Project no. 507457

BRICKS

Building Resources for Integrated Cultural Knowledge Service

Instrument: Information Society Technologies

Thematic Priority : 2.3.1.12 Technology-enhanced learning and access to cultural heritage

D1.0.12 Periodic Activity Report (M37-M42)
(Monitoring Report)

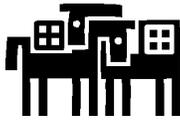Due date of deliverable: August 15, 2007
Actual submission date: September 10, 2007

Start date of project: 01 January 2004   Duration: 42 months

Organisation name of lead contractor for this deliverable: ENG

Version 1.0

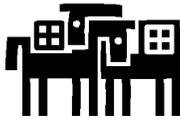| **Work-Package**	WP1.0
Document Number	D1012/ENG/V1.0
Delivery Type	report
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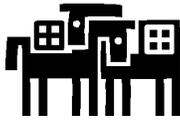
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Change History

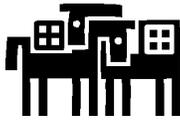| Version	Date	Status	Author (Partner)	Description
0.1	10-August-2007	Draft	Massimo Bertoncini (ENG)	Creation
1.0	10-September-2007	Final	Massimo Bertoncini (ENG)	Final Version

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PUBLISHABLE EXECUTIVE SUMMARY

Overall Objectives

The BRICKS Integrated Project aims at establishing the organisational and technological foundations for a **Digital Library** of the European Digital Memory. A "digital library" in this context refers to a networked system of services over globally available collections of multimedia digital content, providing a variety of knowledge layers for a variety of users and access modalities.

The BRICKS **vision** is that of an integrated system offering functionality for a new generation of Digital Libraries, which becomes a comprehensive term covering "Digital Museums", "Digital Archives" and other kinds of digital memory systems.

The technology results of the project constitute the main assets over the top of which the "**BRICKS Factory**", later on after the end of the project, will be subsidised by the interested core technology partners. The mission of the BRICKS Factory is the design, development and maintenance of a user and service-oriented space to share knowledge and resources in the Cultural Heritage domain.

In order to achieve this vision, three main project **objectives** have been defined and addressed accordingly:

Objective 1:   ***Infrastructure***: an open, distributed, scalable and safe infrastructure has been built delivered and extensively tested. Such an infrastructure provides the enabling technology baseline for the European Digital Memory.

Objective 2:   ***Added-Value Applications:*** some added-value applications have been deployed over the top of the Foundation infrastructure. These applications constitute a significant value for the user communities involved, and demonstrate both the viability of the Infrastructure approach in building application and services targeted to the Cultural Heritage domain, as well as the market potential of BRICKS.

Objective 3:   ***Sustainability***: an appropriate Business Model for the open-source Foundation services is going to be defined for sustaining and exploiting the BRICKS services.

In the third year of the project the final service-based integrated prototype of the infrastructure, known as the "**Foundation**", including all the basic, core and fundamental services, has been released. The infrastructure has been implemented through the integration of independent software units called "**Bricks**", which are deployed on the nodes of the architecture. A Brick is an independent building block whose functionality is made available through a formally defined interface. Bricks can be composed together to provide richer functionality.

In the final period of the project (year 4) the Foundation has been significantly improved and redesigned in terms of performance and stability. Furthermore, developer feedback has been taken into account to improve the foundation API and important missing functionalities like Security, Digital Rights Management and Annotations have been added. Extensive tests within a testbed ensured the high quality of the infrastructure releases.

In order to test and validate the Foundation infrastructure and demonstrate how to build value-added applications and services over the top of such an infrastructure, some significant **added-value** pillar applications have been developed and made available. The intention is to use such applications for validating the Foundation services and, at the same time, be the basis of the future advancement of the BRICKS Factory and be an attractive
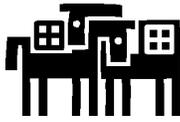
feature for the creation of a future cultural heritage community. The initial Pillar services have the following objectives and users:

Pillar 1.   A scenario regarding the possibility to **share knowledge and information about complex cultural heritage objects.** The selected area concerns archaeological sites. The objective is to understand how to use IT tools to aggregate, compare and distribute information and data. Target users are art, historical and cultural heritage researchers.

Pillar 2.   A services-oriented shared network to distribute, transfer and compare knowledge and expertise about **internal management processes for culture**, targeted at Small and Museum-sized Museums. This means the creation of services for the training, expertise transfer and discussion of internal processes of museums, such as the organization of an exhibition, the training of new people, the visualisation and design of an art collection, and so on. The targeted users of this scenario are the managers and professionals working in Small and Medium Museums.

Pillar 3.   An integrated, shared space for the use of digital content to manage, to add personal experience, to generate new knowledge and **create culture**. The targeted user group are the general public and the visitors of real and virtual cultural exhibitions.

Pillar 4.   A scenario relevant to the aggregation of and access to **digital editions of texts** (artistic and historical documents and manuscripts), together with an advancement in the shared creation and access to critical editions in Art, Science and History. Targeted users are the archive and library professional community.

All the pillar applications concerning Pillar 1, 2 and 3 have been successfully implemented and tested against the Foundation services, while Pillar 4 has been extensively specified.

Significant activities addressing the main objective of sustainability have been undertaken during the last six months of the BRICKS project. In particular:

- A validated Business Plan has been delivered, including a two-step business strategy for the post-project period known as BRICKS-after-BRICKS (the BRICKS Laboratory and the BRICKS Factory), an updated Market and Competition Analysis and the financials for BRICKS-after-BRICKS have been produced

- A Post-Project Cooperation Agreement between four core technology partners (Engineering, Metaware, CNR and ARC) has been signed with a period of validity of one year, defining how these partners will share roles, responsibilities, liabilities and costs for one year after the end of the project

- The Foundation demonstrators (the BRICKS Workspace, the BRICKS Desktop and the BRICKS Importer) have been extensively tested in the real digital libraries context against a great amount of data

- A real Production BNet has been set up, including BNodes installed in prominent cultural heritage institutions

- An Open Source Community has been maintained and increased through targeted dissemination activities, such as tailored workshops held in worldwide famous Open Source Conferences (Apache Conferences) and panels at Digital Libraries Conferences (ECDL 2007), and awareness about BRICKS has been raised in some of the most significant Open Source Communities (e.g.: OW2)

- Several important players within the cultural heritage domain have decided to join the BRICKS Community (http://www.brickscommunity.org), which now includes more than 140 worldwide active members, who have declared their interest in sharing the BRICKS results and in being early adopters of the BRICKS services.
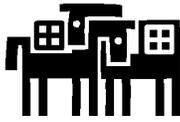
Contractors

The contractors involved in BRICKS are the following:

Name	Country	Name	Country
Engineering (coordinator) Contact: massimo.bertoncini@eng.it	IT	Studio Azzurro IT	IT
Fraunhofer	D	Sistemi informativi Srl Liberologico	IT
Metaware	IT	Museum of Cycladic Art	GR
Austrian Research Centre	A	Österreichische Nationalbibliothek	A
Consiglio Nazionale delle Ricerche	IT	European Museum Forum	UK
University of Sheffield	UK	Uffizi	I
University of Athens	GR	Vatican City State	
Consorzio Forma	IT	Russian Cultural Heritage Network	RU
Ecole Polytechnique Federale de Lausanne	CH	Italian Ministry of Culture	IT
University of Florence- Centre of Excellence	IT	Museums, Libraries and Archives Council	UK
Canoo	CH		
Polydisplay	NO		

Work Performed in this Reporting Period

This report presents the work performed during the fourth reporting period of the project (January 2007 - June 2007).

While the activities covered in the third year can be summarised as **Development**, **Validation** and **Fine Tuning**, the keywords for the fourth period are **Validation, Fine Tuning** and **Sustainability**.

This activity stream concerned all the different BRICKS aspects and domains, such as foundation services, end user applications, business modelling, community creation and user requirement refinement.

A short list of key results obtained is presented here:

- ✓ **Fine Tuning** of the third Foundation Integrated prototype, taking into account feedback provided by the pillars developers, has been carried out. Extensive **Validation** and testing campaigns have been conducted by the pillars' developers and by the Open Source Community members in order to increase the stability and performance and produce more stable releases. Each of these foundation services represents advancement in the Cultural Digital Libraries state of the art both in
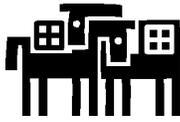
terms of research and in terms of its usage inside Cultural Heritage projects.

✓ **Fine Tuning** of all the released pillars applications has been carried out on top of the foundation services, demonstrating how it is possible to use the basic foundation services for building added-value applications and services:

- o Archaeological Finds Identifier and Archaeological Digital Library within the Archaeological Site pillar

- o European Directory of the Company Museums and High Quality Rendering of Digital Images within the SMM pillar

- o Online Exhibition and Story Album within the Living Memory

- o EMYA award management and European Directory of Company Museums applications

✓ An extensive **validation campaign** for the **pillar applications** has been undertaken at two different levels:

- o Within the consortium by the domain specific users belonging to cultural heritage institutions

- o Outside the consortium by some volunteers belonging to the BRICKS Community

✓ Three foundation-related demonstrators, already available from the end of the second project year, have been further **validated** and **fine tuned** in **real digital library environments**, in order to demonstrate how the BRICKS Foundation services are able to perform well also with great amount of data:

- o The BRICKS Workspace, a web application demonstrating the usage of the services made available within the first integrated prototype

- o The BRICKS Desktop, a stand-alone application which represents a client GUI for accessing the BRICKS Foundation

- o The BRICKS Importer, allowing to harvest both the metadata and the content from legacy repositories

✓ Concrete initiatives have been carried out for sustaining the BRICKS Foundation services approach to the market:

- o The open-source BRICKS Developers Community has been created, stimulated and maintained

- o The Open Source Community has been maintained and increased, through targeted dissemination activities, such as tailored workshops held in worldwide famous Open Source Conferences (Apache Conference) and panels at Digital Libraries Conferences (ECDL 2007), and awareness about BRICKS has been raised in some of the most significant Open Source Communities (e.g.: OW2)

- o An SRU Gateway has been implemented in order to increase the interoperability level of the BRICKS Foundation with external content sources

- o A final **validated** Business Plan has been delivered, including a two-step business strategy for the post-project period known as BRICKS-after-BRICKS (the BRICKS Laboratory and the BRICKS Factory), an updated Market and Competition Analysis and the financials for BRICKS-after-BRICKS have been produced

- o A Post-Project Cooperation Agreement between four core technology partners (Engineering, Metaware, CNR and ARC) has been signed with a period of validity of one year, defining how these partners will share roles,

responsibilities, liabilities and costs for one year after the end of the project

- o The BNet (BRICKS Cultural Heritage Network), consisting of the collection of BRICKS Nodes (BNodes) hosted by European cultural heritage institutions and integrated through a peer-to-peer network, has been deployed, with Nodes installed in prominent cultural heritage institutions, making available the digital collections of some consortium partners and some prominent BRICKS Community Members (Alinari, TEL: The European Library)

- o A set of effective initiatives aimed at enlivening the BRICKS Community and increasing awareness about the BRICKS project especially in the world of cultural heritage institutions (focused training modules, bilateral communication strategies, press campaign, a comprehensive strategy for participating to focused events) has been **developed**. The immediate benefit of doubling the number of BRICKS Community member, now about 140, has been obtained

- ✓ An effective BRICKS organisational structure has been **developed** in order to fulfil the Vertical Integration Critical Success Factor. The objective for this vertical Integration is to ensure prompt and effective communication between the users and the foundation partners. This includes three constantly updated web sites:

  - o for external relationships and Community Members, (http:// www.brickscommunity.org

  - o for internal communication, http:// www.bricksfactory.com

  - o for BRICKS infrastructure developers, https://foundation.bricksfactory.org/
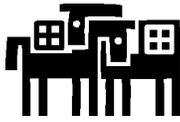
1.   Project Objectives and Achievements

1.1   Overall Objectives

1.1.1 Vision

The BRICKS Project aims at establishing the organisational and technological foundations for a **Digital Library** of the European Digital Memory. A "digital library" in this context refers to a networked system of services over globally available collections of multimedia digital content, providing a variety of knowledge layers for a variety of users and access modalities.

The BRICKS vision is that of an integrated system offering functionality for a new generation of Digital Libraries, which becomes a comprehensive term covering "Digital Museums", "Digital Archives" and other kinds of digital memory systems.

The technology results of the project constitute the main assets over the top of which a concrete deployment and sustainability strategy has been defined and implemented, including significant initiatives, such as the creation of the open-source **BRICKS Developers' Community** and a marketing and deployment plan for setting up a **BRICKS Cultural Heritage Network (BNet)**. .

These initiatives have paved the way towards "**BRICKS-after-BRICKS**", that is the life of BRICKS after the project ends. The main steps are the "**BRICKS Cooperation Agreement**", which will provide for a shared **BRICKS R&D Laboratory**, the pre-requisite of the "**BRICKS FACTORY"**, initially co-funded by some of the BRICKS partners (the "**BFunders**"), with the option of deciding on different legal status during the next 12 months.

1.1.2 Specific Objectives

In order to achieve this vision, three main project **objectives** were defined and addressed accordingly:

Objective 1:   *Infrastructure*: an open, distributed, scalable and safe infrastructure has been built delivered and extensively tested. Such an infrastructure provides the enabling technology baseline for the European Digital Memory.

Objective 2:   *Added-Value Applications:* some added-value applications have been deployed over the top of the Foundation infrastructure. These applications constitute a significant value for the user communities involved, and demonstrate both the viability of the Infrastructure approach in building application and services targeted to the Cultural Heritage domain, as well as the market potential of BRICKS.

Objective 3:   *Sustainability*: an appropriate Business Model for BRICKS-after-BRICKS has been defined.

To reach these objectives, the project has mobilised and motivated a large number of research institutions, industries and culture-based organisations.

1.1.3 Approach

Infrastructure

The infrastructure, known as the "**Foundation**", has been implemented through the integration of independent software units called "**Bricks**", which have been deployed on the nodes of the architecture. A Brick is an independent building block whose functionality is made available through a formally defined interface. Bricks can be composed together to provide richer functionality, and Bricks may encapsulate Content.
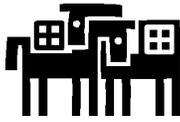
A decentralised, component-based architecture model, centred around the notion of a Brick, has been designed. This model maximises the usage of emerging standards, such as Web services, and adopts a peer-to-peer approach to achieve system scalability and reduce maintenance costs.

Methodologies have been defined and tools specified to create Bricks from existing contents and services and using open standards. Interoperability has been addressed by using existing flexible neutral data models for content and metadata and by specifying mapping from well known standards. The support of multiple languages is an integral part of the access functionalities.

The full set of planned services and policies has been developed and released within the second and third integrated prototype to ensure that BRICKS provides a trusted network, where users can experience secure, personalised, adaptive interactions with the offered services, and providers are protected against misuse of the assets available.

Application Services

In order to test and validate the Foundation infrastructure and demonstrate how to build value-added services over the top of such infrastructure, some significant **added-value** pillar applications have been developed and made available. The intention was to use such applications for validating the Foundation services and, at the same time, be the basis of the future advancement of the BRICKS Factory and be an attractive feature for the creation of a future cultural heritage community.

The chosen examples represented a relevant and well-balanced distribution between different user typologies and different methods of working in a digital content context. These Pillar services had the following objectives and users:

Pillar 1.   A scenario regarding the possibility to **share knowledge and information about complex cultural heritage objects.** The selected area concerns archaeological sites. The objective is to understand how to use IT tools to aggregate, compare and distribute information and data. Target users are art, historical and cultural heritage researchers.

Pillar 2.   A services-oriented shared network to distribute, transfer and compare knowledge and expertise about **internal management processes for culture**, targeted at Small and Museum-sized Museums. This means the creation of services for the training, expertise transfer and discussion of internal processes of museums, such as the organization of an exhibition, the training of new people, the visualisation and design of an art collection, and so on. The targeted users of this scenario are the managers and professionals working in Small and Medium Museums.

Pillar 3.   An integrated, shared space for the use of digital content to manage, to add personal experience, to generate new knowledge and to **create culture**. The targeted user group ais the general public and the visitors of real and virtual cultural exhibitions.

Pillar 4.   A scenario relevant to the aggregation of and access to **digital editions of texts** (artistic and historical documents and manuscripts), together with an advancement in the shared creation and access to critical editions in Art, Science and History. Targeted users of this scenario are the archive and libraries professional community.

1.2   State of the Art

1.2.1 Introduction

BRICKS aims at establishing the organisational and technological foundations for a **Digital Library** of European Digital Memory, which will allow wide sharing and dissemination of knowledge on Cultural Heritage among different people: museum visitors, researchers,
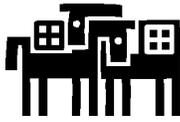
employees of Cultural Heritage Institutions, professionals and companies, as well as the development of new services for Museums, Digital Libraries and other Cultural Institutions.

The BRICKS vision is that of an integrated system offering functionality for a new generation of Digital Libraries, which becomes a comprehensive term covering "Digital Museums", "Digital Archives" and other kinds of digital memory systems.

To meet this vision, BRICKS is advancing the state of the art in a number of areas, impacting both the general field of Digital Libraries for Cultural Heritage applications, and on a number of specific information and communication technologies.

1.2.2 Technical Annex vision

In **Europe**, the Digital Library field started to emerge as a distinct area of research in the middle of the nineties, with the funding of some important national initiatives, such as the eLib programme in the UK, the Medoc project in Germany.

Then the area was taken up by the **European Union**, which with the **DigiCULT**/IST-KA3 section[1] of the 5th EU Framework Programme funded more than 100 projects in the digital heritage and cultural content area. The main focus was on *(New) Access (Modes) to Scientific and Cultural Heritage and Contents* followed by the topics of *Digital Preservation of Cultural Heritage* and *Next Generation Collection*s.

As a distinct discipline characterised by specific scientific challenges, the field of Digital Libraries was substantially enhanced in the **United States**, when NFS, DARPA and NASA created the Digital Library Initiative, which developed through Phase 1 and Phase 2 (1999).

Other analogous developments, although on a smaller scale, could be observed in other parts of the Western world. For instance, **Australia's** *Heritage Collection Council* has built up the *Australian Museums & Galleries Online (AMOL)*[2] Web-portal to preserve and promote Australia's cultural identity. This national museum online-collection and museum gateway is complemented by the *Pandora Archive*,[3] that manages preservation and access to networked documentary resources of Australia.

Canada possesses the *Canadian Heritage Information Network*[4] *(CHIN)* that is closely related to the *Virtual Museum of Canada (VMC)*[5].The more than 700 museums of these networks develop content for online-audiences and care for the standardisation of collection building and management procedures, metadata, information interchange and technical implementation.

However, despite the present flourishing of digital libraries and almost a decade of research and development, the field of Digital Libraries is far from being mature. This is mainly due to the fact that the enormous potentialities and range of applicability of a Digital Library technology somewhat delay the creation of a common vision on what should be the basic functionalities of a Digital Library.

From a scientific point of view, the results obtained under the Digital Library label are mostly of an empirical nature and do not make up a coherent body of knowledge, ready to be disseminated and put at work for the development of Digital Library Management Systems, that is systems supporting services on digital contents in the same way Database Management Systems support applications on structured data. As a consequence, the large number of Digital Library systems that have been, and are currently being created, are essentially *ad hoc* systems.
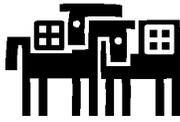
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[1] http://www.cordis.lu/ist/ka3/digicult/projects_a_g.htm

[2] http://amol.org.au/

[3] http://pandora.nla.gov.au/index.html

[4] http://www.chin.gc.ca/

[5] http://www.chin.gc.ca/

In general, Digital Library systems support access to specific types of digital content, on which they may or may not offer specific services for particular classes of users. These systems are the results of initiatives that have pursued their own goals, based on their own visions of what a Digital Library might be, and without any concern towards making their products open to integration with other, existing products.

The result is a multitude of service and content islands that are generally not interoperable and cannot be exploited in different settings.

1.2.3 Advancing the State of the Art

BRICKS is advancing this state of the art by creating an *open* Digital Library system based on the sharing and re-use of contents and services, and therefore able to be extended with additional services of any kind, in a cost-effective manner. The key factor of this advance is the hinging of the Digital Library on an open infrastructure.

The idea of an open, component-based Digital Library infrastructure is very recent and has been pursued in different application domains by a number of recently-launched projects: Scholnet[6], Greenstone[7], Digital Library in a Box[8]. The BRICKS infrastructure advances these from several points of views:

1. it provides better scalability, self-reliability and sustainability, thanks to the decentralised architecture;

2. it offers a secure and trusted environment;

3. it provides a high degree of flexibility in the usage and composition of content and services;

4. it is endowed with advanced basic services, such as multi-dimensional and multi-lingual search;

5. it is heavily based on standards.

On the other hand, most existing Digital Library systems still reflect organisational patterns we are used to from conventional libraries and archives: a central server or repository is the core of the system, where all content is maintained. This is convenient for those who maintain the library, because services can be kept on the desired level of quality in a reliable and well-established way.

A centralized architecture, however, is not demanded by contemporary technology any more. Networking technology provides unprecedented opportunities to create decentralized architectures allowing many partners to participate in the creation of virtual digital libraries, which offer access to the various resources provided by the individual partners. While this results in a new dimension of accessibility which users can enjoy, it also causes new problems. To name only a few: New ways to manage decentralized, potentially inhomogeneous contents and metadata resources are needed to establish necessary librarian standards, access and modification rights need to be managed for various types of property right holders, and search and browse techniques need to be adapted.

The very diverse content of digital libraries makes new and challenging demands on the underlying storage and management systems and architectures. A multitude of different data and formats - including images, video, audio, tables, arrays, graphics, algorithms and procedures, and documents - have to be addressed. Moreover there is a need to expedite the access and use of this data and to consider emerging requirements such as distributed access, collaborative aspects, multimedia compositions, automatic extraction, sophisticated query and browse functionalities, personalized access, etc.

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[6] http://www.ercim.org/scholnet

[7] http://www.greenstone.org/english/home.html

[8] http://dlbox.nudl.org/index.html
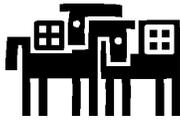
As described in the BRICKS Technical Annex, the ambitious scientific and technology goal of BRICKS is to design and develop an **open distributed service-oriented infrastructure for integrated access to distributed digital libraries.** This means the following main scientific innovations in the Digital Libraries State of the Art:

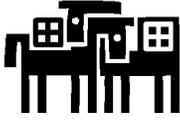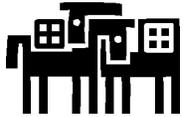1. to develop a **Decentralised Service Infrastructure** to increase flexibility and reliability of the systems and to improve the current web services architecture with a decentralised discovery service.

2. to implement a **Decentralised Metadata Storage** for XML documents, which is used to store globally available information (e.g. service descriptions, ontologies) in a central repository. Such central repositories are not normally available in decentralized architectures such as that of BRICKS. To achieve the availability and reliability of the stored data, data placement, replication and update mechanisms have to be developed to support decentralized environments.

3. to consider digital content collections as **mechanisms for self-organising the information space** that a digital library manages. In order to support the dynamic growth of the content space, the addition of new services and the variability of the digital library user needs, the Collection Management Brick will not gather and store the documents of a collection in an internal repository but instead will maintain them "virtually",

4. to treat **semantic agreement as a dynamic process** and derive global semantics (agreements) from local interactions to handle heterogeneous metadata and ontologies. This means that explicit local mappings are used to derive an implicit global agreement/understanding. In this way knowledge will be distributed among participants of the system. In addition decentralised approaches like **emergent semantics** will be evaluated to handle the evolving set of descriptions when new services are deployed.

5. to develop a **Decentralised Data Rights Management architecture**, increasing the overall system scalability and interoperability. The standard Trust and Confidence approach uses trusted third parties (TTP) that introduces centralisation, dependency on outside authority in the system and adds a substantial cost in the maintenance and usage of the system. BRICKS pursues an alternative, fundamentally different approach to manage online trusts that can work without enforcement by third parties. It will consider reporting, sharing and using reputation information in a society as part of a mechanism that makes co-operation the dominant strategy in interactions. This approach aims at re-establishing a social framework that supports trusted interactions.

1.2.4 Results achieved vs. SoTA

The following results have been achieved in advancing the SoTA (State of the Art). They can be seen in the folloiwing table which is organized according to the following schema:

- In the first column the title of the reference service (brick) is noted

- In the second column a short reminder of the State of The Art, as described in BRICKS TA is presented (see BRICKS TA for a more detailed description)

- In the third one, a short description of main Project objectives relevant to this brick (service)

- The fourth column presents the main results achieved during the reporting period

- The last column contains other comments, if any

Brick name	State of the Art	Bricks objectives	Results achieved	Comments
Bricks Framework	Not applicable	Platform-independent, low-cost, easy installation and administration, conformed to web-service standards and specifications	The BRICKS Framework has been improved in terms of performance, stability and usability. An for the application developer transparent mechanism automatically selects the best invocation method for the service (local via Java or remote via Web Service).	
Service Composition	Some work-in-progress / ongoing research models, specifications, standards and frameworks to support partially composition (e.g. static & non-semantic composition).	Supporting composition of services in order to build new applications based on existing services.	The support for service composition has been designed and a first version has been implemented. Since the proposed Twister BPEL Engine will not be supported anymore by the Open Source community, the evaluation and the selection of another promising Open Source BPEL engine, i.e. ActiveBPEL has been made.	
Service discovery	Web-service standards: UDDI and WSDL	Having a decentralised service discovery	The BRICKS framework has a mechanism that allows local components to find remote components.	
Decentralised XML storage	Peer-to-peer file-sharing systems: no updates Distributed databases: notion of global system overview	Transparent access for users working in highly dynamic and decentralised environment Managing high data availability	Major progress has been made in the development of the data replication mechanisms in order to ensure a high reliability and availability of data. Till the decentralized storage is available, a centralized version has been provided to allow other developers the usage of the service. The decentralized storage undergoes at the moment an extensive testing as this is a core component of the infrastructure.	

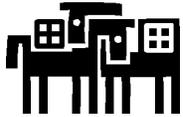| Content Management Brick	Many existing systems tailored to one type of media (e.g. text, images, sound) Cognitive gap between media storage and the way to discovery	Integration of different types of media Unified way to access content, regardless of type.	Handling of simple content (just one media file) further simplified by integration of corresponding methods with new Collection Manager.	
Metadata management	Many Metadata standards in Cultural Heritage	Achieve interoperability between those standards.	Implemented an RDF/OWL based service which can handle all metadata standards that can be expressed in OWL DL (which is the case for almost all of them). Dublin Core mapping of all metadata mandatory (side-effect of using OAI PMH as protocol for metadata import) - ensures base level of compatibility. CIDOC CRM mapping highly encouraged, infrastructure implemented. Test case of handling CIDOC data provided in the framework of the Finds Identifier application. Further interoperability via Query Rewriting mechanism (part of WP3.4)	
Indexing Brick	Indexing in peer-to-peer networks presently mainly concentrates on distributed hash tables of keyword-URI pairs	To specify and implement an indexing mechanism allowing to transparently retrieve data by key values in a peer-to-peer network, hiding the distribution as if the system were a centralized one	The index has been implemented and integrated with the metadata management. It supports single and range queries for Integer and Date values and the containment operator for strings. In particular a new version of the P-Grid software was integrated into the P2P Brick. IndexManager employs the P2P Brick for message routing to distribute and locate index entries in the Bricks network. The IndexManager is responsible for indexing attribute-value pairs extracted from metadata records supporting the following data types: String, Integer and Date. A query in the form of an attribute-value or an attribute-range pair returns the list of collections that store records relevant to the query.	A detailed description can be found in D3.4.3.

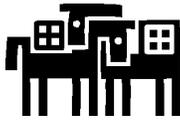| Collection management	There is still confusion about what a collection is and what its characteristics are. In many communities the term collection is used as a synonym of documents container and the issue is how to automatically populate it.	To specify and implement the dynamic construction of logical collections, as customized virtual user views of the digital library.	The Collection Manager API has been redefined to the end of making it simpler to use by application developers and also more efficiently implementable, reducing the number of web services calls. In the new API, the Collection Manager API is the unique entry point for all operations concerning content (including metadata) management and access. A new architecture has also been designed, allowing the sharing of the collection metadata in all the nodes of the network in a transparent way, so as to speed up query evaluation. This architecture has been implemented and tested during the last months of the year.	The new Collection Manager API is documented in D3.1.8
Search and Browse	Many similarity-based techniques, specific to content type, semantic-based techniques, specific to metadata formats and models, and structure-based techniques for document retrieval	Specification and implementation of the BRICKS query language, supporting a cross-language, personalized, semantic-based document retrieval functionality.	The full BRICKS query language has been implemented, including simple, advanced and ontology searches, with multilinguality. It is also possible to express queries on collections. An optimized implementation has been provided, after changing the QM API, which is now part of the Collection Manager API. In this implementation, the QM searches in parallel all the involved nodes, and display the results to the users in real time, without waiting for the entore result set to be available.	
Query personalisation	There is a lot of recent work in the area of personalization and recommended systems. The challenge of this Brick is to select the techniques that best work within the context of the multimedia objects available in the infrastructure.	To provide an overall customized, individualized user experience when accessing a BRICKS digital library, by taking into account the profile and context of a user or group of users.	A new version of the Personalization Manager has been implemented that is synchronized with the changes of the main Bricks framework and has incorporated the new BRICKS API in Personalization Manager. As with the original version, the new personalization Manager supports two types of personalizations: (1) query re-writing on advanced searches, taking into account the user preferences expressed in the user profile, and (2) query result re-ranking for simple searches, which implies a re-shuffling of the rank resulting from a simple search in order to bring to a higher position the objects that better reflect user preferences. In addition to the above, a Web-based personalization profile editor has been implemented using the AJAX technology inside the BRICKS workspace.	

| Monitoring Data Access and usage | Fully integrated secure reputation P2P based trust model, security infrastructure and Digital Rights Management. | Build a secure reputation based peer-to-peer trust model.

Build necessary infrastructure for secure service oriented communication.

Support definition and enforcement of digital rights. | Updated Registration and Rule Management GUI.

Extended users facility with users groups feature and integrated with Role Based Access Control.

Introduced DLObjects ownership concept and integrated with Role based Access Control.

Implemented and integrated P2P Trust model and reputation layer.

Implemented GUI for managing trust.

Provided web-based GUI for extensive security configuration.

Validated security model on several internal and consortium pillar applications.

Extended authorization granularity to include DLObjects on security context.

Implemented API to model License Offers and Digital Licenses following the MPEG21-REL standard.

Implemented DRM service: the DRM API provides web services to create and manage licenses, check digital rights and encrypt/decrypt content through watermarking or data encryption. Integrated the first version of the watermarking tool developed by the MICC laboratory of the University of Florence.

Integrated a simple data encryption algorithm to encrypt textual contents using DES algorithm.

Extended DRM model and service to encompass customisation of third party watermarking engine implementations and data encryption algorithms.

Developed an e-commerce web application (brstore) based on Open For Business open source software for managing digital licenses and other DRM services.

Integrated the Creative Commons standard licenses both in the DRM service API and in the workspace application, where it is possible to associate a CC license when uploading a DLO and to view the CC licenses associated to an image when browsing contents. | Extensible user management service allows for Integration of pre-existing directory services, like LDAP, Active Directory, etc.

Access control policy management GUI Includes policy testing facilities.

DRM brstore web application consists of:

- a back-office area where it is possible to create products, associate license offers to Bricks DLOs and (for admin users) to access to the DRM administration;

- a front-end area which is an e-commerce store where it is possible to buy a DLO and download the MPEG-REL license which has been generated and embedded in the content. |

| Handling heterogeneous metadata (Ontology brick) | Most of the current work focuses on the definition, evolution, and maintenance of standard ontologies the users of a system must employ. | To support (1) the basic management of ontologies; (2) interoperability between heterogeneous ontologies; (3) access to ontological information in support of the Search Brick | The Ontology Manager has been merged with the Schema Manager thus ceating a unique access point for the operations relative to metadata schemas or ontologies. A new API has been created for browsing ontologies, and a mapping definition mechanism has been designed for creating links between concepts of different ontologies, according to the proinciples of the Emergent semantics. | |

1.3 Work performed during the Reporting Period

While the activities covered in the third year can be summarised as **Development, Validation** and **Fine Tuning,** the keywords for the fourth period are **Validation, Fine Tuning** and **Sustainability.**

This activity stream concerned all the different BRICKS aspects and domains, such as foundation service development, end user applications, business modelling, community creation and user requirement refinement.
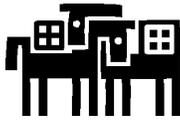
A short list of key results obtained during the fourth reporting period year is presented here to summarise the work performed.

1:    **Fine Tuning** of the third Foundation Integrated prototype, taking into account feedback provided by the pillars developers has been carried out. Extensive **Validation** and testing campaigns have been conducted by the pillars' developers and by the Open Source Community members in order to increase the stability and performance and produce more stable releases. Each of these foundation services represents advancement in the Cultural Digital Libraries state of the art both in terms of research and in terms of its usage inside Cultural Heritage projects.

2:    **Fine Tuning** of all the available pillars applications has been carried out on top of the foundation services, demonstrating how it is possible to use the basic foundation services for building added-value services and applications:

- Archaeological Finds Identifier and Archaeological Digital Library within the Archaeological Site pillar

- European Directory of the Company Museums and High Quality Rendering of Digital Images within the SMM pillar

- Online Exhibition and Story Album within the Living Memory

- EMYA award management and European Directory of Company Museums applications within the SMM pillar

3:    An extensive **validation campaign** for the **pillar applications** has been conducted at two different levels

- Within the consortium by the domain specific users

- Outside the consortium by some volunteers belonging to the BRICKS Community

4:    Three foundation-related demonstrators, already available from the end of the second project year, have been further **validated** and fine tuned in **real digital library environments**, in order to demonstrate how the BRICKS Foundation services are able to perform well also with great amount of data:

- The BRICKS Workspace, a web application demonstrating the usage of the services made available within the first integrated prototype

- The BRICKS Desktop, a stand-alone application which represents a client GUI for accessing the BRICKS Foundation

- The BRICKS Importer, allowing to harvest both the metadata and the content from legacy repositories

5:    Concrete initiatives have been carried out for sustaining the BRICKS Foundation services approach to the market:

- The open-source BRICKS Developers Community has been created, stimulated and maintained

- The Open Source Community has been maintained and increased, through
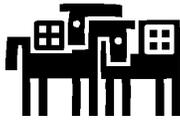
targeted dissemination activities, such as tailored workshops held in worldwide famous Open Source Conferences (Apache Conference) and panels at Digital Libraries Conferences (ECDL 2007), and awareness about BRICKS has been raised in some of the most significant Open Source Communities (e.g.: OW2)

▪ An SRU Gateway has been implemented in order to increase the interoperability level of the BRICKS Foundation with external content sources

▪ A final **validated** Business Plan has been delivered, including a two-step business strategy for the post-project period known as BRICKS-after-BRICKS (the BRICKS Laboratory and the BRICKS Factory), an updated Market and Competition Analysis and the financials for BRICKS-after-BRICKS have been produced

▪ A Post-Project Cooperation Agreement between four core technology partners (Engineering, Metaware, CNR and ARC) has been signed with a period of validity of one year, defining how these partners will share roles, responsibilities, liabilities and costs for one year after the end of the project

▪ The BNet (BRICKS Cultural Heritage Network), consisting of the collection of BRICKS Nodes (BNodes) hosted by European cultural heritage institutions and integrated through a peer-to-peer network, has been deployed, with Nodes installed in prominent cultural heritage institutions, making available the digital collections of some consortium partners and some prominent BRICKS Community Members (Alinari, TEL: The European Library)

▪ A set of effective initiatives aimed at enlivening the BRICKS Community and increasing awareness about the BRICKS project especially in the world of cultural heritage institutions (focused training modules, bilateral communication strategies, press campaign, a comprehensive strategy for participating to focused events) has been **developed**. The immediate benefit of doubling the number of BRICKS Community member, now 142, has been obtained

6:    An effective BRICKS organisational structure has been **developed** in order to fulfil the Vertical Integration Critical Success Factor. The objective for this vertical Integration is to ensure prompt and effective communication between the users and the foundation partners. This includes three constantly updated web sites:

▪ for external relationships and Community Members, (http:// www.brickscommunity.org,

▪ for internal communication, http:// www.bricksfactory.com

▪ for BRICKS infrastructure developers, https://foundation.bricksfactory.org/

1.3.1 Work Performed vs. BRICKS Objectives

The work performed during the fourth reporting period can be compared to the three general BRICKS main objectives, as described in the Amended BRICKS Technical Annex, (*see chapter 13. Detailed Implementation Plan – Period m37-m42*):

Ob. 1 - Build an open scalable infrastructure

Ob. 2 - Develop the right value added services

Ob. 3 - Use an effective sustainability model

A short list of the main results achieved versus these objectives is presented here.

Work performed vs. Objective 1. *(Build an open Scalable Infrastructure)*

The overall objective of building an open, scalable infrastructure has been addressed by completing the following tasks:

- ✓ Continuous **monitoring, bug fixing and fine tuning activities**, targeted to increase the stability and the performance of existing services and applications, has been carried out on the third Foundation Integrated prototype.

- ✓ New comprehensive and timely **functional and integration tests** have been further conducted for ensuring a seamless integration of the services. The automatic testing methodology has been included as an integral part of the BRICKS foundation page (https://foundation.bricksfactory.org/)

- ✓ To prepare the Foundation for public release and open source developments, final APIs, source code, documentation and an **integrated design report** for the whole Foundation have been made available (D3.1.11 – *BRICKS Design Documentation* deliverable)

- ✓ An SRU gateway has been implemented for in order to allow BRICKS to be highly **interoperable** with other external content sources, like TEL (The European Library).

- ✓ To allow a continuous improvement and extension of the BRICKS system even after the end of the project, a development infrastructure like SourceForge and, consequently a BRICKS **open source developers community** (available at http://dev.brickscommunity.org) has been provided to the open source developers, which holds all information and source codes necessary for the development and maintenance of the foundation. This activity has been undertaken in close collaboration with the roof and sustainability activity, since this community is a strategic asset for sustaining the future of the project.

- ✓ A continuous updating of the technology state of the art has been made aimed at identifying new and emerging new technologies which could further advance the BRICKS Foundation Infrastructure (D3.1.10 – *Updated Technology Watching* deliverable).

- ✓ The **BRICKS software** is available to be downloaded from the BRICKS developers community web site.

Work performed vs. Objective 2. *(Develop the right Added-Value Services)*

The objective of developing appropriate added-value services has been addressed by completing the following tasks:

- ✓ All the seven **pillars applications** have been validated, fine tuned and updated and made available built on the top of the foundation services, demonstrating how it is possible to use the basic foundation services for building added-value services and applications:
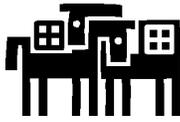
- o **Archaeological Finds Identifier** and **Archaeological Digital Library** within the Archaeological Site pillar
- o **EMYA Award Management, European Directory of the Company Museums** and **High Quality Rendering of Digital Images** within the SMM pillar
- o **Online Exhibition** and **Story Album** within the Living Memory pillar

- ✓ Another pillar application has been delivered and validated within the Small and Medium Museum pillar targeted to allow the final user to create **personalised tourist itineraries** based on the small and medium museums belonging to the Polo Museale Fiorentino (D2.3.5 – *Personalised tourist itineraries application for SMMs* deliverable)

- ✓ An extensive **end user validation campaign** for the **pillar applications** has been undertaken at two different levels: within the consortium by the domain specific users belonging to cultural heritage institutions and outside the consortium by some volunteers belonging to the BRICKS Community. Their comments, suggestions and purposes will be the more significant evaluation of what the project has produced concerning the pillars' area. These activities have been carried out for all the pillars and are available in deliverable D2.1.4 – *Validation of the pillar applications by users*

- ✓ A specific monitoring activity has been undertaken to verify that **end users have been successfully integrated into the development process**, e.g. involving them in testing and even in certain of the technical choices. In particular some volunteers within the BRICKS Community members have been selected for validating the pillars applications. This has led to a unified vision of the project being developed, to setting up a number of communication tools and above all to the definition of the specifications of application scenarios which will be implemented next year.


Work performed vs. Objective 3. *(Use an effective Sustainability Model)*

The overall objective of approaching the market in a sustainable way has been addressed by carrying out the following tasks:

- ✓ A set of concrete and effective initiatives has been carried out targeted to **enliven the BRICKS Community** and increase awareness about the BRICKS project especially in the world of the cultural heritage institutions *(focused training modules, bilateral communication strategies, press campaign, a comprehensive strategy for participating to focused events, joint panel with the other European projects in the Digital Libraries field)*. The immediate benefit of these activities has been the doubling the number of BRICKS Community members, now consisting of 142 members. A significant report of these activities has been included in the D1.1.6 – *Aggregation Final Report* and D1.2.5 - *Dissemination Final Report* deliverables.

- ✓ The **user-oriented BRICKS Community web-site** – http://www.brickscommunity.org has also been constantly updated. It provides specific sections dedicated the Community Members and all the information related to the project activities and complete information on how to be become involved.

- ✓ A successful **Brand name** in the non-proprietary middleware open source world has been created and continually exploited throughout the project lifetime. This is not only a matter of producing a good quality product, as it requires a balance between gaining the support of the open source development community and getting the **BRICKS Factory** message in front of Digital Libraries decision makers.

- ✓ An **Open-source BRICKS Developers Community** has been created, stimulated and maintained
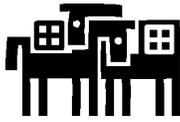
✓ The Open Source Community has been maintained and increased, through targeted dissemination activities, such as tailored workshops held in worldwide famous Open Source Conferences (Apache Conference) and panels at Digital Libraries Conferences (ECDL 2007), and awareness about BRICKS has been raised in some of the most significant Open Source Communities (e.g.: OW2). The website of this community is available at http://dev.brickscommunity.org

✓ A final **validated** Business Plan has been delivered, including a two-step business strategy for the post-project period known as BRICKS-after-BRICKS (the BRICKS Laboratory and the BRICKS Factory), an updated Market and Competition Analysis and the financials for BRICKS-after-BRICKS has been produced (D1.1.7 – *Final Business Plan* deliverable).

✓ A **Post-Project Cooperation Agreement** between four core technology partners (Engineering, Metaware, CNR and ARC) has been signed with a period of validity of one year, defining how these partners will share roles, responsibilities, liabilities and costs for one year after the end of the project

✓ A **BRICKS Cultural Heritage Network (BNet),** consisting of the collection of BRICKS Nodes (BNodes) hosted by European cultural heritage institutions and integrated through a peer-to-peer network, has been deployed, with Nodes installed in prominent cultural heritage institutions, making available the digital collections belonging to some consortium partners as well as to some prominent BRICKS Community Members (Alinari, TEL: The European Library, etc..)

✓ Several **training modules** targeted to cover the different aspects of the application scenarios (application maintenance from a technological point of view, specific application usage dealing with the content management and maintenance, how to gain benefit from the exploitation policy of the BRICKS project and the innovation applied to the Cultural Heritage) have been carried out (*D1.2.6 Training final report* deliverable).

✓ Three foundation-related demonstrators, already available from the end of the second project year, have been further enriched with new functionalities, **validated**, and fine tuned in **real digital library environments**, and suitably documented in order to demonstrate how the BRICKS Foundation services are able to perform well also with great amount of data:

    o The BRICKS Workspace, a general purpose web application providing end-users with direct access to important Foundation services (D1.3.3 – *BRICKS Workspace Demonstrator (Code, Setup and Configuration Documentation)* deliverable)

    o The BRICKS Desktop, a Java standalone application demonstrating the whole set of Foundation services in all detail (D1.3.4 – *BRICKS Desktop Demonstrator (Code, Setup and Configuration Documentation)* deliverable)

    o The BRICKS Importer, allowing to harvest both the metadata and the content from legacy repositories
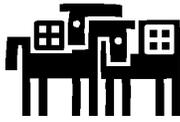
1.3.2 BRICKS Infrastructure Development

The aim of the BRICKS project wass to design and develop an open user and service-oriented infrastructure to share knowledge and resources in the Cultural Heritage domain. This required the development and integration of various technologies like self-organising data stores, decentralised query processing or digital rights management. All technology areas addressed in the project were complex in themselves. But they were based on a common technological basis like XML, RDF or web services, which enabled the integrated usage of the technologies for the development of sophisticated user applications. Because of the complexity of the whole concept, this work was divided into five different work packages. These Work Packages (WP3.1, WP3.2, WP3.3, WP3.4 and WP3.5) have produced various deliverables, which have been grouped as comprehensive deliverables released within the WP3.1 Work Package. For clarity's sake a summary of the results are presented here.

- **Updated Technology Watching (D3.1.10)**, providing an update to the technology state-of-the-art at the end of the BRICKS project. This deliverable is based on the D3.1.1 - *State of the Art and Technology Watching Plan* deliverable and is targeted to provide an updated technology positioning of the BRICKS technologies in comparison with other new and emerging technologies.

- **BRICKS Design Documentation (D3.1.11)**. This document provides an integrated design report of the whole Foundation services, including the architecture, use scenarios and UML diagrams. It is fundamental for sustaining the BRICKS technology after the end of the project, allowing improvements and extensions of the BRICKS system, after the end of the project. Such a report is naturally complemented by the API Reference Guide (Deliverable D3.1.8).

1.3.3 Developing Value-added Pillar Applications

Within the current reporting period, the second part of the pillar applications validation strategy has been carried out: specific and targeted groups of end users (students, researchers, teachers, domain experts) both belonging to the BRICKS Consortium or coming from the BRICKS Community have spontaneously participated to this validation campaign, providing numerous feedback about the pillar applications. Simultaneously the seven pillar applications, already available from the third reporting period, have been fine tuned and their stability has been improved.

All this work has been made within four different workpackages (WP2.1, WP2.2, WP2.3, WP2.4), which have produced two deliverables; for clarity's sake a summary of the results are presented here.

- ✓ **Validation of the pillar application by end users (D2.1.4).** This deliverable consists of: 1) a web application, the BRICKS Feedback Questionnaire (BFQ), available at the http://feedback.brickscommunity.org web site allowing any kind of user (pillars developers, end users) to express its own feedback about the foundation prototype, as well as the pillar applications; 2) feedback collected by the final users of the pillars applications. In particular such a feedback has been gathered by users belonging to the BRICKS consortium and by volunteers organisations belonging to the BRICKS Community. The second group of end users has been very important in order to measure the satisfaction level of people who did not have been involved in the design and specification of the pillar applications.

- ✓ **Personalised tourist itineraries application for SMMs (D2.3.5).** This prototype has been delivered directly using the services made available by the third
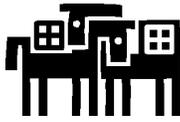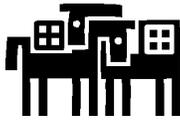
foundation release and has to be considered as an extension of the **High Quality Rendering of Digital Images** applications, when it is applied to the digital content of the small and medium museums belonging to the Polo Museale Fiorentino. This application has been validated and tested by cultural heritage experts' .

- *Making available the work on the users specifications* carried out within the WP2.5 Scriptorium to the concerned scientific communities, as requested during the second review, allowing other users in the field of the critical editions could profit from the activities carried out to date.

1.3.4 Sustainability

As the BRICKS project comes to the end, many activities have been carried out concerning the sustainability aspect, aimed at bridging the gap between the advanced technologies developed within BRICKS foundation and the potential market for BRICKS-after-BRICKS. The most important of these activities was firstly targeted to enliven the BRICKS community and increase the awareness about the BRICKS project, especially in the world of cultural heritage institutions, in the scientific community of the digital libraries *(focused training modules, bilateral communication strategies, press campaign, a comprehensive strategy for participating to focused events, Joint BRICK-TEL.MICHAEL-DELOS Panel at ECDL 2007 Conference, Participation at the OW2 Open Source Community, Exhibition and Demo at the Apache 2007 Conference)*. As a concrete measure of how such initiatives have been successful, the number of the BRICKS Community members increased to 142. Several other initiatives supporting the sustainability of the project have been undertaken, even in close collaboration with the Foundation, such as the creation, the fostering and the maintenance of an open source community for developers, the delivery and validation on real digital library environments of specific demonstrators, the delivery of a validated business plan, including the financial estimates for BRICKS-after-BRICKS, and the incremental deployment of a Production BRICKS Cultural Heritage Network (still in progress), where a number of content providers will be able to expose their contents. All this work has been made within three different workpackages (WP1.1, WP1.2, WP1.3), which have produced various deliverables; for clarity's sake a summary of the results are presented here.

- *Aggregation Final Report (D1.1.6).* This deliverable is the concrete result of task 1.1.7 – *BRICKS Community and aggregation strategies.* The aim of the document is to report about all the activities related to the BRICKS Community and in particular to all the strategies carried put for aggregating members of the Communities, like appropriate collaborations and synergies with other projects, definition of legal issues, IPR and Service Provision in order to prevent illegal use of content. The aggregation strategies have been defined and put in practice in close cooperation with the other WP1.1 tasks.

- *Final Business Plan (D1.1.7).* This document presents the Business Plan of the "**BRICKS-after-BRICKS**" activity, that is the life of BRICKS after the project ends. The deliverable provides an updated market and competition analysis and presents the financials for the next four years after the end of the project. Within the time framework of the BRICKS Project partners worked together towards a common goal, identifying mutual strengths and interests. The results of the project are the basis on which **BRICKS-after-BRICKS** is built. Weaknesses that are present in the results of the project have been identified. These include making the infrastructure more robust and optimising the BNode performance. Signing a **Post-project Cooperation Agreement** is the first step. This agreement specifies the creation of a shared laboratory, financed with seed funding from a subset of the BRICKS Partners known as the **BFunders**. The Agreement will last 1 year from the end of the BRICKS project. The objective of the laboratory is to address the weaknesses in the results of the project. At the conclusion of the Cooperation Agreement, the shared laboratory will become the basis of the **BRICKS Factory**, whose specific legal status will be determined during the Cooperation Agreement period. This is planned to occur towards the end of the first year after the project. The BRICKS

Factory will provide support for BFunder or BRICKS Partner or BRICKS Community Member offerings in the Cultural Heritage market.

- ***Dissemination Final Report (D1.2.5).*** This deliverable documents all the strategies and the activities which have been carried out to enhance the visibility of the BRICKS project, including the updating of the BRICKS Community web site, promotional material (brochures, updated booklets, posters, bookmarks, newsletters, flash presentations), collaboration with other projects, participation at focused events like the 2007 Apache Open Source Conference, a panel at the European Conference of Digital Libraries, and the participation at the OW2 Open Source Community.

- ***Training Final Report (D1.2.6).*** This deliverable reports about all the activities which have been carried out within the Task 1.2.2. – *Training Activities*. In particular three different categories of training modules have been deployed along the project lifetime (targeted respectively to technical operators and system administrators, to application developers and to non technician people coming from cultural heritage institutions (curators, museums managers, policy makers). The documents illustrates all the training sessions which have been organised for each of the training categories, the target group and the gained impact and results of each of these sessions

- ***BRICKS Workspace Demonstrator (Code, Setup and Configuration Documentation) (D1.3.3).*** The BRICKS Workspace is a web application demonstrating some of the Foundation services, tailored to be used mainly by non technician people, that is to say by people interested in cultural heritage in general and by expert users and staff belonging to museums, libraries and archives. The essential focus of the Workspace has been to have an easy to setup and use demonstrator at hand to show the different aspects of the BRICKS Foundation services. The document, after a general introduction to the Workspace application, provides user documentation showing how users can interact with the application. Furthermore, the architecture of the application and how it has been integrated with BRICKS foundation has been presented. Finally all the details concerning the setup and the implementation of the application's modules are illustrated.

- ***BRICKS Desktop Demonstrator (Code, Setup and Configuration Documentation) (D1.3.4).*** This document describes the Graphical User Interfaces and the software architecture of the BRICKS Desktop Demonstrator, and provides guidelines for the software developers who want to add new plug-ins to the BRICKS Foundation. The deliverable begins by presenting an overview of the state-of-the-art concerning the Rich Internet Applications, introducing the technology framework of the Desktop application in comparison with other emerging platform for the web development. The user documentation has been included explaining how to install and update the Desktop software and how to use the Desktop GUIs to interact with BRICKS. Furthermore the basic concepts of the Eclipse RCP Framework and the logical layers of the Desktop architecture have been presented and a short tutorial to the installation of a full-featured Desktop Development Environment have been included.
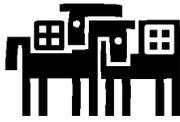
2.   Workpackage Progress

2.1   BRICKS Structure

The BRICKS Project and its Workpackages are structured into 3 main areas:

1.   **Roof**: WP1.0, WP1.1, WP1.2, WP1.3

2.   **Pillars**: WP2.1, WP2.2, WP2.3, WP2.4

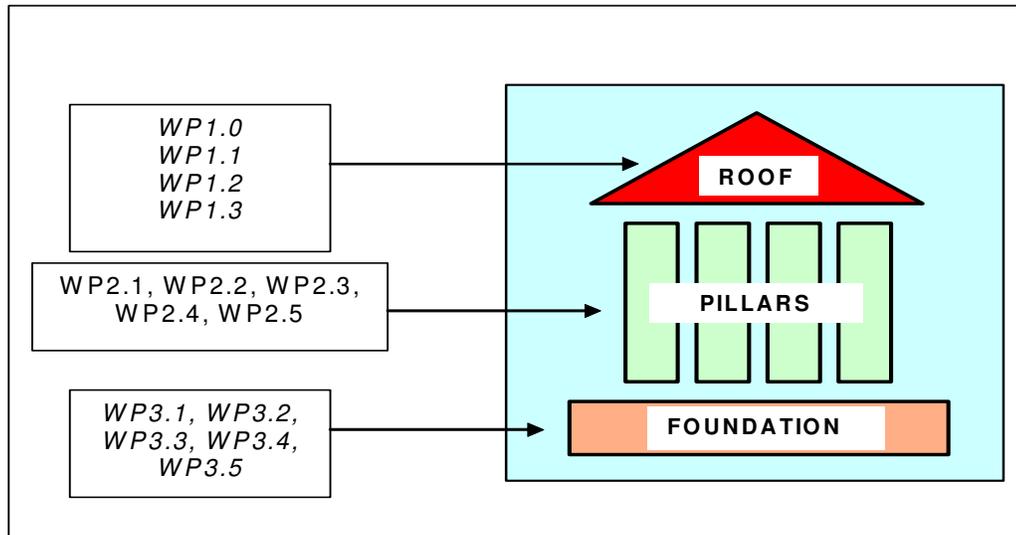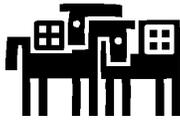3.   **Foundation**: WP3.1, WP3.2, WP3.3, WP3.4, WP3.5

Figure 2-1: BRICKS Workpackages

2.2 WP1.0 Management & Co-ordination

Work Package Leader - ENG

Planned Objectives

At the starting point of the reporting period, the objectives of this deliverables were:

1. **To ensure the overall management of the work undertaken in BRICKS**. This involves controlling the technical and chronological coherence of contributions from the partners, and implementing the quality rules adopted by the Board of Directors. Progress of the work will be monitored against the milestones and the objectives defined in the project programme, as well as the quality plan.

2. **To conduct all the activities carried out in this work-package according to the BRICKS management structure.** Engineering is responsible for this workpackage as overall coordinator of the Integrated Project. The Project Director will be supported by his staff, composed of the Technology Director, the Innovation Director, the Exploitation Director, the Content Director and the Administrative Director.

Progress towards objectives

The two work package objectives have been fully achieved.

First objective

Three project meetings have been organised (including the third review meeting in March 2007 in Vienna) and conducted, inside the meetings all communication amongst the partners have been ensured, moreover a lot of effort has been dedicated to communication during the normal activity. All coordination of reporting and administrative activities has been carried out.

Some international co-operation activity has been conducted and can be found inside the dissemination plan.

The project **Quality Plan** has been applied to ensure consistent quality of all deliverables, including an internal auditing and peer review process.

Communication with the EC and the project officer have been ensured, according to the EC guidelines and to the BRICKS internal Quality Plan.

All deliverables relevant to the Project reporting have been completed and submitted, namely D1.0.12 Monitoring report, D1.0.13 Financial reports.

Second Objective

A specific task has been dedicated to the strategic direction of the project, together with the management of Change, to ensure the right flexibility for the BRICKS conduction and evolution. The Board of Directors has handled all strategic decisions regarding project management, including possible alliances and relationship changes management of the project.

All directors have contributed to the Project management in its different aspects, including scientific and technical problems, vertical integration between users and technical people, content and cultural aspects, valorisation and dissemination, etc.

Main deviations from the workplan

No main deviations from the foreseen Work Plan
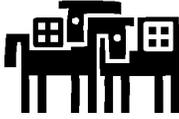
Deliverables Status	
D1.0.12 Monitoring report (Periodic Activity Report)	Submitted
D1.0.13 Financial reports	Submitted
Milestones Status	
T42: Yearly Financial Report	Achieved
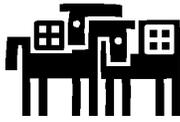
2.3   WP1.1 Exploitation and Sustainability

Work Package leader – ENG

Planned Objectives

This workpackage addresses the Business Development activities leading to a successful launch of the BRICKS Factory Company.

During the concluding phase (m37-m42), this work package will:

1:     Manage the BRICKS Brand

2:     Implement aggregation strategies and leverage the BRICKS Community

3:     Implement a Cultural Heritage Network

4:     Finalise the Business Plan

Progress towards objectives

The objectives of the reporting period have been fully achieved.

First Objective

BRICKS Brand

A Brand name in the non-proprietary middleware open source world for BRICKS services has been created. This is not only a matter of producing a good quality product, as it requires a balance between gaining the support of the open source development community and getting the BRICKS FACTORY message in front of Digital Libraries decision makers. The BRICKS FACTORY will present itself as a "benevolent guardian" of the true spirit of open source and will allow people/companies to use the software for free, having in mind that the target is on the growing open source conversions being contemplated in Digital Libraries organizations: the definite true target market.

The BRICKS FACTORY will leverage on and need the support of the BRICKS Community at large, which will constitute the first potential client base.

Second Objective

BRICKS Community and aggregation strategies

New aggregation activities have been developed in order to improve and regulate the access of new institutions and actors in the BRICKS Community. The aim was to continually increase the number of users and developer members, defining appropriate collaboration with the involved subjects and expanding synergies with other projects and similar initiatives. Definition of legal Issues including IPR and Service Provision in order to prevent illegal use of the content have been carried out, and basic rules fixed to regulate access and consulting of contents by specifying the level of details to be delivered and valid security mechanisms.

Third Objective

BRICKS Cultural Heritage Network Implementation

A BRICKS Cultural Heritage Network (BCHN) is now fully operational in order to ensure that the BRICKS Community has a strong visible impact and influence in the cultural heritage sector (support for sustainability), and to maximize the number of the networked institutions and the volume of available digital content (exploitation).

A BCHN with a limited yet prominent number of BNodes, belonging not only to BRICKS partners but also to BRICKS Community members, has been deployed. The BCHN represents a concrete result of the BRICKS project and it consists of a comprehensive collection of BRICKS Nodes (BNodes) hosted by European cultural heritage institutions and integrated through the peer-to-

peer network, released through the Foundation. The main activities carried out so far are:
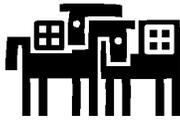
- Delivery of a concrete "marketing & deployment plan", identifying the most promising market segments for strengthening the exploitation of BRICKS.
- Setting up of the network
- Providing support to the cultural institution and/or technology providers which decided to install a BNode
- Validation of the BCHN, through the uploading of digital content by the BRICKS partners and BRICKS Community Members

Fourth Objective

Business Planning

The main activity during the last six months of the project was the formulation of the Business Plan for the "**BRICKS-after-BRICKS**" activity, that is the life of BRICKS after the project ends.

The **BRICKS Project** allowed its partners to work together towards a common goal, identifying mutual strengths and interests. The results of the project are the basis on which BRICKS-after-BRICKS is built. Weaknesses that are present in the results of the project have been identified. These include making the infrastructure more robust and optimising the BNode performance.

Signing a post-project **Cooperation Agreement** was the first step. This agreement specifies the creation of a shared laboratory, financed with seed funding from a subset of the BRICKS Partners known as the **BFunders**. The Agreement will last 1 year from the end of the BRICKS project. The objective of the laboratory is to address the weaknesses in the results of the project.

At the conclusion of the Cooperation Agreement, the shared laboratory will become the basis of the **BRICKS Factory**, whose specific legal status will be determined during the Cooperation Agreement period. This is planned to occur towards the end of the first year after the project. The BRICKS Factory will provide support for BFunder or BRICKS Partner or BRICKS Community Member offerings in the Cultural Heritage market.

Examples of 6 business scenarios that will be supported by the BRICKS Factory are provided in the Business Plan, together with financial forecasts for these scenarios for a 4-year period. It can be seen that during Year 1 (that of the Cooperation Agreement), the BFunders completely finance its operation, with no returns planned. During years 2-4, it can be seen that the cost of the shared laboratory is offset by increased income for the companies involved. The overall operation is expected to break even during the third year.

Main deviations from the workplan	
None	
Deliverables	
D.1.1.6 – Aggregation final report	Submitted
D1.1.7 – Final Business Plan	Submitted
Milestones Status	
T42: A concrete sustainability plan made available	Achieved
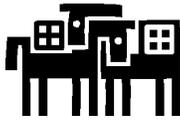
2.4   WP1.2 Dissemination and Training

Work Package leader – MW

Planned Objectives

This workpackage deals with the future evolution and valorisation of the BRICKS system. There are two main focuses:

- The first one is manifold targeted dissemination with the fundamental aim to reach an enlarged public interest. The fundamental principle is to go further than simple dissemination actions like participating to events and distributing dissemination materials to a targeted audience, rather it focuses on creating a worldwide community composed of all those organisations interested in BRICKS concepts and ideas. These activities are carried out in strict collaboration with WP1.1 Exploitation and Sustainability.

- The second focus is the training. These activities have the goal to guarantee a correct and easy usage of the BRICKS system and services in order to assure and facilitate a future utilisation and valorisation of the project results.

1. **The dissemination activities** cover the following aspects:
   - Defining different dissemination channels (Web-site, brochures…)
   - Disseminating and publicising the project to national and international bodies
   - Implementing the strategic market, innovation and technology watch activities
   - Concertation with other projects active in the 6th framework, that produce or possess complementary know-how
   - Follow up activities in regulatory and legal issues
   - Participating in concertation and coordination workshops

2. **The training activities** aim at:
   - Training the technological actors for the system and service maintenance
   - Training the user of the BRICKS services: the manager of the memory institution, researchers, schools and universities, museum operators and scientific professionals

Progress towards the Objectives

First important results, according to the scheduling foreseen in the TA, have been achieved.

The BRICKS Community Web Site (www.brickscommunity.org)

The BRICKS Community Web Site involves a productive critical mass around the activities of BRICKS and its initiatives. This Website offers different functionalities, and principally focuses on: *Dissemination*, which presents specific material presenting the Project to the public; and *Communication,* one of the most important values of BRICKS, since it offers the collaboration and the exchange of experiences between Partners and Community Members. Each Partner, as well as Community Members, have a dedicated area where they can present themselves, their products, and activities. Of course, restricted areas are contemplated. A specific section is available to all the Community Members to provide a platform to exchange experiences, to publicise communications and events, disseminate best practices, and other useful information.
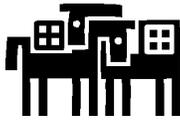
A CMS (Content Management System) guide was produced, is available on-line, and is distributed upon registration to new members to offer instructions in light of web functions in order to automate the workflow for the publication of documents, information retrieval, statistics about web site users, and how to successfully navigate the website. Each user will be able to upload and update articles, news, specific information, documents, and files in an easy and autonomous way by just logging into the site.

Dissemination material

A diverse selection of dissemination materials have been produced in order to stimulate public awareness. More specifically, in addition to materials created to establish the BRICKS brand, new dissemination materials have been designed according to different communication needs, various event typologies and, following the evolution of the project. These materials include an official BRICKS booklet, brochures, posters, bookmarks, and a seasonal on-line published Newsletter.

Events and workshops

A complete and rich calendar of events foresaw BRICKS participation in several significant events. The entire list is also available on the public web site (www.brickscommunity.org). At the same time, BRICKS-focused workshops have been organised, as well as special events where specific topics related to BRICKS scenarios have been developed, analysed, and offered as an opportunity for researchers and experts of that scenario to brainstorm together and exchange experiences and skills. Several e-press articles have already been published on the web regarding the BRICKS project.

BRICKS Content Provider Technical Survey

This survey corresponds with the deployment of the BRICKS Cultural Heritage network, or "BNet" - which includes content from individual digital collections. In order to support this large scale deployment, BRICKS is gathering information about individual collections, metadata, and technical infrastructures. To this end, BRICKS has posted a survey which is helping BRICKS move towards the creation of a BRICKS network and installation of Bnodes.

Strategic Meetings

Meetings with strategic potential users have been carried out in order to serve as a point of reference to promote technical interoperability among between BRICKS and target institutions. These meetings are instrumental in expanding the BRICKS network, and establishing tangible relationships among prominent European institutions in the Cultural Heritage domain. These meetings furthermore consolidate collaboration opportunities to guarantee the future exploitation of BRICKS results and solutions. Using BRICKS they can fulfil their fundamental needs within a very low cost model.

The BRICKS Community Membership

With the aim of building and accessing the BRICKS open community across Europe and beyond, international institutions and individuals have been invited to join the BRICKS User Community. Dissemination efforts have been put forth (an official BRICKS Community Invitation) to target specific industry sectors, and as a result, the Community has sustained a dramatic increase in population There are currently 143 members that have joined the BRICKS Community from 34 countries, 22 states within the EU and 12 non-EU member states.

Concertation with other projects

Clustering among BRICKS and other Cultural Heritage EC funded projects was pursued by the organisation of open events. Poster sessions were attended, involving numerous researchers and professionals, as a way to diffuse and disseminate information to the general public and specialized audiences working in the target industry.

BRICKS has created strong collaboration ties with MICHAEL, TEL/EDL, DELOS, MINERVA, and PRESTO SPACE.

Training

In particular three different categories of training modules have been deployed along the project lifetime (targeted respectively to technical operators and system administrators, to application developers and to non technician people coming from cultural heritage institutions (curators, museums managers, policy makers).

Bonus addition from workprogramme

 A major unforeseen addition to the WP was the creation of the BRICKS Developer Community. The BRICKS Developer Community is the main tool for the creation of the appropriate awareness among technology providers, independent system integrators and developer partners for the project and was created as a Wiki-based Developer Community Website, at http://dev.brickscommunity.org. The aim of the website is to become the center for collecting BRICKS development-related documentation in a collaborative fashion. After a simple registration, anyone can edit the website pages and share knowledge with the rest of the Community. Relevant information is planned to appear on the BRICKS Developer Community website, including a How-to guide, Frequently Asked Questions, as well as pointers to the existing resources, downloads, and technical deliverables.

No Deviations from original workprogramme were made

Deliverables Status

D1.2.4 Training Final Report   Submitted

Milestones Status

2.5   WP1.3 Demonstration

Work Package leader - ARC

Planned Objectives

The objective of this work package is to support any member of the BRICKS consortium that might be called upon to explain, justify, and sell the project to potential partners, users, and funding agencies, by providing a set of applications that will concretely demonstrate various aspects of the project. The demonstration efforts thus directly supported BRICKS exploitation and dissemination activities through these applications, which have been referred to as the BRICKS Demonstrators.

Progress towards the objectives

The development of the demonstrators comprised three different phases:

Phase 1 was a preliminary demonstrator that consisted of an application with minimal functionalities, as it has been deployed as a single BNode with locally imported content, and offered only a limited demonstration of Web Services. Furthermore it did not require an internet connection for demonstration.

Phase 2 was completed at the end of year 2005 and was parallel to the development of the various Foundation prototype deliveries. In addition to illustrating extended functionality of the foundation services, the phase 2 demonstrators consisted of several BNodes and fully demonstrated the distributed Web Services architecture.

Within Phase 2 the following demonstrators have been developed and made available, in order to demonstrate how to use the BRICKS Foundation services:

- The BRICKS Workspace, a web application for the general user demonstrating the usage of the Web Services made available with the first integrated Foundation prototype.

- The BRICKS Desktop, a more technical stand-alone application for administrators which represents a client GUI for accessing the BRICKS Foundation.

- The BRICKS Importer, allowing to harvest both the metadata and the content from legacy repositories.

Phase 3 has been completed and consisted of final prototypes at the end of the BRICKS project (T42). This phase provided more advanced versions of the three demonstrators introduced in Phase 2 (BRICKS Workspace, BRICKS Desktop and BRICKS Importer).

The BRICKS Workspace has proven to be crucial for testing the Foundation components – it is deployed in the Foundation's testbed and used whenever insight into the Bnodes contents has to be provided. The effort within this phase is focused on testing and integrating the new Foundation API and new Foundation features.

The **BRICKS Workspace GUI Design**, including BRICKS corporate identity (CI) guidelines, layouts, menus, links, and forms, has been successfully adopted by several other Pillar applications. The implementation and testing of the BRICKS Workspace always had and has the character of a pilot application helpful to other Pillar developers when starting with their applications from scratch or integrating new Foundation features.

Moreover **Phase 3** provides demonstration scenarios through use cases, scripts, and story boards and a Flash-demonstration which shows the most important aspects of the BRICKS Workspace web application allowing for the coordination of significant BRICKS Dissemination activities.

Deviations from workprogramme

No main deviations from the foreseen Work Plan.

Deliverables Status
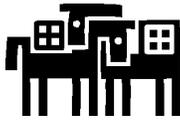
D1.3.3 BRICKS Workspace Demonstrator (Code, Setup and Configuration Documentation)	
	Submitted
D1.3.4 BRICKS Desktop Demonstrator (Code, Setup and Configuration Documentation)	
	Submitted
Milestones Status	
T37: Beta release of Demonstrators	Achieved
(available via the project website http://develop.bricksfactory.org/projects/workspace/)	
T42: Final version of Demonstrators	Achieved
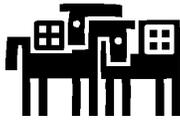
2.6   WP 2.1: User scenarios monitoring and evolution

Work Package Leader - ENG

Planned Objectives

Three main objectives were expected to be achieved within WP2.1:

1:    Collecting all the **feedback** coming from the developers and from final users of each pillar application, in order to fully understand and evaluate how the user needs and requirements collected in the previous period of the project have been implemented in the BRICKS foundation and in the pillars' pilot respectively;

2:    Promoting a **cross-pillar cooperation** and **communication**, in order to make the developers share their knowledge and expertise in using the released bricks for implementing the pillar applications;

3:    Validating the second version of the pillar prototypes by the submission of the implemented software to groups of end users.

Progress Towards Objectives

First objective

In order to monitor, month by month, the **feedback** on the Pillars applications, on the Foundation demonstrators and on the BRICKS framework, a real **web application** has been set up. This web application, named **BRICKS Feedback Questionnaire (BFQ)** is the tool used by groups of selected users and developers (a sort of "evaluation panel") to express their evaluations, comments and suggestions. Moreover, BFQ is also a dynamic deliverable in which some sections explain the document itself and keep the same content along time and other sections are semi-automatically updated when new feedback are submitted by the users that log in the BRICKS Feedback Questionnaire (BFQ) application or by registered developers.

Concerning the end users, content providers involved in the Consortium make contact with evaluators that periodically express their comments on the implemented functionalities. The contacts are kept by e-mail or by phone calls. Users are invited to use an application prototype, available on the Web or during a training session, following a set of pre-defined scenarios, so that all the functionalities can be tested and evaluated. After users have accomplished the suggested tasks, they are asked to access the BFQ website. The questionnaire is self-explicative and so museum curators, artists, archaeologists, students and others can answer all the questions of the form in few minutes since no paper, no pencil or notebook is required. What end users think about the applications is useful for both the pillar developers, that will gather the end users comments during the refinement of the prototypes, and the Foundation developers committed in the tuning and optimisation of the second integrated Foundation software.

Second objective

Some procedures have been defined in order to promote a **cross-pillar cooperation** and **communication** during the project lifetime. These mechanisms are:

• Definition of "*human-bridge*" people between developers of different Pillar applications;

• Definition of a specific mailing list targeted to all the developers using the Foundation software (Pillar developers and Desktop and Workspace developers)

• Pillar developers meetings planned to make all the key developers work together (and together with the Foundation developers) in order to compare their difficulties and to share the right solutions.
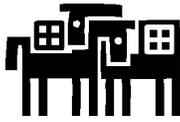
Third objective

The BFQ web application has been designed so that it collected end users evaluation day by day.

Deviations from workprogramme

No main deviations from the Workprogramme.

Deliverables Status

D2.1.4 Validation of the pillar applications by end users   Submitted

Milestones and expected result

T42: Feedback collection and validation of the final versions of the pillars' prototypes   Achieved
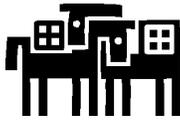
2.7   WP2.2 Archaeological Sites

Work Package leader - MLA

Planned Objectives	
In the reporting period the main objectives of the work package were to validate and fine tune the archaeological site pillar applications Implementing the BRICKS integrated prototype to develop a first prototype application for the archaeological sites pillar (by month 30)	
Progress towards Objectives	
In support of WP 2.1 the second prototype of the archaeological sites has been extensively tested and validated with end-users starting from month 37. The related documentation to support the archaeological pillar application has been further revised.	
Main deviations from the workplan. No main deviations from the Workprogramme	
Deliverables Status	
Milestones and expected result T42: Tested final archaeological site prototype	Achieved
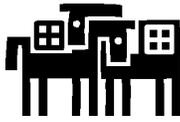
2.8   WP2.3 Small and Medium Museums

Work Package leader – ENG

Planned Objectives
The main objectives planned for the concerned period were: • The implementation and the validation of a new pillar application, tailored to match the Company Museums requirements. • The design and the implementation of a new pillar application targeted to exploit the tourist potential of the small and medium museums belonging to polo Museale Fiorentino
Progress towards the Objectives ***First Objective*** On the basis of the High Quality Rendering of Digital Images pillar applications made available in the last reporting period, a new pillar application has been delivered by Engineering, allowing un-experienced and experienced users and/or tourists to create and browse personalised tourist itineraries, including the Small and Medium Museums belonging to the Polo Museale Fiorentino ***Second Objective*** A new application has been implemented on the BRICKS foundation targeted to the Company Museums. The development did not begin from scratch because, thanks to the reusability of the EMYA software, some components of the first application have been reused, customized and extended for the second, EDCM. This application represents an important result for the Small and Medium Museums Pillar because it is able to attract in a single directory all those Company Museums that have not ever had a reference at European level.

Deviations from workprogramme
No main deviations from the Workprogramme

Deliverables Status	
D2.3.5 Personalised Tourist Itineraries application for SMMs	Submitted

Milestones Status	
T42: final prototype for ECDM application	Achieved
T42: Updated Developers Guide and User Tutorial	Achieved

2.9 WP2.4 Living Memory: Vienna, 1945

Work Package leader - ONB

Planned Objectives

The main objectives of WP 2.4 to be achieved in the reporting period were:

- Implementing the final prototype application for the Living Memory Pillar based on the specification document

- Enhancing and fine tuning the final pillar applications taking into account the evaluation of the first prototype and integrating the components of the third integrated BRICKS prototype

Progress towards the Objectives

First Objective – Task T2.4.4 Final LM prototype development

Development of functionalities of the Living Memory pillar have continued after the release of the first Living Memory prototype. Such activity took into account the evaluation of the first LM prototype and integrated the components of the third BRICKS integrated prototype. The final LM prototype delivered the functionalities as specified in D.2.4.1

Second Objective - T2.4.5 Living Memory system documentation

Suitable documentation has been released explaining to end users how to work with the software and an internal technical description of the system has been prepared to allow other developers to extend, improve and update the system.

Main deviations from work plan

No main deviations from the plan

Deliverables Status

None in this period.

Milestones Status

T42: Updated Living Memory Final Prototype   Achieved

T42: Updated LM system and related documentation released   Achieved

2.10 WP3.1 Integration of Components and Services

Work Package leader - FHG

Planned Objectives

- Analysis and continuous monitoring of state-of-the-art in research and related projects.

- Assessment of the IT requirements of Cultural Institutions.

- Definition of the overall design of the BRICKS system.

- Specification of Brick interfaces and interaction.

- Continuous coordination and monitoring of the integration process.

Progress towards objectives

The objectives of the reporting period have been fully achieved. In particular, the following activities have been conducted to achieve the results as reported in deliverable D 3.1.10 and D 3.1.11

BRICKS API Reference Guide

The documentation of the foundation API and the development of a user developer guide about the programming of the BRICKS technology have been delivered.

Technology watch

A regular technology watch over related industrial and research activities as well as international projects has been conducted. The results with conclusions and action proposals have been regularly reported to the management for decisions to ensure high quality and state of the art project results.

Integrated Prototype

Throughout the project, regular releases of integrated versions of the foundation services have been created and delivered to the users. The integrated versions were used for integration testing and to receive regular feedback from the application developers.

Integration Testing

Regular integration tests of the integrated prototypes wereused to ensure the seamless integration of the services and to identify already at an early stage possible integration problems. For the integration testing a testplan was defined and refined after the testing of the first prototype.

BRICKS Design Documentation

An integrated documentation of the design and the concepts of the BRICKS foundation in order to allow developers to more easily understand the concepts of the BRICKS foundation has been delivered.

Main deviations from work plan

No main deviations from the plan

Deliverables Status

D 3.1.10: Updated Technology Watching   Submitted

D 3.1.11: BRICKS Design Documentation	Submitted
Milestones Status	
T42: Final Integrated Prototype	Achieved
T42: Updated BRICKS API Reference Guide	Achieved
T42: Updated BRICKS Design Documentation	Achieved
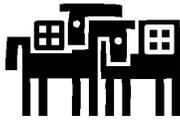
2.11 WP3.2 Core Functionalities

Work Package leader - FHG

Planned Objectives

The goal of this workpackage is the specification and implementation of the core functionalities:

•   Bricks Framework (BNode)

•   Bricks composition

•   Decentralized XML database (former Decentralized Metadata database)

•   BNode Storage

•   Bricks Registration and Discovery

Progress towards objectives

The objectives of the reporting period have been fully achieved.

The goal of this workpackage is the specification and implementation of core components of the BRICKS system. Within the third project phase the focus was the implementation of the Bricks Framework and the development of data availability strategies for the decentralized XML storage.

Bricks Framework (BNode)

The BNode is the bridge between the organisation's internal infrastructure and the BRICKS system. The BNode framework mainly consists of a container for the execution of Brick code (an application server such as Axis), the Web service interface (most likely a SOAP server), and the communication infrastructure supporting the peer-to-peer communication between BNodes. A first second and third prototype of the BNode framework has been developed according to the detailed design (see deliverable D 3.2.1), which has afterwards been extensively used by the developers.

Decentralized XML database (formerly Decentralized Metadata database)

A complete implementation for the decentralized XML database has been delivered at M42. This component is used to store metadata of general interest, e.g. service and content descriptions. Hence the design goals are: high availability of data, efficient access, and scalability. It has been implemented as a peer-to-peer (P2P) database with content-based querying and update capabilities.

Due to the importance of the decentralized XML database, an early version was based on a centralized XML database, which already provides the foreseen interfaces. In parallel the necessary research and development has been conducted in the areas of data replication and updates in order to come up soon with a decentralized implementation. Good progress has been done in the development of the data replication strategies, which has already been reported on several scientific conferences.

Composition of Bricks

Much of the basic functionality exists in the form of Bricks that can be used to build higher-level services. For this purpose a framework for the composition of Web services is required. . A complete design and a preliminary implementation has been delivered

Bricks Registration and Discovery

The BRICKS registration and discovery service is an application of the decentralized metadata database. Hence the full implementation depends on the availability of a decentralized database.
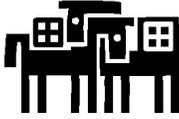
Main deviations from work plan
No main deviations from the plan
Deliverables Status
Milestones Status

2.12 WP 3.3: Content Management

Work Package Leader - ARC

Planned Objectives
The goal of this workpackage is the specification and implementation of the following Bricks:
• Content Manager
• Metadata Manager
• Annotations Service
• Collections Service
• In the past year, the final version of all these components has been delivered.
Progress towards the Objectives
Task 3.3.2: Content Manager:
API streamlining: removed methods related to old Bricks IDs syntax; removed collection-related methods now exclusively available through CollectionManager.
Updated JCR implementation libraries (jackrabbit v.1.2.1)
Added binary content download by means of a one-download-only URL to protect contents from unauthorized accesses.
Added setting of Owner user for creation of new DLObjects.
Introduced content models specific for simple items managed by CollectionManager.
Task 3.3.3: Metadata Manager:
Work on the Metadata Manager mainly focused on further integration with the Ontology Manager and enhancement of stability and performance.
Task 3.3.4: Metadata Extraction Manager:
This task has been eliminated according to the recommendation of the reviewers not to add new components in the last year and to focus on stability and performance instead.
Task 3.3.5: Annotations:
The Annotation Manager implementation had to be adapted to the changes in the foundation components it is based on. Furthermore, advanced functionality like searching for annotations has been added.
Task 3.3.6: Collections:
The Collection Manager has been completely redesigned to handle the performance issues the previous version had. Also, the web service interface of the Collection Manager has been considerably altered. It now includes the methods of the former Query Mediator and methods to store simple content and metadata. The new Collection Manager is therefore able to perform most tasks needed to implement a client application. This facilitates implementing client applications, because the client doesn't need to communicate with different web services (Content Manager, Metadata Manager, Query Mediator, Collection Manager) – in most cases the New Collection Manager will be the only service the client needs to contact.
Dynamic Collections have been replaced by the concept of "stored queries", also available via the Collection Manager interface.
Deviations from workprogramme **None**
Deliverables Status
Milestones Status

2.13 WP 3.4 Semantic and Cross language Retrieval

Work Package Leader - CNR ISTI

Planned Objectives

The overall objectives of this Work Package are the design and implementation of the following Bricks:

•   Indexing Manager

•   Ontology Manager

•   Query Personalization Manager

•   Search and Browse (including cross-language).

At the starting point of the reporting period, the objective of this Work Package was the testing and fine tuning into the BRICKS framework of the above Bricks for the third prototype of the Foundations.

Progress towards the Objectives

The objectives of the reporting period have been fully achieved. In particular, the following work has been carried out:

•   Index Manager: In order to support the IndexManager component, a new version of the P-Grid software was integrated into the P2P Brick. IndexManager employs the P2P Brick for message routing to distribute and locate index entries in the Bricks network. The IndexManager is responsible for indexing attribute-value pairs extracted from metadata records supporting the following data types: String, Integer and Date. A query in the form of an attribute-value or an attribute-range pair returns the list of collections that store records relevant to the query. Additionally, chapters related to the IndexManager description were updated. Research work related to efficient processing of conjunctive queries in structured P2P networks with the focus on query-driven indexing techniques has been performed and the paper entitled "Distributed Cache Table: Efficient Query-Driven Processing of Multi-Term Queries in P2P Networks" was published and presented at the P2PIR workshop, Arlington VA, USA, November 11, 2006 (http://lsirwww.epfl.ch/p2pir2006).

•   Translation Manager for cross-language Search: In the past 12 months University of Sheffield worked on providing the translation services for BRICKS prototype while continue improving the design models and specifications. The translation services are developed and deployed in BRICKS framework and can be called by web services using AXIS and Tomcat. Meanwhile, Canoo's term review service was embedded within translation manager to provide review information for query terms which cannot be properly translated. In addition, a user dictionary service was also developed for special phrase and terms translation defined by users. The user dictionary is loaded to framework as a resource when translation manager is initialised. It can be updated by calling the APIs from translation manager's web services.

•   Personalization Manager: A new version of the Personalization Manager has been implemented that is synchronized with the changes of the main Bricks framework and has incorporated the new BRICKS API in Personalization Manager. As with the original version, the new Personalization Manager supports two types of personalizations: (1) query re-writing on advanced searches, taking into account the user preferences expressed in the user profile, and (2) query result re-ranking for simple searches, which implies a re-shuffling of the rank resulting from a simple search in order to bring to a higher position the objects that better reflect user preferences. In addition to the above, a

Web-based personalization profile editor has been implemented using the AJAX technology inside the BRICKS workspace.

- Ontology Manager: The Ontology Manager has been merged with the Schema Manager thus ceating a unique access point for the operations relative to metadata schemas or ontologies. A new API has been created for browsing ontologies, and a mapping definition mechanism has been designed for creating links between concepts of different ontologies, according to the proinciples of the Emergent semantics.

- Query Mediator: The full BRICKS query language has been implemented, including simple, advanced and ontology searches, with multilinguality. It is also possible to express queries on collections. An optimized implementation has been provided, after changing the QM API, which is now part of the Collection Manager API. In this implementation, the QM relies on a replicated cahce containing the metadata of all collections in the network. Designing and imlementing this cache has been a major activity. Another implemented feature is that the Query Mediator searches in parallel all the involved nodes, and displays the results to the users in real time, without waiting for the entore result set to be available.

Deviations from workprogramme

No main deviations from the foreseen Work Plan

Deliverables Status

Milestones Status

2.14 WP 3.5 – Security & Monitoring

Work Package Leader – MW

Planned Objectives

The goal of this workpackage is to provide the necessary security infrastructure for the BRICKS framework.

The workpackage includes the implementation of:

- Trust manager component
- Single sign-on framework   for web-services using the provided trust management, a Certification Authority and SAML protocol
- Federated access control framework
- Distributed accounting (logging) service for all user operation
- Digital Rights Management framework supporting pluggable watermarking engine
- Integration of third party Watermarking engine (MICC, FhG).

Progress towards the Objectives

Task 3.5.1 Monitoring Data access and Usage

This task took care of the implementation of a distributed accounting service for all user operation. The Accounting service component has been produced, based on an open Radius protocol implementation. Furthermore, the necessary model for bricks-specific event monitoring has been defined.

Task 3.5.2 Trust model and security

The activities in this task consisted of in a further refinement on the security infrastructure that has already been implemented by adding calculation of trust based on a reputation-feedback model, provided by a new Trust Manager component.

Task 3.5.3 Single sign-on framework

This task involved extension of current security framework to allow users to perform operations on any BNode without having to provide credentials once they have been verified. This requirement implies the implementation of distributed authentication framework capable of verifying user credential in a distributed fashion, using Trust Manager component and SAML protocol.

Task 3.5.4 Federated access control

This task involves the integration of current access control framework with the Trust manager component to enforce control over services invoked in a distributed fashion, possibly covering different BNodes.

Task 3.5.5 Digital Rights Management

This task provided the implementation for the BRICKS Digital Rights Management infrastructure, which includes different components each suited for a specific feature set. In particular the following components have been implemented:

- License Management service
- License packaging service
- License distribution service
- Pluggable Watermarking framework
- Plugins for MICC and FhG watermarking technologies.

Deviations from workprogramme

None.

Deliverables Status

Milestones Status

3.   Consortium Management

3.1   Introduction

The objectives of this period were to effectively coordinate the project. This involved controlling the technical and chronological coherence of contributions from the partners, and implementing the quality rules adopted by the Board of Directors. Progress of the work was monitored against the milestones and the objectives defined in the project programme, as well as the quality plan. The approach used and results obtained can be seen in Section 2 of this report, WP1.0.

The achievements include the deliverables D1.0.12 (this report, Period Activity) and D1.0.13 (Financial Report).

The contractor involved was Engineering S.p.A., the project coordinator.

3.2   Consortium management tasks and their achievement

One of the most interesting and Critical Success Factors (CSF) in BRICKS management is an effective and "real" communication between different aspects in general, and particularly, between users partners and technical partners. Since the Technical Annex preparation, this aspect has been stressed and put in evidence: The whole BRICKS management structure and the project organisation has been designed in order to face this problem. During the second year period it has been increased and faced in order to avoid the risk to have a general "gap" between the design of infrastructure and what users really need: this has been called the **BRICKS vertical integration** factor.

BRICKS is a very large, distributed project. There are a number of thematically isolated responsibilities: for example: digital rights management, sustainability model, metadata extraction, etc. Although these are thematically isolated, they are intimately related at the technical and business levels. This is the reason why an effective integration between the responsible groups is a requirement of success. In order to improve this integration some specific activities and management structures have been defined:

First of all, since the start of BRICKS, a specific director for the integration activity has been appointed, namely the **BRICKS Innovation Director**. According to the Innovation Director some specific **managers** have been appointed to create a task force for a better integration and exchange of information between users and technical partners. This task force is presented in the following table:

	Name	Partner	User application
BRICKS Innovation Director	Ross King	ARC	All
Integration manager	Thomas Risse	FHG	Archaeology
Integration manager	Kevin Kearney	ENG	Small Medium Museums.
Integration manager	Robert Hecht	ARC	Living memory
Integration manager	Carlo Meghini	CNR	Scriptorium
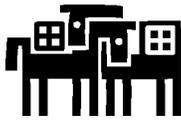
3.3   Project timetable and status

| | | BRICKS | | | | | |
| | | Q13 | | | Q14 | | |
		37	38	39	40	41	42
WP1.0	**Management and Coordination (m37-42)**						
T 1.0.1	Project admin and resource monitoring	■	■	■	■	■	■
T 1.0.2	Quality assurance	■	■	■	■	■	■
T 1.0.3	Reporting to EU	■	■	■	■	■	■
T 1.0.4	Benchmarking Management	■	■	■	■	■	■
T 1.0.6	Project steering and change management	■	■	■	■	■	■
D1.0.12	*Monitoring report (m42)*						X
D1.0.13	*Financial reports (m42)*						X
WP1.1	**Exploitation and Sustainability (m37-42)**						
T 1.1.6	BRICKS Brand	■	■	■	■	■	■
T 1.1.7	Community and aggregation strategies	■	■	■	■	■	■
T 1.1.8	Business Planning	■	■	■	■	■	■
T 1.1.9	Cultural Heritage Network Implementation	■	■	■	■	■	■
D1.1.6	*Aggregation final report (m42)*						X
D1.1.7	*Final business plan (m42)*						X
WP1.2	**Dissemination and Training (m37-42)**						
T 1.2.1	Dissemination activities	■	■	■	■	■	■
T 1.2.2	Training activities	■	■	■	■	■	■
D1.2.5	*Dissemination Final Report (m42)*						X
D1.2.6	*Training Final Report (m42)*						X
WP1.3	**Demonstration (m37-42)**						
T 1.3.4	BRICKS Workspace	■	■	■	■	■	■
T 1.3.5	BRICKS Desktop	■	■	■	■	■	■
D1.3.3	*BRICKS Workspace Demonstrator (m42)*						X
D1.3.4	*BRICKS Desktop Demonstrator (m42)*						X
WP2.1	**User scenarios monitoring & evolution (m37-42)**						
T 2.1.4	Validation of the pillar applications	■	■	■	■	■	■
D2.1.4	*Validation of pillar applications by users (m39)*			X			
WP2.2	**Archaeological sites (m37-42)**						
T 2.2.8	Testing and validation	■	■	■	■	■	■
WP2.3	**Small and Medium Museums (m37-42)**						
T 2.3.3	User interface components	■	■	■	■	■	■
D2.3.5	*Personalised tourist itineraries application for SMMs (m42)*						X
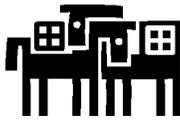
		BRICKS					
		Q13			Q14		
		37	38	39	40	41	42
WP2.4	**Living memory: Vienna, 1945 (m37-42)**						
T 2.4.3	End user interface components						
T 2.4.4	Final Living Memory prototype						
WP3.1	**Integration of components and services (m37-42)**						
T 3.1.4	Technology watch						
T 3.1.5	Integrated prototype						
T 3.1.6	Integration testing						
T 3.1.7	BRICKS design documentation						
D3.1.10	*Updated Technology Watching (m42)*						X
D3.1.11	*BRICKS Design Documentation (m42)*						X
WP3.2	**Core functionalities (m37-42)**						
T 3.2.1	Bricks Framework (BNode)						
T 3.2.2	Composition of Bricks						
T 3.2.4	Decentralized XML database						
WP3.3	**Content Management (m37-42)**						
T 3.3.1	Legacy data						
T 3.3.2	Content Manager						
T 3.3.3	Metadata Manager						
T 3.3.4	Metadata Extraction Manager						
T 3.3.5	Annotations						
T 3.3.6	Collections						
WP3.4	**Semantics and cross language retrieval (m37-42)**						
T 3.4.1	Index Manager						
T 3.4.2	Ontology Manager						
T 3.4.3	Query Mediator						
T 3.4.4	Query personalisation						
WP3.5	**Security and Monitoring (m37-42)**						
T 3.5.1	Monitoring Data Access and Usage						
T 3.5.2	Trust Model and Security						
T 3.5.3	Single sign-on Framework						
T 3.5.4	Federated Access Control						
T 3.5.5	Digital Right Management						

3.4 Contractors: name changes

No changes have been made to the name of the contractors within the last reporting period.

3.5 Co-ordination activities in the period

3.5.1 Communication between partners, internal communication

As described in the previous paragraph, a lot of effort has been dedicated to communication between partners and consortium members. As a part of the BRICKS vertical integration already described, many specific and general meetings have been organised. In the following, a list of them is presented. Agenda, meeting minutes, participants list and presentations can be found in the "meeting area" of the bricks management web site http://www.bricksfactory.com

Review Preparation Meeting, Venue ARC in Vienna Austria	February 1-2 2007
Review Meeting, Venue ARC in Vienna Austria	March 12-13 2007
Board of Directors Meeting, Venue Engineering In Roma Italy	June 26 2007

3.5.2 External communication

A general web site has been designed and developed in order to ensure proper dissemination and external communication. This web site is found at the address http://www.brickscommunity.org.

In order to connect more specifically with the global free/open source software community, a wiki-based aimed at software developers and IT people has been set up at http://dev.brickscommunity.org. This website offers software downloads, technical documentation, and extensive possibilities of networking and cooperation among developers.

BRICKS has been presented in numerous dissemination events and initiatives. many of which in collaboration with other projects and CH players. The entire list is available in this document and on the public web site (http://www.brickscommunity.org). At the same time, BRICKS-focused workshops have been organised, as well as special events where a specific topic has been developed, analysed, and offered as an opportunity for researchers and experts to exchange experiences and skills.

In the first year general audience communication activities and dissemination materials have been realised; starting on the second year, the communication activities have been undertaken according to a more focused strategy, aimed at selecting potential strategic users and customers. In view of the deployment of the BRICKS Network, and to elicit viable business opportunities, focused dissemination materials and initiatives have been organised and planned in order to reach specific target sectors.

Significant collaborations between BRICKS and other EC funded projects, such as PRESTOSPACE, TEL, MINERVA, and MICHAEL have been put in place. With this regard a joint workshop of the BRICKS and PRESTOSPACE projects has been organized in October 2005 in Amsterdam (the workshop title was "Innovation In Cultural Heritage").

In addition BRICKS is fully involved in the **Firenze Agenda** activity for "*The Future of Digital*
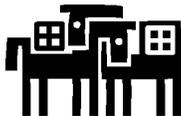
Memory and Cultural Heritage" trans-national initiative.

A very wide range of online and traditional communication materials has been produced and distributed, according to different audiences and communication needs.
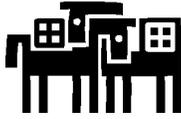
4.   Other Issues

None

5.   Annex – Plan for using and disseminating the knowledge

5.1   Introduction

The BRICKS project exploitation and dissemination activities are grouped in the "Roof" dimension. This dimension includes 3 specific work-packages dealing with the plan for using and disseminating the knowledge: WP1.1 Exploitation and Sustainability, WP1.2 Dissemination and Training, and WP1.3 Demonstrators. The activities in this area are meant to pave the way for the transformation of the BRICKS Project into the self-sustainable BRICKS Factory; that is, to ensure that BRICKS will still be sustainable after the end of the project, and that its activities will be further carried on. In order to reach this goal, a complete plan has been designed. The project duration of over 42 months, was further split into three phases, each with specific goals:

- 1st phase (1st year): Design and planning of a dissemination strategy; aggregation of a critical mass; market research; drafting of a preliminary sustainability and dissemination plan. The communication activities address a very wide audience, developing a wide range of different communication tools.

- 2nd phase (2nd year): Continuing the aggregation of a critical mass, calling for Community members to contribute to development and validation activities, so to bring about a steady improvement of the BRICKS system, to build the first BRICKS demonstrators.

- 3rd phase (3rd and 4th year): Definition of a final business plan with costs and revenue analysis. Involvement of as many Community members as possible in the running of the system; realise the demonstrator for the foundation and for all the pillar application scenarios. The communication activities are now directly focused on the selection of potential users and strategic partners, in view of the exploitation of the project's results.

The following paragraphs describe in detail the BRICKS plan for using and disseminating the knowledge and its implementation.
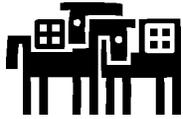
5.2   Section 1 – Exploitable knowledge and its Use

The following table presents and describes the exploitable knowledge and products.
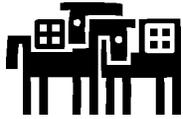
Exploitable Knowledge (description)	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Patents or other IPR protection	Owner & Other Partner(s) involved
1. Simple Applications for Small Cultural Institutions	• Development of small, simple applications for Small Cultural Institutions using basic tools from the Foundation such as search and access to metadata, collection search and browsing, access to content, virtual extension of exhibitions, catalogue browsing, shopping cart and payments. Objective is to help cultural establishments provide an online service.	• System Integrators / Technology providers wishing to develop small, simple applications to help Small Cultural Institutions provide an online service. • Target: 100-225 small cultural institutions / year	2008-2010	To be decided	Engineering MTW
2. Publishing - BNet as a distribution channel for eCommerce	• Additional to existing distribution channels, content is accessed through a BNode installed at the Content Providers. The BNode is both a revenue and a visibility multiplier, supporting content publishing on the BNet and user-driven search criteria for content.	• Content Providers wishing to publish and sell their content over the BRICKS BNet • Target: 4-9 / year	2008-2010	To be decided	Alinari
3. Digital Libraries	• Targeted applications providing access to large Digital Libraries, including distributed and controlled access to resources, brokers,	• System integrators who wish to develop specific	2008-2010	To be decided	Engineering

| Exploitable Knowledge (description)	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Patents or other IPR protection	Owner & Other Partner(s) involved
	collectors, citizens, editor, internet users, researchers, sponsors, schools, universities, students and visitors.	applications based on the Foundation to address large Digital Libraries (such as Regione Campania) • Target: 1-3 / year			
4. Integration of 3rd party tools	• Commercial third party tools (e.g.: for visual technologies, digital signature and interactive high-resolution imaging) which add value to the Foundation and contribute to high quality content access, supporting professional requirements.	• Technology Providers who wish to integrate part of their own offer into the BRICKS Foundation • 1-3 / year	2008-2010	To be decided	Centrica
5. Use of Foundation tools for exhibitions	• Cultural Institutions, direct customers of technology providers, are interested in artistic environments where technology, narration and space are blended together in an interesting way for visitors.	• New Media Technology Providers who provide services to exhibition organisers and who wish to use the BRICKS Foundation to enrich the artistic nature of the shows	2008-2010	To be decided	Studio Azzurro Sarzana Museum

Exploitable Knowledge (description)	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Patents or other IPR protection	Owner & Other Partner(s) involved
		• Target: 5-8 / year			
6. Installation of BNode in Cultural Institution	Installation of BNode in Cultural Institutions involved in the BRICKS comunity.	• Cultural Institutions wishing to install and set up a BNode for using BRICKS-based applications • Target: 150-330 small cultural institutions / year	2008-2010	To be decided	ONB ARC University of Vienna
7. Digital Rights Management	• On-line cultural content trading • Identification, trading, protection, monitoring and tracking of all forms of usage of rights on both tangible and intangible assets, including management of IPR • Watermarking mechanisms for DRM	• Publishing	2008-2010	To be decided	Engineering Metaware CF Alinari
8. Development of shared collective memory	• Tools to allow members of the public remote access over the web • Critical editions and generation of shared collective memory concerning texts • Study and development of applications that demonstrate the benefits of shared access to knowledge and information	• Cultural Heritage • Archaeological studies • World heritage sites • Management of Monuments	2008-2010	Open source approach	Engineering ARC Metaware USFD OAD SA

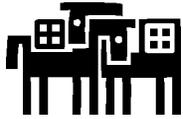| Exploitable Knowledge (description)	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Patents or other IPR protection	Owner & Other Partner(s) involved
	• GIS in association with geo-spatial dataset such as maps, aerial photography and satellite imagery • Digital Memory through metadata management • Set of data exchange and interoperability protocols for Cultural Heritage • Digital content delivery in public spaces, integrating design, high technology information systems, and a new concept about narration introducing interactivity, multipoint parallel displays and a new approach to video language (SA) • Computing systems for cataloguing works of art and documentary archives constituted by various sources (bibliography, archive, iconography, photography, etc.) • EASL multistabel displays allowing computing effect potential and communication based on static, dynamic and relative digital data transmission	• Maps • Publishing			LI PD MCA ONB EMF UFF RCHN MBAC MLA
9. Training	• Innovative electronic platform that supports the development, marketing and management of Cultural Heritage and Tourism resources in Italy (Engineering). • Training course for Museum employees and managers (Metaware, MICC, UFF, MBAC)	• Cultural Heritage	2008-2010	N/A	Engineering Metaware ARC

Exploitable Knowledge (description)	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Patents or other IPR protection	Owner & Other Partner(s) involved
	• Training in areas of ontologies, metadata management and content management (ARC, EPFL) • Technology transfer in Digital Libraries (CNR, UOA, EMF, RCHN) • Training of non technical personnel to improve technological abilities (CF, SA, MCA, EMF, UFF) • Training for professionals in Digital Library technologies (MLA)				CNR UOA CF EPFL MICC SA MCA EMF UFF RCHN MBAC MLA
10. Secure Software platform	• Software platform to support the Trust and Confidence environment (PKI for soft certification and interoperation with official Certification Authorities and their smart card-stored certificates • Building of Critical Editions	• Secure systems • E-trading	2008-2010	Patents to be applied for	Metaware
11. Best practice consultancy	• Consultancy on the impact of Information and Communication Technology in art and culture • Consultancy and support for Culture management, particularly dedicated to the	• Cultural Heritage	2008-2010	N/A	Metaware USFD CF

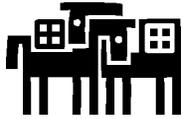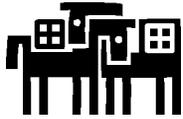| Exploitable Knowledge (description)	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Patents or other IPR protection	Owner & Other Partner(s) involved
	introduction of innovative approaches. • Best practice consultancy of culture management • Consultancy related to the quality of museum information available for visitors, and information regarding organisational aspects of museums				MICC SA MCA EMF UFF RCHN MLA
12. Access rare books	• Internet access to rare ancient books through electronic editions or transcriptions • Studying and managing contents of published and unpublished texts and images concerning archaeological, artistic and architectural complexes	• Publishing • Archaeology • Historical	2008-2010	Open source approach	Metaware CF OAD SA VAT
13. Knowledge reconstruction of archaeological sites	• Cross language facilities addressed at archaeologists • Reconstruction of knowledge of archaeological sites, considering their perception during history • Access to wealth of archaeological information available in different formats and different places around the world.	• Archaeology	2008-2010	Open source approach	USFD CF OAD MBAC MLA
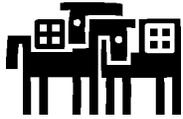
5.3   Section 2 – Dissemination of knowledge

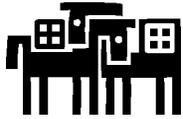| Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
Continuously	Press releases	General public	National and international bodies		All partners
Since 2005, ongoing	Direct e-mailing, contacting	Focused public, similar projects	All		MW, EMF, ENG, ONB
2005, 2006 update	Info-package, two releases	All main European cultural heritage institutions and actors, public as well as private	National and international bodies		MW
Since June 2004	Dissemination Web site	All main European cultural heritage institutions and actors, public as well as private, general public	All	Web site accesses June 2004 – February 2007 (unique visitors) : 44833	MW responsible, but all partners and members are involved.
2005	CMS (Content Management System) guide	Partners and Community Members, one version released to each, in order to simplify website functionalities	All	Consortium and User Community	
Since 2005, ongoing	Papers	Public; available for download in PDF from BRICKS Community website	All		CNR, FhG IPSI, MW, UoA
Since Spring 2005 , ongoing	Eight Newsletters releases	Dedicated to BRICKS Community members and to potential new members	All		MW with the collaboration of partners and members
Christmas 2005, 2006	E-card, Christmas 2005 and 2006 editions	Dedicated to BRICKS Community members and to potential new members	All		MW
Since 2004-present	Printed Communication Material	General public, specialised audience (5 posters, 2 booklets, 1 brochure, bookmark,)	All		MW, all partners consulted for contributions and approval

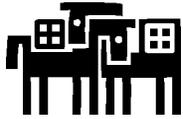| Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
December 2006	Flash Presentations	General Public	All		MW
10 October 2005	Focused workshop ("Different perspectives on Technology Based Innovation – How Innovation technology impacts on management, business, industry, creativity, culture and art and how different actors can lead it")	Selected public (researchers and experts)	European countries	One hundred people.	MW (with the participation of ENG, EMF, SA) in collaboration with PRESTO SPACE
29 November 2005	Focused workshop "BRICKS: paving the way for the next generation of Cultural Digital Services"	Selected public (researchers and experts) in the framework of the 8th International Conference EVA 2005 in Moscow (RU)	All	Hundred of people	MW in collaboration with RCHN
December 2005	Demonstrator II phase: Workspace, Desktop, Scriptorium (critical edition), SMM (EMYA)	BRICKS potential user/customers (community members and any organisation dealing with Digital Content	All	Hundred of people	ARC, MW, ENG, EMF, CNR

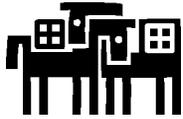| Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
2005	Conferences	Researchers, and all main European cultural heritage institutions and actors, public as well as private	International bodies	Participation to around 30 international conferences	All partners involved, and more specifically ENG, FhG, MW, ARC, CNR, USFD, UoA, CF, MICC, SA, EMF, MiBAC, MLA, RCHN, CF, OAD
2005	Aggregation and communication focused actions	Museum professionals and all other experts on management of cultural heritage	National and international bodies	Several focused meeting have been organised in order to enlarge the BRICKS Community. It has been estimated that more than 100 meeting will be held.	All partners involved
3-7 April 2006	MLQA06: EACL Workshop on Multilingual Question Answering – One paper presented	Researchers in multilingual QA, including searching in multilingual document collections	All	35 people	UShf

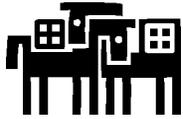| Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
4 April 2006	"EVA 2006 Florence " - Conference, training, Exhibition and Workshop – One paper presented	Users, suppliers, within scientific research communities	All	About 50 people.	RCHN, MW
April 10th-12th 2006	ECIR '06: European Conference on IR Research - One paper presented	Authors, artists, graphic designers, information retrieval group, information studies,	All	150	
10 May 2006	International workshop: "BRICKS: The European challenge for Cultural Heritage services". Two Community-oriented training modules have been held.	Museum professionals and all other experts on management of cultural heritage but especially dedicated to the BRICKS Community membership	All	About 50 people.	MW, in collaboration with European Museum Forum

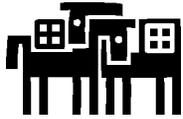| Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
26 May 2006	OntoImage'2006 – Intl. Conference – One paper presented	Researchers involved in automatic image annotation and computational linguistics.	All	About 50	UShf
14-16 June 2006	El Pub 2006 - Conference on Electronic Publishing: Anniversary celebration of Bulgaria and UNESCO – One paper and one presentation delivered	Researchers, lecturers, librarians, developers, businessmen, entrepreneurs, managers, users and all those interested on issues regarding electronic publishing.	All	Approximately 130	CF, ENG

Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
19-23 June 2006	EUSEA 2006 (Euro-Southeast Asia) ICT Forum - A training session provided an overview of the state of the art of DRM (Digital Rights Management) Also organised a booth.	European and Southeast Asian businesspeople, researchers, and regulators	Mainly Europe and Southeast Asia	Over 800.	MW
23 June 2006	International Workshop: "Building bridges with BRICKS - Digital Cultural Heritage Networks in Europe"	Decision-makers in Cultural Heritage institutions; Museum, archive, and library professionals	All	About 50 people	ARC

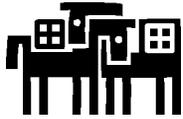| Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
24-28 June 2006	"VI - EMAC Supporting Museums in Achieving Quality". - Distributed BRICKS materials and a presentation, including the specifics of the entire BRICKS project.	Small & Mid-sized museums	All	45 people	EMF
15 August 2006	The BRICKS Infrastructure - An Overview - Research Seminar	Academic, DL specialists	Mostly Germany	20 people	FhG

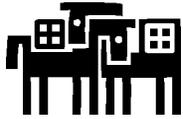| Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
14-16 September 2006	2006 European Museum Forum Workshop – Intl. Conference - Presented how BRICKS applications are relevant to small and medium sized island museums for development	Directors of small and medium sized museums	All	85 people	EMF
17-22 September 2006	10th EDCL Tutorial: Bringing Digital Libraries to Digital Infrastructures	Librarians with a technology background and researchers.	All	16 people	CNR, FhG
18-20 October 2006	International Congress "Cultural Heritage and New Technologies" – Presentations on BRICKS	Archaeologists, computer specialists, public sector representatives from municipal institutions and private sector representatives from all over Europe	All	171 (From both European and Non European Countries)	ARC

Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
19-20 October 2006	TEL-ME-MOR Policy Conference - Demonstrated how BRICKS results interacted with the TEL-ME-MOR project to provide a digital library development forum, highlight future research requirements, and formulate concrete recommendations as to how the EU and international R&D agendas can lead to improving access to our common cultural heritage	Directors and key personnel of the National Libraries of European countries and some Asian and Eastern European reps, and European Commission officers.	All	About 100 people	MW

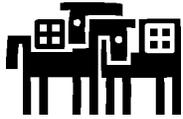| Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
25-27 October 2006	EChallenges 2006- Intl. Conference – Organised information booth on BRICKS	ICT specialists, SMEs, decision makers	All	Over 600	ARC
30 October.-4 November 2006	VAST2006 "The e-volution of Information Technology in Cultural heritage " – Participation to workshop, two presentations on BRICKS.	Public bodies (e.g. UNESCO, European Union, National States, etc.) or private foundations (e.g. Getty Foundation, World Heritage Foundation, etc.), to promote a common approach to the tasks of recording, documenting, protecting, and managing the World Cultural Heritage	All	About 50	CNR,
14-15 November Jerusalem	3rd Annual Jerusalem Conference on the Digitisation of Cultural Heritage	Professionals, practitioners and researchers in the areas related to the digitisation of science and cultural heritage resources.	All	55	MW

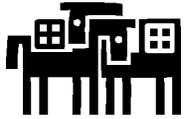| Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
21-23 November 2006	IST Event 2006 - Conference and Exhibition on High level European innovation and technology exhibition – presentations of BRICKS, participation to "Best IST website Award"	Exhibition open to General Public. Also academia, large EU companies, SMEs & international companies.	All	Over 500	MW
4-5 December 2006	Intl. Conference "Museums, libraries and archives on line: MICHAEL service and other international initiatives" – presented project and poster	Museum, library, archive professionals; decision makers	All	Over 100	MW

Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
4-8 December 2006	EVA Moscow '06 International Conference	Reps. of inter- governmental and international non-governmental organisations, public authorities in culture, education, science, info. and communications; reps. from business, civil society, res. and edu. community, mass media; political and public figures, and leading experts.	All	Estimated over 400	MW
March 26-30 2007	EVA Florence 2007	Professionals and researchers collaborating on developing integrated digital archives for cultural heritage and contemporary art; management of museums by using ICTs; also specialists in human-computer interaction for cultural heritage applications; copyright protection	All	Approximately 230	MW
May 2007	European Museum of the Year Award	Representatives from European prestigious museums, libraries, and archives	All	Estimated 200 guests	MW

Planned Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
June 17-23 Vancouver, Canada	JCDL Conference	professionals involved in digital library research and practice, including computer science, information science, librarianship, archival science and practice, museum studies and practice, technology, medicine, social sciences and humanities	All	340 guests	MW
June 25-28 Rio de Janeiro, Brazil	Belief-Eela Conference	European and Latin American business leaders, researchers and regulators	All, particularly representatives from Latin America and Europe	250	MW

5.3.1 Dissemination activities description

The project has adopted a focused strategy for the dissemination and communication activities. The overall objective of this plan is to guarantee the self-sustainability of the BRICKS services and tools after the end of the project and to realise all the needed conditions in order to continue its activities. During the project lifetime several focused dissemination events have been and will be organised and hundreds of potentially interested organisations involved in the Digital library and Innovation for Cultural environment will have been contacted with the aim to successfully exploit the BRICKS results.

All the activities relevant to dissemination, demonstration, and training are being used as leverage to enliven and enhance the Community.

Dissemination, exploitation and demonstration efforts are adequately structured to be focused and specifically targeted to the artistic and scientific communities.

The users have been identified in the several following categories, as listed below:

- Digital creators of all kind in the cultural heritage framework
- Professionals dealing with development of shared digital collective memory
- Managers of distributed heterogeneous multimedia
- Data curators, scientists of critical editions
- Secure software platform services providers
- Archaeologist, researchers and professionals involved in the valorisation of archaeological sites
- Curators of virtual exhibitions
- End users of digital cultural content
- Individuals with a stake in the preservation and exploitation of digital cultural heritage

According to the selected target, the principal characteristics of the plan's strategy have been identified as described:

1.   Activities have been customised and addressed to specific target communities, according to their needs and specificities;

2.   Activities have been developed taking into account fundamental peculiarities such as underline interaction with users; gathering their feedbacks and suggestions; and dynamicity that means to be ready to evolve and update the communication and dissemination strategy according to the target audience reactions;

3.   Activities have been and will be continuously and progressively carried out and updated throughout the full duration of the BRICKS project; Dissemination and communication activities are strictly connected with the demonstrator tools. Demonstration results will be used as exploitation tools to approach the BRICKS potential market.

Moreover, in order to augment the effects of the plan for using the BRICKS services and results, a complete training programme, with personalised levels and topics, has been designed. Whenever possible, Community member organisations have been involved in training activities, and a module has been delivered following a request by a Community member organisation.

The training modules held so far are the following:

1. **Training Module on Guidelines for the implementation of small/medium CH organizations websites**

   This module, held in Lisbon on 10 May 2006 during the BRICKS Community Kickoff event, has illustrated a proposal elaborated by the MINERVA Project for an instrument that may be useful especially for small- and medium-sized museums to plan and implement a quality website. The instrument consists of a series of models provided online that can be personalized and customized in several ways. A

booklet has been distributed.

Responsible partners: MW, MiBAC

2. Using the BRICKS Community website and CMS Training Module

This module, also held in Lisbon on 10 May 2006 during the BRICKS Community Kickoff event, has illustrated to the BRICKS Community members the functionalities and the potentialities of the BRICKS website as a tool for communication, dissemination, discussion, and as a means to enhance the visibility of their own initiatives toward a worldwide audience. The seminar has focused on providing the BRICKS Community members with a better practical understanding of the website's content management system. A visual guide on CD-ROM has been distributed.

Responsible partner: MW

3. Why and how to use the EMYA Application: A collective memory on museums innovation in Europe; and European Directory of Company Museums applications in BRICKS: Practical test

The training module, held on 13 September 2006 in Athens, has covered the overall BRICKS architecture and has then focused on the BRICKS applications for the archaeological domain and on the European Museum of the Year Award and on the European Directory of Company Museums applications.

Responsible partner: EMF

4. Archaeological pillar training module.

This module, held in Volterra (I) on 24 October 2006 during a specialization course for cultural heritage specialists, featured several lectures on the BRICKS overall architecture, on the specific applications for archaeology, and practical exercises of annotation of digital cultural resources.

Responsible partners: MLA, CF

5. A training module on the **CIDOC Conceptual Reference Model** has been held in Pisa on 30-31 January 2006. The two-day module was structured into a theoretical introduction to the reference model and its applications, and into a hands-on session with practical exercises of mapping of cultural digital resources.
    Responsible partners: OAD, ARC

6. BRICKS has been presented and discussed on 1 November 2006 at the International workshop CIPA/VAST 2006 "The e-volution of Information Technology in Cultural Heritage" (http://www.vast2006.org/). The presentations have dealt with the overall **BRICKS concept and architecture**, and with **Query translation** procedures in BRICKS.
    Responsible partners: ISTI-CNR, ARC, ENG.

7. A tutorial **"Bringing Digital Libraries to Distributed Infrastructures: Challenges, Solutions, and Lessons Learned"**, was given by Yannis Ioanidis (University of Athens, Greece), Carlo Meghini (CNR-ISTI, Italy), Heiko Schuldt (University of Basel, Switzerland) at the ECDL 2006 Conference (http://www.ecdl2006.org/tutorial4.jsp) in Alicante (E) on 17 September 2006.
    Responsible partners: ISTI-CNR, UOA

8. An intensive hands-on **BRICKS Foundation-Pillars training module** has been held in Ferentino (I) on 9-10 October 2006 to provide Pillars developers with a deeper working knowledge of the Foundation software. Among the topics discussed were: Collections management; Searching;

Adding content to BRICKS; BRICKS importer; Advanced content management; Advanced metadata management; Security; Annotations; Client layer. The module has been an occasion to improve cooperation across the various branches of the project and has produced a large quantity of useful materials. A Community member organisation also attended the course, gaining insight into the BRICKS internals to facilitate future technical cooperation.
Responsible partners: ENG, MW

9. A **BRICKS Tutorial** has been delivered per request of the Community member Universidad Politécnica de Valencia (E) on 29 November 2006 during the Conference "Contenidos y Aspectos Legales en la Sociedad de la Informacion" (http://www.calsi.org). The module has featured an overall introduction to BRICKS, and has then focused on metadata management in BRICKS.
     Responsible partner: MW

10. A tutorial on **BRICKS and other digital library solutions** has been delivered on 11 June 2006 during the JCDL event in Chapel Hill, NC, USA, featuring a comparison and in-depth discussion of the major international initiatives in the field of digital libraries.
     Responsible partners: ARC, FhG

11. This tutorial named, **The challenge of a distributed DRM system: The BRICKS Project** has been given in Singapore on 19 June 2006 during the EUSEA 2006 (Euro-Southeast Asia) ICT Forum. The training module provided to an audience of European and Southeast Asian businesspeople, researchers, and regulators, an overview of the state of the art of DRM (Digital Rights Management) technologies, with respect of the whole lifecycle of digital content creation and distribution, focusing on best practices and innovative approaches drawn from the experiences acquired in the development of BRICKS. This tutorial has allowed to collect expressions of interest from many key players in the Asian Cultural Heritage sector. Responsible partner: MW

12. This event, **Building the European Digital Library** was held in Oslo on 27-28 June 2007 and has been organised by BRICKS Partners PolyDisplay and Engineering in cooperation with the Norwegian Archive, Library and Museum Authority (ABM-utvikling). The goal of the event was to inform the cultural heritage community about the results of BRICKS and to make representatives from cultural institutions, ministries, content providers, art professionals, culture based businesses, academics and others comfortable with its application areas and their potential in daily use.
     Responsible partner: PolyDisplay, ENG

- • Dissemination activities.

Thanks to a consolidated expertise developed during the first two year of activities, the creation and execution of dissemination and promotional activities have been realised according to a **focused** approach. In particular, the realisation and delivery of targeted material has been carried on according to the plan throughout the project duration, but especially in its second and third phases.

The materials include:

- **BRICKS booklet**: two different editions with detailed information about the project in its different state of advancement
- **BRICKS brochure**, general description of the project mission and objectives.
- **BRICKS bookmark and stickers**, appealing material more suitable for conference booths and exhibitions,
- **BRICKS leaflet**, few words and concepts in order to easily catch the reader's attention and interest
- **BRICKS posters** (different versions according to different targets, currently two versions of posters have been already realised and other four will be realised in a short, customising a poster to each of the different application scenarios).

- **BRICKS newsletter**. during the second year, a special attention has been devoted to the redaction of the BRICKS Newsletter: now at its third edition, an easy understandable, downloadable and emailed two-pages document, the BRICKS Newsletter has been realised as a short leaflet plenty of news, pictures, information on members and achieved results of the project. The target of the Newsletter is to let participate the members of the Community and to create a shared space where to exchange experiences and opinions or to promote collaborative actions, as well as a first contact with BRICKS for all that institutions reached by email and not already sign in.

- **BRICKS e-card**, Christmas greetings in Winter 2005 and 2006, sent to Community members and other interested recipients.

- **E-press** have also been published in the web talking about the BRICKS project. Among others, detailed information about BRICKS have been uploaded in one of the more important websites dedicated to the Digital Culture, digiCULT, http://www.digicult.info/ (in the categories: Collaboration and virtual communities, Digital Asset Management Systems for Cultural Heritage Institutions, Open source and Mobile access to cultural institutional information resources).

- **BRICKS papers**. A huge number of articles, many of which refereed, are being published in PDF on the Community website as they are available to disseminate the progresses of the project among the widest possible audience.

- **BRICKS Community website.** A website completely dedicated to the Community members, where specific functionality are offered to the members and partners in order to discuss, transfer and share results, knowledge, best practices and products. In other words, the Community virtual meeting point.

- **BRICKS Animated presentation:** 2 animated FLASH presentations were produced (one in English and the other in Italian) In order to present the project in an attractive electronic format, targeted to a general audience.

▪ *Synergies with other projects.*

The Consortium partners highly value the synergy with other projects with complementary objectives and commit themselves to explore and implement new opportunities for collaboration. Synergies have been created with other major Cultural Heritage projects, such as: MINERVAPLUS, DELOS, EPOCH, CALIMERA, PRESTOSPACE, TEL, MICHAEL.

In particular, BRICKS synergies with other projects in the reference period have been:

- a joint event has been organized in collaboration with PRESTO Space in Amsterdam on 10/10/2005 *"Different perspectives on Technology Based Innovation"*

- BRICKS has built a strong collaboration especially with the MINERVA project. This is guaranteed by the participation of the Italian Cultural Ministry, the MINERVA coordinator in the BRICKS project as partner, in the same time the participation of some BRICKS members inside the MINERVA working groups is already started. In addition Minerva actively collaborates with BRICKS in the training activities, in fact during the Lisbon event the Module: Guidelines for the implementation of small/medium cultural heritage organisations websites has been implemented in collaboration with the MINERVA Project.

- Dissemination actions have been developed in co-operation with EVA (Electronic Imaging & The Visual Arts) Initiatives and in particular with EVA Florence, EVA London and EVA Moscow.

- BRICKS has continued its co-operation with EVA (Electronic Imaging & The Visual Arts) Initiatives. In the framework of the 8th International Conference EVA 2005 in Moscow (RU), MW has organized a workshop on 29 November 2005.

- In collaboration with European Museum Forum, an event has been held on 10 May 2006 in Lisbon. During the event, two Community-oriented training modules have also been held. The event has been an important occasion of dissemination and cooperation especially with the European Museum sector and has brought about several new accessions to the BRICKS Community.

BRICKS is also part of the *Digitisation CLUSTER*[9] and of the *Firenze Agenda*[10], and Digital Library Association (DLA).

▪ ***Communication web site***. http://www.brickscommunity.org

The Community web site, the BRICKS communication tool especially dedicated to the involvement of a huge critical mass of users – and of potential customers - has been constantly improved and upgraded. The site http://www.brickscommunity.org includes a special section in the homepage area where the new entry in the BRICKS Community are highlighted. The content management system, designed to simplify the workflow for the publication of documents and for the information retrieval, has been upgraded to offer new functionalities, and its interface has been redesigned to make it easier and more fun to use. Each partner and member can autonomously publish several content types, including an organisation profile page, news, events, and articles, and be always connected with the events related to project activities and other initiatives in the world of the digital libraries and of the innovation in the cultural heritage domain.

During the second year, the BRICKS Community website has been transformed, changed, updated, new functionalities have been added and others have been deleted in order to create an easy and user-friendly tool. All the project's events are advertised on the website; the website also provides online registration services.

An animated guide to the website and its content management system is being distributed on cd to all Community members.

A 'favicon' was added in order to Increase traffic to the website and make It easier for visitors to return to the portal.

New administrative tools have been added to the website to increase timeliness and effectiveness in the interaction with the Community and its management.

A section on training has been added, providing the Community members with detailed information on the planned training modules. Online registration is available for each training module.

▪ ***Quantitative web site data***.

To verify the content's participation and popularity rating, a system to assess the access statistics has been implemented. This system has been set up in a private section of the web site and thanks to a specific technology application (http://www.brickscommunity.org/stats/awstats.pl) it is possible to retrieve statistic values. For example, from its start (on July 2004) to February 2007 the *BRICKS Community* web site shows an increasing trend in visits, as shown by this table:

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[9] Digitisation CLUSTER aims at maximising impact and effectiveness, as well as sharing exchanges and good practices of the projects funded by the EC in the FP IST and working on the digitisation of culture. The CLUSTER is composed by: BRICKS, CALIMERA, MINERVA, DELOS, PRESTO SPACE, EPOCH, EUROMED, EVA.

[10] Following the Council Resolution of 25 June 2002 on preserving memory and digital content (2002/C 162/02), an experts workgroup was proposed to check the state-of-art and plan development as needed to implement the resolution principles. The workgroup has been leaded by the Erpanet and Minerva projects, under the chairing of the EC and the Italian Presidency.
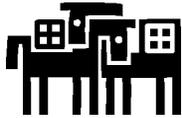
Month	Unique visitors	Number of visits
Jun 2004	2	2
Jul 2004	149	293
Aug 2004	165	321
Sep 2004	213	383
Oct 2004	219	372
Nov 2004	364	525
Dec 2004	237	356
Total 2004	**1349**	**2252**
Jan 2005	275	385
Feb 2005	349	453
Mar 2005	515	658
Apr 2005	595	802
May 2005	707	980
Jun 2005	994	1421
Jul 2005	1281	1659
Aug 2005	1401	1834
Sep 2005	1765	2291
Oct 2005	1866	2623
Nov 2005	1452	2270
Month	Unique visitors	Number of visits
Dec 2005	1203	2035
Total 2005	**12403**	**17411**
Jan 2006	1539	2414
Feb 2006	1845	2881

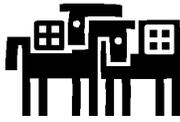| Month	Unique visitors	Number of visits
Mar 2006	2285	3474
Apr 2006	2007	2934
May 2006	2011	2943
Jun 2006	2115	3073
Jul 2006	1958	2960
Aug 2006	2159	3153
Sep 2006	2227	3177
Oct 2006	2751	4083
Nov 2006	2719	4045
Dec 2006	2460	3575
Total 2006	**26076**	**38712**
Jan 2007	2611	3751
Feb 2007	2394	3416
Total 2007	5005	7167
Total 2004-07	**44833**	**65542**

5.4   Section 3 - Publishable results

The demonstration scenarios (for further details, see D1.3.1 *Demonstration Scenarios, Design, and Configuration*) are a key element in BRICKS, because they represent the first publishable results, the very important tool for the dissemination and the exploitation of the project's achievements. It is fundamental to establish convincing demonstrations for attracting the attention of cultural institutions, cultural organisations managers and related potential customer/user. The demonstration of concrete, "publishable" and tangible application services is a useful mean to communicate the technological features to the final users, who are generally not expert in technology. These demonstrations scenarios will be simple and powerful at the same time, based on interactive, appealing and very usable interfaces, and able to show the services implemented in BRICKS.

The Demonstrators will present different foundation and pillars functionalities as a wide spectrum of example applications. In order to provide valid demonstrator systems, some activities will be dedicated to the set-up of easy-understandable interfaces, looking for transforming the technological results into a comfortable end-user tool (the BRICKS Workspace and the BRICKS Desktop).

An on-line version of the demonstrators will be created and made available on the Internet, and the demonstrator will be also presented on site, by selected potential customers.