



**STACHEM Project**

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# **CULTURAL HERITAGE IN THE DIGITAL ERA**

**NEW TOOLS FOR THE INVESTIGATION,  
DOCUMENTATION, PRESERVATION AND  
DISSEMINATION OF THE CULTURAL PAST**

# CETI

- 1998 Founded in Xanthi, Thrace as an independent Institute
- Under the auspices of the General Secretariat of Research and Technology - Ministry of Development
- November 2003, joined the Research Center 'Athena'

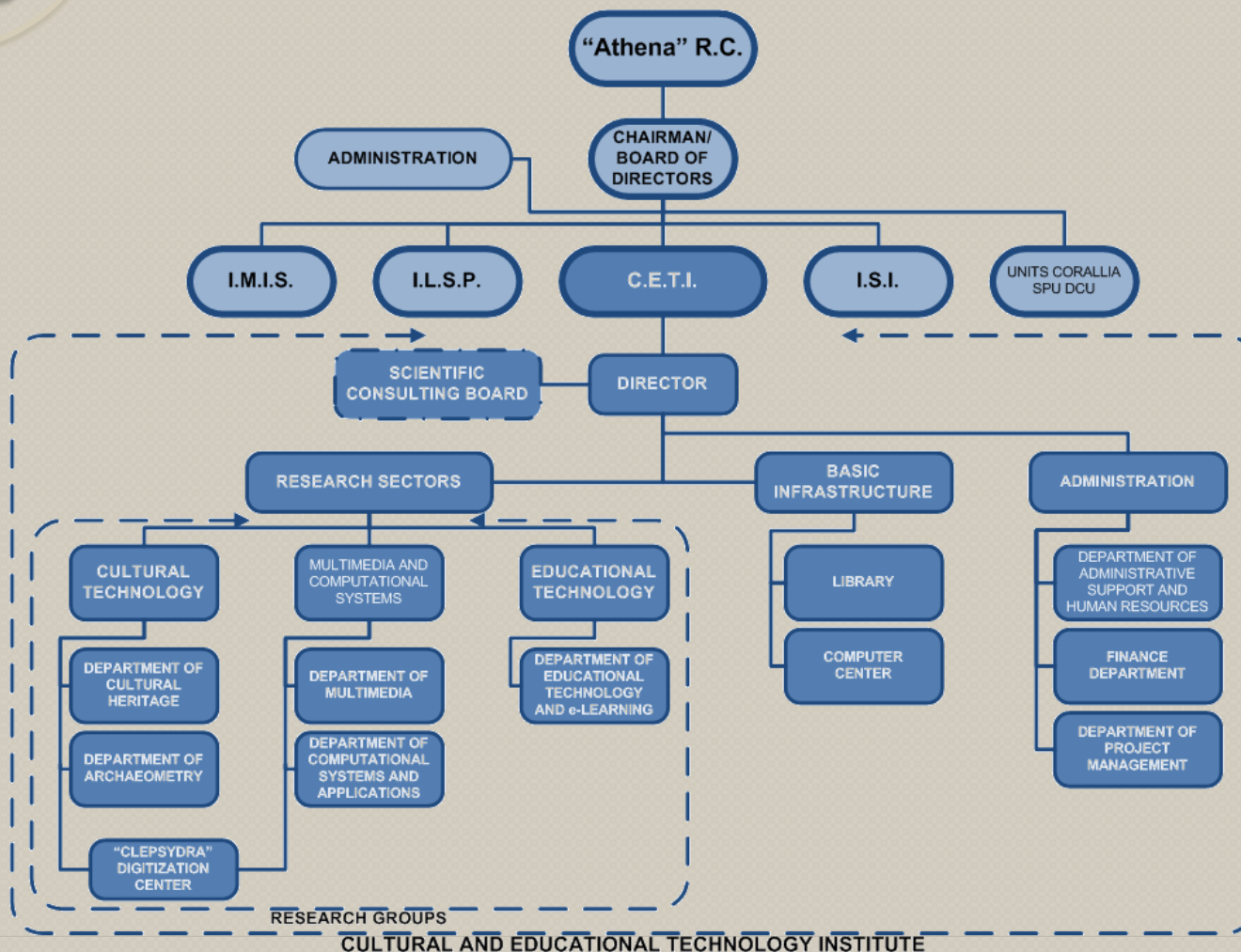


# CETI *(cont.)*

- **Main objectives**

- strengthening of research and technological activities
- application of new technologies to humanitarian sciences, culture and education.

# Organizational Structure



# CETI Research Sectors

- **Cultural Technology Sector**

- Research related to the study, preservation and promotion of the versatile and multi-dimensional character of Culture and Heritage with the usage of technology

- **Educational Technology Sector**

- Development of instructional tools and pedagogical applications like tele-education, distance learning and training, education-on-demand

- **Multimedia and Computer Systems Sector**

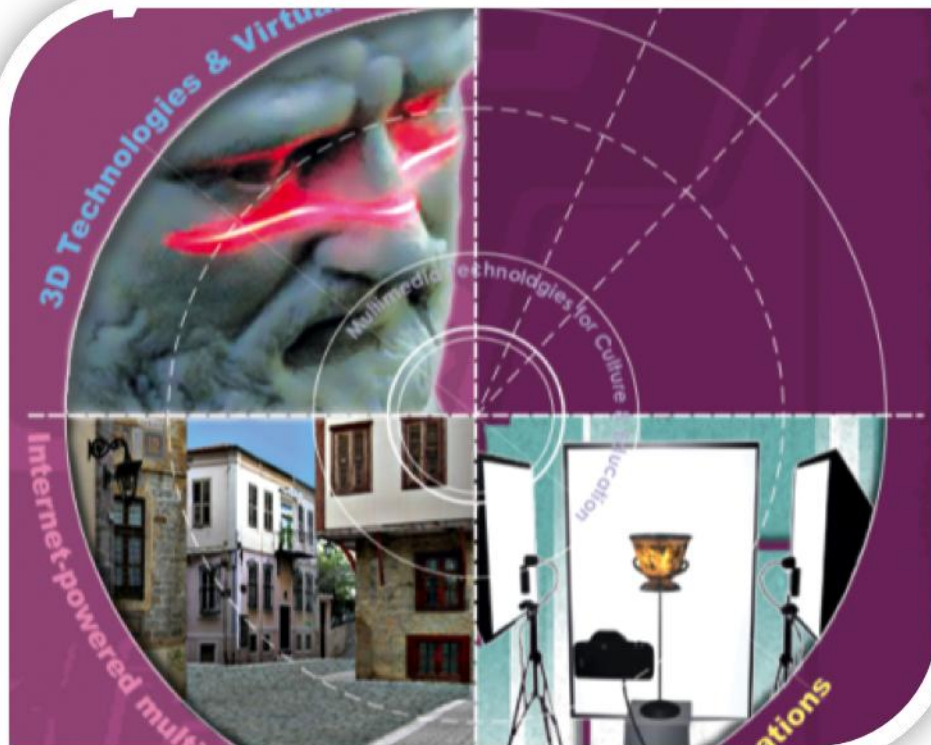
- Information technologies, multimedia and their applications in the fields of Education and Humanities

# Digital Heritage

## Focus on Cultural Heritage in the Digital Era

- ✓ 3D scanning, archiving, retrieval and presentation of cultural objects, monuments, archaeological excavations, urban areas and open spaces
- ✓ Multimedia Databases (MPEG7, CIDOC)
- ✓ GIS systems
- ✓ Multimedia content analysis and retrieval
- ✓ Advanced pervasive VR systems for education and heritage dissemination





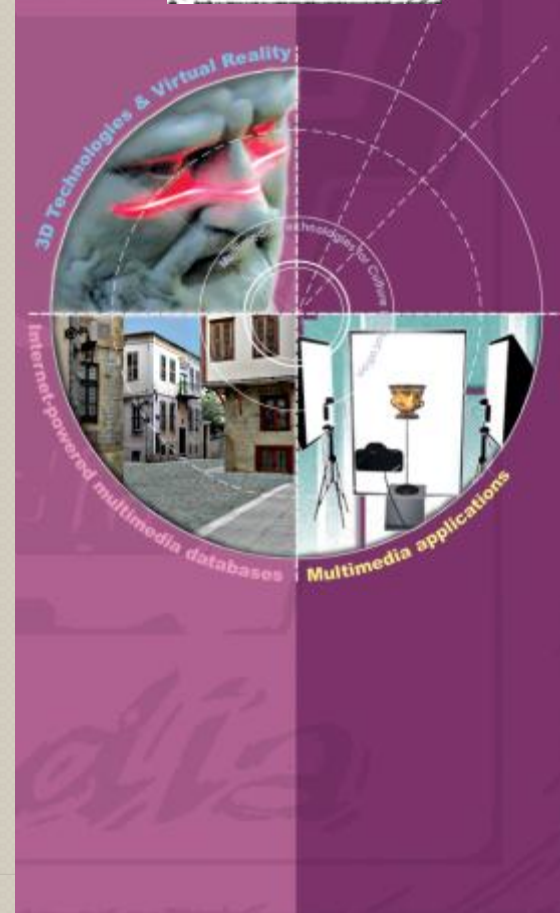
Multimedia technologies  
for cultural heritage and education

## Multimedia Department



# Multimedia Dept.

- Techniques for 2D/3D digitization
- Techniques for digital data storage, archiving and dissemination (publishing)
- Multimedia applications, CD/DVD-ROM titles, Web sites
- Virtual reality applications / interactive 3D visualizations
- Internet-powered multimedia databases
- GIS applications for cultural heritage applications
- Metadata models and descriptions (MPEG-7)
- Imaging: image processing, segmentation, analysis, compression





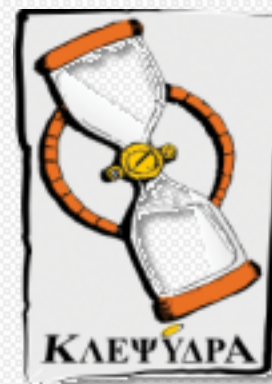
# Multimedia Dept. *(cont.)*

- Current Research Activities
  - **3D imaging:** scanning technologies
  - **GIS:** 3D web-based GIS applications
  - MPEG-7 **metadata descriptions** for 3D data
  - Advanced methods for 3D **data visualization** and search by content
  - **Game engines**, culture and education
  - Advanced **user interfaces**, VR, ambient and ubiquitous **intelligence**



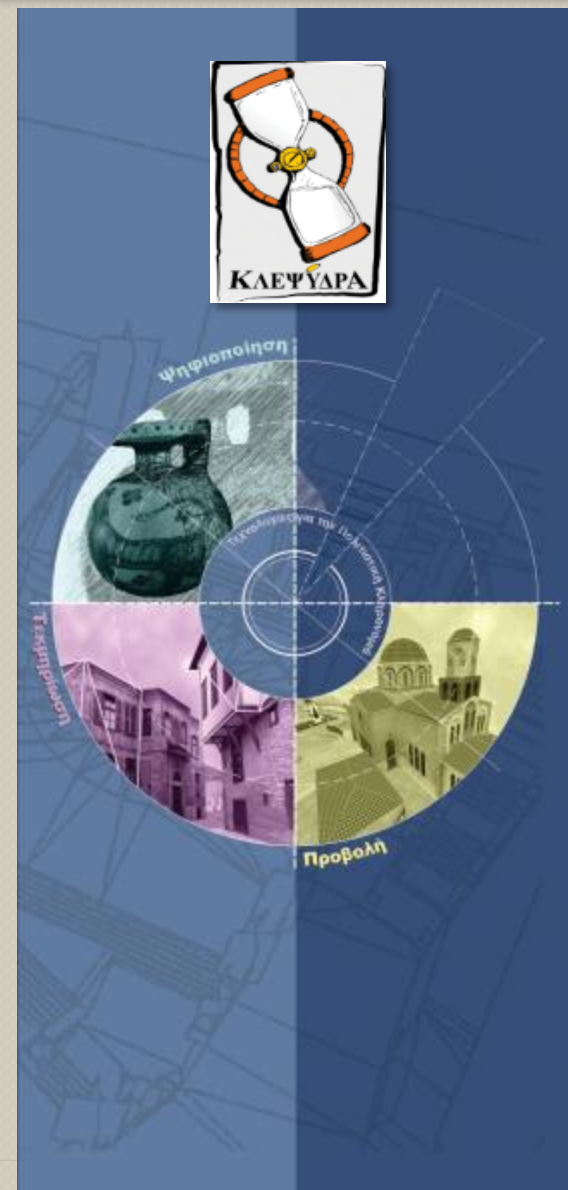
Cutting edge technologies & research  
for cultural heritage digital recording

## **CLEPSYDRA** **Cultural Heritage** **Digitization Center**



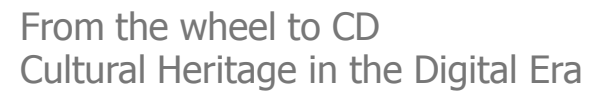
# Clepsydra

- Established 2006 (IST project - Greece)
- Focus on digital recording
  - Digitization, preservation, organization, management, dissemination, replication, reproduction of Cultural Heritage



# Clepsydra *(cont.)*

- Services of high added value
  - Digitization of documents, manuscripts, books, films and audiovisual content
  - 3D digitization of cultural heritage objects, monuments, urban areas, open spaces
  - Digital curation, documentation, organization, management
  - Display and dissemination of information

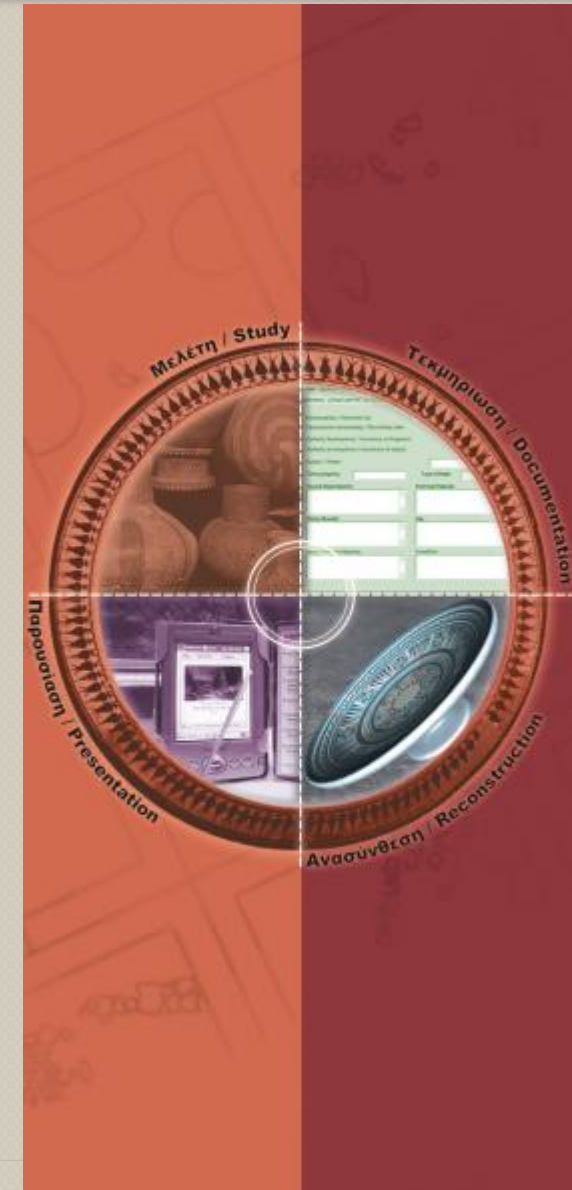


# Cultural Heritage Department



# Cultural Heritage Dept.

- Established 2002
- Principal goal: preservation, protection, dissemination of cultural heritage
- Interdisciplinary research in the field of culture and humanities
- Aims to be a certified center in Cultural Technology



# Cultural Heritage Dept. *(cont.)*

- **Activities**

- Documentation, archival, study, presentation and publication of Cultural Heritage with traditional methods and new technologies
- Research in the field of Archaeology and Museology
- Research and publication of ancient pottery through the application of modern technologies and archaeometry
- Cultural Databases
- 3D reconstructions
- Archaeological GIS
- Introduction of new technologies in museums and sites
- Participation in an archaeological excavation (Karabournaki)

# Infrastructure

- 2D scanners
  - Hi-res flatbed
  - Film/microfilm
  - Book/newspaper/poster



- Digitizers



- Film printers



# Infrastructure

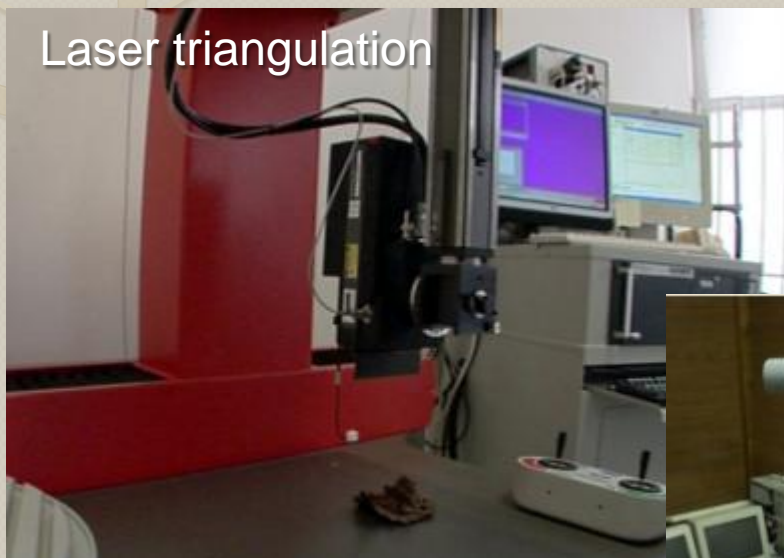
- Hi-res Photographic studio
- Multispectral imaging
- Digital audiovisual studio





# Infrastructure *(cont.)*

Laser triangulation



Shape-from-silhouette



Structured-light



Laser triangulation



Time-of-flight





# Personnel

Position	Number
Researchers	3
Technical staff	1
External contractors	2
PhD candidates	2
Postgraduate students	1
Students / trainees	3
<b>TOTAL</b>	<b>12</b>

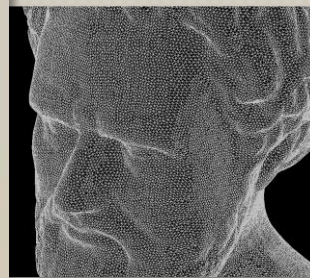
# Selected Projects

- Application domains
  - 3D digitization (objects, monuments, sites)
  - Virtual tours / reconstructions / museums
  - Integrated archaeological site management platform
  - Museum guides
  - Museum educational toolkits
  - Digital utilities

# 3D digitization of objects



Laser scanning



3D reconstruction based on partial laser scanning



Shape-from-silhouette

# 3D digitization of objects *(cont.)*

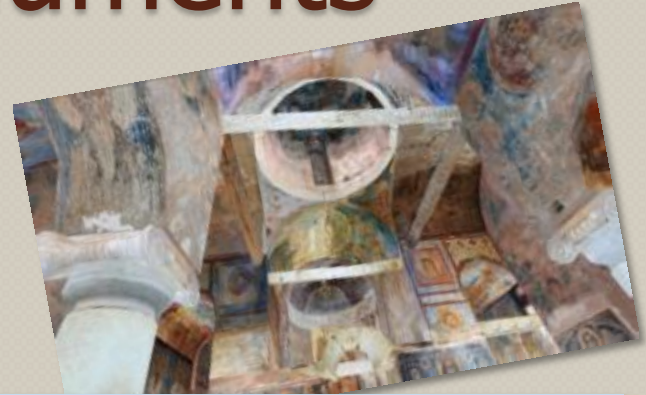


Shape-from-silhouette scanning



# 3D digitization of monuments

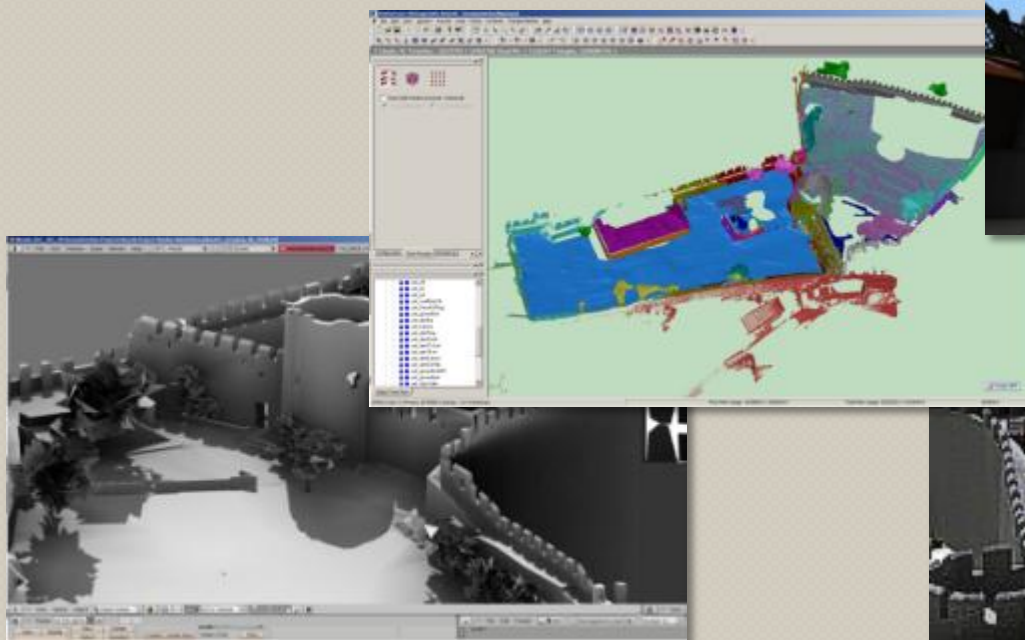
- Byzantine churches of Mani
  - Photogrammetry





# 3D digitization of monuments *(cont.)*

- Castle of Kavala
  - Laser scanning



# 3D digitization of sites



Maronia excavation site - Laser scanning



# Virtual tours

- Avatars
- Content-based retrieval

<http://polymnia.ipet.gr/akoutsou/xanthi>

[www.ipet.gr/vrchat](http://www.ipet.gr/vrchat)



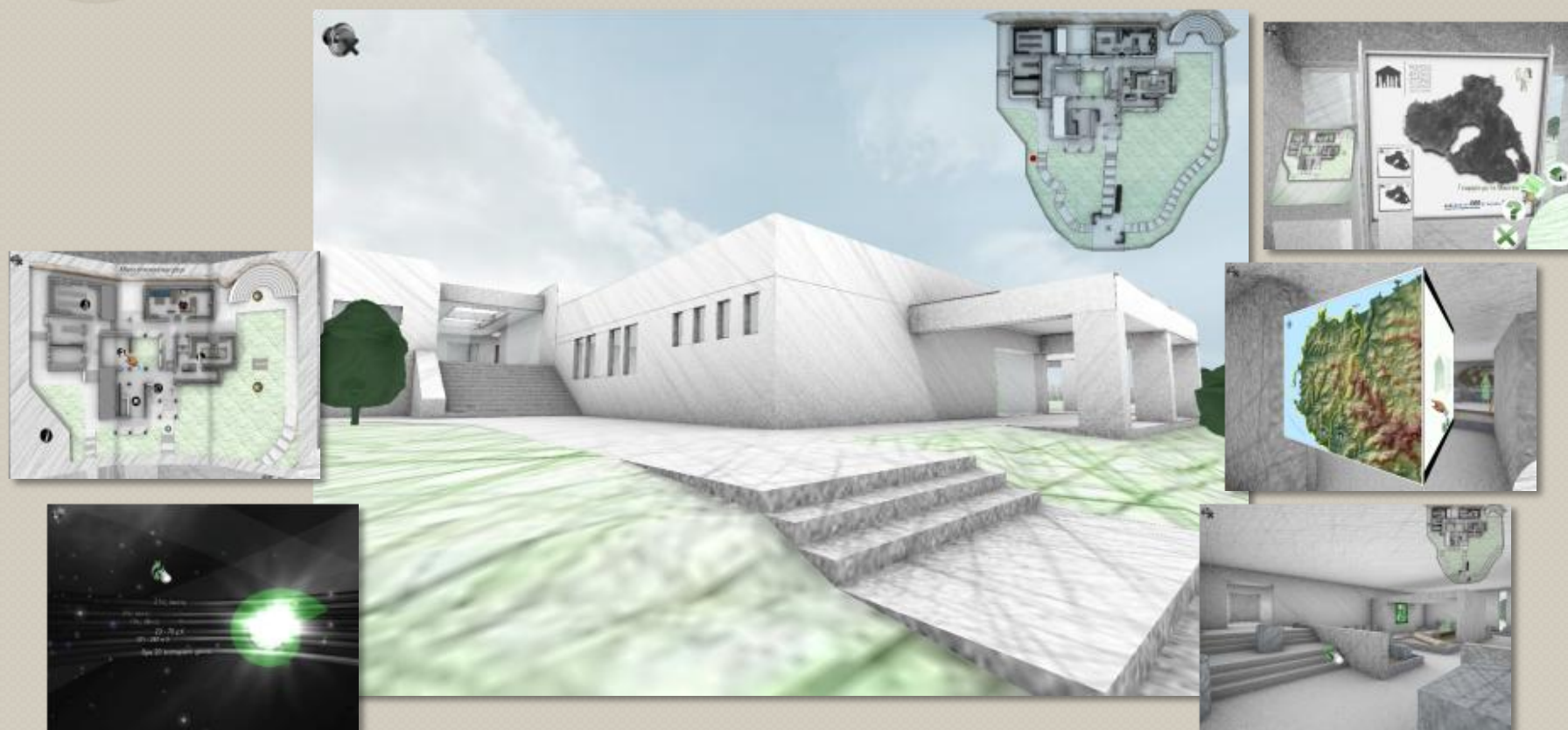
# 3D reconstruction of historic sites

- Argostoli, Kefalonia, Greece  
(destroyed by earthquake in 1952)



# Virtual museums

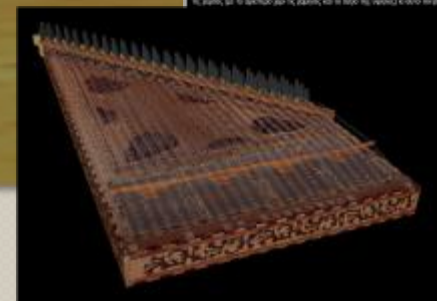
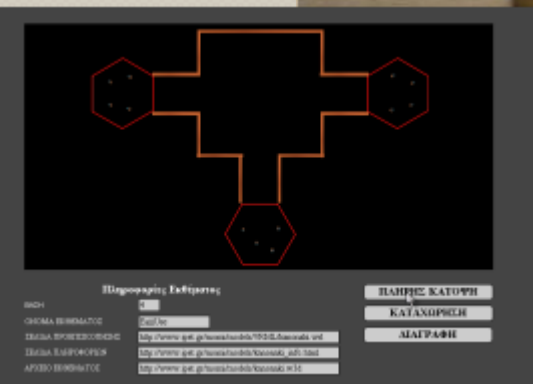
- Natural History Museum of the Lesvos Petrified Forest





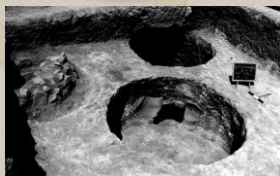
# Virtual museums (cont.)

- Dynamic museum of traditional Greek musical instruments



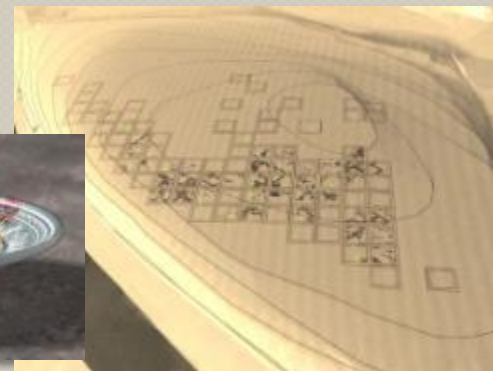
Dynamic content management

# Integrated site management



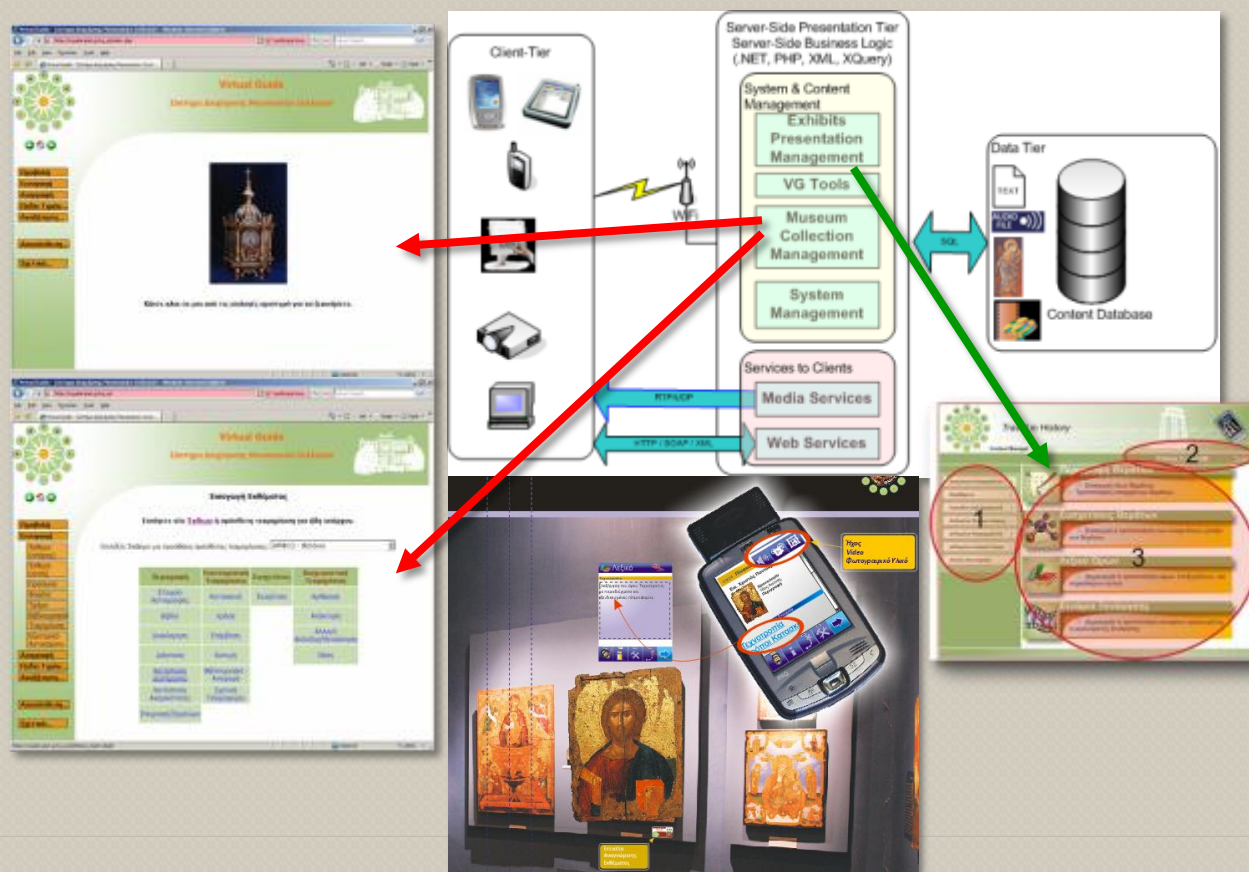

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# Museum guides

- Virtual Guide (PDA based museum guide)





# Educational applications

- **Nautilus** (historic information through a sailing trip from Thrace to Cyprus with a cargo ship in ancient Greece - a game for primary school children)

[Launch app](#)



- **Museum toolkits** (folkloric dresses of Thrace, Aegean islands and Cyprus - a game for primary school children)

[Launch app](#)



# Educational applications (cont.)

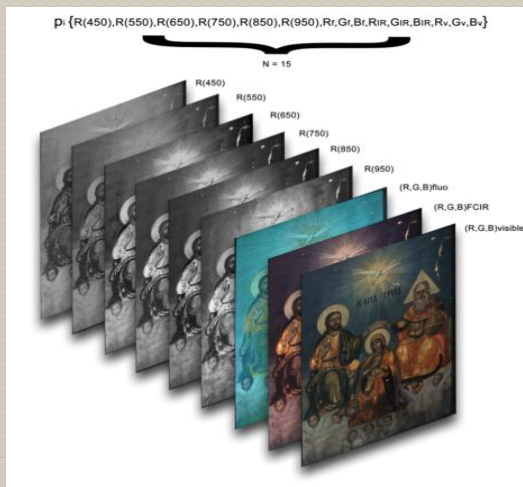
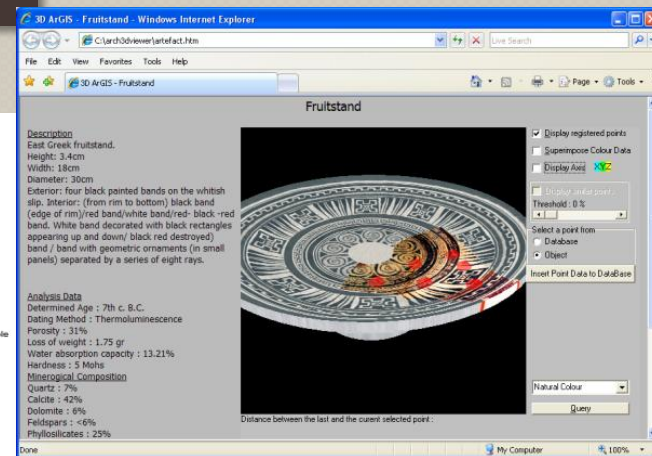
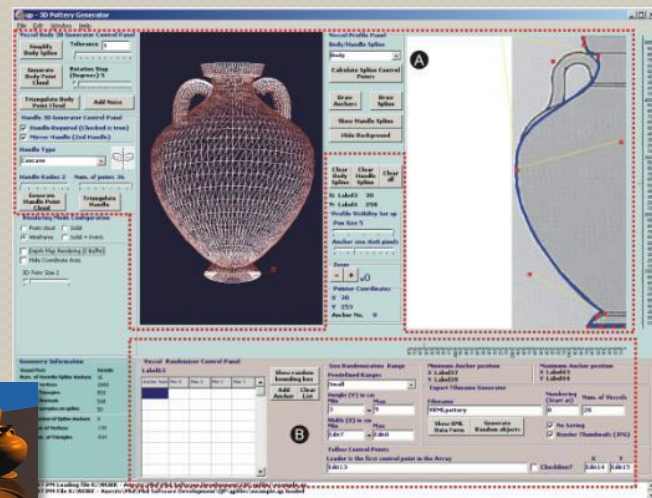
- **The Village** (info for the life in the country – Kozani folkore museum)





# Digital Utilities

- qp – Experimental 3D pottery design software
- 3D GIS for archeological objects
- Multispectral recording data, cluster analysis and pseudo-G.I.S. implementation



# Cultural Databases

- Stone masons in Thrace, the Aegean and Cyprus
- The Art of Refugee Heirloom
- Thrace in the Greek Parliament



**ΠΟΛΙΤΙΣΤΙΚΟ ΑΝΑΠΤΥΞΙΑΚΟ ΚΕΝΤΡΟ ΘΡΑΚΗΣ**

Η βάση δεδομένων με τίτλο "ΚΙΒΩΤΟΣ ΚΕΙΜΕΝΩΝ ΠΡΟΣΕΥΧΩΝ" παρέχει φωτογραφίες και στοιχεία κειμένων αντικείμενων που έχουν σχέση με τους Έλληνες πρόσφυγες των αρχών του 20ού αιώνα. Τα τεκμήρια αυτά της ζωής των Ελλήνων στη Θράκη και Ανατολική Θράκη, τη Μικρά Ασία και τον Πόντο, εντοπίστηκαν σε δημοτικές, Εκκλησιαστικές ή Ιδιωτικές Συλλογές, αλλά και ως μεμονωμένα ογκογενετικά κειμήλια στους Ναυτικούς Έβρου, Ροδόλης, Σάνθης, Κοβάκιος και Δράμας της Περιφέρειας Ανατολικής Μακεδονίας-Θράκης.

The present Database titled "ARK OF REFUGEE HEIRLOOM" contains photographs and information of some four thousand articles, related to the waves of early 20th century Greek refugees. These tokens of Greek presence in North and Eastern Thrace, Asia Minor and Pontos, are today located in Municipal, Religious and Private Collections, or they are individually kept as family relics in the treasuries of Evros, Rodolphi, Sani, Kovaki and Drama of the Region of Eastern Macedonia-Thrace, NE Greece.

Για καλύτερη εμφάνιση

Αντιστοίχιση παλαιότερων Υπουργείων με τα Υπουργεία της περιόδου 1996-2000.

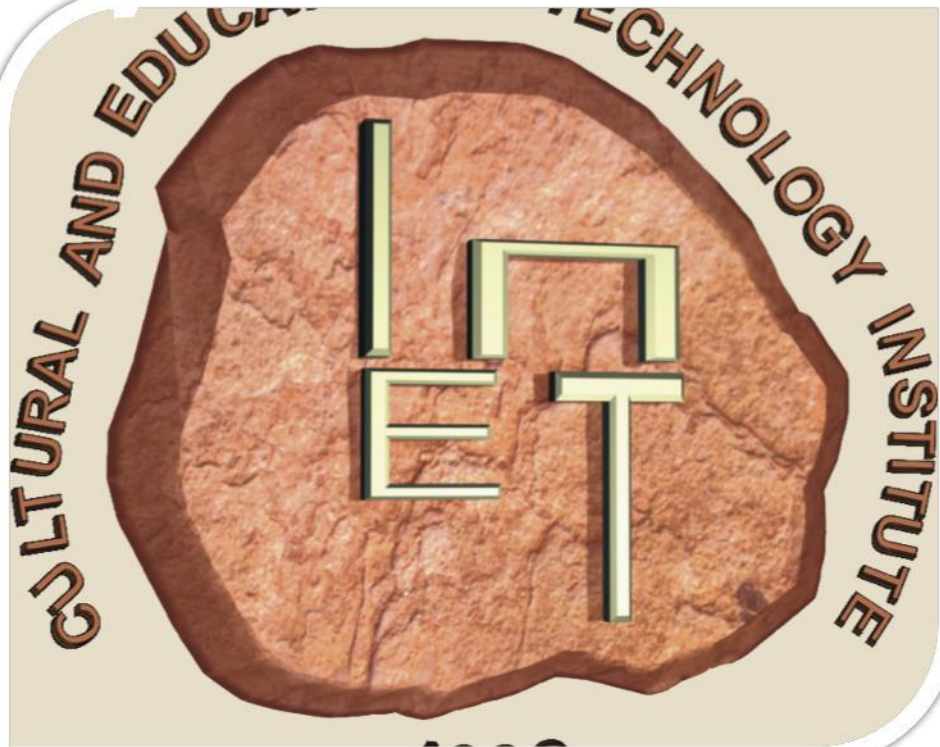
# Development Strategy

- Department targets
  - Pervasive and ubiquitous 3D technologies/VR in culture and education
- Future planned projects
  - Game engines and cultural/educational apps
- Collaboration capacity & target
  - Research/government/private organizations
  - Private sector/industry

# Ideas

- Game technologies and artificial intelligence
  - Maximization of the user acceptance
- Pervasive technologies
  - Maximization of the impact
- Ubiquitous/ambient technologies
  - Maximization of user-friendliness for museum and on-site applications
- Design for all (D4A)
  - Maximization of accessibility





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**Thank you**