

# **Euromed 2010 – Digital Heritage**

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### **Comparative Study of Interactive Systems in a Museum**

**Despina Michael**  
**Nectarios Pelekanos**  
**Isabelle Chrysanthou**  
**Panagiotis Zaharias**  
**Loukia Hadjigavriel**  
**Yiorgos Chrysanthou**

***University of Nicosia***  
***A.R.M.E.S. Ltd***  
***A.R.M.E.S. Ltd***  
***University of Cyprus***  
***The Leventis Municipal Museum***  
***University of Cyprus***

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# Introduction

- Traditionally museums conveyed information to their visitors through the exhibit of the real objects



# Introduction

- The new trend:
  - active involvement
  - technologically advanced interactive ICT systems (information and communication technology)



# Introduction

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- These systems can be separated in two categories:
  - systems located outside the museum
    - target audience: virtual visitors - not able to visit physically the museum
    - examples:
      - online material, virtual reality systems
      - a digital representation of the existing museum and its exhibits
      - combination of exhibits from different museums

# Introduction

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- systems located within the physical space of a museum
  - target: attract more visitors at the physical space of the museum
  - act as communication and learning tool and as an additional material next to the original real objects
  - examples: VR systems, augmented reality, haptic devices, touch-tables
- In this work we focus on systems of the 2<sup>nd</sup> category (located at museums)

# Introduction

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- We present a comparative study between:
  - 5 different types of interactive interface exhibits
    - VR tour (projection)
    - multi-touch table
    - 3 augmented reality exhibits
  - and a traditional exhibit (real maps).
  - located at the Leventis Municipal museum at Nicosia, Cyprus
- Quantifying high-level interaction qualities
  - enjoyment and satisfaction
  - desire to use the system again
- Systems differ among different parameters

# Systems Description: VR tour

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- Projection – Virtual tour in Nicosia of the 19<sup>th</sup> century:
  - single-wall front projection setup
- It allows the visitor to get an idea of how the city might have looked like around the middle of the 19<sup>th</sup> century
- The scenario is built on the description given by an un-named English traveler who visited the island at the time and published his report in a British Magazine called “The Home Friend” (Anonymous, 1850)
- The virtual tour has several points of interest
  - examples: Famagusta gate, bazaar, Hammam, house of Kornesios



# Systems Description: VR tour

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- Interactivity
  - limited
  - using a touch screen
  - rotate the camera, zoom in/out, play/pause



# Systems Description: VR tour



# Systems Description: VR tour



# Systems description: Multi-touch table

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- “The Walls of Nicosia”
  - multi-touch table
  - an interactive application that allows the user to have a virtual tour through the fortifications of Nicosia across the centuries.
  - the target was to explain and present the development of the area and the history of the construction of the fortifications of the city
  - the Walls of Nicosia and other historical landmarks in 5 different historical periods

# Systems description: Multi-touch table

## ■ Interactivity

- similar to i-pad
- change viewpoint (camera)
- choose historical period





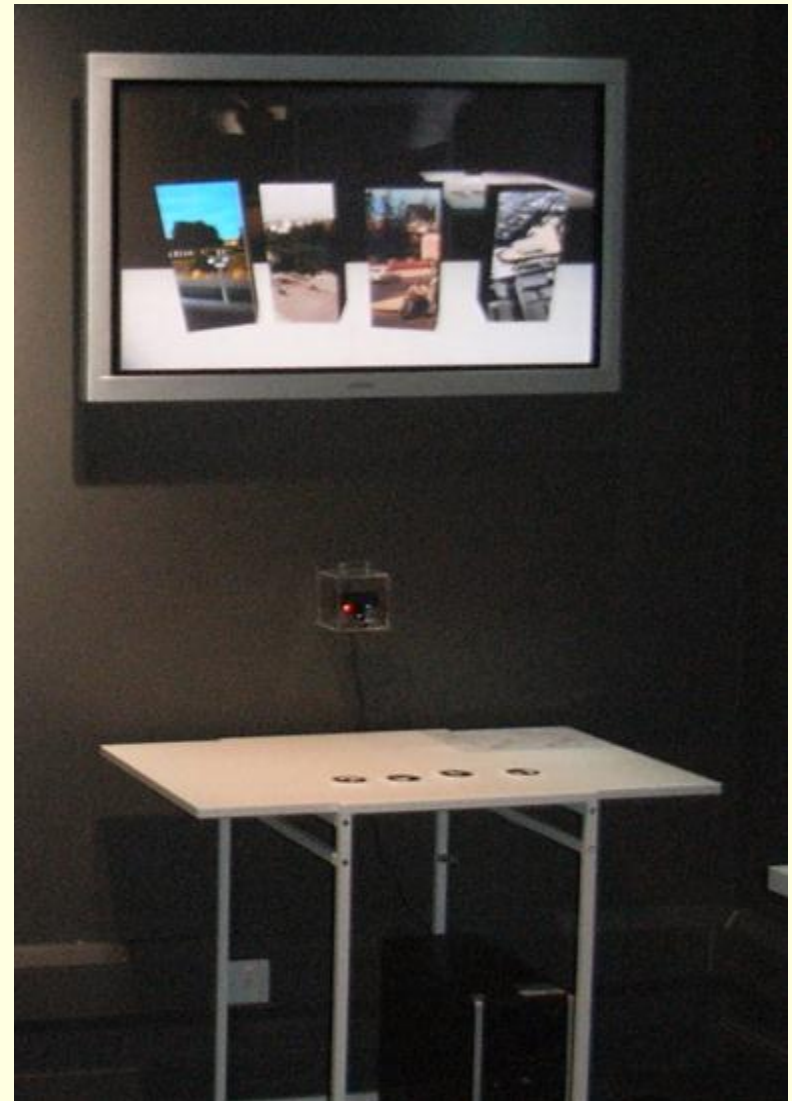
# Systems description – AR puzzle

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- AR puzzle
  - augmented reality
  - four photos of the same landmark at different time periods have been cut into four pieces and have been mounted onto four cubes linked to four markers
  - the user finds the four pieces of the picture and then puts them in the correct order to solve the puzzle

# Systems description – AR puzzle

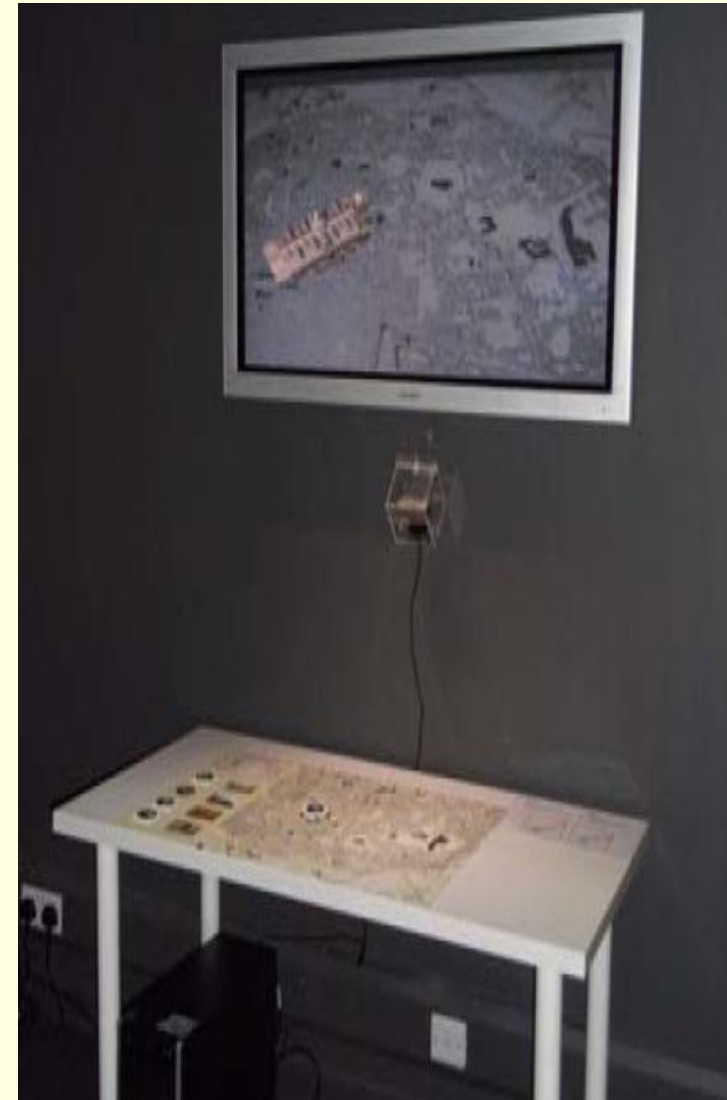
- Interactivity
  - using markers
  - rotation
  - changing position





# Systems description – AR map

- AR map
  - augmented reality
- the user explores the location of four monuments in the city of Nicosia
- with the use of a printed map and four markers he tries to place the monuments on the correct location on the map
- each of the four markers corresponds to one specific monument
- in order to see the 3D model of a monument the marker must be placed on the correct position on the map
- Interactivity
  - markers
  - changing position (sliding the marker)





# Systems description – Touch history

- Touch history
  - augmented reality
  - a 3D object is linked on a marker
  - the user can see the object from all the perspectives, inside and outside by moving the marker freely
- Interactivity
  - marker
  - rotating (in all axes)
  - changing position



# Traditional way – Real maps

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- Real maps
  - study printed maps exhibited in the museum




# Evaluation method

- This paper evaluates the subjective user experience of the children
- ~35 children participated at each exhibit
- Age range: 9-11 years old

- Evaluation tools
  - Smileyometer
  - Again-Again table

1) Your experience from the exhibit was:



Awful      Not very good      Good      Really good      Brilliant

2) Would you like to do it again?

Yes	Maybe	No
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Right after the interaction of the children with the exhibits, children were asked to tick one face in the Smileyometer and fill in the Again–Again table

# Evaluation method

- Classification of systems
  - digital information (type, amount of content)
  - interaction constraints
  - type of activity

	Digital information	Interaction constraints	Type of activity
Touch History	3D still, low	3D free	exploratory, non-challenging
AR puzzle	2D still, low	2D free	game like, challenging
AR map	3D still, medium	2D free	game like, highly challenging
VR tour	3D dyn, very high	1D buttons	passive
Touch table	3D still, high	2D free	exploratory, challenging
Real Maps	2D still, medium	N/A	passive

# Results

## ■ Smileyometer results:

- ICT exhibits have been rated higher than the traditional way (brilliant score)
- the three AR applications' scores differ greatly (brilliant score)
  - AR puzzle: 67%
  - Touch history 42%
- AR map scores even lower than the real map exhibit (really good and brilliant)
  - even though the interaction constraints of the AR map are the same as the highly popular AR puzzle
  - AR map application requires knowledge of the city and special understanding that most of the children did not possess → students get tired and frustrated
- Multi-touch table is leading with 92% (really good and brilliant)

# Results

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- Again-Again results:
  - most popular applications:
    - AR puzzle
    - Multi-touch table
  - traditional way of exhibition (real maps) has been rated with high scores in “no” responses



# Conclusions

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- Present a comparative study of interactive museums exhibits
  - main emphasis on assessment of user experience
  - compare 5 different systems and a traditional way of exhibition that varying among different parameters

# Conclusions

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1. ICT exhibits generally are rated higher than the traditional teaching methods
2. Passive does not mean bad
  - VR tour scores high at Again-Again
    - enjoyable entertainment similar to a movie theatre
3. Using the same technology do not always have the same results
  - AR applications have greatly different scores
4. Type of content is not always appreciated
  - AR puzzle (2D still) > AR map, Touch history (3D still)
5. Freedom in the degrees of interactivity does not always give better results
  - Touch history (3D interaction) < AR puzzle (2D interaction)
6. It seems that it's the type of activity the main factor when assessing the wish to repeat the experience with the exhibit
  - game-like puzzle activity scored highest

# Future work

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- Only one traditional method of exhibition has been assessed in this study → use others as well
- Investigate further correlations between the classifications of the exhibits and the user experience results
- Educational assessment – ability to learn



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**Thank you!**

***END***