

**Augmented Representation of Cultural Objects** 

D19.3 – Updated ARCO Fact Sheet and Web Site Report

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# **Report Documentation Page**

#### **Report Documentation**

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# Glossary

Terms	ARCO Glossary File
For a complete glossary of ARCO terms see	ARCO-Glossary-R-1.0-280402.doc

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## 1. Introduction

The Web Site document is written in order to disseminate the effort spent on the Web Site until the end of the third period, to provide a guide through the pages, and also to identify and list future developments. Clearly this report is not written to provide any technical details, although the web site's design will be presented. The intended audience is mainly the consortium of the ARCO project.

## 2. Updated Fact Sheet

The following articles have been presented or submitted to:

- COMDEX Fall 2002
- Advanced Imaging Magazine
- Eurographics 2003 EC Projects Stream

#### 2.1 COMDEX FALL 2002

#### Cultural artefacts project turns images into augmented reality

A European Union project to enable students, researchers and members of the public to study and compare important scientific and historical artefacts over the Internet or at their local museum could have a host of applications from training military personnel to home shopping. The technology behind the project will be presented at this year's COMDEX exhibition by ARCO project coordinator, The University of Sussex ("UoS").

Project co-coordinator, Dr. Martin White, from the Centre for VLSI and Computer Graphics at UoS explains, "ARCO—Augmented Representation of Cultural Objects—is a shared venture between a number of European universities and organizations including museums such as the Victoria & Albert Museum, and Sussex Archaeological Society. We exploit the huge potential of 'Augmented Reality'—which we define as 'mixing real reality with virtual reality' to visualize 'Virtual Representations' of cultural objects in the real world. The process starts with a novel technology developed by the Commissariat à l'Energie Atomique (CEA) to digitise a series of photographic images of an object, from which we extract its three-dimensional geometry and texture. Other partners in the project (Poznan University of Economics (PUE), University of Bath (UKOLN) and Giunti Gruppo Editoriale (GIUNTI) are working on new techniques to specify and capture contextual data, i.e. 'metadata' that describes the object, which is then stored with the virtual representation in an object relational database ready for visualization over the Internet or at your local museum".

A major goal of the project is to simplify and reduce the cost of modelling and rendering cultural objects in 3D, while increasing the quality. Key features of the project are the extensive use of XML in defining both the digitization, refinement, manipulation and visualization processes—refining the cultural objects includes setting it in the context of a virtual world described using X-VRML, and describing the object with XML metadata such that both the object or virtual representation and its descriptive context can be visualized together. The virtual representation is then presented to the public remotely through a web browser designed with X-VRML or a local browser exploiting hardware accelerated graphics rendering engines through the augmented reality interface.

"Although the project's first objective is to make important cultural artefacts available to anyone anywhere in the world, the implications of the technology being developed are very exciting," says Russ Bown of Sussex IP, the arm of the University of Sussex established to protect and exploit new technologies developed at the University".

"For a start, it is working on standard platforms, making it applicable to a wide range of sectors, and it is relatively inexpensive. At present, we are focusing on objects of about one cubic foot or less for automatic digitization, but ARCO can exploit less automatic commercial software to capture much larger objects—it just takes more time, that's all. So we have the potential to capture both the architecture of a museum, generate a virtual museum and populate it with virtual cultural artefacts for you to virtually visit. This has obvious implications for home shopping on the web, where you can examine a product, and from every angle. You could even develop a three-dimensional version of yourself, put it into your personal programme and "try out" new clothes on your augmented reality self.

"The scope for training, defence and other educational applications is enormous. What we have now would have been described as science fiction a few years ago—but the technology is here now."

The members of the consortium are: the University of Sussex, Sussex Archaeological Society, the department of Information Technology of the Poznan University of Economics, Commissariat à l'Energie, Giunti Gruppo Editoriale, the UK Office for Library and Information Management at the University of Bath and the Victoria & Albert Museum.

UoS are co-ordinating the project and lead the Interactive Refinement and Rendering tool and Augmented Reality Interface workpackages. This is based on UoS's wide experience in high quality 3D modelling, rendering and animation for virtual reality applications, both in hardware accelerator systems and software.

Visitors to the "UK@COMDEX" pavilion at COMDEX will be able to see the technology in action and attend technical presentations being given by Russ Bown throughout the exhibition.

#### 2.2 Advanced I maging Magazine

ARCO—Augmented Representation of Cultural Objects

To enable museums to establish a digital profile they require simple and innovative technologies to help them digitise artefacts, manage the resulting virtual representations and create virtual exhibitions efficiently.

#### Abstract

ARCO is a research project, funded by the European Union, aimed at developing technology for museums to create 3D virtual exhibitions within the museums and on the Web. Virtual exhibition building begins by digitising selected museum artefacts. The result of digitisation is a virtual representation in VRML/X3D together with descriptive metadata in XML. A database content management application, together with X-VRML technology, allows museums to easily construct a virtual exhibition. X-VRML defines the virtual museum layout and allows dynamic updates of the virtual exhibition by simply changing the database contents. An ARCO prototype was demonstrated at COMDEX Fall 2002.

#### Introduction

ARCO is an open architecture that integrates, through XML technology, state-of-the-art and custom designed components and processes for creating virtual exhibitions of museum artefacts. Four key processes are being developed: creation of 3D models of museum artefacts; creation of enhanced virtual representations with the inclusion of other related media objects; storage and management of the virtual representations in an XML-enabled multimedia database; and finally visualisation of virtual representations in virtual exhibitions.

Figure 1 illustrates the ARCO dataflow, which starts with the digitisation of museum artefacts to create 3D models using photogrammetry techniques. Software and hardware used in this process are referred to as Object Modelling tools. The resulting 3D models often need refining in some way, and this is done with a customised modelling interface based on 3ds max called the Interactive Model Refinement and Rendering tool. Virtual representations composed of several media objects (3D models, images, object movies, etc.) and associated metadata are imported into an object-relational database via a user friendly Content Management Application. Initially, a virtual representation may only consist of a 3D model and associated

metadata created by the digitisation process. This initial acquisition is referred to as an acquired cultural object. An acquired cultural object can be further refined by the modification of existing or addition of new media objects extending the virtual representation. The extended representation is called a refined cultural object. The cultural objects (both acquired and refined) stored in the database can be visualized in 2D and 3D virtual exhibitions using the Augmented Reality Interface.

The ARCO system is integrated by the use of an XML Data Exchange (XDE) format. XDE data files can be exported and imported by all ARCO components ensuring a standardised data exchange mechanism between ARCO components and different instances of the ARCO system, as well as data interoperability between the ARCO system and other systems and applications. Use of XML as primary data exchange medium enables close integration of all ARCO tools into a coherent suite, while at the same time providing communication mechanisms that make the ARCO system both internally and externally open.



Figure 1: The ARCO System Components and Processes

#### Digitising Museum Artefacts

Before digitization of artefacts, museums will first propose a virtual exhibition, make a list of artefacts to exhibit, and identify other media objects that will make up the virtual representation. Once this information is known the museum can start to digitize artefacts and enter other data into the database. Two approaches are used for digitisation. The first approach uses a single digital camera and state-of-the-art photogrammetry software, such as Realviz's ImageModeller, for digitising medium to large artefacts. However, while this approach is cost effective it requires significant user interaction with the software and thus is time consuming. Our second approach is a custom-built stereo camera photogrammetry system for digitising small to medium artefacts with a high degree of automation.

Assuming the museum has chosen to digitize with the stereo camera object modeller tool, the artefact is placed within the view of the stereo cameras and stereo image pairs are taken under

appropriate lighting conditions. Photogrammetry algorithms are applied to the image pair to generate a polygon mesh. The process is repeated to produce several meshes that are textured and merged to produce an accurate 3D model. The models are then exported as XML data exchange files containing encoded X3D/VRML geometry and descriptive metadata.

The XML files can be imported into the database or a down stream refinement application. If the model requires further refinement ARCO provides the Interactive Model Refinement and Rendering tool which is a customised version of 3ds max optimised to provide only the graphics modelling functionality required by the museums. Using plug-ins, this refinement tool also re-exports the 3D model in an XML file, and provides database connectivity to allow the museum user to browse the database. Future extensions to the refinement tool will include a laser scanning plug-in, a mechanical scanning plug-in and implementing the stereo camera object modeller as a plug-in.

Virtual Representations of Artefacts in XML

ARCO defines a virtual representation of a museum artefact as a cultural object. Each cultural object contains all available data and metadata associated with the corresponding artefact. Cultural objects can be exchanged between ARCO components based on the XML data exchange format.

The XML data exchange format is an XML schema that allows encapsulation of consistent sets of data conforming to the ARCO data model. For example, an XDE file may contain all data related to a cultural object together with associated media objects and metadata. Other types of data that can be carried by XDE include virtual exhibition spaces, visualization models, and data dictionaries. Data contained in an XDE file may range from a single media object exchanged between two ARCO components up to an entire virtual gallery with a collection of cultural objects and visualization models for use by an Augmented Reality Interface working in an off-line mode.

The cultural objects are described with a metadata schema implemented in XML. Our metadata schema adopts international metadata standards such as Dublin Core and the CIMI XML Spectrum using the concept of application profiles, which is a method for accessing the namespaces of metadata standards. ARCO's metadata schema describes cultural objects at all stages of processing from digitisation of a physical museum artefact and associated media objects, all the way through to visualisation of the artefact in a virtual or augmented reality environment. The metadata schema is implemented as a set of specific XML schemas that describe administrative, curatorial, technical, preservation and use type metadata covering all potential museum requirements for digitisation. The AMS metadata schema is part of the XDE exchange format.



Figure 2: ARCO Data Exchange based on XDE

#### Virtual Representations in the Database

The database is a common repository of all data used in the ARCO system. These include the cultural objects with associated media objects, accompanying metadata descriptions, virtual exhibition spaces, and visualization models. The database is currently implemented on top of Oracle 9i Object Relational Database Management System. The multimedia data and XML metadata descriptions are stored natively in the database taking advantage of the advanced features offered by the ORDBMS. This approach guarantees easy access to the data and efficient data manipulation at the same time offering all advantages of database systems such as data consistency enforced by consistency constraints and transactional processing, local and remote access to data, data security, as well as backup and recovery mechanisms.

#### Building Virtual Exhibitions

ARCO visualizes the virtual representations of museum artefacts in the Augmented Reality Interfaces built dynamically with X VRML visualization models. X-VRML is a high-level language enhancing virtual reality standards such as VRML and X3D with dynamic modelling capabilities. The dynamic modelling technique enables the museum to develop dynamic database-driven virtual reality applications by building parameterised models of virtual scenes that constitute the application, and dynamic generation of the instances of virtual scenes based on the models and current values of model parameters, query provided by a user, data retrieved from a database, and user privileges or preferences. The artefacts may be visualized by museum visitors in interconnected virtual exhibition spaces composed of both 3D virtual galleries and 2D multimedia web pages. The form of visualization depends on the preferences set by the museum curator building the exhibition. A number of different X-VRML visualization models can be used with the same collection of digitised artefacts allowing to the museum to build different visualizations for different purposes (e.g. one for use within the museum and another for use on the Internet).

The ARCO content management application allows museum users to build virtual exhibitions by simply assigning cultural objects and X-VRML visualization models to virtual exhibition spaces. Parameterisation of the models allows users to further differentiate visualization in different spaces. Depending on the set of parameters pre-configured by the museum curator an X VRML visualization model may generate a fixed virtual gallery, a user-customisable virtual gallery, or a search interface. A sample 3D virtual gallery is presented in Figure 3.



Figure 3: ARCO – 3D virtual exhibition on the Web

(Objects courtesy of Sussex Archaeological Society)

#### 2.3 Eurographics 2003 EC Projects Stream

#### Project Goals

ARCO is developing innovative technology for creating virtual exhibitions of museum artefacts for display in augmented and virtual reality environments accessible both within museums and over the Internet. The museum artefacts are represented as collections of digital media objects such as 3D models, photographs, movies, textual descriptions, etc. The 3D models are created using a stereo photogrammetry system called the Object Modeller Tool, which includes a simple software interface. A 3D modelling tool called the Interactive Model Refinement and Rendering Tool is also being developed to enable further refining of the 3D models. Virtual object representations are organised into virtual exhibitions using an XML enabled Object

Relational Database managed by a Content Management Application. The presentation layout of the virtual exhibition is based on X-VRML templates, which dynamically generate Augmented Reality Interfaces as either web browser VR environments or full-screen AR environments. All system components are integrated by the use of an XML Data Exchange format providing component interoperability. ARCO also defines an original Metadata Schema that allows museums to describe the cultural objects and their multimedia content at all stages from digitisation to visualisation.

#### Main Results

ARCO's museum pilot sites: Victoria and Albert Museum in London and the Sussex Archaeological Society define museum requirements, and evaluate ARCO prototypes at Museum User Trials. This ensures that ARCO delivers what museums really need. The ARCO dataflow starts with the Digitisation of Museum Artefacts to create 3D Virtual Representations using photogrammetry techniques-no expensive lasers. Two approaches are used: state-of-theart software for medium to large artefacts, and the custom built stereo photogrammetry system for small to medium artefacts. 3D models generated by the object modellers are refined in the Interactive Model Refinement and Rendering tool. Virtual object representations composed of particular media objects and associated metadata are imported to the ARCO database. The ARCO Content Management Application (ACMA), containing a set of user-friendly data managers, allows the museum user to manage all kinds of data in the database. The two most important ACMA managers are the Cultural Object Manager for maintaining virtual representations of cultural objects and the Presentation Manager, which is used to create Virtual Exhibitions by simply assigning cultural objects and X-VRML visualization models to virtual exhibition spaces. The final virtual exhibitions containing the cultural objects assigned to the particular exhibition spaces are then dynamically generated based on the visualization templates and parameters set by the exhibition designer and the end-user. The virtual exhibitions or galleries can be visualized in several ways through a VRML/X3D enabled web browser (over the Internet, or on a touch screen display in the museum) or through a Table-top Augmented Reality Environment in the museum.



# Figure 4: illustrates the acquisition of 3D artefacts and subsequent processes through to visualization in a virtual exhibition.

Future Work

ARCO has so far delivered first and second prototypes, with the third prototype due around April 2003 and the final system due in October 2003. ARCO is currently focusing on refining current implementations and developing advanced scenarios for augmented reality visualizations.

#### References

[1] Krzysztof Walczak, Martin White, 'Cultural Heritage Applications of Virtual Reality', Web3D 2003 Symposium Proceedings, March, 9th-12th, 2003, St Malo, France.

[3] Krzysztof Walczak, Wojciech Cellary, 'X-VRML for Advanced Virtual Reality Applications', IEEE Computer, March 2003, pp.89-92

## 3. Overall design of ARCO's Web-Site

The UoS developed ARCO's Web Site. Its purpose is to be accessible by both the public and the consortium. The web site is a continuing development that hosts project descriptions, deliverables, disseminations, etc. The web site also has a secure area for exchange of consortium information that is not public. This area is password secured. The first draft version of the web site has been operational since month 3, and development will continue as the project develops. Figure 5 illustrates the overall design of our Web Site that was valid until first of March 2003.



Figure 5: The Overall Design of the Web Site

Since the 1<sup>st</sup> of March 2003 the overall design is updated and it is better illustrated on Figure 6.

In order to access the web Site the user needs to enter the following URL <u>http://www.arco-web.org/</u> in a web browser. The first page displayed is the index page, which provides two links to the public site; a Flash and an HTML version. Both of those links lead to the same public page. The only difference is that the Flash link introduces to the user a flash intro that describes in short our project. The user may go to our private side by clicking on the Members link. In order to get into the private area the user needs to be aware of the username and

password. A more detailed structure and information about the ARCO web site will be presented on the following two sections of this report.



Figure 6: Current Overall design of the web site.

## 4. The Public Area of the ARCO's Web-Site

On the publicly accessible area, ARCO Consortium has been contracted to provide the Web Site with the following type of information:

- The parts of the Annex 1 "Description of work" deemed by the consortium to be publicly available.
- The Project fact sheet, which will be updated every six months.
- The Project Presentation.
- All public (PU) disseminations
  - Deliverable D6: Description of the Final prototype Interactive Model Refinement and Rendering Tool.
  - o Deliverable D8: Report on the XML descriptions of the database cultural objects.
  - Deliverable D9: Report on XML schemas, XSL style sheets and X-VRML technology.
  - Deliverable D10: Report on the XML interface description between system components.
  - o Deliverable D11: Final Report on XML Technology.
  - Deliverable D12: Description of the Augmented Reality Interface based on X-VRML.
  - Deliverable D13: Description of the Augmented Reality Interface based on XML/OpenGL.
  - Deliverable D16: Assessment and Evaluation report on the ARCO system and its components.
  - o Deliverable D18: Dissemination and Use Plan.
  - o Deliverable D19: Updated ARCO Fact Sheet, and web site report
- ARCO publications, e.g. journals, conferences, workshops, etc.
- Feedback forms for targeted groups.

All the above and an amount of other information, such as contacts' and partners' details, can be found on-line. A more detailed structure, of the public accessible area, will be presented in this chapter.

Figure 7 illustrates the first level of links of the web site when the user has just entered the publicly accessible area. The information held on the pages, where the first level links lead, will be listed in the following subsections of this chapter.



Figure 7: The first level of links in the publicly accessible area

#### 4.1.1 The "Members" link

The "Members" link leads to a page, where the user is asked to enter the username and password. If the login is successful, then he can enter the private area. More details about the private area are reported on chapter 5.

#### 4.1.2 The "Description" link

The "Description" link pops up a menu (see Figure 8) that provides links to description pages of the ARCO project that contain general information such as:

- Project Overview
- Data Flow
- Object Modeller
- Object Refinement
- Database Management System
- Metadata
- XML Technology
- Visualization
- Consortium



Figure 8: Description menu

Figure 9 illustrates exhibits a result of this effort.



**Figure 9: The Description Pages** 

#### 4.1.3 The "Documents" link

The "Documents" link pops up a menu (see Figure 10) that provides links to document pages of the ARCO web site such as:

- "Project Publications"
- "Project Deliverables"
- "Project Factsheet"
- "Project Presentation"



**Figure 10: Documents Menu** 

The **"Project Publications"** link leads to a page where actual ARCO published work can be found.

The **"Project Deliverables** link leads to a page where all the deliverables, in the form of a short description, with related work package descriptions also presented. Each deliverable description is actually a link to relative pages, where deliverables' information is provided (See also chapter 9).

The **"Project Factsheet"** is a link to the IST web site where information about the ARCO project may be found

The **"Project Presentation"** will eventually lead to a page where the updated project brochure exists.

Figure 11 exhibits a result of this effort.

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**Figure 11: The Document Pages** 

#### 4.1.4 The "Participants" link

The "Participants" link leads to a pop up menu (see Figure 12), where the user is able to select a link for a page that describes each consortium member. Also the links from this page lead to relevant pages for each participant that provides information about the groups, the key people and finally links to each group's web site.



Figure 12: Participants Menu

#### 4.1.5 The "Site Map" link

The "Site Map" link leads to a page, where the user is provided with a site map in order to facilitate the site's navigation. The latest site map is illustrated on Figure 13.



Figure 13: ARCO Public Site Map

#### 4.1.6 The "Feedback" link

The "Feedback" link leads to a page, where the user could provides feedback about the web site or other issues.

#### 4.1.7 The "Contacts" link

The "Contacts" link leads to a page, where the user is provided with information about all the people involved in the project as well as their contacts.

## 5. The Private Area of the ARCO's Web-Site

On the secure consortium (private) area, ARCO consortium has been contracted to provide the Web Site with the following type of information:

- All confidential (CO) or restricted (PP) deliverables:
  - Kick-off meeting minutes, management meeting minutes, prototype specifications, final system specifications, business and IPR models, market analysis, etc.
- All management reports
- All periodic progress reports
- Resource usage sheets and document templates for general partner use
- Model contract
- Consortium agreements
- Exploitation agreement
- The links for JISCmail service, which provides a forum for general or specific consortium communication on technical and management issues.

Figure 14 illustrates the first level of links of the web site when the user has just entered the secure area. The information held on the pages, where the first level links lead, are listed in the following subsections of this chapter.



Figure 14 : The first level of links in the secure consortium area

#### 5.1.1 The "Public" link

The "Public" link leads to the main public page of the ARCO web site.

#### 5.1.2 The "News" link

The "News" link leads to the main page of the secure consortium area, where the partners can be informed about the latest news that occurred on the ARCO web site. The news are categorised by month and their relevant links are provided at the bottom of the main "news" page. News may be considered to be museum user trial data, deliverables, project meetings, internal documents, and other minor or major changes to the ARCO web site.

#### 5.1.3 The "Project" link

The "Project" link leads to a sequence of pages, where the description of work document "Annex 1" can be found in an HTML format.

#### 5.1.4 The "Documents" link

The "Documents" link leads to a page where a set of useful links for consortium members can be identified

- "Project Deliverables"
- "Project Reviews"
- "Museum User Trials"
- "Project Meetings"
- "Project Possible Dissemination Venues"
- "Project management Templates"
- "Project Months"
- "Annex 1(Description of work)"
- "Project Development Documents"
- "Project Review and Monitoring Templates"
- "Project Contracts & Amendments"
- "Project Cost Claim Guidelines"

The **"Project Deliverables** link leads to a page where all the deliverables, in the form of a short description, with related work package descriptions also presented. Each deliverable description is actually a link to relative pages, where deliverables' information is provided.

The **"Project Review"** link leads to a page where information for the project reviews may be found. This information includes review dates, agendas, partners' presentations and the report returned back by the European commission.

The "**Museum User Trials**" link leads to a page where information for the project museum user trials may be found. This information includes MUT dates, their duration period, the event coverage place and finally useful data acquired during this MUT.

The **"Project Meetings"** link leads to a page where information for the held project meetings may be found. This information includes meetings' dates, meeting minutes reports, the host of the venue, and the purpose of the meetings.

The **"Project Possible Dissemination Venues"** link leads to a page where the possible dissemination venues and actual published work can be found.

#### 5.1.5 The "Organisation" link

The "Organisation" link leads to a page, where the Project management structure is illustrated.

#### 5.1.6 The "Site Map" link

The "Site Map" link leads to a page, where the web site visitor is provided with a site map in order to facilitate the site's navigation.

#### 5.1.7 The "Forum" link

The "Forum" link leads to a page, where the user could find links and a guide for ARCO forums.

## 6. Logo & Branding

The Branding of the web site has being provided by GIUNTI.



Figure 15: ARCO logo

The original web site needed to be branded. GIUNTI provided the Consortium/partners with 9 possible branding options. All the partners took part in the vote and the best logo was selected. The winning logo was used to brand the public area of the ARCO web site as illustrated in Figure 15 and Figure 16.

GIUNTI provided UoS with the modified templates, which were applied to both of the public sites; i.e. the HTML and Flash Version. Over one hundred pages were modified in this way.



Figure 16: ARCO Web site Branding

When you visit the ARCO web site the first thing you can see on the screen is the ARCO Main Page (illustrated in Figure 15). There the user is provided with two options. The "HTML Version" and the "Flash Version". If the "Flash Version" is selected then a short flash movie introduces the ARCO web site to the user. A screenshot of the flash file is illustrated in Figure 17.



Figure 17: Flash intro

## 7. News Page

This page provides useful information about modifications of current pages and/or insertion of new pages. The page is illustrated with the use of a table that provides a short description of the news event, and a link to the relevant page. The indexing of the events is chronological. The news page may be found at <u>http://www.arco-web.org/secure/News.htm</u>. Figure 18 presents the layout of the ARCO news page. This page also provides a table, which illustrates the ARCO project duration, divided into months. Each month is a link that leads to the relative's month news page.

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Figure 18: News Page in the private Area

## 8. Hit Counter

The purpose of the hit counter is to keep log entry of the web sites visitors. Two counters are currently in use in our web site. These are introduced in the secure, and the HTML public area respectively. All the counters are active since the  $10^{th}$  of September 2002.

The counters can be visited on the following web site links:

- Private area: http://www.arco-web.org/secure/News.html
- Public HTML area: <u>http://www.arco-</u> web.org/TextVersion/Description1.html

The web counters are provided by <u>http://www.digits.com/</u>. The ARCO web site developers followed all the policies of the web counter services. The policies may be found at <u>http://www.digits.com/policies/</u>. Figure 19 shows the logo of the web counter services.



Figure 19: web counter services Logo

## 9. Deliverables

The ARCO deliverables are mounted on the web site. The deliverables may be accessed from both public and secure web site areas according to their security level. The relative links are provided below:

- Public HTML area: <u>http://www.arco-</u> web.org/TextVersion/Documents/Deliverables/deliverables.html
- Secure area: <u>http://www.arco-</u> web.org/secure/Documents/Deliverables/deliverables.html

Finally, it has to be mentioned that unauthorised web site visitors will not be able to access the deliverables that are not considered to be of "public" security. This is enforced by the use of password protection.

The following sub sections indicate which documents have been mounted or they will be mounted until the end of the current six-month period.

Deliverable Number	Deliverable Name
D1.1	Kick-Off Management Meeting
D1.2	Consortium Agreement
D1.3.1	First Management Report
D1.4.1	First Periodic Progress Report
D1.5	Project Presentation
D3.1	Specification of the first prototype
D18	Dissemination and Use Plan
D19.1	Updated ARCO Fact Sheet and web site report

#### 9.1 1<sup>st</sup> Six Month Period

### 9.2 2<sup>nd</sup> Six Month Period

Deliverable Number	Deliverable Name
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D1.3.2	First Management Report
D1.4.2	First Periodic Progress Report
D3.2	Specification of the first prototype
D8	Report on the XML descriptions of the database cultural objects
D9	Report on XML schemas, XSL stylesheets, and X-VRML technology
D10	Report on the XML interface descriptions between system components
D17.1	Report on Business and IPR models
D19.2	Updated ARCO Fact Sheet and web site report

Deliverable Number	Deliverable Name
D1.3.3	First Management Report
D1.4.3	First Periodic Progress Report
D2.1	Mid term review report
D3.3	Specification of the first prototype
D17.2	Report on Business and IPR models
D19.2	Updated ARCO Fact Sheet and web site report
D20	ARCO Exploitation Agreement

# 9.3 3<sup>rd</sup> Six Month Period

## 10. Future Work

The list below identifies the future work that has to be done on the web site until the end of the project.

- Mount links for assessment and evaluation questionnaires
- Search Engine (pages' search, e.g. Google)
- Update site with future deliverables
- Update Publications Page
- Update Internal documents