Digital Cultural Heritage
Centre of Expertise

INTERACTIVE INSTITUTE

RAPPORT FROM THE COLLABORATION:

TII, Stockholm/NTU, Singapore ; Digital Heritage in Singapore

January 2009 – 19 April 2009

The collaboration was sponsored by Digital Cultural Heritage Centre of Expertise at The Interactive Institute, Stockholm and School of Art, Design and Media at Nanyang Technological University in Singapore.

Background

With the financial support of the Knowledge Foundation, a delegation of 29 representatives of Swedish research and development in the fields of moving images, digital cultural heritage, visualization and ICT in learning visited Singapore on September 14-20, 2008. The purpose of the visit was to find common ground between research and business development in Singapore and Sweden. The origins of the visit dates back to November 2005, when the CEOs of Sweden's independent research foundations made a trip to evaluate Singapore's rapid progress. This first visit resulted in the signing of a Memorandum of Intent on Co-operation between the five foundations, among them the Knowledge Foundation, and the Agency for Science, Technology and Research (A*Star). The Knowledge Foundation sent a smaller group for a scouting visit in September 2007. This trip resulted in a workshop collaboration 2008 between researchers at Nanyang Technological University, Malmö University, Blekinge Institute of Technology and Interactive Institute. The Knowledge Foundation and the financers behind the Visualization Programme decided to sponsor eight researchers connected to the Visualization Programme and its two cross-boundary arenas, C-site in Norrköping/Linköping and Centre of Visualization Göteborg, in order for them to join in the visit to Singapore. Six delegates, representing the Knowledge foundation, also joined the 2008 delegation with the aim to evaluate if and how the Knowledge Foundation can work for a future exchange between researchers, education, business and culture in Sweden and Singapore. The September 2008 delegation from Sweden was quite a strategically mixed group representing different fields of science, technology and arts. All of the delegates have contributed to the evaluation of the visits and added contacts, as well as to the conclusions within this report.

During five days in September the Swedish delegation visited 17 organizations (within the public-, research-, business- and culture sectors). Furthermore, they attended in total 4 events. The preparations for the trip and the contacts made during the trip have made it quite clear that Singapore is very strong on technology, strategies and funding. Sweden carries the strength in content, creativity and creative co-operation. And even if Singapore seems to have some way to go in the areas of content and creativity it is obvious that they are committed to develop these areas. We can observe the focus

and strategies on arts and new media as well as the creative industries – they are investing in start-ups and getting things going as well as making heavy investment at NTU.

The next steps will probably be taken both on a more individual level by the different organizations in the delegation, several of the delegates already have made, or are about to make, contact with parties we met in Singapore in order to continue exchange. But it is also of great interest to find a fruitful and sustainable exchange on a national level which can involve the Knowledge Foundation, in co-operation with other national bodies on the Swedish side and A*Star and other Singaporean national bodies on the other.

The Knowledge Foundation have an idea to propose a collaboration with A*Star to set up mirror cross boundary arenas during a trial period of 3-5 years. A well functioning cross boundary arena engaging actors from the two countries from the fields of research, education, industry, business, the arts and culture sector as well as the public sector, could be a good infrastructure to which independent research projects can be connected. The areas of visualization, which we see include the areas of moving images and animation and the area of ICT in learning are relevant focus themes for such an international cross-boundary arena.

Collaborative Workshop Organised by ADM | Pensyl Russel and IMI | Martin Reiser

Digital Heritage was one of the topics at the workshop presented by Halina Gottlieb from The Interactive Institute /The InDigital Heritage.

Interactive Institute is a Swedish experimental IT-research institute that combines expertise in art, design and information technology to perform world leading applied research.

The institute develops new experience oriented products and services, and provides strategic advice to corporations and public organisations. Research results are exhibited worldwide and are commercialised through license agreements and spin-off companies. Since the start in 1998, our work is characterized by not only conducting traditional academic research but also exploring the borders between art, design and technology, industry and academy, etc. The institute has about 60 employees organized in a number of research studios/groups located in Kista/Stockholm, Piteå, Eskilstuna, Norrköping, Växjö and Göteborg. Each research group has its own focus area that relates to the overall focus of combining technology with art and design. Interactive Institute works to find new, and improve old, connections between art, design and science through interdisciplinary methods. We believe that representatives of these areas have a lot to learn from each other, and that our society has much to gain on increased cooperation and deeper understanding between the areas. This point of view puts us in the middle of “The Quad Helix model” since our work is as an effort to combine art and science in order to develop society and business. To be successful we have to ensure the highest quality to be maintained within each sector. We also have to support and stimulate meeting points between the areas, in every way.

The Centre is a member of the European network established by EPOCH (European Network of Excellence in Open Cultural Heritage). Formed in 2007, the Centre draws its experience from years of collaboration with a constellation of researchers, SMEs, governmental agencies, organisations and academia.

With a considerable background in the digital cultural heritage field, the Centre excels in creating competence in the use of digital and new communication technologies for cultural heritage content. Our main areas of focus are multidisciplinary knowledge transfer and new interfaces for communication with visitors.

Results of the Workshop

The interest for the collaboration within digital heritage was expressed by the workshop participators from IMI, ADM, EEE, SCI.

Halina Gottlieb was invited for 3 months by NTU/ADM for the investigating the possibilities for the collaboration between The Interactive Institute and ADM within digital heritage field.

HALINA GOTTLIEB

Director of Digital Cultural Heritage Centre of Expertise at the Interactive Institute in Stockholm,

Chairwoman for NODEM – Nordic Digital Excellence in Museums and Heritage Sites

Halina Gottlieb, art historian and multimedia producer, has been a programme manager at Vision for Museums at the Interactive Institute (Stockholm) since 1999. As project manager she has taken part in the development of several prototypes pertaining to the interpretation of objects at art galleries. Furthermore she has assisted as concept developer for exhibitions at several museums in Sweden. She is also curator for the Interactive Salon, a show room for technologies that promote and preserve cultural heritage.

In 2002, Halina founded the conference/award forum Nordic Digital Excellence in Museums and Heritage Sites (NODEM). At the University College of Film, Radio, Television and Theatre in Stockholm she organised and was head lecturer of a course entitled Exhibitions & New Media. Halina is currently a board member of the Executive Committee at EPOCH (2005-2008) and is the Swedish representative for Epoch's Network of Expertise Centres. In 2006, she became director of the Digital Cultural Heritage Centre of Expertise at the Interactive Institute.

Results of the Collaboration, 19/12/2009 – 19/04/2009

1. Mapping the interactive digital media in Singaporean museums and heritage sites.

Typology of the new media used in museums and heritage sites in Singapore.

1. Typology

The type of interactive digital media technology that has been applied to Singaporean museum environments can be grouped into five main groups.

1. Detached, stationary applications
2. Spatially enveloping and large-scale applications
3. Internet-based applications
4. Portable and mobile application
5. Hybrids between physical and digital objects and/or configurations of rooms

Each group represents different types of technologies but also function which naturally has been applied differently depending on the content, aim and conceived usage. This demarcation has been made in an attempt to categorize different types of representation. In some cases, especially valid for group 1 and group 2, the fixation of boundaries will be such that they partially overlap.

This typology neither has room for nor does it aim to present a detailed list of specific hardware systems; in most cases the utilized technical platforms are commercially available. Instead, a general description is given of what technology, platforms and interaction purposes have appeared in the context of museums independent of what individual systems could have been chosen for the actual implementation.

Museums Heritage Centres	Mobile / portable	Stationary / Kiosk	VR	AR	MR	Video Projection	Internet -based

Asian Civilization Museum	X	X	X	X		X	X
National Museum of Singapore	X	X				X	X
Science Centre	X	X	X	X	X	X	X
Peranakan Museum		X		X	X	X	X
Singapore Art Museum						X	X
Malay Heritage Centre						X	X
Chinese Heritage Centres						X	X
Playeum						X	X
Singapore Philatelic Museum		X					X

Stationary

This group is composed of stationary or fixed contributions that have been placed at a certain place,

station or space of an environment, such as computer kiosks, terminals or wall-mounted monitors.

A stationary production can be made up of digitally-equipped installation which through individual design attains furniture-like or sculpture-like qualities. The station can also be made of an interactive, experimental station with digital control of analogue and digital processes. Listening stations in museum environments where content is mainly conveyed through sound using speakers or headphones can also be included into the stationary category.

In the case of computer kiosks the interaction normally takes place through the production's screen-based graphical interface, through pointing-, button- or other input tools, or through a pressure-sensitive screen (touch-screens). The visitor is supposed to be able to approach the kiosk and explore its content through one of the above mentioned interaction devices.

Different types of hyper-medial representations are common i.e. content that is linked together with pictures, text, sounds, animations, three-dimensional visualizations; mono-medial or multi-medial which the user controls. The content can in turn be stored in a computer, on disc (CD-ROM or DVD) or be downloaded through a network/the Internet.

The kiosk or station format often allows two sometimes three users simultaneously, in practice limited by the possibility of more than one person using the menu controls. Other limiting factors of the computer stations are the size of the screen, positioning of screen and the station's ergonomics - if there is place for one or more people to sit or stand in front of the station simultaneously. Sometimes, more than one screen or larger projections of screen content are available so that more than one or two people can view it simultaneously.

Wall-mounted screens can have a purely visual function with non-interactive, often film based content. These often have the aim to function as animated signs or vignettes during introductory moments, so called "keynote screens". Digital bulletin boards can also be considered stationary and present events and activities to visitors or function as dynamic orientation boards, so called "visitor orientation systems".

Listening stations can be equipped with one or more headphones so that several people can listen in simultaneously, often with controls for each individual audio track. Headphone-equipped stations are often present in environments where the sound is supposed to demarcate from the rest of the room so as not to disturb visitors that have chosen not to listen.

Internet-Based

Productions that utilize the Internet as their structural platform; a network-based format for publication

and propagation of digital material: graphics, text, pictures, film, sound, VR, real-time communication, database content etc.

The established form to interact with Internet-based productions is through a screen-based interface. For people with special needs, such as the visually impaired, there exist alternative interfaces such as voice recitals and voice commands. Just as in the case with digital interactive multimedia productions, the Internet is based on a hyper-medial structure. The user can navigate, with the freedom to choose in what order, through content which can also be made by other publishers as web content with different authors is actively linked together.

Internet-based museum productions have a variety of content and design and have been made accessible for various reasons. Reference material such as recent news, programs, contact details and an overview of activities is blended together with facts, experience-based content, articles and learning material. Publications of databases of various collections (objects, photos etc) are commonplace, both simple directory catalogues and those with advanced search facilities.

Internet exhibitions or “virtual exhibitions” are screen-based and sometimes have multimedia elements are also common, especially digital versions of larger exhibitions or productions that have been developed specifically for the Internet.

The Internet-based platform is as a form of production not bound to spatial and temporal restrictions which allows for the creation of a parallel information- and production context for museums. Via the Internet, visitors can get in touch with the museum and what the museum is offering without having to be at the museum. Internet productions offer specific “Internet experiences” which physical places lack.

One of the primary properties of Internet-based productions makes it possible to have accessible content irrespective of chosen physical locality or degree of participation in the environment and analogue real world social contexts. These are factors that to larger extend affect production types that are only applicable to museum and exhibition rooms.

In an exhibition, presentation kiosks, installations and similar products can be integrated in terms of form and set design to a spatial/content entirety. Naturally, this possibility does not exist since the Internet user’s environment/context is independent of the physical context. However, Internet-based productions are often to be found in museums, exhibitions and factual rooms, as stationary application. Computers connected to the Internet are also often offered as a public service in the café department and such like. In practice, the Internet puts all publishers on equal terms. The possibilities and limitations of the medium are shared by museums with others that also publish Internet-based material.

The Internet is characterized by versatility – it is an environment which can hold deep content, a high degree of multi-modality and interactivity. However, Internet-based productions can be nothing more

than web pages with very limited content where the content is static and user's choices are few.

The development of wireless information communications technology (ICT) has brought about possibilities to also access to Internet productions through mobile phones and hand-held devices which further liberates the user from having to be at a certain place and computer.

The possibility to store and retrieve information on the Internet can also be utilized by stationary production to, for example, retrieve instant audio playback, to communicate with other media productions, retrieve content from databases etc. The Internet is therefore a collective resource for the propagation of different formats to different media units; this is something museum material, rich on information, can utilize.

Portable

Devices with different types of information content and productions that are carried by visitors while they are in a museum, exhibition or similar place: portable CD players, digital gaming units, handsets, hand-held computers (Palmtop/PDA) or mobile phones.

The category of portable guides includes so called audio guides - portable audio media players with information about the exhibition. This technology has been modelled on the portable analogue cassette players and are able to, via CD-ROM discs, have a self-contained storage memory. Furthermore, the guides use a compressed digital sound format and are able to dynamically integrate with both visitors and other digital media units.

The following devices belong to the digital development of audio guides: multimedia guides and portable hand-held units with large displays. The latter of these is normally a hand-held computer and can, apart from auditory information, present longer textual content, graphics, pictures, video as well as more advanced forms of interactions. Also laptops which are used in a mobile fashion to convey museum content are considered to belong to this category.

The principle of portable units is that visitors gain access to certain content and retrieve it while they move about freely. In contrast to the otherwise static information that the visitor utilizes: exhibition texts, plaques, signs, individual objects, live animals or buildings and larger sections of an environment

Etc. Portable units allow the visitor to experience objects and other exhibition content without being confined to a particular position or place.

The appearance of portable units also affects the ergonometric aspects of the device and how it is

carried by the visitor: in the hand like a telephone receiver, through a headset, hearing device, around the neck or shoulder, or in the palm of the hand like a hand-held computer.

Two principles hold for portable productions: linear tours where the content of the guide follows a predetermined path which the visitors also follows, and random access tours where the visitor decides where and with what exhibition item to initiate the relevant content.

Guide-based productions generally employ a positional system which informs the visitor with clear numbers or symbol signs where in the environment the visitor can activate the unit for particular content. This activation is usually done through an alphanumerical keypad or virtual interface on the screen of the guide.

Content can also be triggered automatically through different types of sensor and wireless positioning technologies which reacts to a visitor's position and chooses content accordingly. Through positional or time-controlled codes portable units can also be synchronized with digital stations and events like video films, projections, light- and audio environments etc.

Additional complexity is allowed in the form of computer applications in hand-held computers. With these, the visitor can get personalized content presented to them in line with a previously set user profile or inferred from previous user choices. Another common use of portable units is choice of language or language level complementing or expanding existing language production in, for instance, exhibition environments.

Generally speaking, one can make a distinction between systems that only allow storage in the unit itself and those that download content wirelessly. Technology between hand-held computers and mobile phones is converging. Functions that were clearly separate have now merged, expanding the possibilities of making use of spatially dynamic content to communicate with the world around with multimodal communication.

Through ICT which is integrated into physical objects and clothing, it is possible, in a more advanced and intuitive way, to create productions that the visitor can profit from when on the move, and liberate them from having to hold onto a particular device unit.

Hybrids: Physical – Virtual

Productions where analogue and digital components are combined so as to act as an interface for communication or interaction, or that clearly fuse together and create large spatial configurations. In the form of digitally enhanced physical reality, augmented reality, or as a union between physical and digitally created realities: mixed reality.

To this category we also include physical artifacts that are equipped with advanced, concealed digital functions, so called tangible bits; or electronic productions that the user can control with non-mechanical controls/functions or interfaces, such as voice recognition, gesture recognition, body and eye movement etc. Hybrids of physical and virtual productions do not need to depend on a screen for content production and can also utilize functions of the screen presentation that have been transferred onto other physical materials and surfaces. The advanced and experimental character of hybrid productions contributes to why productions of this kind are still relatively rare in museum and exhibition contexts.

Depending on context, choice of technology and aim of the production it is also hard to point to a standard for the accomplishment of these. Many of the qualities that have been mentioned in the above mentioned categories, such as immersive and portable/wireless aspects, are also characteristic of hybrid forms between analogue and digital interfaces in media productions. At the same time, there are examples in museum exhibitions where clear attempts have been made to integrate the communication between the visitors, between visitors and between visitors and environments/objects. Examples of this are collaborative installations such as multi-player games. Other examples are dramatized productions that integrate both human and digital acting as well as a high level of interactivity between visitors, actors and/or with the environment.

Other types of hybrid-based productions can for example involve combinations of technology that visitors are wearing which gives them the ability to store, “remember” what they have seen and done, engage in real-time contact with people both in and out of the environment they are in, as well as technology that dynamically adapts representations of content depending on what the visitor is doing, how and where they are doing it. During this dynamic content switching, the visitor does not have to focus special control functions or menus so as to control events while they are happening, as a form of development within context communication technologies.

The category “physical-digital hybrids” presents a real opportunity to unite human interaction with electronic information which in a more adequate way satisfies an individual’s different possibilities for communication and gets rid of the need to learn given controls. They also create a diversity of alternatives for interaction with technologies around us which might result in fewer types of production units with amassed intelligent functions.

On the market there already exist ICT products that aid people with disabilities. If these were to come

into the domain of common knowledge they would simplify the interplay with surroundings for others, even in specialized environment contexts which museums represents; in both physical as well as cognitive/multi-sensory respects. The research area, assistive technologies, represents a real encounter between physical and digital dimensions. Within the museum sphere this is as of yet a relatively non-researched area.

2. Initiation of the Collaboration between Professionals from Cultural Heritage Sector in Singapore and NTU

- National Heritage Board
- Asian Civilization Museum
- Singaporean Science centre
- National Museum in Singapore
- Malaysian Heritage Centre
- Chinese Heritage Centre

3. Writing Project Tier Proposal in Collaboration with IMI/HSS/CamTech

Project: *Language ecology, documentation and visualization of intangible heritage*
Partners: IMI, HSS, CamTech, EEE, NTU Museum
Timeline: 2010- 2012
Status: Research Grant Application (ACRF Tier 2)— Pending

- This project aims to capture the vibrant cultural and linguistic fusion of Singapore through the study of three major ethnic communities; Malay, Hokkien and Baba Malay through an interdisciplinary lens.
- The project will see the collaboration between linguists, historians, interactive media specialists, computer engineer scientists and museum curators.
- Apart from the interdisciplinary nature of the project, another novel aspect of this study is the bridging of the research to the public utilization of the research produced.

• More often than not, academic research tends to stay within the confine of academia but in this project, we will be actively working with public institutions to make the output meaningful for the community at large.

4. Development of Digital Cultural Heritage Cluster at NTU that was initially planned as a Hub at ADM an Sponsored by IMI.

The proposal was accepted by IMI and Halina Gottlieb was invited for 6 months(November 2009-May 2010) to develop the cluster for Digital Intangible Heritage in Asia hosted by HSS sponsored by IMI.