image/frame. In general, different methods are better suited for either photo-realistic rendering, or real-time rendering.

inside installations