



# Public Version of Final Report

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# 1 Motivation and Objectives

SCALEX is an application server for the publishing of digital content in exhibitions, museums and educational institutions. With SCALEX museums shall prepare and realise adaptive, knowledge based exhibitions and exhibition components for use in place and online. SCALEX consists of a *Knowledge Editor*, a *Storyliner*, a *Player* and a *Profiler* component.

SCALEX shall be an easy-to-use toolbox for museums and exhibition makers. It allows to add digital media to traditional exhibition objects or to produce entirely digital exhibitions. The digital exhibitions or exhibition components realise the interactive possibilities of digital media and provide an exhibition experience suited to visitors used to contemporary digital media.

SCALEX is developed in cooperation with museums and providers of digital content, who will use the product for the presentation and publication of their assets. It is tested and refined with model exhibitions in order to ensure that the product suits the needs and possibilities of exhibition authors.

SCALEX endows the visitor of an exhibition with the ability to modify its content by selecting storylines leading through the exhibition and by browsing additional content connected to the individual exhibition objects. SCALEX recognises user behaviour and presents customised content to specific user groups and even individuals. SCALEX delivers content depending on factors such as age group, language, or interests of the visitors.

SCALEX exhibitions are based on a multidimensional map of the topics and the media of an exhibition. The exhibition is conceived as a sequence of views on this knowledge map from the perspective of different user interests and access levels. In the digital exhibition the knowledge base is projected into a set of different and selectable storylines.

SCALEX uses state of the art internet-technology as a base for components tailored for the specific requirements of museums and exhibitions. It will as well allow the publishing of exposition content on the web.

Exhibitions are already using multimedia content, but SCALEX has introduced several new steps. With this project the possibility to make multimedia installations was replaced by a framework for the creation and the presentation of multimedia exhibitions. The Scalable Exhibition Server (SCALEX) is thereby scalable in several ways:

- Scalable over different exhibition sizes – from small multimedia installations up to multimedia information systems for whole museums
- Scalable over different kinds of display devices – from small personal digital assistants (PDAs) to touch screen kiosks up to large screen projection walls.
- Scalable over different types of media – at the moment the SCALEX Player is written in Flash MX. The presentation templates are Flash MX movies as well. But the system is designed in a way, that it is easily possible to expand it and to use HTML or Director presentation templates as well.

The main components of the framework are the *Knowledge Editor*, the *Storyliner*, the *Player*, and the *Profiler*. In addition to that so called *Device Controllers* are also part of the system.

- The exhibition makers are using the *Knowledge Editor* to import and arrange exhibition items, presentation templates, content elements, profile data and storylines.
- The *Storyliner* decides in which sequence which exhibition items are presented to the exhibition visitor. Furthermore for each exhibition item the storyliner decides which presentation template is used and what kind of content is selected to fill the presentation template.

- For each display unit (i.e. personal digital assistant, touch screen kiosk, projection wall) one *Player* is used. These *Players* work together with the *Storyliner*, other *Players* and special *Device Controllers*. All these components are connected via the SCALEX messaging system.
- The *Profiler* manages different generic user profiles and decides for each exhibition visitor to which generic user profile he belongs.
- *Device Controllers* do not belong to the main components of SCALEX, but are important parts of it as well. *Device Controllers* are the eyes and ears of a SCALEX installation. Several kinds of *Device Controllers* were in use during the model exhibitions (RFId readers, infrared sensors) to enhance the user experience and to allow the system to achieve all its tasks.

The main outcomes of the project are:

- The implementation of an easy-to-use toolbox for museums and exhibitions makers that allows to add digital media to traditional exhibition objects or to produce entirely digital exhibitions. The toolbox consists of three main components: *Player and Profiler – Knowledge Editor – Storyliner*.
- Three different *Model Exhibitions* were produced with the SCALEX toolbox.

These outcomes will be described in more detail within the following chapters. Chapter 2 will describe the *Model Exhibitions*. The technical outcome of the project will be described in chapter 3. Chapter 4 summarizes the main dissemination activities.

## 2 Project Results - Model Exhibitions

The SCALEX consortium has produced and published two big and two smaller Model Exhibitions. The first model exhibition took place at the Technical Museum Vienna and had the title “View of Vienna”. The main focus of the first Model Exhibition was to demonstrate the possibilities of an adaptive system for museums. For realizing the first Model Exhibition the main components of SCALEX were used. In addition to that some *Device Controllers* were needed to perform task like visitor identification. This was done primarily by using RFId devices together with RFId cards owned by the exhibition visitors.

The second Model Exhibition was carried out at the ZKM in Karlsruhe with the title “From Panorama to Virtual Reality”. The main focus of the second Model Exhibition was on using personal digital assistants within the SCALEX framework for a personalised information presentation. At the second model exhibition, the whole SCALEX framework was employed.

For the third Model Exhibition, the ZKM implementation was used to give school classes the possibility to get a feeling on how a SCALEX exhibition can be made. School classes were asked to try out and work with the SCALEX framework and evaluate how usable the system is for schools.

Last but not least, the Technical Museum in Prag used the SCALEX framework to create a small exhibition with the title “History of Transportation”. For this exhibition the SCALEX system was used as an out-of-the-box solution and the Technical Museum Prag designed, implemented and published the exhibition without major help from the technical project partners.

## 2.1 Model Exhibition 1 – “View of Vienna”

The first Model Exhibition was planned and successfully realized by the Technical Museum Vienna together with the other consortium members. The exhibition was installed in the permanent exhibition area *medien.welten* in the period November 27<sup>th</sup>, 2003 to January 12<sup>th</sup>, 2004 and was available to all museum visitors.



Model Exhibition 1 consisted of a real part with information elements about real exhibition objects and a virtual part that presented information elements (text, images, audio, video) about places and buildings in Vienna.

### 2.1.1 Content of the exhibition

The content of the exhibition was related to concrete exhibits from the holdings in the museum archives and collections. In particular, a series of large-format photographs taken from the south tower of St. Stephan's Cathedral in 1857 were used. The pictures were probably made by Paul Pretsch and are counted amongst the oldest existing shots of the city of Vienna. In both size and technique these historical photographs are similar to a series of panorama pictures which were commissioned by the photographic department of the *K.K. Hof- und Staatsdruckerei* (Imperial and Royal Court and State Printers) in 1860. Laid side by side the sequence of pictures presents an almost complete 360 degree panorama of Vienna before the demolition of the bastions. Today there are only two complete sets of these photographs – one in the collection of the *Albertina* and the other in the *Wien Museum*.

The 1860 photographs were reproduced by the Eduard Castle, the Austrian historian of literature, in 1929 and published by the *Verlag der Österreichischen Staatsdruckerei* (Austrian State Press Publishing House) as a “Panorama from St. Stephan's Cathedral”. In the years 1994 and 2002 a new, expanded edition of the Eduard Castle portfolio was prepared by the *Kulturverein Stadtpanorama* (Klosterneuburg). In a lavishly produced publication the historical photographs from the year 1860 are compared with modern Vienna. Both portfolios are to be found in the collection of the Technical Museum Vienna.

The historical series from 1860 was very probably photographed with a bellows camera (which was also exhibited) from the south tower of St. Stephan's Cathedral at a height of 132 meters. Little is known of the *Staatsdruckerei* photographer, Leopold Weiss. The camera constructor was the Austrian photo pioneer Josef Petzval (1807-1891) whose personal effects have been preserved in the Technical Museum. Petzval was a professor of mathematics and mechanics at the University of Vienna. It was because of his optical calculations, in conjunction with the work of optician Voigtländer,

that the first fast, distortion-free, portrait lens could be made in 1840, only one year after the invention of photography.

In the Model Exhibition “View of Vienna” the two panoramic views from 1860 and 2002 are compared to each other. Taken from the tower of St. Stephan’s, they offer the visitor an unusual and interesting view of the city. With the help of the SCALEX system a presentational form was found so as to be able to alternate from the historical panorama to the contemporary one as well as being able to obtain in-depth information about numerous buildings and places in Vienna (hotspots) on the basis of personal interest.

This virtual tour of Vienna was accompanied by a few selected objects which had a direct link to the historical panorama photographs. The most outstanding exhibit was the large format Petzval camera with which the historical photographs were very probably made. In addition the two portfolio works and a historical relief plan showing the City of Vienna in the year 1859 were presented. Information about all these objects could be accessed via a portable computer (PDA). This took place using special informational points (tags) which had been attached to the objects themselves.

### ***2.1.2 Virtual exhibition part***

The virtual part of the exhibition consisted of a large format video projection and a kiosk used to control the projection. The projection showed a section from one of the two panorama pictures as required or a horizontally divided view of both panoramas one below the other. Using the kiosk station the images could be moved fluidly further to the left or right so that a panoramic view was created.



**Fig. 2-1: Setup of Model Exhibition 1 at the Technical Museum Vienna**

Fig. 2-2 shows the interface used on the work station. There were three panorama views. One for 1860, one for 2003 and a mixed mode where both 360° panoramas were shown. This part of the template was shown on a projection system. The lower part of Fig. 2-2 shows the part, which was located on a touch screen kiosk. With the magnifier the visitor was able to navigate through the 360° panorama. This part also shows the information for the hotspots that can be selected by touching the blinking rectangles in the magnifier. There are possibilities to set the visitor profile, select a tour or change the panorama view. RFID cards were used to identify the visitor.

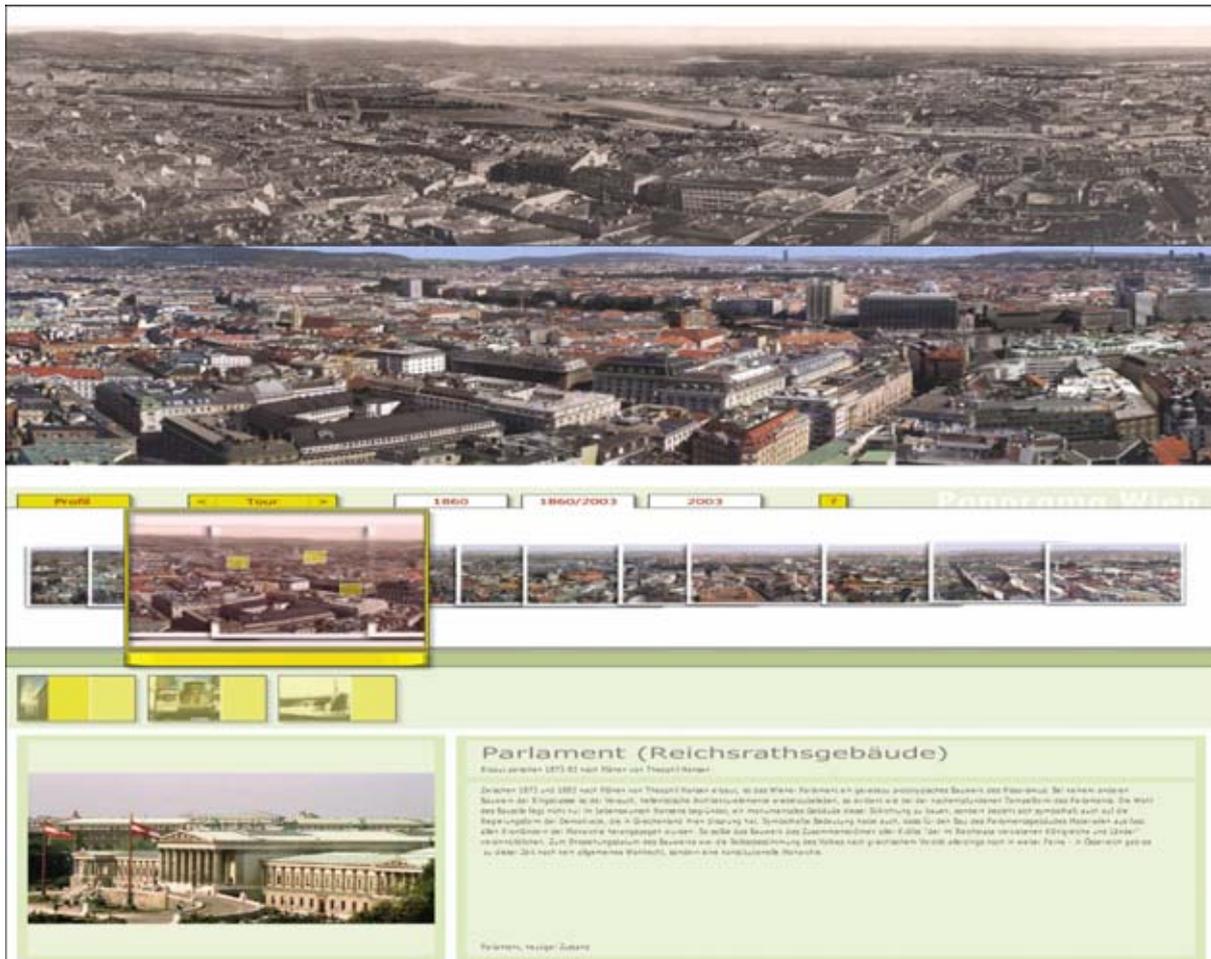


Fig. 2-2: Interface used during Model Exhibition 1

### 2.1.3 Real exhibition part

In the real part of the exhibition two large objects and a showcase were presented. Their content was linked to the theme of the exhibition. The objects used were:

- Josef Petzval's Large Bellows Camera (TMW Inventory No 16.677)
- Relief plan of the imperial city of Vienna 1859 (TMW Inventory No 13.165)
- Portfolio "The Panorama from St. Stephan's Cathedral", 1929 (TMW Archive)
- Portfolio "The Panorama from St. Stephan's Cathedral", 2002 (TMW Archive)

The use of small portable computers (PDAs) enabled retrieval of text, picture and AV media content via WLAN during a tour of the museum. Special informational points (tags/smart cards) were affixed to the objects which allowed deeper level information to be activated.



Fig. 2-3: Real exhibition objects used during Model Exhibition 1

## 2.2 Model Exhibition 2 – “From Panorama to Virtual Reality”

The second Model Exhibition was planned and successfully realized by the ZKM in Karlsruhe together with the other consortium members. The exhibition was installed in the permanent exhibition area of the Media Museum in the period March, 31 to May, 2<sup>nd</sup> 2004 and could be used there by all museum visitors.



The second Model Exhibition was focused on using personal digital assistants (PDAs) for a personalised adaptive presentation of multimedia content about the exhibition objects. The PDAs were offered by the museum and visitors could use them to explore the content of the second Model Exhibition. For people not using a PDA two touch screen kiosks were set up so that these visitors could also browse the information space.



### 2.2.1 Content of the exhibition

The content of the exhibition was related to concrete exhibits from the public collection in the Media Museum of ZKM. The topic “From Panorama to Virtual Reality” derived from a curatorial selection of five art works, in particular, five interactive media art installations, its immanent features of illusion and immersion with the typical architecture and visual form of the Panorama. The Panorama as such is

seen both as a technological structure of visual presentation and as a historical entertainment and art object.

Moreover the former head of the largest institute of ZKM, the Institute of Visual Media, the Australian born artist, Jeffrey Shaw has in its artistic work always focused on new ideas of panoramic visual representation. Inventions such as the “EVE (Extended Virtual Environment)”, from 1993, a balloon like projection structure of nearly 360° degrees, and other works are significant for his relation to the topic of Panorama.

But the art works are not just a re-edition of the historic panorama but emerged through a further technological development of the aspects of immersion and illusion to the realization of the phenomenon of Virtual Reality. All 14 selected art works had strong relations to either the concept of Panorama or the concept of Virtual Reality, or both. Therefore the exhibition presented a thematic tour through a selected group of works in the Media Museum of ZKM focused on the topic ‘From Panorama to Virtual Reality’.

Within the virtual guided tour through the permanent exhibition 5 real art works and 9 referential works are introduced to the visitor. These 14 media art installations have either been produced at the ZKM, or previously exhibited at the ZKM.

Jeffrey Shaw:	Place – Ruhr, 2000; Place Urbanity, 2002 Eve (Extended Virtual Environment), 1993 ConFiguring the Cave, 2001 The Legible City, 1988-1991 The Virtual Museum, 1991
Luc Courchesne:	The Visitor: Living by Number, 2001
Maurice Benayoun:	So.So.So (Somebody, Somewhere, Sometime) , 2002
Michael Naimark:	Be Now Here, 1995 – 1997
Masaki Fujihata:	Fieldwork @ Alsace, 2002

The visitor is offered educational and informative descriptions of these 14 art works related to the overall topic. The virtual tour is exemplary and offers, as mentioned before, a selected view of the Media Art collection of ZKM. 5 real art works are displayed and can be visited directly, 9 other works are referential works to the topic and the artist within the collection. The referential works strengthen on one side the focus of the individual artist on the topic of panorama and virtual reality and on the other side broaden the view of the topic and the quality of art within that special field.

### **2.2.2 The PDA**

As already mentioned, the second Model Exhibition was concentrated on using personal digital assistants (PDAs) for adaptive presentation of multimedia content about the exhibition, so the exhibition was prepared for intensive use of PDAs. To localise the visitor within the exhibition space of the Media Museum, so called “Infrared Beacons” were used. These beacons send an ID that can be read by the PDA and thereby the system knows at which object a visitor is within the exhibition space and can offer the information that is available for that object. The Infrared Beacons work in a distance

up to 7 meters. The visitor points his PDA in the direction of the beacon and the system recognises his position. Fig. 2-4 shows an Infrared Beacon and how it was used during the second Model Exhibition.



**Fig. 2-4: Infrared Beacons**

A specially designed user interface has allowed the PDAs to present personalised information to the visitors. Fig. 2-5 shows the user interface used on the PDAs. The interface was designed in a way that the visitors could use their fingers to navigate through the information space.



**Fig. 2-5: Interface used for the PDAs during Model Exhibition 2**

### 2.2.3 The Kiosk

For people not equipped with a PDA or people not wanting to use one, two touch screen kiosks allowed those visitors to find out more about the exhibition objects.

The content offered at the kiosks was identical to that on the PDAs, but the navigation was different. As the kiosk can be seen as a fixed information pool it enabled the free and individual selection of artist and artworks. Alongside to the free selection of art works, visitors also had the possibility of choosing one of three predefined didactical tours.

The Map in the right hand corner of the kiosk screen offered a special notice where to find the actual art work in the museum space.

Fig. 2-6 shows the interface that was used on the touch screen kiosk.



Fig. 2-6: Kiosk view in Model Exhibition 2

## 2.3 Model Exhibition 3 – School Exhibition

The School Exhibition was a down-scaled version of the previous Model Exhibition II for educational purposes. It was foreseen as a purely virtual exhibition, taking into account the limited technical infrastructure and technical expertise of the personnel as typical conditions usually to be found in schools. While Model Exhibition I and II centred on the use of SCALEX in museums, the focus of the school exhibition was on the assessment of the value of the product for pedagogic purposes and educational institutions as other potential end users of SCALEX.

## 2.4 Technical Museum Prag – “History of Transportation”

The exhibition “History of Transportation” implemented by the Technical Museum Prag was the first exhibition where the SCALEX system was used as an out-of-the-box solution. This means that the whole exhibition was designed, implemented and published without major help from the technical project partners.

The exhibition uses touch screen kiosks to present information about historical vehicles and aeroplanes that can be found at the museum’s Hall of Transportation. The interface used for the information presentation reflects the needs of the museum and is shown in Fig. 2-7.



Fig. 2-7: Kiosk view “History of Transportation”

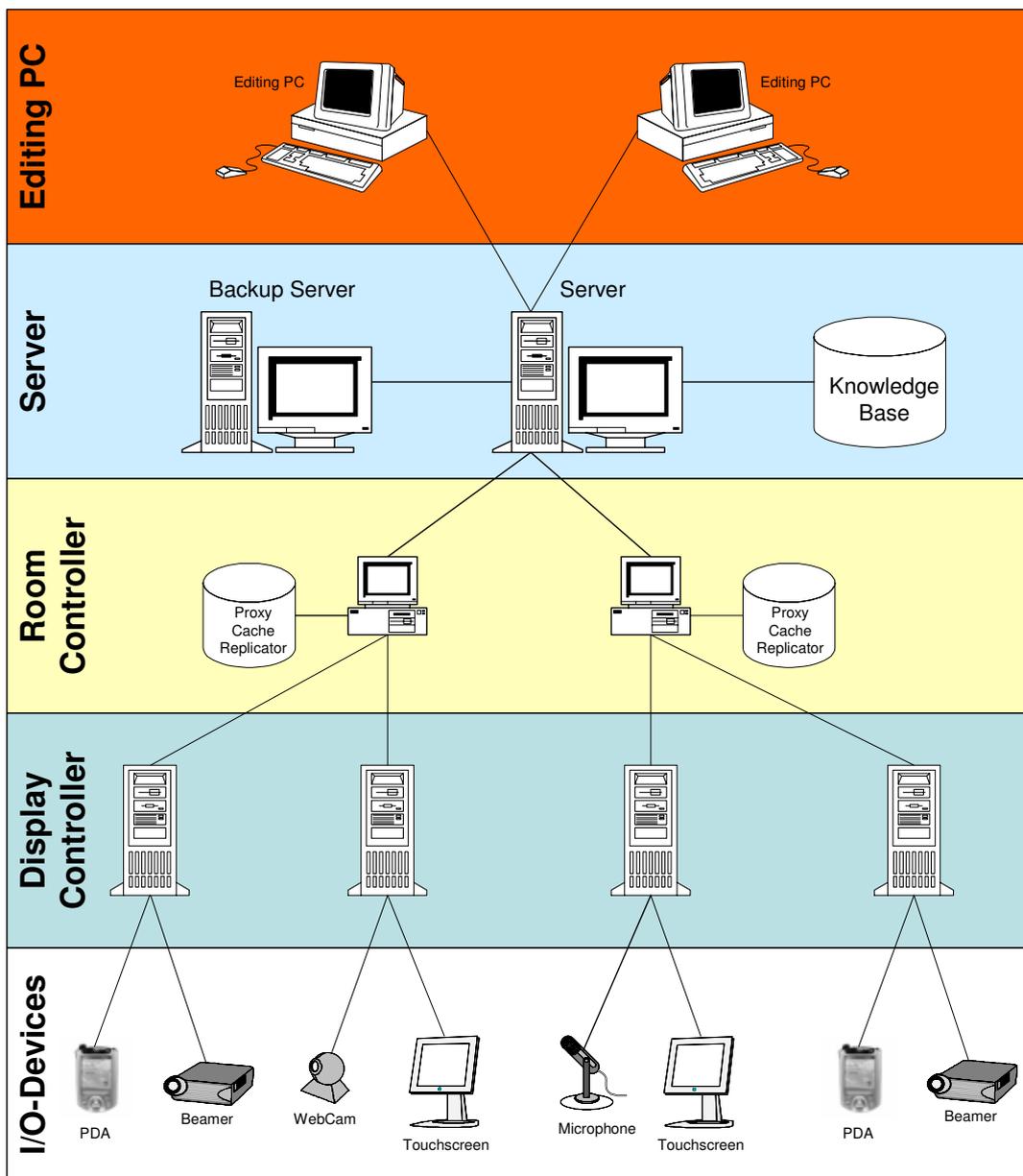
### 3 Project Results - Technical Achievements

In the course of the project a software architecture with three main components and a hardware architecture have been designed and implemented. The following two sections describe in detail these architectural approaches.

#### 3.1 Hardware Architecture

This section describes the hardware structure of the overall system. The main hardware components and their interrelations are shown in

Fig. 3-1. In the following sections a more detailed description about the different hardware components is given.



**Fig. 3-1: SCALEX Hardware Architecture**

## Server

The central element of SCALEX is a server. The server is a single point for maintaining software and digital multi media content of an exhibition. If high availability is a requirement, a backup server with the same functionality and with the same data will be used. Both servers together build a unit, so that clients do not know if the response comes from the server or the backup server. The circumstance that the server is the central point for software components and multi media content does not mean, that every processing step is done by the server and that every request for digital multi media content is fulfilled by the server. The main software component running on the server is a J2EE compatible servlet engine, i.e. APACHE Tomcat. Furthermore Topic Maps for Java (TM4J) and the database Ocean will be used. Java will be used as the throughout the whole system.

## Room Controller

The main functions of the room controller are to control the devices of one exhibition room and to play the role of a sub-server for this room. A proxy is running on a room controller. This proxy tries to fulfil the requests from the display controllers. A possible implementation of such a proxy could be an adapted Jigsaw from W3C. Digital multimedia content parts are replicated and stored in a local cache by the room controller. This means that only not locally existing parts have to be requested from the server. This should help SCALEX to preserve scalability. Room controllers are able to present a default presentation if the server is down or unreachable. Another important task of the room controller is to control what each display in the room is actually showing.

## Display Controller

On the display controller customized web browser clients show the content. This content is delivered by the room controller. Devices used by the display controllers are video beamer, CRT/LCD monitors and touch screens for displaying. Web cams, microphones and other devices are used as input devices by the display controller. Java applications have to control the input devices and sensors. These applications communicate with the other components in the SCALEX architecture. The question whether display controllers need proxies similar to the proxies on the room controller or if customized web browsers are sufficient, must be evaluated in the prototype phase. For the presentation of content to the visitor Macromedia Flash MX files will be used. A messaging system based on simple socket connections and XML messages is used for inter-component communication and synchronisation issues.

PDA's are connected temporally to display controllers, but room controllers are responsible for the PDA's.

## Editing PC

Exhibition makers will use standard PC's for creating and editing SCALEX based exhibitions as well as for the creation of the digital multimedia content that is presented to the visitors.

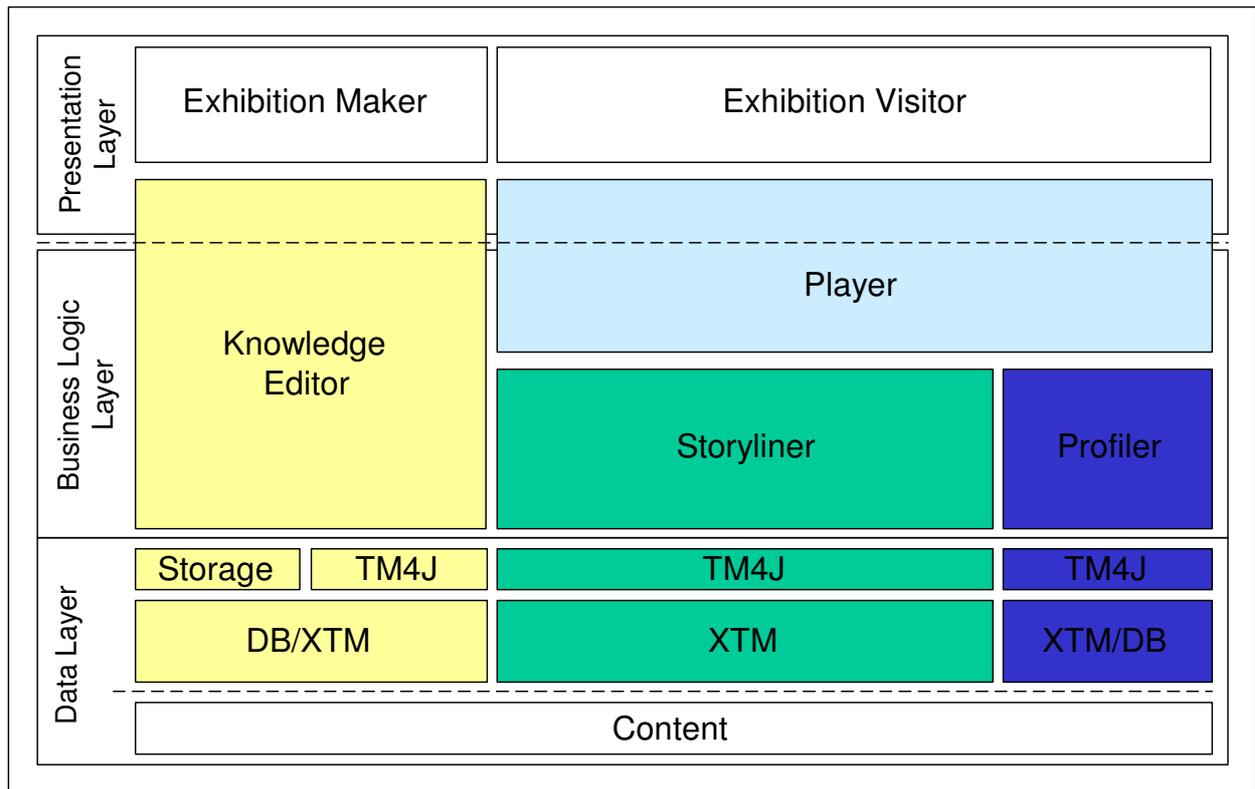
## I/O Devices

Within SCALEX different I/O devices can be used. Screens of different sizes can be used for the presentation. These are for example standard computer monitors or touchscreens, either CRT's or LCD's, large-scale projection systems with beamers or small mobile devices, i.e. PDA's. Some of these output devices also allow the visitor to interact with the system, e.g. touchscreens. Other input

devices for offering interactivity will for example be cameras (simple WebCam’s) or microphones. But also other sensors for opening an input channel into the system can be thought of.

### 3.2 Software Architecture

The software architecture of SCALEX is a typical three-tier architecture. These three layers are data layer, business logic layer and presentation layer. Fig. 3-2 gives an overview of the software layer architecture of SCALEX.



**Fig. 3-2: Three Layer Architecture of SCALEX**

The two main functions of SCALEX are the creation of digitally enhanced exhibitions and the presentation of digital multimedia content to the exhibition visitors. The software architecture can thus be split into two main blocks, namely Exhibition Maker and Exhibition Visitor.

As can be seen in Fig. 3-2, both blocks use a common data layer. On the exhibition maker side digital multimedia content is uploaded into the data layer and descriptive data, so called metadata, is added to classify the data. On the exhibition visitor side the digital content is presented to the visitors.

There is one very important data flow, namely the circular flow of information between Storyliner, Player and Profiler. This information flow is used to adapt the presentation of content to the different visitor profiles

#### Data Layer

The data layer is storing relevant information and data. Primarily, all digital multimedia content elements are stored in the data layer. These content elements can be text, images, videos or sounds and will be used for presenting them to the museums visitors. The Knowledge Editor is responsible

bringing the data into the server. In addition to that the Knowledge Editor allows the exhibition creator to add metadata describing the content elements. The Storyliner also stores its rules and constraints in the data layer. Furthermore also the Profiler saves its profile information in the data layer.

As a summary we can say that the following four data blocks are stored in the data layer:

- Digital Multimedia Content
- Metadata describing the Digital Multimedia Content
- Rules and Constraints for the Storyliner
- Generic Group and Visitor Profile Information

All the data is stored in the XTM (XML Topic Map) format and the access to the data is done via the interface TM4J (Topic Maps for Java).

## **Business Logic Layer**

The Business Logic Layer represents the logic of the overall system. It can be seen from two views, namely the exhibition maker or exhibition creator view and the exhibition visitor view.

On the exhibition maker side there is only one block in the business logic layer. This block is the Knowledge Editor that is used for editing content metadata, rules and constraints for the Storyliner and generic group profiles.

On the exhibition visitor side the Storyliner and Profiler components are part of the business logic layer.

## **Presentation Layer**

The Presentation Layer describes the presentation of the different components to the respective users. It can also be seen from two views, namely the exhibition maker or exhibition creator view and the exhibition visitor view.

On the exhibition maker side there is the interface to the Knowledge Editor. On the exhibition visitor side the main interface is the so-called Player. The Player is responsible for showing the right digital multimedia content on the right display for the specified visitor.

### 3.3 Main components of the SCALEX toolbox

#### 3.3.1 Knowledge Editor

The Knowledge Editor is a tool that aids the designer(s) of an exhibition in creating and managing an exhibition’s underlying 'knowledge' data in terms of thematic descriptions and associating exhibition items with several digital representations. In a more technical sense the editor is used for creating the ontology that describes a particular exhibition and that gets interpreted by the Storyliner.

The Knowledge Editor supports the workflow of the exhibition creators and makes it possible to design a Scalex driven exhibition without having know how about knowledge representation and the underlying technology.

But the Knowledge Editor is neither another tool for content creation or content manipulation nor another project management tool. The Scalex system and the Knowledge Editor in particular, rely on ready made digital content which is produced using existing content authoring tools (e.g. HTML editors, Macromedia Flash or Director, SMIL editors).

The Knowledge Editor consists of the modules Resource Manager, Exhibition Designer, Profile Editor and a Notes Tool.

Fig. 3-3 shows a screenshot of the Knowledge Editor application.

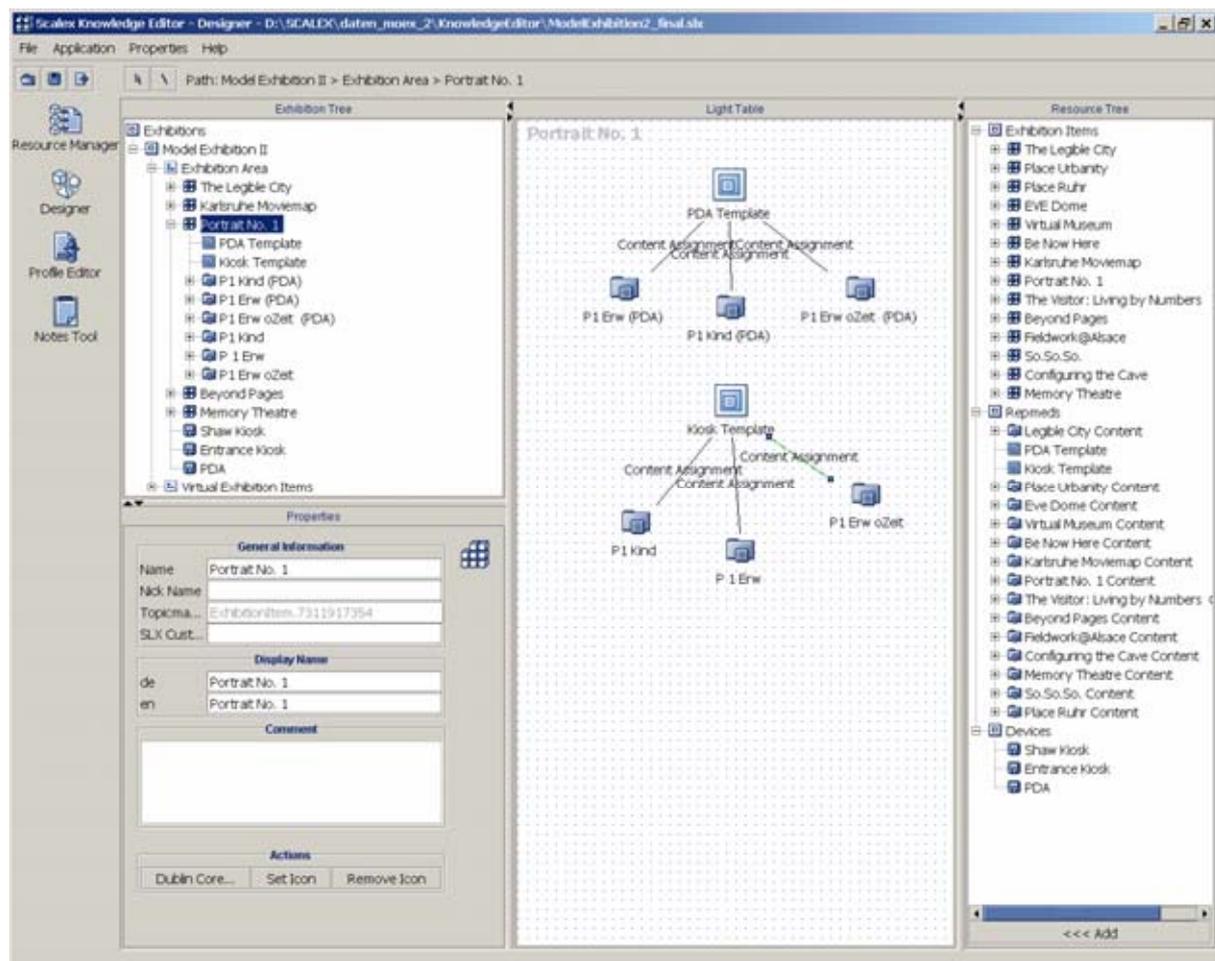


Fig. 3-3 Knowledge Editor (Exhibition Designer module)

### 3.3.2 Storyliner

The Storyliner is tool that is not directly used by any user but works in the background. It enables adaptive exhibitions. The Storyliner is based on an exhibition ontology, which is realized with XML Topic Maps (XTM). Fig. 3-4 shows an interface that allows exhibition visitor to select a certain predefined storyline (used during Model Exhibition I). This is the only way, where the exhibition visitor is in direct contact with the Storyliner.



Fig. 3-4 Selecting a storyline

### 3.3.3 Profiler

The Profiler again is a tool, which more or less is invisible to the exhibition visitor.

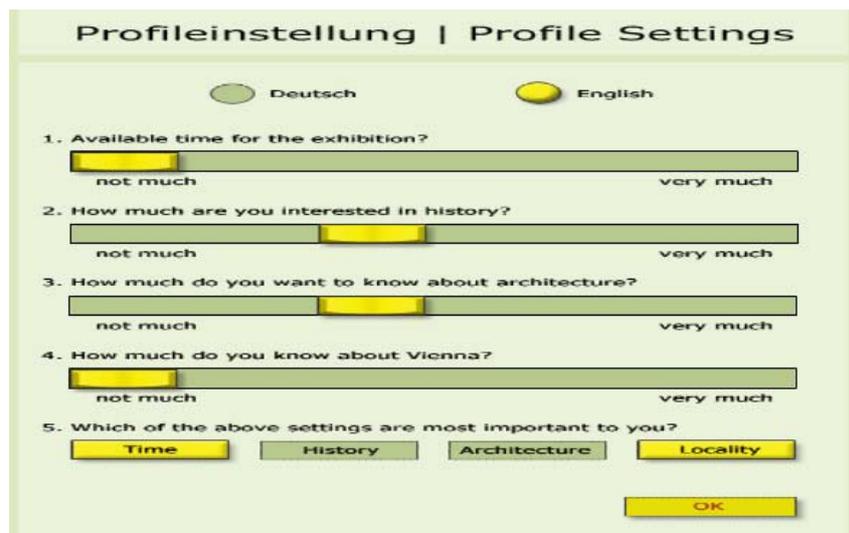


Fig. 3-5 Profile Settings Dialog used during Model Exhibition 1

Fig. 3-5 shows a dialog that was used during the first Model Exhibition for profile selection. For the first Model Exhibition the profile consisted of a language selector and four continuous parameters. Sliders

are used for setting those profile values. In addition to that, the visitor is able to decide which of the four parameters are more or less important to him. Fig. 3-6 shows the profile selection dialog used during the second model exhibition. Here, icons symbolize the different profiles and the user chooses his profile by selecting one of it.

For the presentation of the final adaptive exhibition, Profiler and Storyliner work closely together.



Fig. 3-6 Profile Selection Dialog used during Model Exhibition 2

### 3.3.4 Player

The Player is the component that the exhibition visitor uses to interact with the SCALEX system. It is responsible for showing the proper multimedia content to the respective visitor.

The Player is implemented in such a way that it can be used on large scale projection screens, standard touch screens and computers and also for mobile devices such as PDAs.

All screenshots of the Model Exhibitions are representative for the Player component and show specific interfaces of the Player. The Player displays the interfaces for the specific exhibition items and dynamically fills in the content that best fits the current visitors needs and interests. The decision on what the best content for a specific visitor is, is done by the Storyliner together with the Profiler.

## 4 Dissemination Activities

This chapter summarizes the dissemination activities undertaken by all SCALEX consortium members during the project duration. The chapter starts with a short description of a weblog that is open to all interested people and about the SCALEX brochure. The rest of the chapter lists all dissemination activities.

### 4.1 Weblog

Deliverable D8.2.1 describes the weblog that was developed for SCALEX. This weblog is open to everyone.

The "Documents about Market and Technology Development" produced in the course of the development of SCALEX are published electronically in a so called "Wikiblog". This form has two functions:

- Chronologically structured display of information and a
- Flexible, collaborative hypertext system.

The SCALEX weblog is a news system that informs the SCALEX partners and the public in general continuously about developments in the realm of digital technology for museums. The news are linked to keyword entries with background information. The information is structured by an index and an internal hierarchisation of the entries. The weblog is maintained on behalf of Fachhochschule Joanneum, but as a collaborative system it is open for contributions of all partners and even for associated contributors not belonging to the SCALEX consortium.

The screenshot shows the SCALEX weblog interface. The browser title is "scalex - Microsoft Internet Explorer". The address bar shows "http://www.witterbink.net/scripts/scalex\_wato". The page header includes "SCALABLE EXHIBITION SERVER" and the "scalex" logo. A navigation menu has "scalex", "Objectivez", "Partnerz", and "Advancement". The main content area is titled "The Scalex Weblog: Digital Technology for Museums and Exhibitions". It features a search box, a "today?" button, and a calendar for August 2003. The main text includes a post from Wednesday, 18. Juni 2003, discussing online museums in Europe, and a post from Dienstag, 17. Juni 2003, about Flash development for designers. A sidebar on the right lists dates and resources.

## 4.2 Brochure

A special brochure was developed in order to better promote SCALEX at for instance events, exhibitions and trade shows.

### WHY ARE MUSEUMS STRUGGLING WITH TODAY?

Museums are facing a number of challenges that are making it difficult to sustain their operations. The most significant challenges are:

- Declining Visitor Numbers:** Many museums are experiencing a steady decline in visitor numbers, which is leading to a loss of revenue.
- High Operating Costs:** Museums are facing high operating costs, including salaries, utilities, and maintenance.
- Competition from Other Entertainment Options:** Museums are competing with other entertainment options, such as theme parks and shopping centers.
- Changing Demographics:** The demographics of museum visitors are changing, with a growing number of young people and families.
- Limited Marketing Budgets:** Many museums have limited marketing budgets, which makes it difficult to reach a wider audience.

### SCALEX REDUCES RISKS IN THE PRODUCTION PROCESS

SCALEX helps museums reduce the risks associated with the production process by providing a secure and reliable platform for digital content. This helps to ensure that the content is always available and can be accessed from anywhere, at any time.

### WHO MAY USE THE SCALEX PRODUCT?

The SCALEX product is designed for use by museums, galleries, and other cultural institutions. It can be used by anyone who has access to the internet and a computer.

### HOW SCALEX WORKS

SCALEX works by providing a secure and reliable platform for digital content. This helps to ensure that the content is always available and can be accessed from anywhere, at any time.

### SCALEX ENHANCES THE CUSTOMER EXPERIENCE

SCALEX enhances the customer experience by providing a secure and reliable platform for digital content. This helps to ensure that the content is always available and can be accessed from anywhere, at any time.

### WHAT DOES SCALEX COMPANY OFFER?

SCALEX Company offers a range of services, including:

- Secure and Reliable Platform:** A secure and reliable platform for digital content.
- Easy-to-Use Interface:** An easy-to-use interface for managing content.
- 24/7 Support:** 24/7 support for any issues that arise.
- Integration with Existing Systems:** Integration with existing systems, such as CRM and ERP.

### OTHER PRODUCTS THAT WILL BE OFFERED BY SCALEX A/S

SCALEX A/S will offer a range of other products, including:

- Virtual Reality Experiences:** Virtual reality experiences that can be accessed from anywhere, at any time.
- Augmented Reality Experiences:** Augmented reality experiences that can be accessed from anywhere, at any time.
- Mobile Applications:** Mobile applications that can be accessed from anywhere, at any time.

### PARTNER

SCALEX A/S is a partner of the following companies:

- Microsoft:** Microsoft is a partner of SCALEX A/S.
- Google:** Google is a partner of SCALEX A/S.
- Facebook:** Facebook is a partner of SCALEX A/S.
- Twitter:** Twitter is a partner of SCALEX A/S.



SCALEX  
SCALABLE EXHIBITION SERVER

### 4.3 Complete List of Dissemination Activities

- 23<sup>rd</sup> April 2002: Participation of SCALEX at the IEP Workshop in Barcelona
- 27<sup>th</sup> May 2002 :Presentation of SCALEX at Orange in London, UK by partner Lost Boys
- October 23 – 25, 2002: SCALEX has been discussed in the context of open user interface and adaptable technology accessible for all at the ERCIM Workshop UI4ALL (Paris Chantilly, France).
- 7<sup>th</sup> June 2002: forwarding of INFORM Fact Sheet of SCALEX to EC Project Officer for further processing and dissemination
- November 26, 2002: The SCALEX development and achievements have been presented at the Curatorial Advisory Board of ZKM, which is a consortium of 15 German curators and advisors from diverse museums and educational institutions.
- December 13, 2002: Report on SCALEX project and presentation of objectives and achievements at Austrian Society for the Austrian History of Computer Science, Board of Directors, Vienna, Museum of Technology.
- 29<sup>th</sup> January 2003: submission of SCALEX Public Annual Report 2002 to EC Project Officer for further processing and dissemination
- February 16, 2003: Report on SCALEX project and presentation of concepts of ontologies at Board meeting of the MobiLearn Project - Mobile Teleteaching of Media Informatics.
- April 2003: Information of teachers about the SCALEX project at the educational fair in Nürnberg/Germany (FWU)
- 2<sup>nd</sup> April 2003: SCALEX and its ideas have been presented at the Institute of Information Processing and Computer-Aided New Media, University of Technology, Graz.
- June 21<sup>st</sup> 2003: A presentation of the SCALEX project was given to a general audience at the University Day of the University of Amsterdam.
- Submission of an abstract for the 3rd International Conference on Knowledge Management I-KNOW '03 (Industry meets Science) (<http://www.i-know.at>).
- Contacts and discussions about SCALEX with partners from C3, especially AE in New York, Carl Goodman at the American Museum of the Moving Image (AMMI) and MP in Athens for Light Aegina symposium (C3)
- The SCALEX solution has been introduced at various prospective clients in order to test the value proposition and gain further insights that can be used in the refinement of the SCALEX products and services. These prospective clients are amongst others:
  - Rijksmuseum Amsterdam
  - NEMO Amsterdam
  - Universiteitsmuseum Amsterdam
  - Anne Frank Foundation
- SCALEX has been used as a case study for demonstrating new ways of using technology at the following seminars:
  - Mutimedia Cycle, University of Amsterdam, communication studies
  - Introduction to Mobile Internet, Icon Medialab Seminar, Barcelona
  - New Mobile Services, O2/Telfort, The Netherlands
  - Mutimedia Sponsor Opportunities Workshop, NUON, The Netherlands

- In addition to that various dissemination efforts by all partners have been undertaken. To support the dissemination activities a brochure was produced that will be used during events and mailings. A contact to ADOPT-IT has been established to support the SCALEX dissemination activities.
- ADM did some research in the fields of relations between existing Content Management Systems and the multimedia interfaces. They also had contact with the Schmuckmuseum Pforzheim, which is an institution that needs to incorporate multimedia-presenting environments into an existing infrastructure and was identified as a potential customer.
- SCALEX has been featured in two extensive articles in Spits!, the second largest daily newspaper in The Netherlands
  - As a result UvA and Lost Boys have been approached by several end-users from within our core target audience, amongst which the highly reputed museums Boijmans van Beuningen from Rotterdam and the Stedelijk Museum from Amsterdam
- The SCALEX solution has been introduced at various prospective clients in order to test the value proposition and gain further insights that can be used in the refinement of the SCALEX products and services. These prospective clients are amongst others:
  - Roos Images
  - Media Republic
  - NOS Broadcasting Company
  - Anne Frank Foundation (2<sup>nd</sup> presentation)
- SCALEX has been used as a case study for demonstrating new ways of using technology at the following seminars:
  - Visions, Universiteit van Amsterdam
  - Spin Awards, example of "Best Wireless Concept"
- Together with another high profile Lost Boys project, the Prada store in New York, SCALEX has been included in a corporate brochure to be distributed within the European network of Lost Boys companies. Main focus of this brochure is to demonstrate the possibilities of creating a 'digital' experience within public spaces like shopping malls, museums, cities and fair grounds.
- Lost Boys has appointed Karin Groen to function as the SCALEX press-officer during the final months of this project. The reason for this appointment is the heightened interest from various media to see SCALEX in a real world context.
- A paper on visitor requirements research was submitted to the International Communications Association by Ed Tan from UvA.
- FWU presents SCALEX idea to various teachers at different schools.
- On occasion of an invited lecture at the Tate Modern in London, UK, Peter Weibel, CEO of ZKM took the advantage to introduce SCALEX to some of the participating curators there. The Tate Modern itself launches a Multi-Media Guidance tool at their galleries from October to December 2003. The occasion was a lecture/talk given by Peter Weibel on October, 28, 2003 under the Title 'When Media Was New', a series of talk on New Media Art organised by the Tate Britain.
- A paper on the visitor requirements research was submitted by UVA to the International Communications Association
- On occasion of the 'Museum Computer Networks' Conference in Las Vegas, USA from November 5 -8, 2003 Jürgen Enge, Head of the Institute of Net Development at ZKM, invited

by the Zurich School of Design, took the advantage to discuss and introduce SCALEX with participating researchers and museum officials.

- In December 2003, Ed Tan from UvA presented SCALEX end user research before an audience of the Reinward Academy, a school for museum management. Among the audience were curators of the Frans Hals Museum in Haarlem, the Mauritshuis in The Hague, and colleagues from companies Antenna Audio and Wireless Web Solutions, both involved in implementation of presentation systems in museums.
- SCALEX Model Exhibiton 1 presentation to the companies Illustree and HiWeb, 11.12.2003; Technical Museum Vienna, participants from FHI: Jochen Martin
- Presentation of SCALEX project in the annual report of the FWU
- FWU participates at the Educational Fair in Munich in February 2004, featuring SCALEX.
- SCALEX was introduced and presented to partners and potential users at the “Schaufenster” event in the Museumsquartier in Vienna by FHI on 11<sup>th</sup> March 2004.
- Ed Tan (UVA) presented SCALEX to students of his University in March with people who had jobs in museums. Informal contacts with the Rijksmuseum in Amsterdam were established. A class with the museum school was held by Katri Oinonen (UVA) and an article on SCALEX by Ed Tan will be published in a book by the European Science Foundation (ESF).
- Otmar Moritsch (TMW): two articles featuring SCALEX were published in “neues museum” and the TMW internal newsletter. Article: Das EU-Projekt SCALEX. By: Otmar Moritsch, Brigitte Rauter, Martin Reinhart, in „neues museum. die österreichische museumszeitschrift. Nr. 4, February 2004, pp. 46 – 49, published by: Österreichischer Museumsbund
- ZKM:
  - Presentation by Anke Hoffmann at a conference of museum trainees from the region Baden-Württemberg on February, 19, 2004 at Natural History Museum Karlsruhe;
  - Presentation within a talk on the ZKM and its museum communication department by Bernhard Serexhe at ARCO, Arcoforum, Madrid on Februar 16, 2004;
  - in order to prepare technical and didactical Mo Ex II tour at ZKM, examination visit of the Multi Media Guide currently presented at the Tate Modern, 3rd floor, Anke Hoffmann, February 20, 2004.
  - Mr. Serexhe also had a talk about Scalex at the coordination meeting from IMAGEDUC (EU Projekt), presentation on visitor guidance with new media, Turin, 25. Oktober 2003
  - Several presentations as guided tours to visitors and official groups during the public MoEx II at ZKM; press declarations about Scalex in Foyer, Website and as Poster in Museum. Presentations of Scalex as guided tour during the public MoEx II at ZKM to Prof. Richards of University Frankfurt; to a group of EU Officials from the Commission with Trevor Jones and Joaquin Calvo-Basaran (Project Officer), within the period of the Model Exhibition at ZKM.
  - Presentation of Scalex as lecture at the information event on EU Projects on May, 18 2004 at the Landesmuseum Stuttgart organized by the Ministry of Science, Research and Art of County Baden-Württemberg
- FWU: presentation of the SCALEX project to visitors at the DIDACTA Fair in Cologne, 09.02. – 13.02.2004.
- AEC:
  - Presentation of the SCALEX project to supervisory board members, (among others) Dr. E. Watzl (vice major of Linz) and Prof. Dr. G. Pomberger (Department Chair:

Institute of Business Informatics, University of Linz), by employees of the Futurelab, February 5, 2004.

Informal talks about SCALEX at the Fundacion Christobal Gabarron, (<http://www.fc-gabarron.es>), April 12-16, 2004 (H. Höllerl).

D. Offenhuber presented SCALEX during his lectures at the "Kulturforum" in Amriswil (May 13, 2004),

at the "Kornhausforum" in Bern, (May 14, 2004) and

at [plug.in] in Basel (May 15, 2004).

H. Höllerl presented SCALEX to university lecturers/representatives and students of the HfGZ Hochschule für Gestaltung und Kunst Zürich, May 27, 2004.

- FHI: 9. NÖ Museumstag "Wissen sammeln und bewahren", Horn, 28<sup>th</sup> March 2004: Presentation of SCALEX by Univ.Doiz. Dr. Karl Stocker
- FHI: (planned events):
  - Participation in 6<sup>th</sup> International Summer Academy for Museology in Graz, 14<sup>th</sup> to 21<sup>st</sup> August 2004
  - Presentation of SCALEX at Nokia-NRC in Helsinki together with UVA, 14<sup>th</sup> June 2004
  - Participation and presentation of SCALEX at the IST conference in The Hague , 15<sup>th</sup> to 17<sup>th</sup> November 2004
  - SCALEX Presentation at the EDEN Conference 2004 16<sup>th</sup> to 19<sup>th</sup> June in Budapest
  - Update of the SCALEX folder with a strong focus on the product SCALEX

## 5 Summary

SCALEX is an easy to use toolbox for museums and companies that deal with the creation of digital content. With SCALEX it is possible to combine digital content, as for example texts, images, videos and audios, with real exhibition objects. In addition to that SCALEX also supports the creation of purely virtual exhibitions. The presentation of the digital media is directly coupled to the interests of the specific visitor. Exhibitions that are enhanced with digital media open up new interaction possibilities and thereby offer the visitors a completely new experience during exhibition visits.

With the help of SCALEX museums can realize adaptive, knowledge based exhibitions that use the possibilities of the digital world.

The goals during the development of SCALEX were to:

- Offer museums an easy to use and affordable toolbox for the creation of digitally enhanced exhibitions to attract more and new visitors.
- Adapt digital media to the needs and base knowledge of different visitor groups and thereby leading to a completely new and exiting exhibition experience.
- Support the reuse and exchange of digital exhibition content between museums.

The use of SCALEX is not strictly limited to museums. It is useful wherever the goal is to present information that is adapted to the viewers needs. This includes Fairs, Visitor Information Systems and many more.

## 6 Annex 1 - General Project Framework

The EC project SCALEX (IST-2001-35103) started on April 1<sup>st</sup>, 2002 within key action III (Multimedia Content and Tools) and has been successfully finished after a duration of 27 project months in March June 2004.

The SCALEX Consortium consisted of the following 12 partners from 5 different countries (Austria, Germany, The Netherlands, Hungary, Czech Republic):

<b>Partner</b>	<b>Web-Address</b>	<b>Role</b>
Fachhochschule Joanneum Austria	www.fh-joanneum.at	Co-ordinator - Software development
Universität Linz Austria	www.uni-linz.ac.at/	Research Partner - Software development
Universiteit van Amsterdam The Netherlands	www.uva.nl	Research Partner - Visitor Research
Joanneum Research Graz Austria	iis.joanneum.at	Research Partner - Software development
atelier für digitale medien Austria	www.adm.at	Industrial Partner - Exploitation
Lost Boys Business Solutions The Netherlands	www.lostboys.nl	Industrial Partner - Exploitation
Ars Electronica Center Austria	www.aec.at	End user – Museum Software Development
Center for Culture and Communication Hungary	www.c3.hu	End user – Media Museum Software Development
Zentrum für Kunst und Medien Germany	www.zkm.de	End user – Media Museum
Národní Technické Muzeum Czech Republic	www.ntm.cz	End user – Museum
Technisches Museum Wien Austria	www.tmw.at	End user – Museum
Institut für Film und Bild in Wissenschaft und Unterricht Germany	www.fwu.de	End user – Educational Institution

## **7 Annex 2 - Further Information and Contact Details**

Further Information can be found at the official SCALEX Website under <http://www.scalex.info> or directly from the Project Coordinator:

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Web: <http://informations-design.fh-joaanneum.at>