

ARCO Project

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www.arco-web.org

ARCO@CHAVR-Web3D 27th February 2003

The ARCO RTD Project

- ARCO started in October 2001 as a three year RTD project
 - Key Action II Multimedia Content and Tools
 - Action Line III.1.6 Virtual representations of cultural and scientific objects
- Co-funded by the EC under the 5FP
 - Total investment is 2.8M Euro inclusive of 2.05M Euro from the EC
- Seven partners including two museum pilot sites from 4 European countries
 - United Kingdom: University of Sussex, Victoria and Albert Museum, Sussex Archaeological Society, University of Bath
 - France: Commissariat à l'Energie Atomique
 - Poland: Poznan University of Economics
 - Italy: GIUNTI Publishing Group



Goals of the ARCO Project

- The ARCO vision is to develop innovative technology and expertise to help museums Create, Manipulate, Manage and Present cultural objects in virtual exhibitions both inside and outside museums
- How? By building a set of tools and processes from digitisation to visualisation:
 - Digitise Artefacts using Photogrammetry, 3D Modelling and Refinement, Database and Content management, Visualisation in a Virtual or Augmented Reality Environment
 - Interoperability, i.e. an Open Architecture
 - XML Data Exchange between tools and other systems
 - Metadata Element Set based on Standards
- Why?
 - To allow museums to create virtual museums and galleries
 - Visitors can virtually interact with archived multimedia collections

ARCO Prototype Systems and Components



Create: Digitise Artefacts using Photogrammetry

- But first we need to select Museum Objects for 3D Modelling
- Objects selected by museum curator for model creation
 - Consider down stream tool capabilities
- Method of modelling depends on features of the objects
 - Objects with *simple geometry* modelled with modified 3ds max or Maya
 - Objects with *complex geometry* modelled with:
 - Photogrammetry
 - Mechanical digitisers
 - Lasers



Create: Digitise Artefacts with the Object Modeller

- For complex models ARCO is developing a stereo digital camera system:
 - Easy to use and portable in order to model artefacts with accuracy, completeness, texture
 - How? Several sequences of digital stereo pictures from which museum object geometry and textures are extracted and merged to produce a 3D textured model





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Manipulate: 3D Modelling and Refinement

- Interactive Model Refinement and Rendering Tool
- A tool for refining digitised models and for creating simple models
- Key Features
 - Simple Interfaces
 - Refinement
 - Creation
 - Database Browser Plug-in
- Future Plug-in Extensions
 - XML Data Exchange
 - Roland Picza Laser
 Scanner (£7.5K)
 - MicroScribe GX2 (£2.5K)



Media Objects from the Creation and Manipulation

- Sample media objects representing cultural objects in the database:
 - Images from the photogrammetry (OM)
 - VRML models exported from model refinement (IMRR)



Manage: Object Relational Database

- All ARCO data is stored in a database for consistency
- Currently implemented in Oracle 9i ORDBMS
- Meta-schema approach allows to add new types of media objects without changing database structure, content management application, or visualization interface
- XML data stored in native XML format



Manage: Content Management Application

- Museums will not manage the database directly
- Specific application created for management of the ARCO database
- Provides several managers for ease of data manipulation, e.g.
 - Museum cultural objects
 - X-VRML templates
 - Virtual museums



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Interoperability: AMS – ARCO Metadata Schema

- AMS is a metadata schema for describing the ARCO process from digitisation to visualisation:
 - Resource discovery metadata
 - Curatorial and descriptive metadata
 - Technical metadata associated with ARCO components
- AMS elements:
 - Adopted from standards
 (DC, AMICO, SPECTRUM, etc.)
 - ARCO specific elements
- Interoperability
- Implemented with XML Schemas

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AMS Metadata Editor

Cultural Object AMS

XDE – XML Data Exchange

- XML interfaces of ARCO components
- Open architecture
 - Extensible set of ARCO tools
 - Interoperability with other systems
- Off-line work without database connection
 - Archaeology
 - Museum presentations
- Data exchange between distributed ARCO databases



Presentation: Augmented Reality Interface

- Visualisation on the database delivering ARCO media objects (e.g. VRML, metadata, pictures ... virtual exhibitions) to the user
- Three visualisation interfaces
 - **Remote Web Interface**
 - Local Web Interfaces
 - Local AR version based on **ARToolKit**

Remote Web Interface in a Browser



Presentation: Dynamic Modelling with X-VRML

- X-VRML high-level XML-based language for creating dynamic VR models and parameterised presentation templates
- Dynamic creation of ARIF contents by combining data and X-VRML templates
- Template instances for:
 - Search interfaces
 - Parameterised browsing
 - Virtual exhibitions
- Same database content visualised three different ways by applying different X-VRML templates



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Conclusions

- ARCO is developing an open architecture that integrates state-of-the-art with ARCO specific technologies to allow museums to build virtual exhibitions
 - Digitisation and modelling of 3D museum artefacts (OM)
 - Refinement and creation of the 3D virtual representations (IMRR)
 - Object relational database and content management application (ACMA)
 - Visualisation of museum exhibitions in a virtual environment (ARIF)
 - Integrated through XML technologies (X-VRML, AMS, XDE)
- Visit us at ARCO website:
 - http://www.arco-web.org/



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