

## **ICHIM03**

Seventh International Cultural Heritage Informatics Meeting,  
8-12 September 2003, Ecole du Louvre, Paris

---

### **Multimodal Interfaces for Museum Audiences: A Collaborative Study Project of Finnish National Gallery and UIAH Media Lab**

Paper presented on 11st September 2003 by

**Riikka Haapalainen,**  
**Finnish National Gallery, Art Museum Development Department (KEHYS), Finland;**

**Marjo Mäenpää,**  
**University of Art and Design, Media Lab, Finland**

<http://www.fng.fi/kehys>

<http://www.mlab.uiah.fi/>

#### ***Abstract***

The MUMMI project (Multi modal Museum Interfaces), a study project conducted by the Finnish National Gallery's Art Museum Development Department and the Media Lab of University of Art and Design, Helsinki, was launched in 2001. The project aims to contribute to the emerging field of digital and interactive media and support innovative applications, which would improve the accessibility of diverse audiences to cultural heritage information.

The initial purpose of the project was to promote the methods and good practice of user centred design, visitor studies and accessibility matters (Design for All principle) and to unite the expertise of both institutions for common objectives. The project aims to incorporate the content rich and versatile cultural heritage information with the latest innovations on digital interactivity and installations. It also aims to enhance the understanding of the museum visitors and their various needs, and to create content that is meaningful, intelligible, and communicable for its users - regardless of their various backgrounds, skills and learning styles or strategies.

From its beginning the MUMMI project has had a vital part in Media Lab's interface design and information design studies, where MA-students and researchers of New Media are able to practice user centred design with real audiences and interesting content (<http://mlab.uiah.fi/mummi>). While creating innovative museum applications the MUMMI project also provides challenging case studies in the accessibility and usability matters. Already, the project has produced several final thesis projects for Media Lab students (see: <http://mlab.uiah.fi/~marjo/museum>)

The synergy between Media Lab and Art Museum Development Department has been very close and fruitful. While Media Lab is in charge of the implementation of the technical innovations, interface design and the human-computer-interaction, the Art Museum Development Department coordinates the development of museum applications and produces content. In addition, the Art Museum Development Department takes part in teaching, planning the MUMMI curricula and its objectives, and evaluation of the demonstrations.

The MUMMI project also aims to disseminate its research results and know-how on the challenges and implications of the recurrent media for the cultural heritage field. This means efficient networking. One important information channel for the project is the Access Consultation for Finnish Cultural Institutions managed by the Art Museum Development Department and financed by the Ministry of Culture and Education. The project partners have also produced several links and cooperation with other universities, museums and research and cultural institutions, among others the Finnish Association of Deaf, the Finnish Federation of Visually Impaired, the national and European Design for All -network, the University of Helsinki (Department

of Translation Studies, Department of Art History, and Department of Computer Science), and the University of the Arts in Philadelphia.

The paper discusses further the process of this multidimensional cooperation and demonstrates its present results. It also describes the methods of teaching (workshops, lectures, projects, planning through virtual platform) and gives practical guidelines for the development of Multi modal museum interfaces.

**Keywords:** Design for All, User Centred Design, Collaboration, Cultural Heritage, Art Museum, Multimodality, Virtual exhibition, New Media studies

## 1. Introduction to MUMMI<sup>1</sup>

The MUMMI project (Multimodal Museum Interfaces), a three-year study project conducted by the Finnish National Gallery's Art Museum Development Department (KEHYS) and the Media Lab of University of Art and Design, Helsinki, was launched in 2001. The project aims to contribute to the emerging field of digital and interactive media and support innovative applications, which would improve the accessibility of diverse audiences to cultural heritage information.

The initial purpose of the project was to promote the methods and good practice of user centred design, visitor studies and accessibility matters (Design for All principle) and to unite the expertise of both institutions for common objectives. The project aims to incorporate the content rich and versatile cultural heritage information with the latest innovations on digital interactive applications and installations. It also aims to enhance the understanding of museum visitors, their expectations of museum visit (both on-line and in-site) and their various needs during the visit. In order to serve museum visitors better, the MUMMI project wishes to create cultural heritage content that is meaningful, intelligible, and communicable for its users - regardless of their backgrounds, skills and learning styles or strategies.

In the Finnish museum field, the pedagogical multimedia productions realized by the Finnish National Gallery have had a pioneering role in many respects. The longstanding experience of the Gallery's Art Museum Development Department (former Education Department) in accessibility issues and educational programs has had a significant impact on museum practice in Finland. For example, Finnish National Gallery was the first museum in Finland to put their collections on-line in 1995, which instantly brought the cultural heritage information available to broader public. In 1999, the Finnish National Gallery launched an accessibility

---

<sup>1</sup> As in Finnish the word "mummi" means also "granny" the name of our project usually brings many pleasant connotations for the Finnish speaking audience.

project to develop accessible services for museums. The internationally acknowledged project has successfully raised awareness of museum visitors with special needs. Numerous visitor studies with different approaches and methodologies, conducted and developed by the Development Department have also brought the opinions of culturally diverse audience visible for the curators, educators and content planners. Yet, in spite of the pronounced experience and the expressed policy to promote accessibility of digital cultural heritage, there was no sufficient funding to further implementations. This called for new and innovative solutions.

The Media Lab at the University of Arts and Design was conducting some academic research projects, which aimed to combine the idea of multimodality to Design for all -standard. The Media Lab had earlier produced several multimedia programs for different cultural organizations. However, the Media Lab was keen to find new partners who could contribute suitable and challenging enough content and contexts as a test bed for their technological developments.

The Art Museum Development Department and the Media Lab realized their common objectives in 2001 and set up a research and study project focusing on the accessible innovations for digital environment in museum. Thanks to this project, a very promising and profitable interaction between the content providers, technology developers, designers and cultural heritage audiences was established.<sup>2</sup> The basis for the MUMMI was the mutual desire to create multimedia productions which would offer multiple insights into the visual arts and which could be used by as many museum visitors (real or virtual) as possible.

The MUMMI is also a textbook example of a fruitful learning process for new media students, which functions in the cross-section of the theoretical framework of academic institution and the practical demands of working life. It gives a holistic approach to art museum experience and provides at the same time continuous interaction between designers and users. The MUMMI focuses in all kinds of digital media (CD-rom or DVD-rom based or other desktop or mobile applications, the World Wide Web or other remote or Internet-based applications).

---

<sup>2</sup> The initiators of the MUMMI project were Marjatta Levanto, the Development Manager of the Finnish National Gallery and Marjo Mäenpää, producer and teacher in the Media Lab.

## **2. The background of MUMMI**

The Internet - as well as other digital and multimedia applications - offers a major opportunity for the dissemination of cultural heritage beyond national and cultural barriers. However, this promotion and dissemination of content rich and complex information to ever broadening audiences requires also technological and content based innovations, which would support high quality presentation, user-friendliness and accessibility.

For instance, information provided in monomodal formats cannot be easily accessed by mobile users, and it falls beyond the reach of e.g. visually impaired or the deaf users altogether. At the same time, rapidly evolving multimedia narration and technology is offering new options for relating, perceiving and learning from the museum collections in different, multi-sensory ways. By making use of these options and challenges and taking into account the users' perspective, their own needs and interests, as well as communication languages (signed, written and spoken languages), access to the world of cultural heritage could be extended to a wider range of audience groups through multimodal formats.

### ***2.1. Media Lab, UIAH and MUMMI***

The Media Lab of University of Art and Design Helsinki was formed in 1993. Today the Media Lab coordinates two 2-year masters' programmes: the MA in New Media and MA for New Media Professionals, both programmes with interdisciplinary students. In addition to its degree programmes the Media Lab UIAH is involved in many educational, research and production activities in cooperation with the various departments of UIAH and other external partners. For example, we are actively involved, as coordinator and partner, in many R&D projects and Thematic Networks within the EU's current IST Programme. The mission of the Media Lab is to explore, discover and comprehend the new digital technology and its impact in society; to find and exploit the possibilities it opens to communication, interaction and expression and to evaluate, understand and deal with the challenges it poses to design and creative production.

The MUMMI study project has a vital part in the studies where Media Lab students, researches and designers of have to consider user friendly and user centred design methods. The MUMMI as a "Design for All & accessibility to art history" -study project has several

goals. First of all it aims to benefit from the concepts like accessibility and usability, and methods like Design for All, Universal Design, eAccessibility, Cultural Usability, IT, ICT.

Second goal is to gather together all the cumulative knowledge and research done in Media Lab about these issues. What do these principles mean when designing and planning media for wide audiences, media presentations for museums and virtual museums? Naturally, these methods should also be self evident principles when designing new media solutions for every kind of public usage.

To study Multimodal interfaces is to understand the conversational interface design of the future. Multimodality means flexible use of input modes depending on the setting. In multimodal interface speech, signing, gesture, pen could be a vital part of interaction between human and the computer. Flexible use means broader range of users from ordinary citizens, children, elderly to culturally diverse users.

### **2.1.1. Research in multimodality**

Through its various research and study projects the Media Lab has profound experience in contributing internet applications that are accessible for the deaf and in the natural language interaction research. (See, Jokinen and Raike (2002) and the presentations from <http://www.uiah.fi/~araike>). The number of research contributions in this area has grown considerably. Providing systems with multimodal behaviour is seen as a way of allowing for more natural human-machine communication. And indeed, many sources claim that users generally prefer multimodal to monomodal systems. Furthermore, the ability to process input from different modality devices adds inherent robustness to the system, since the interpretation of the user's communicative acts can be based on input from different channels: errors in one channel can be compensated by the information coming from another channel.

The approach to multimodality within the MUMMI project has several respects. Firstly, a generic model for merging multimodal inputs are being developed, thus favouring system adaptability to new modalities and portability to different application domains. Secondly, the project explores not only intentional use of modalities, but also deals with how systems can react to unintentional modality use. This is a new research area which is likely to produce very interesting results for the development of more natural interfaces (See for instance the

Interact project, a three year collaboration between four Finnish universities:  
[http://mlab.uiah.fi/interact/html/summary\\_in\\_english.htm](http://mlab.uiah.fi/interact/html/summary_in_english.htm)).

Another innovative aspect of the MUMMI project for the Media Lab consists of applying different machine learning techniques throughout different stages of the project. They will be applied at multimodal input analysis, coordination and generation and dialogue management. (See: <http://mlab.uiah.fi/fle/index.html> and <http://fle3.uiah.fi/> for the research project of the web-based learning environment Fle3, which is a server software for computer supported collaborative learning - CSCL.)

### **2.1.2. The Deaf and sign language**

On part of MUMMI studies and the linguistic research – also conducted in different countries - indicates that sign languages are natural languages: sign languages do not originate from the surrounding spoken languages. Sign languages change according to the context where they are used. Sign language is the only language that the deaf can naturally adopt. Antti Raike has discussed further these issues in the Cinema sense, a net-based study material on film production (<http://www.mlab.uiah.fi/elokuvantaju/2001/english/english.jsp>), which also has sign language implementation. A signing avatar to guide visitors in museum could be a concrete result of the MUMMI.

### **2.1.3. Human computer interaction and linguistic research**

Advanced natural language processing techniques as well as adaptive machine learning techniques are used when experimenting with and implementing the concepts and models of the interactive museum interface. For instance, machine learning techniques are applied at the stage of user input classification. The correct interpretation of a user's utterance depends on many different factors like the situation, the user, his expertise, his education, his background and many other situational aspects coming through different modalities. The extra opportunities lying in the integration of the different modalities to get a better view on the role of these utterances and their combination can be taken advantage of, but the increased complexity of multimodal interaction makes the specification of explicit rules a virtually impossible task. Using machine-learning techniques, such as neural networks and Bayesian

networks, to resolve these acts is a challenging and largely unexplored area. Combined with advanced natural language processing techniques, the project will stimulate the research on addressing various questions on the adaptivity and learnability of multimodal interfaces.

The knowledge of cooperative interaction and both spoken (and written) and signed language communication will bring theoretical insights into the empirical basis of the multimodal adaptive interaction. Providing systems with multimodal behaviour is seen as a way of allowing for more natural human-machine communication.

## ***2.2. Accessibility and learning in museums - The mission of Finnish National Gallery***

The Finnish National Gallery is the largest art museum in Finland. It consists of three independent museums - Ateneum Art Museum, Museum of Contemporary Art Kiasma, and Sinebrychoff Art Museum - with their own special art collections (which cover approximately 700 years of art history), exhibitions, and other activities. The fourth department - Central Art Archives - forms the national centre for the documentation of the visual arts. The organisation of the Finnish National Gallery also includes joint units for administration, conservation and art museum development.

The Art Museum Development Department acts as a liaison between Finland's art museums and other cultural institutions, focusing primarily on special development projects and their coordination. The department (and its predecessor Education Department) has worked over the past ten years for new multimedia solutions as part of museum's educational services. The multimedia projects carried out by the department are mainly content productions for various joint initiatives and development projects. The Development Department tries to create new opportunities for interdisciplinary cultural collaboration, both nationally and internationally. Its chief aims are to identify the specific needs of diverse target groups, to improve art museums' public relations and to make every museum visit a rich, meaningful experience. Underpinning these efforts is the 'Design for All' principle, i.e. the strive to ensure that art history resources and educational material is made available to target groups of varying abilities and educational/socio-economic backgrounds.

Multimedia is an effective media, through which museums are able to communicate at the same time with totally new audiences and more differentiated communities or postmodern “tribes”. The new technology is especially revolutionary for people with disabilities and special needs: the ones who have traditionally been excluded from the museum content and services. The Development Department’s education policy takes into consideration the diversity of different audiences and aims to create inclusive programs.

### **2.2.1 Accessibility in museums**

Access promotion is an attitude and philosophy that permeates all goals and projects undertaken by the Art Museum Development Department. The aim is to ensure that all work done by art museums in Finland is readily accessible to diverse target groups. Representatives of disability organisations have formed an advisory group to advise in the access matters. (For further information, see Salovaara 2001).

The key aims are:

- **Removal of barrier**

All members of the public, including those with functional limitations, must be guaranteed barrier-free access to museum services. This includes elderly people with functional limitations, people with disabilities, linguistically disadvantaged immigrants and mobility-challenged visitors (e.g. visitors with pushchairs impeded by physical barriers).

- **Proactive promotion of access**

Promoting access means addressing the diverse needs of customers at every stage of their visit and in all museum services. Improving the accessibility of facilities, information and services calls for open exchange and cooperation with various customer and user groups.

- **Design for All**

The key to access promotion is ‘design for all’ or ‘universal design’ i.e. design that addresses the needs of diverse user groups. This means creating easily adaptable solutions that are usable by all people, irrespective of their age or individual abilities.

## **2.2.2 Education and learning in museums**

Education and learning is been one of the core activities in the Art Museum Development Department. The basis is that we all learn differently, and prefer different learning strategies and styles - and thus need a variety of methods of engagement. In order to create inspiring environments for continuous and life-long learning opportunities, the Art Museum Development Department has applied several theories of learning and knowledge in its multimedia programmes.

One essential theory for learning in museums is Howard Gardner's Theory of Multiple Intelligences (1983). Gardner presents the properties of seven domains of learning, which are analytical, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal and intra-personal. The museums should structure the presentation of material in a style which engages most or all of the intelligences. This kind of presentation not only motivates visitors to learn spontaneously, but it also allows a museum educator or concept planner to reinforce the same material in a variety of ways. By activating a wide assortment of intelligences, education can facilitate a deeper understanding of the subject material.

George Hein (see for example Hein 1995) uses Gardner's ideas of multiple intelligences and introduces the constructivist theory of learning. Constructivism claims that both knowledge and the way that it is obtained are dependent on the learner. Learners construct knowledge as they learn new things, reorganising this knowledge as they interact with the world. According to this definition, a constructivist museum contains exhibits and programs that may have multiple paths and a range of presentation methods catering to different learning styles. Visitors are able to make their own connections and meaning about the content: the constructivist museum focuses on visitors, not on the subject or content to be learned.

The overall framework of a museum visit is consequently understood as a whole: different kinds of activities and services function together for common communicative purposes, not as separate fragments of activities. This approach includes the elimination of possible barriers or hindrances for learning. For example, a barrier may occur through an impairment in the visitor's reasoning skills, literacy, mobility or concentration (for the complete list of barriers and suggested solutions, see *Disability Directory for Museums and Galleries* (2001, 135).

### **2.2.3 Case 1: See Hear Imagine - On-line Exhibition for the Visually Impaired**

The Internet is in many cases understood as merely a visual media. To brave this convention, Finnish National Gallery's Development Department (then, the Education Department) created a virtual art exhibition See Hear Imagine of Hugo Simberg's art ([www.fng.fi/hugo.htm](http://www.fng.fi/hugo.htm)) designed especially for the visually impaired - both for the blind and partially sighted in 2000. The project was carried out in collaboration with the FNG and the Finnish Library for the Visually Impaired. The venture was the first one of its kind in the world, which put a lot of emphasis on testing the usability and structure of the exhibition throughout the process of planning and realization.

The exhibition presents Hugo Simberg's (1873-1917) symbolist world through six of his paintings. The main concern in designing the exhibition was to make sure that the information would be found easily for every potential visitor. A simple, yet effective use of text, sound and graphics was pursued. All the texts were written in close co-operation with the Library for the Visually Impaired. The Library described systematically each work of art or image, and then the art historical content was added. The final form of the presentations is a combination of at least two different approaches to narrate a work of art: a systematic image description and the art historical substance. When editing the texts, the plain language approach was used.

The Web Accessibility Guidelines were also carefully followed. In a nutshell the goal was to create a web-site, which would function as well for the visually disabled as for the people who can see and access the pages with more commonly used graphic-based browsers. Even though the pages were targeted for the visually impaired, we did not want to exclude any potential user group. In this way the normally sighted people could also be introduced to a very different way to perceive the visual art.

Yet, no matter how punctually we may have tried to follow the written guidelines for the accessible web-site, they could not substitute the evaluation done by the real audience. Therefore, throughout the whole process the usability and accessibility of the pages were tested with the visually impaired users. Not only the technology was evaluated, but also the texts were tested beforehand.

### **2.2.3 Case 2: In Touch with the Ateneum – a Multimedia Program**

The starting point for the In Touch with The Ateneum (2001) program was a desire to create a multimedia which would offer different insights into the visual arts and could be used by as many museum visitors as possible; a multimedia program which would be:

- Content-rich
- Multi-modal
- Accessible in technology, content, navigation, graphic design, and in the supportive equipment of the multimedia kiosks (magnifying glasses for the poor or partially sighted, headphones and induction loops for the people with hearing impairments, a "pointing stick" for people who need assistance with the mobility of hand etc.)
- Designed according to the Design for All principles
- Educational (supports different kind of learning styles and information)

The final program provides the museum visitor with information about the history of the museum, the artists and art works in the museum's collections, and the architecture and the history of the museum building. It also contains hundreds of images of the art works and other digitised archival material. The program is browsed in multimedia kiosks, located in two places in the Ateneum Art museum.

To increase the user-friendliness of the program, the content was conveyed through various senses. For example, the visually-impaired will find the sound facility helpful: the texts of the program can be listened to with ear phones. Other sounds support and enliven the visual features and create the right atmosphere for story-telling. Special attention has been paid in the graphic design to keeping the program's visual appearance calm and clear. To ensure easy use for everyone, the elements stand well out from the background, a sufficiently large and discernible text type has been used, and the program proceeds logically. The texts have been written observing the principles of easy-to-read language.

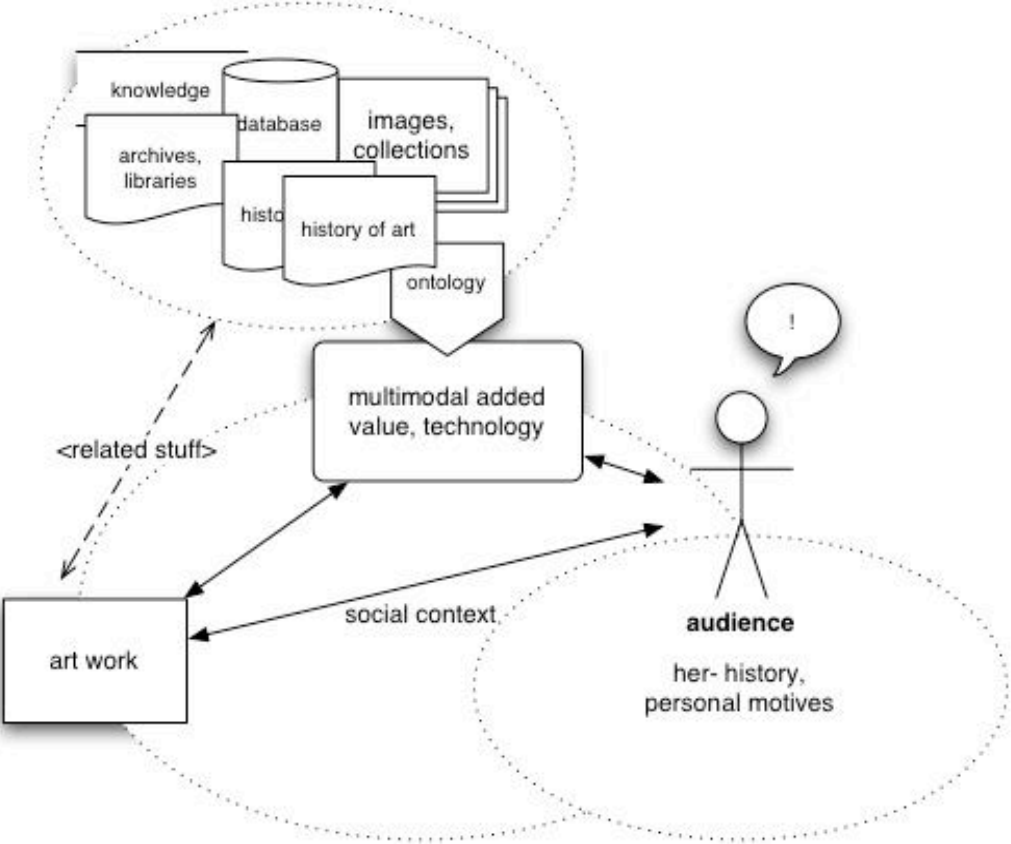
Before the concept design of the program was launched, a small-scale empirical survey was conducted. Some museum guards were asked to keep a diary for a certain period of time. They wrote down all questions, comments and problems the museum visitors spontaneously addressed to them. In this manner the concept designers could receive more profound knowledge about the interests and needs the visitors “naturally” or “spontaneously” express

while visiting the museum. The collected information created a loose structure for final content of the program.

### 3. Principles and main objectives of the MUMMI project

The current MUMMI project operates in three levels:

- 1) The research for multimodal user interfaces conducted by Media Lab
- 2) The courses and lectures about Design for All and Cultural Heritage for new media students coordinated by Media Lab and the Art Museum Development Department
- 3) The creation and implementation of innovative applications in museum context carried out by the Art Museum Development Department.



(Figure 1)

The most important aspect in all these levels is the experience of the users. The Figure 1. illustrates from the user's perspective the complexity of the project. The project introduces multi-modality as the technology that integrates sophisticated presentation with universal access to digital services and artworks. The project also aims to develop intelligent and user-friendly ways to manage, sort and catalogue the cultural heritage information. It also seeks the ways to combine different kinds of museum information as intelligible entities with the use of ontology and semantic web<sup>3</sup>, which would support the reception of the work of art and learning.

In effect, The MUMMI project creates unique interaction between the technology developers, the museum educators and curators, the designers and the audiences. The project investigates how the digitized content (texts, images, sounds, film clips, works of arts etc.) can take into account the multi-sensory access as well as the cultural and technical aspects of accessibility. It also provides museums with new ways and means to communicate with its audiences.

The main emphasis is in the user, not in technology. The MUMMI-project proceeds from the need to examine how the new technologies can be used in establishing virtual exhibitions that approach the visual arts through multiple routes and ways. The project aims to create new forms of encountering the arts, alongside and/or around a museum visit. Moreover, it aims to consider how material provided through the web could be used to support both formal and informal learning.

The objectives of the MUMMI-project can be summarised as follows:

- Integrate high-quality presentation of cultural heritage content with user-friendly access to thematic information and explanations
- Investigate forms of presentation targeting different user groups
- Develop proof-of-concept virtual exhibitions and other content
- Research how emotive interfaces, virtual humans and unified communication services address the requirements and interests of mobile users and users with special needs.
- Create innovative ways to present art history content, which would support different learning styles and strategies and enhance and motivate the user's self-supportive and life-long learning.
- Search for new ways to manage and present information in databases, that would be user-friendly, dynamic and culturally and contextually temporally meaningful
- Promote inclusive practice and user-centred design methods for students and designers of new media.

---

<sup>3</sup> Among others, the Finnish National Gallery's Art Museum Development Department is partner in Finnish Museums On-Line and Finnish Semantic Web projects, which are major research project of semantic web technology conducted by the University of Helsinki's Department of Computer Science.

- Challenge the conventional use of multimedia in the museum communication and context

### ***3.1 Universal access to Finnish Cultural Heritage***

According to general definition to museums, they “enable people to explore collections for inspiration, learning and enjoyment. They are institutions that collect, safeguard and make accessible artefacts and specimens which they hold in trust for society”. (Museums Association’s definition, 1998.) Museums exist for people. Although new people are reached through the Internet, the content supply may not necessarily be accessible to the same degree. Thus more attention needs to be paid in the content design phase on who is using the product, how, where and why.

Information on the arts, especially on the web sites of art museums, has traditionally been conveyed through pictures and visual narration. Information provided in that format falls beyond the reach of, for example, visually impaired users. At the same time, rapidly evolving multimedia narration and technology could offer new options for relating and teaching visual arts in different, multi-sensory ways. By making use of these options, access to the world of visual arts could be extended to a wider range of audience groups - from the perspective of their own needs and interests. Design for All (sometimes called Universal Design) standards (see Chapter 5. for principles of Design for All) are the basis for inclusive practice in developing multimodal interfaces for museums. The MUMMI project takes into account both multi-sensory access and the cultural and technical aspects of accessibility.

### ***3.2. The Design for All Concept for Digital Museum Environment and Museum Pedagogy***

Beside its innovations in interactivity design and technology research, the MUMMI project also aims to create new models for the history of art narration. This attitude challenges the traditional or conventional ways to understand the role of the museums as well as its means to present its collections. Our desire is not to simulate the functions, services or collection displays that already exist in the “real” museums with “real” objects. Nor do we wish to reconstruct the physical museum in virtual format. The MUMMI project re-evaluates the possibilities of multimodal narration in virtual exhibitions and the use of new technology as a tool for new kind of communication and learning.

When the digitised content is designed for all, the museums are able to reach audiences it already did not have at all, or to a very small extent. New audiences require new approaches to the cultural heritage. The interactive technology calls for new kind of museum concepts, and activates the ways the museum visits are traditionally perceived. One has to pay attention to all potential audiences in an innovative and broad-minded manner, and examine the ways they would prefer to interact with the content. Museums no longer need to define or control the “right” or “best” way to access the cultural heritage they possess: the users are able to choose themselves the information and interaction they - in that specific situation - wish to acquire.

The MUMMI project produces digital content that tells about the history of art in versatile and multisensory ways. Depending on the user’s preferences, he or she may access the same content via multiple ways of looking or interpreting. It presents by the side of the work of art different perspectives to look at, talk and experience art. In this way, the MUMMI investigates new narration and presentation models for works of art, which would deconstruct the traditional and modernistic hierarchy between the expert/museum and the layman/visitor. The aim is to create places for polyphonic dialogues between the museum visitor, the work of art and the museum personnel, which would encourage the visitors to make their own interpretations about the history of art.

When we create different routes and channels to the cultural heritage content, the otherwise fragmented and impersonal cultural heritage information will become more personal and a part of the everyday experience we all share. The multimodality of cultural heritage content does not treasure one way of apprehending the arts as better than the others: it reflects and values to richness of the interpretations and points of views. Most importantly, it provides the museum visitors a unique possibility to rediscover the collections of museums as anew.

### **3.2.1 Exclusion vs. Inclusion - as Transparent Technology as Possible**

In accordance with the Design for all standards, the MUMMI focuses on researching and mapping out general strategies for designing multimodal interfaces and content. There are different types of barriers to access in digital content, which have to be taken into consideration (the types and examples freely adapted from Dodd & Sandell 1998, 14):

- *Physical access*: are multimedia kiosks in the museum building accessible with wheelchairs?

- *Sensory access*: is the content in multimedia conveyed through multiple senses?
- *Intellectual access*: is the content provided in easy-to-read language?
- *Financial access*: is the access to on-line collections free of charge?
- *Emotional/attitudinal access*: is the design of multimedia materials user-friendly?
- *Access to decision-making*: is it possible for audience to partake in multimedia projects?
- *Access to information*: does the chosen technology provide access to information
- *Cultural access*: does the multimedia content reflect the interests and life experiences of the target audience?

The MUMMI project tries to make the possibilities as well as the limitations of technological evolution more visible: the current state of affair too often is that the technology is added to the pedagogical programs as an unquestioned end in itself. However, when planning concepts for new technology programs, one should first consider the user and the anticipated learning outcomes and make scenarios for the possible use of the program. New technology should only support or bring some added value to the content – not to be the content in itself. The added value of multimodal technology lies mainly in its ability to communicate and interact with the museum visitors and provide multiple ways to comprehend and interpret the museum objects. Though the new technology opens immense new potentialities for presenting art history, one should not be enchanted by it, but to keep the content and the user as the first priority. The new media should be perceived as a transparent tool.

The role of the museum is in change towards being a transmitter of new kind of knowledge, which is based on the everyday experiences, memories and expectations of the museum visitors than fixed interpretations and facts. Then the challenge is not only to identify the users, but to get to know how they use museum and its digital services, and how they would like to use it. These questions should not be raised once the production is finished. On the contrary: the user evaluation should be present throughout the process of planning and realization, ever since the beginning.

#### **4. The MUMMI Project in practice**

The synergy between the Media Lab and the Art Museum Development Department has been very close and fruitful. While Media Lab is in charge of the implementation of the technical innovations, interface design and the human-computer-interaction, the Art Museum

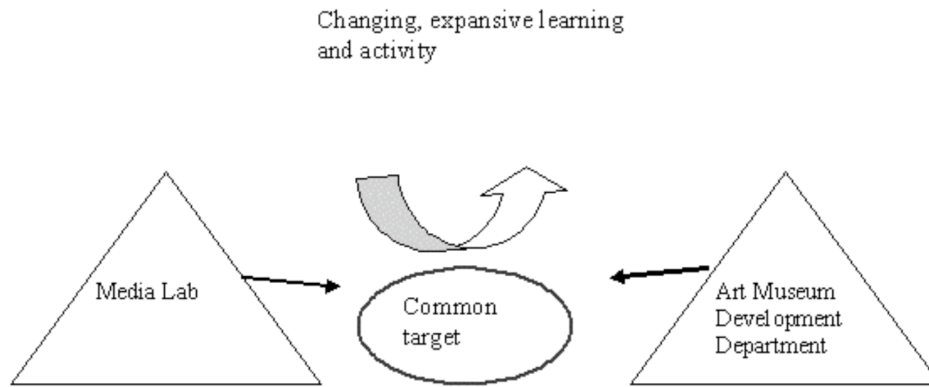
Development Department coordinates the development of museum applications and produces content. In addition, the Art Museum Development Department takes part in teaching, planning the MUMMI curricula and its objectives, and the evaluation of student demonstrations.

#### ***4.1 Organic Synergy between Different Fields of Expertise***

The manner in which MUMMI functions across the organisational boundaries has been in itself innovative. The partners shared a common desire to create standards for best practises in new media design, which would benefit the partners, students of Media Lab as well as the museum visitors.

The project has opened an opportunity for the Finnish National Gallery to act as an active and equal partner and creative content and concept definer in the realm of technological development, where the cultural heritage content is traditionally and quite mechanistically perceived as an interesting but separate case-example. The Gallery has had close collaboration with the technology and interface designers in a cross-section of gradually deepening individual expertise and jointly produced models to participate horizontally. Throughout the project the ideas of fixed and representational roles of expertise has been questioned and changed: the key has been to openly share the experiences and knowledge, and to learn by doing.

This partnership also opens new possibilities for expansive learning and development transfer in educating the students of Media Lab. The objective is to reproduce knowledge in the framework of work (museums) and its changing practices (for instance rapid development of technology). For students, this collaboration creates a boundary-crossing relationship between the Media Lab (theoretical knowledge) and the Finnish National Gallery (everyday practices). In this way, meaningful transfer of learning takes place through interaction between two institutions: school and workplace engage in collaborative interaction in which both learn something from each other. Figure 2. presents the overall framework for this developmental activity. (Tuomi-Gröhn 2001, 28-66).



(Figure 2)

#### **4.2. MUMMI studies in Media Lab**

From its beginning the MUMMI project has had a vital part in Media Lab's interface design and information design curricula, where MA-students and researchers of New Media are able to practice user centred design with real audiences and interesting content (<http://mlab.uiah.fi/mummi>). While creating innovative museum applications the MUMMI project also provides challenging case studies in the accessibility and usability matters. Already, the project has produced several final thesis projects for Media Lab students (see: <http://mlab.uiah.fi/~marjo/museum>)

At the initial stage of the project students produced, through workshops and lecture series, plans and ideas for different web-based applications using the "Design for all" approach. During the courses the students have learnt, in a hands-on fashion, how to design and create an interactive educational or communicational environment. The students have also designed prototypes of a communication method and technology for multimedia productions conducted and coordinated by the Art Museum Development Department. Later, new forms of international cooperation with museums other cultural institutions interested in the concept of accessibility are going to be built. Foreign guest speakers have been invited to attend the lecture series and workshops.

### **4.3. The Dissemination of Information**

The MUMMI project aims to disseminate its research results and know-how on the challenges and implications of the recurrent media for the cultural heritage field. This means efficient networking. The Finnish art museums will have straight access to the results of this co-operation and benefit from its outcomes. This will be guaranteed by the Art Museum Development Department, whose mission is to develop the art museum sector and share its expertise. One important information channel for the project is the Access Consultation for Finnish Cultural Institutions managed by the Art Museum Development Department and financed by the Ministry of Culture and Education. The Art Museum Development Department is also actively promoting the MUMMI ideology through its own digitisation and content production projects and other study projects (for instance “The Text and the Museum” education programme in collaboration with the University of Helsinki’s Department of Art History).

Both partners have also produced several links and cooperation with other universities, museums and research and cultural institutions, among others the Finnish Association of Deaf, the Finnish Federation of Visually Impaired, European Design for All -network, the University of Helsinki (Department of Translation Studies, Department of Art History, and Department of Computer Science), and the University of the Arts in Philadelphia.

## **5. Check-list for Accessible Virtual Heritage**

The Centre for Universal Design has defined the principles of Design for All / Universal Design as follows (in the *Disability Directory for Museums and Galleries* 2001, 118-119):

- Equitable use: the design does not disadvantage or stigmatise any group of users
- Flexibility in use: the design accommodates a wide range of individual preferences and abilities
- Simple and intuitive use: use of the design is easy to understand, regardless of the user’s experience, knowledge, language skills, or current concentration level
- Perceptible information: the design communicates necessary information effectively to the user, regardless of ambient conditions or the user’s sensory abilities

- Tolerance for error: the design minimises hazards and the adverse consequences of accidental or unintended actions
- Low physical effort: the design can be used efficiently and comfortably and with a minimum of fatigue
- Size and space for approach and use: appropriate size and space for approach, reach, manipulation, and use regardless of user's body size, posture or mobility.

In addition, the user-centred design includes several aspects:

- *Collaborative teamwork with shared and expansive expertise* acts as a basis for interface design, graphic design, information design and interactive design processes.
- The starting point for *multimedia manuscript* (i.e. design of the content, interface, technology, interaction) should always be the needs and experiences of the users.
- *Co-design process*: users and designers work together. The testing and evaluation goes hand in hand with the process of planning and designing.

## References

*Disability Directory for Museums and Galleries* (2001). London: Resource: The Council for Museums, Archives and Libraries.

Dodd, J. and Sandell, R. (1998). *Building Bridges*. London: Museums & Galleries Commission.

Gardner, H. (1983). *Frames of Mind*. New York: Basic Book Inc.

Hein, G. E. (1995). The Constructivist Museum. *Journal for Education in Museums*, No. 16, 1995 21-23.

Jokinen, K. and Raike, A. (2002). *Multimodality - technology, challenges and visions for the future*. A presentation held 18th October 2002, Multimodality IT-seminar, Castberggård, Denmark.

Oviat, S. et al. (2000). *Designing the User Interface for Multimodal Speech and Pen-based Gesture Application: State-of-the-Art Systems and Future Research Directions*. *Human Computer Interaction*. 2000, vol. 15, no. 4, 263-322

Tuomi-Gröhn, T. (2001). *Kehittävä siirtovaikutus koulun ja työpaikan yhteistyön tavoitteena: tapaustutkimus lähihoitajien lisäkoulutuksesta* [Developmental Transfer as an objective for partnership between the school and work]. In T. Tuomi-Gröhn & Y. Engeström (eds.) *Koulun*

*ja työn rajavyöhykkeellä. [At the Boundary Zone between the School and Work].* Helsinki:  
University Press

Salovaara, S. (2001). *Saavutettavuus-projekti Valtion taidemuseossa 1999-2001*

[The Finnish National Gallery Access Project, 1999-2001]. Unpublished report. Helsinki:  
Finnish National Gallery.

## **Authors**

**Riikka Haapalainen**, art historian and educational scientist (specialized in adult education) has worked since 1996 at the Finnish National Gallery's Education Department and currently in Art Museum Development Department as researcher. She coordinates and is in charge of both national and international projects that deal with multimedia, content production, accessibility and digitisation of cultural heritage, which all aim to develop the Finnish art museum sector. Among others, she also conducts evaluations and visitor studies, as well as takes part in other national cooperation and development programs for art museums. Haapalainen has given several presentations in international conferences dealing with the artistic content in multimedia. In addition to her work at the Finnish National Gallery, she writes actively about art and visual culture (her weekly art reviews are published in national newspaper *Iltalehti*) and teaches art history essay writing at the Academy of Fine Arts, Helsinki.

**Marjo Mäenpää**, MA, is teacher, producer, managing director, publisher and critic. She has studied literature and social sciences at the University of Helsinki and had studies in writing for multimedia at the Theatre Academy 1996-97. She lectures in new media management, writing for multimedia, interface usability and www-design, information design and dramaturgy of hypertext in Finland and abroad. She is the founder and managing director of Publishing House Taifuuni Ltd. Her educational activities include: Head of the 2-year MA-program: New Media Program for professionals in Media Lab, University of Art and Design; Coordinator of MUMMI-Multimodal museum interface study project and productions (See: <http://mlab.uiah.fi> and <http://mlab.uiah.fi/~marjo/mummi> and <http://www.taifuuni.com/maenpaa/cv.html>)