REGNET

Cultural Heritage in REGional NETworks

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REGNET

Final Report

Deliverable D15

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Deliverable Report D15

Final Report

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Distribution Type	Public		
Authors (Partner)	All REGNET partners		
Abstract	The deliverable contains the results and description of work for all tasks carried out during the project lifetime.		
Keywords List	REGNET, technical engineering, System Services and Business processes, trial service, recommendations, dissemination		

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Executive Summary

The REGNET Project which ran for 2 years delivered a system which provides a service infrastructure (technical & legal framework) to service centres supporting cultural institutions and industries. The project was divided into two phases: development and demonstration and brought together two groups of partners, content providers (representatives of libraries, museums and archives) and developers (research organisations, industries and SMEs) altogether 23 partners and 2 subcontractors from 12 countries. The coordination was done by AIT-Angewandte Informationstechnik Forschungsgesellschaft mbh, located in Graz, Austria.

The REGNET system offers now a common service-portal to different services like data entry, search and retrieval, and e-Business and different regional service portals which are targeted to the clientel of the Cultural Service Centres (CSCs) which evolved within the framework of the REGNET-Project. A new European Economic Interest Group (EEIG), the CSC-Europe EEIG was founded within the course of the REGNET-Project and is considered the "umbrella"-organisation for existing and just evolving CSCs.

Technical work was related to: content engineering, platform engineering and business engineering and was based on emerging technologies like XML, SOAP, Z39.50, OAI-Harvesting Protocol, ebXML, WEB-Services, and remote data entry and distributed search mechanisms based on Dublin Core metadata.

In the course of the Publishing Framework the use of Semantic-WEB technology was investigated and delivered several tools for creating and presenting TopicMaps based on the XTM-Standard.

Summing up the objectives of REGNET have been fully achieved and comprise:

· Development of a service infrastructure which enables business to business (B2B) transactions (eg: procurement processes for museum shops) as well as business to consumer (B2C) transactions like e-shop or e-auction functionalities,

· Development (by use of an XML and WEB-based data entry system) and use of existing - locally held - electronic catalogues (OPACS: Online Public Access Catalogues) referring to cultural & scientific objects contained in libraries, museums, archives, and galleries, as well as to goods (museum shop articles) and services (eg: digitising services in an image archive),

· Integration of a distributed search and retrieval system to achieve a 'virtual union' catalogue of all OPACS and product/service catalogues held locally; test samples of some REGNET-data bases can be accesses via the OAI-Harvesting Protocol,

· Definition of Information Products and Services (using UML-specification language) including necessary 'supply chains' and the connected business processes and functions to deliver digital and physical goods,

· Setup of a baseline for a legal framework necessary for all business transactions on the B2B and B2C level,

· Integration and test of existing components, standards, and methods in the field of distributed search and retrieval and e-commerce.

The access to the REGNET-WEB services via mobile devices via de facto standard protocols (WAP) has been implemented on a first trial version but had been dropped from the list of objectives due to the delay of the UMTS-services publicly available.

During the Demonstration Phase there have already been integrated external project users to test some of the REGNET-tools which have been developed by the REGNET-developers.

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WP7: Project Management

Deliverable 14:

Report "REGNET - Quality Assurance System

Deliverable 15:

Final Report"

Deliverable 16:

Project Presentation

(Web Presence)

Deliverable 17:

Project Presentation

(Fact Sheet)

Task Briefs

T7.1

Project Management

Responsible: **AIT**

Involved: AIT, ONB, SR, IMAC, SUL, TARX, MOT, SPAC, IAT, ICCS, ZEUS, SI, CERT, VALT, TINC

Contributions of all partners

T7.2

Quality Assurance

Responsible: **MOT**

Involved: MOT

Deliverable D15:

Report:

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Final Report

Compiled & Edited by AIT

Due by

2003-03-31

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Introduction

1   Project Objectives

1.1   Description of background, problems and objectives

The internet-presence and application of latest technology tools in areas like e-Business or ePublishing become more and more important for cultural heritage institutions. These tasks put them in a situation where to chose between the establishment of an in-house technology centre and the employment of technology and standards experts or to charge a specialised service centre with the realization of the envisaged technology concept. Both ways may be good policy depending on the size and the future intentions of the cultural organization. But small and regional organizations shall for sure derive the most advantage from the service centres concept.

This was the vision within REGNET: To generate a set of technical tools specialised for the use in cultural heritage institutions (like data entry based on cultural heritage description standards, topic maps etc.), to bundle these tools in a REGNET system, define an infrastructure and legal framework for cultural service centres an supply the previously established REGNET service centres with the REGNET system. The final phase of the project then targeted at the demonstration of the services and the offering of the services gathering first input from external test users or clients. Because of the large REGNET consortium real international tests covering 6 European regions (a dozen states) were possible.

Moreover, by implementing the REGNET concept the project intended to support the dissemination of European Culture Heritage and facilitate the access for European citizens to catalogues of intellectual, cultural and scientific heritage stored in archives, libraries and museums and.

For technology development it was most important that standards were used in the field of information structure, retrieval and e-Business. The interoperability between systems (interoperable access to distributed resources/catalogues: cultural & scientific content and products & services) based on the complementarities of the capabilities of each partner (group) had to be enforced.

Finally the service infrastructure that was to be established should allow to develop a network of (cultural) service centres throughout Europe.

In order to reach this aim the REGNET project set itself the following tasks:

To develop a service infrastructure which enables business to business (B2B) transactions as well as business to consumer (B2C) transactions,

To develop and use existing - locally held - electronic catalogues (OPACS: Online Public Access Catalogues) referring to cultural & scientific objects contained in libraries, museums, archives, and galleries, as well as to goods and services.

To integrate a distributed search and retrieval system to achieve a 'virtual union' catalogue of all OPACS and product/service catalogues held locally ,

To define Information Products and Services as well as the necessary 'supply chains' and the connected business processes and functions to deliver digital and physical goods (to provide high quality services an editorial committee will be installed),

To set up a legal framework necessary for all business transaction on the B2B and B2C level (containing payment features, copyright systems, authentication control, etc),

To integrate and test existing components, standards, and methods in the field of distributed search and retrieval and e-commerce,

To provide access to the REGNET-WEB services with mobile devices via de facto standard protocols (such as wireless application protocol ,WAP etc).

And finally to run a trial service (demonstration phase) which should be followed by a regular service.

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REGNET here addressed several 'hot' topics in actual research and development activities: the interoperability of data stores (catalogues), the content creation and management in a standardised way, and electronic business. The reorganisation of existing processes and introduction of computerised functions which makes it worth while making transactions for low money goods (i.e. small copyright fees for digital images) was envisaged.

Vertically seen the REGNET system consisted of three building blocks: 1) the content creation and management which was based on actual standards efforts in the field of the different organisations involved. To provide interoperability of catalogues held in museums, libraries, and archives the semantics for the descriptions of collections and the collection items had to be harmonised. The inclusion of so called 'Dublin Core' meta data was here as well a topic as the Z39.50-related standardisation work, which is targeted to a harmonised search and retrieval facility across different domains. The interoperability for open access catalogues was essential to REGNET, since it enables the dynamical generation of the catalogue of the REGNET shopping system according to a user request. Content creation was carried out by the REGNET content provider partners digitising 2- and 3-dimensional objects.

2) The platform management was based on latest internet technology and builds the basis for the middle ware being the agent between content and service supplier and the requester (user).

3) The enterprise engineering focused on selected business processes and functional units: access to distributed catalogues, a shopping cart system, creation of a personalised catalogue based on retrieved data from the 'virtual catalogue' (in printed and electronic form), an internet auction system (i.e. offering duplicates of posters), and a delivery system for physical goods (i.e. goods from museum stores).

On a 'horizontal' basis the XML/XSL-technology was used to structure data semantically and physically. This had an effect on the creation of meta data, describing real (primary) objects (artefacts, naturefacts,...), media objects (photos, videos, ...) or bibliographic type objects (literature in the broadest sense). All information within business transactions was wrapped within XML structures: Order, Invoice, Despatch, Report, ...). Recent developments in the field of XML/EDI standardisation have been implemented here (ebXML). Finally the definition of information products by appropriate document type definitions and style sheet had been envisaged which should in future enable the 'non-media-professional' end user to generate catalogues or even CD-ROMs on demand.

The REGNET system architecture:

The REGNET Project is developing building blocks to set up a service infrastructure for organizations and users in the field of Cultural Heritage. These blocks (referred to as 'nodes' within the REGNET Architecture) which constitute the REGNET-System are supporting access to cultural & scientific information as well as to product & service information offered by different organizations.

These Nodes ('building blocks') are:

The REGNET-Portal (entry of remote data, distributed search, e-Business)

The REGNET-Cultural Heritage Data Management (search in distributed metadata repositories connected to data of cultural heritage content)

The REGNET-e-Business Data Management (access to distributed goods and services catalogues via e-Business system)

The REGNET-Ontology Checker (contains specifications of metadata, terminologies etc. used in the e-Business and cultural heritage field)

The REGNET-Electronic Publisher (allows the production of personalized digital products based on standardized metadata and work flows)

The building blocks are outlined in the figure below.

Figure 1: The REGNET building blocks (next page)

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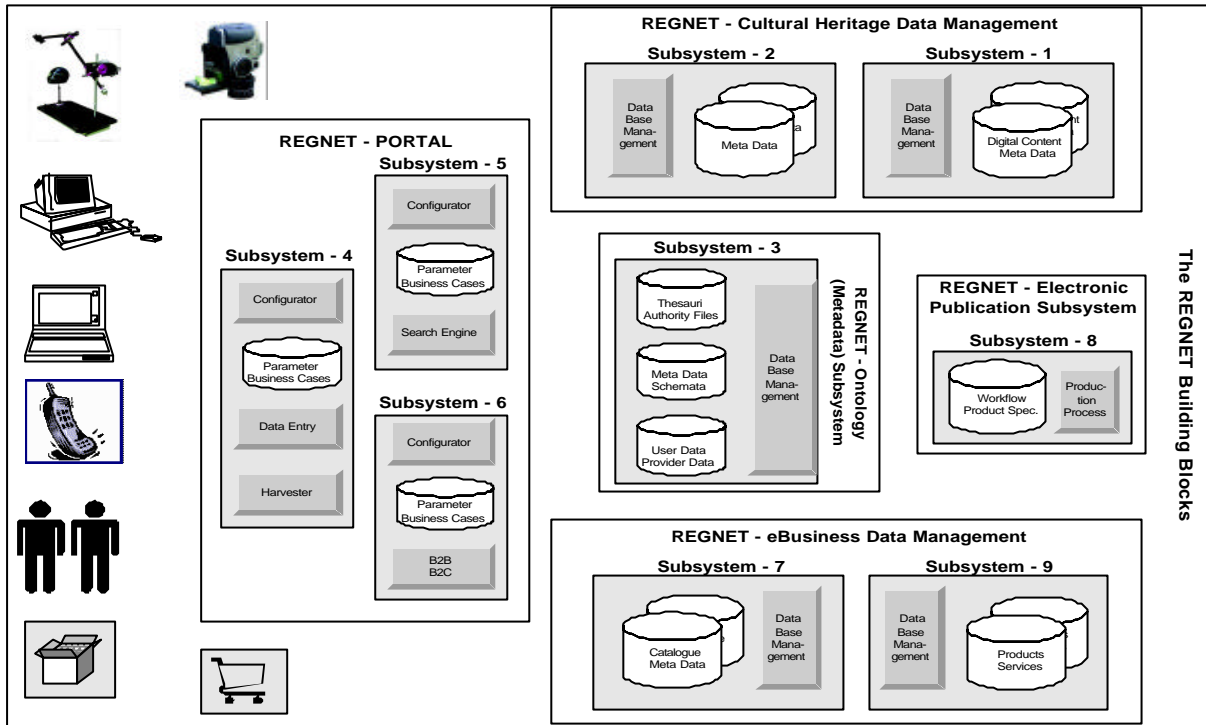
Figure 2: The interconnection between different REGNET components

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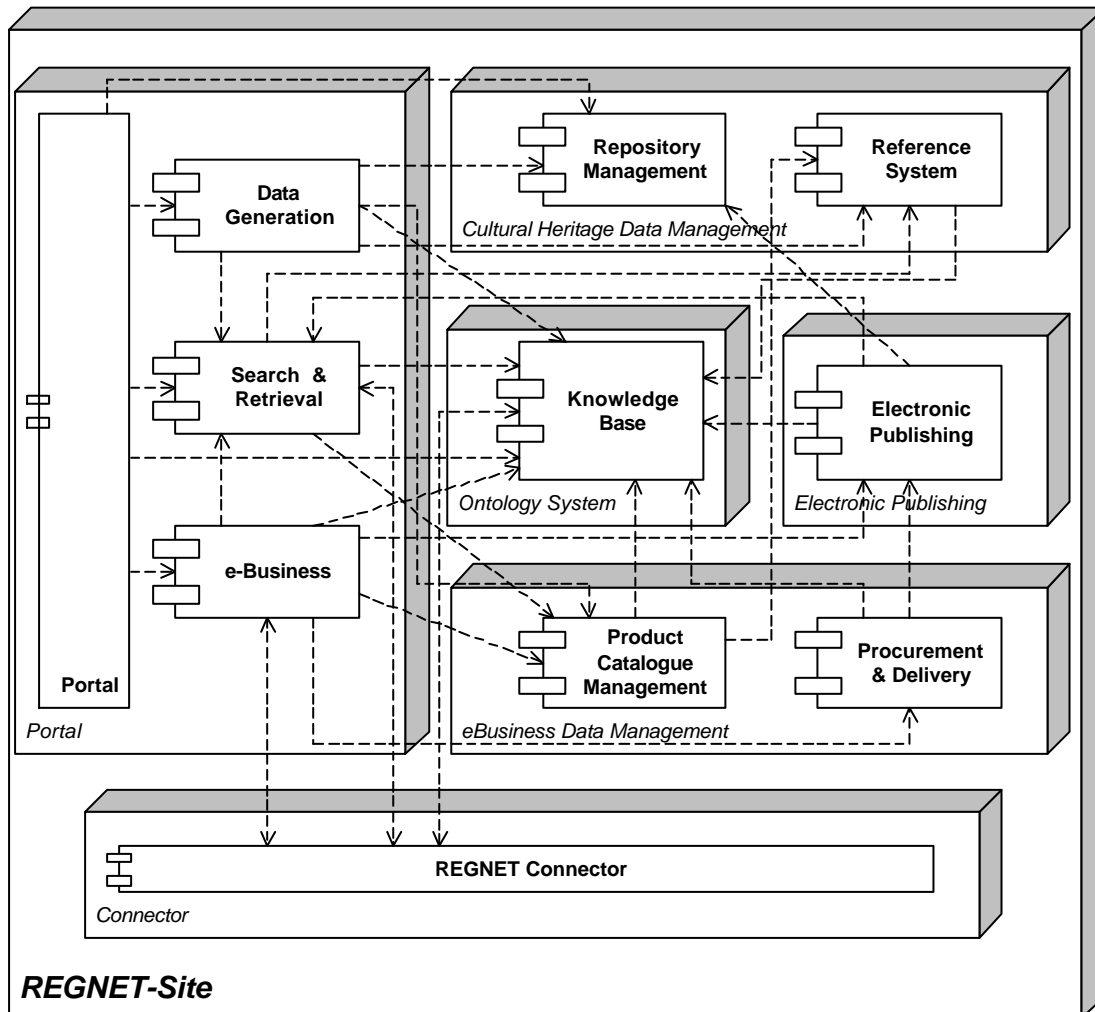
The REGNET service network:

The REGNET network will integrate multi-media industries, content providers and service centre operators which will contribute and profit from the network in different ways..

The Content providers (museums, libraries, archives etc.) provide access (via wired and wireless communication) to their digital contents, services and products and offer them to their clients (B2C). In return they can use the REGNET facilities for multi media productions and data base management, or cooperate with other REGNET partners during the creation of data bases, generation of multi media products or creation of a virtual exhibition (B2B). The REGNET Service Centre operators themselves generate income by providing the technical infrastructure (software/hardware) to content providers and other partners within the REGNET network. They can offer additional IT-services and consultancies. Third the System developers are selling the REGNET system to Cultural Service Centres and Content Providers. They have the possibility to implement additional components for the REGNET software system (additional 'nodes' like an 'exhibition creator', etc), and will generate income via licence fees for the REGNET system. Finally for the end user the system offers easy and wide access to cultural data and services of an integrated virtual catalogue, and invokes the production of personalized goods (i.e. CDROM) and services. A great variety of cultural services (consultancy work etc..) and goods can be purchased via internet shopping (Museums Shops etc…).

1.2   Project Tasks

The REGNET Project aimed to develop building blocks to set up a service infrastructure for organisations and users in the field of Cultural Heritage. These blocks which constitute the REGNET-System are supporting access to cultural & scientific information as well as to product & service information offered by different organisations.

The baseline concept behind the REGNET project is laid down in following figure:
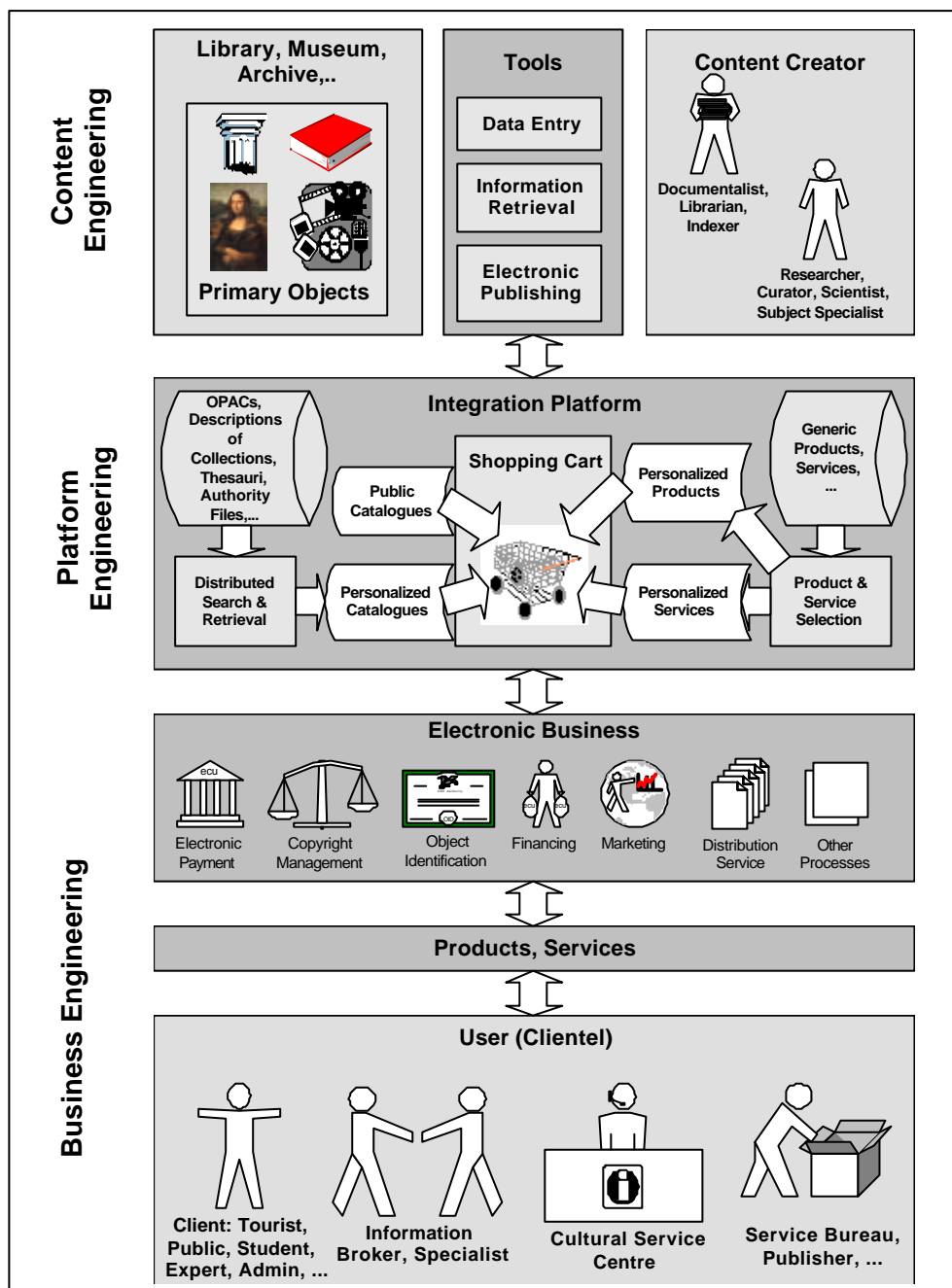
The main areas to be investigated are: content, platform and business engineering.

It is not by accident that the shopping cart is located in the centre of the figure: it is the entry point for all services supported by a REGNET infrastructure

The shopping cart is not only filled by CH related data, but also by services and eventually real goods (museum shops). Some scenarios are outlined in the annex.

Figure 3: The baseline concept behind REGNET

To achieve the objectives of REGNET the project was divided into two Phases:

Phase I was dedicated to the development and implementation phase to set up the service infrastructure which is build upon the REGNET 'building blocks' (nodes) and consists of three work packages (WP1, WP2, WP3). During this phase the first version of the REGNET demonstrator was developed. The development of a second version was carried out in parallel with the validation and preparation (demo) activities (Work Package 3 - Demonstration).

Phase II included the trial service and was defined as part of the Demonstration Phase (WP4).

Other activities included information dissemination, exploitation and project management (WP5, WP6, WP7) and last during the whole project life time covering both phases.

Since the trial service was an integral part of the REGNET project Phase II it was not separated from the rest of the project; this means that WP3+WP4 (demonstration) was part of an overall and unique project structure.

Overview on Tasks

During the project life-time the following tasks have been carried out:

Analysis of the State of the Art and Development of Concepts
Work package 1

- Definition of content to be provided (Task 1.1)

- Development of a documentation and digitisation plan for content creation and management (Task 1.2)

- Identification of standards to be used (Task 1.3)

- Development of the System Specifications (Task 1.4)

- Setup of the Legal Framework and Partnership Model (1st Phase) (Task 1.5)

- Definition of supported Business Functions (Task 1.6)

- Identification of Market (Segments) and User Groups (Task 1.7)

Implementation of the System and Preparation of Services and Product Generation
Workpackage 2

- Preparation of content and products (Task 2.1)

- System Implementation (1.Version) (Task 2.2)

- Setup of the legal framework (2nd Phase) (Task 2.3)

- Business process (re-) engineering (Task 2.4)

- Market preparation (Task 2.5)

Validation and Preparation
Workpackage 3

- Validation of the REGNET-Demonstrator (Task 3.1)

- Preparation of the Demonstration Phase (Task 3.2)

- Implementation of the version 2 of the REGNET system (Task 3.3)

Demonstration, Assessment and Evaluation
Workpackage 4

- Execution of the demonstration phase (trial service) (Task 4.1)

- Refinement of system and services where appropriate and necessary (Task 4.2)

- Analysis of the trial service, assessment and evaluation of the system (Task 4.3)

Development of a technological implementation plan
Workpackage 5

- Development of a technological implementation plan (draft) (Task 5.1)

- Development of a technological implementation plan (final) (Task 5.2)

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Information Dissemination
Workpackage 6

- Information Dissemination (Task 6.1)

Project Management
Workpackage 7

- Project Management (Task 7.1)

- Quality Assurance (Task 7.2)

1.3   Expected Results

The whole project was divided into an implementation and demonstration phase. Work package 1 to 3 referred to the research and development phase while work package 4 was solely devoted to demonstration. The work packages 5 to 7 pertained to both.

- **WP1-(R&D)**
  Analysis of the State of the Art and Development of Concepts

  Definition of content to be provided, development of a documentation and digitalisation plan for content creation and management (Work Area A).

  Identification of standards to be used, development of the user requirements and system requirements & specifications (Work Area B).

  Development of the legal framework and partnership model, definition of supported business functions, identification of market (Segments) and user groups (Work Area C)

The main objectives of the WP1 were:
  - to define the content of the REGNET system. To provide high quality digital assets and services it is necessary to analyse the available content at partner sites. The important decision was to define what objects or surrogates might attract potential users or could be a basis for follow up added value processing. The nature of data is not only of cultural & scientific type; goods available in museum shops were documented too to provide internet access to the museum shop.
  - Development of a documentation and digitisation plan for content creation and management. The objects used within REGNET differ in type, size, quality and quantity. In general two streams of actions have to be considered: retrospective digitisation and day to day cataloguing work.
  - Identification of standards to be used. To enable the usage of low cost hardware and reuse of available components (either hard- and software) a study work were done at the early beginning of the project. The standards investigated related on one hand to the system development, on the other hand to the storage and exchange of cultural heritage related data.
  - Development of the System Specifications. System specifications were elaborated using state of the art and well proofed methods. There are five main – server side - components (REGNET-Portal, REGNET-Cultural Heritage Data Management, REGNET-e-Business Data Management, REGNET-Ontology Checker, REGNET-Electronic Publisher) located on different nodes. This implies a n–tier architecture with interoperable components like protocol gateways, (multi media) data management, data exchange facilities, etc. Standard notations (i.e. UML) were used as applicable.
  - Setup of the Legal Framework and Partnership Model. To set up an operational e-Business network the future cooperation based on sound agreements among the stakeholders doing business in the Cultural Heritage field. Existing networks were investigated in the light of the experience made in practice. The AMICO project carried out in the USA was a model to start. A big issue was the mixture of profit- and non for profit enterprises. REGNET introduced a layer between content holders and distribution and service channels.

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- Definition of supported Business Functions. To enable a wide range of services by a REGNET based service centre all relevant core and support business processes and functions related to a cultural organization were investigated. To integrate B2B processes related to industrial production of digital goods also workflows of media enterprises were investigated carefully. The core processes contain (museums, archives, and library): acquisition, registration, inventarisation, cataloguing, disposal, etc. Such processes are already described by different associations, like MDA (Spectrum) or IFLA. Support processes include i.e. Payment systems, watermarking and copyright management, etc. The knowledge gained in this task was input to the knowledge base located at the ontology subsystem.
- Identification of Market (Segments) and User Groups. The REGNET network addresses a wide range of users ranging from individuals, CH organizations to media industry or publishing enterprises. The segments envisaged comprise: Education, (Cultural) Tourism, Science and Research, Recreational Economics, Administration (Multimedia) SMEs & Industries, Arts, etc. To tailor the services of a REGNET based CSC (Cultural Service Centre) to the need of a (world) wide clientele it was necessary to make in depth analyses of different user groups.

The main outcomes of the WP1 were the following Deliverables:

- D1: Report: "Content Creation and Content Management"

- D2: Report: "The REGNET - System: Specifications and State of the Art"

- D3: Report: "REGNET - Enterprise Engineering and Market Analysis".

- **WP2-(R&D)**
  Implementation of the System and Preparation of Services and Product Generation

  Preparation of content and products (Work Area A).

  System implementation; development of the building blocks; integration into the REGNET-System (Work Area B).

  Settlement of the legal framework, business process (re-) engineering, market preparation (Work Area C).

Main expected result from WP2 (Implementation of the System and Preparation of Services and Product Generation) was:

- The first version of the REGNET software. That means that we obtain a first version of all the main software modules: Portal, Cultural Heritage Data Management, e-Business Data Management, Ontology and Web Electronic Publisher. These components will allow the user group to be able to try it and give feedback at the functional level. This first software version allows also validating main technical risks about software architecture.
- Preparation of content and products. According to the plans and the guidelines elaborated in the previous Work-Package digital content available at the content providers side has to be prepared to be available for the REGNET demonstration phase. The museum shops connected to a museum have to prepare product catalogues in electronic form.
- Set-up of the legal framework. To operate the REGNET virtual enterprise contracts have to be prepared and signed between different stakeholders in the network (i.e., content owner <–> REGNET-Cultural-Service Centre, REGNET-CSC <-> end user/dealer, …) The contract should allow an easy extension of the network by integrating different type of partners. Especially the creation of user groups has to be facilitated.
- Business process re-engineering. To provide services to different users, access points to the REGNET network have to be installed. This requires appropriate technical or human resources related measures. Museum shops, have to be integrated into the internet based communication flow (stock control, billing and accounting system). In case a production process can be invoked either internal or external orders have to be generated and a control workflow will be instantiated. All this might dramatically change the way the cultural organization has done the business up to now. In order to prepare this deployment we need a clear view on existing business processes and the way we have to modify it. The work to be done is based on the result of previous Work-Package.

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- Market preparation. To address the user groups identified under previous Work-Package appropriate measures have to be undertaken to inform a wide range of clients that the REGNET network is running and delivers services and goods to the customer.

The main outcomes of the WP2 were the following Deliverables:

- D4: Report: " Available Content and Products"

- D5: Prototyp: " REGNET-System: Version-1"

- D6: Report: " System Services and Business Processes".

- **WP3-(R&D)**
  Validation of the REGNET-Demonstrator and preparation of the Demonstration Phase

  Validation of the REGNET-demonstrator; preparation of the demonstration phase.

  - Work related to work package 3 referred to the test of the REGNET system by selected users and the consortium itself to detect eventual misbehaviour. In order to do this the validation concept and methodology must be defined and described. In order to carry out tests of functionality, usability and performance criteria for usability and performance measurement must be provided together with test case for functional tests and the identification of test user groups. All test results should be collected (test reports) and analysed in order to formulate necessary improvements.

The main outcomes of the WP3 were the following Deliverables:

- D7: Report: " Validation of the REGNET System operation & Preparation of the REGNET - Demonstration Phase "

- D8: Prototype: " REGNET-System: Version-2"

- **WP4-(Demo)**
  Demonstration, Assessment and Evaluation

  - The REGNET-System will be used in a trial services which includes an initial testing phase (selected users). The REGNET-demonstration part of the project includes: execution of the demonstration phase (trial service); refinement of system and services where appropriate and necessary; analysis of the trial service.

The main outcomes of the WP4 were the following Deliverables:

- D9: Report: " REGNET System operation "

- D10: Prototype: " REGNET – Demonstration (Trial Service) "

- D11: Report: " REGNET trial service and recommendations "

- **WP5-(R&D-Demo)**
  Development of a technological implementation plan

  - Development of an exploitation plan on different levels (content providers, service providers, business access points). The plan has to include new models of co-operations and partnerships.

The main outcome of the WP5 was the following Deliverable:

- D12: Report: " Technology Implementation Plan "

- **WP6-(R&D-Demo)**
  Information Dissemination

  As is usually the case with EU projects, dissemination plays a very important role. The key dissemination channels have been studied and analysed during all the project lifespan in the WP6.

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- Within REGNET, emphasis was given in promoting the project's position and results to conferences and workshops related to the field of cultural heritage, museum information technologies and cultural heritage regional models. Particular attention was also paid at cultivating contacts and relations with other EU projects.
- Whenever possible, the REGNET project is intended to develop a common platform to apply metadata schemas ensuring interoperability between all information resources in order to enhance the attractiveness of regional networks of less-famous memory institutions to improve their socio-economic role getting consensus among all related initiatives and involving advanced interactive multimedia solutions.
- This process is culminating in the emergence of standards on metadata, and in the development of specifications to be used freely by any person, company or institution.
- The WP6 is a collective effort by all the REGNET partners who will contribute input to conferences and journals. Thanks to the disseminations activities and the dissemination of the whole REGNET site, the main goal of the exploitation of the REGNET project should be the creation of a fully functional REGNET site with a big cultural database to be available on the web with a dual role: a promotional area for customers and a complete/powerful tool for added value services (i.e. professional publishing).

The aim of the dissemination of the REGNET project and its content was two-fold:

1. To widely disseminate information about the REGNET offer to the cultural heritage community in order to ensure early adopters of the technology within the institutions. This dissemination will be accomplished, among the other actions, by means of participation to conferences, workshops, seminars and specialized fairs.

2. Dissemination will also be directed to the participation of project members in relevant standardisation committees and workshops. Due the multidisciplinary (cultural institutions: museums, libraries, archives etc, cultural industries: new media enterprises, ASPs, etc) REGNET addresses different target groups: individuals, organizations, enterprises, and associations.

- The Information dissemination of REGNET project has been done using different types of dissemination channels: Project WEB-Site, conferences, seminars, printed paper and electronic publications. Special attention has been drawn to the participation of project members in relevant standardisation committees and workshops. Due the multidisciplinary (cultural institutions: museums, libraries, archives etc, cultural industries: new media enterprises, ASPs, etc) REGNET addresses different target groups: individuals, organizations, enterprises, and associations.

The main outcome of the WP6 was the following Deliverable:

- D13: Report: " REGNET – Information Dissemination Activities "

- **WP7-(R&D-Demo)**
  Project Management

This work package included management, reporting, quality assurance, etc. The management activities were split up into contractual and technical matters and were covered by two different partners.

The objective of the Quality Assurance System has been to define processes to be observed in monitoring, reporting and providing consulting support for the development of the REGNET product, assuring that the established process is actually being implemented.

The main outcomes of the WP7 were the following Deliverables:

- D14: Report: " REGNET - Quality Assurance System "

- D15: Report: "Final Report "

- D16: Project Presentation (WEB Presence)

- D17: Project Presentation (Fact Sheet)

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2 Project Framework

2.1 Description of working method (organizational structure)

The seven REGNET Work packages were broken down in different tasks each of them having a responsible task manager. The content and targets of each task was contained in a 'task brief' (standard form) which was elaborated by the responsible task manager before a task started according to the descriptions included in the work packages. The subdivision of tasks into subtasks was by intention not worked out in the overall project plan. It was open to the work package leader in consent with the technical coordinator to develop a short term project plan dedicated to a predefined work load. This system proved to be very useful for project controlling and provided for each partner a consistent overview over the project.

Due to the complexity of the project the work plan identified three work areas (A, B, C) in Phase I and two work areas (D,E) in Phase II.

Work Area A referred to the content creation and content management,

Work Area B referred to the platform engineering (integration of middleware components) and the development of the REGNET building blocks (nodes), and

Work Area C covered the enterprise engineering (business process engineering, definition of work flow) and the set up of a legal framework.

Work Area D covered the domain specific aspects of the REGNET-System.

Work Area E contained the management of the demonstration assessment and evaluation phase.

The first half of project year 1 within REGNET has been dedicated to the analysis of the state of the art and the development of concepts. In the second half of the year the implementation of the system and the preparation of services and product generation started. The work was therefore split up in content engineering, management and integration of work area A, and platform engineering, network, operations and service management of work area B, and work area C which comprises cross enterprise engineering, process and change. The graphic depicted on the following page shows at the bottom the research work for setting up the infrastructure
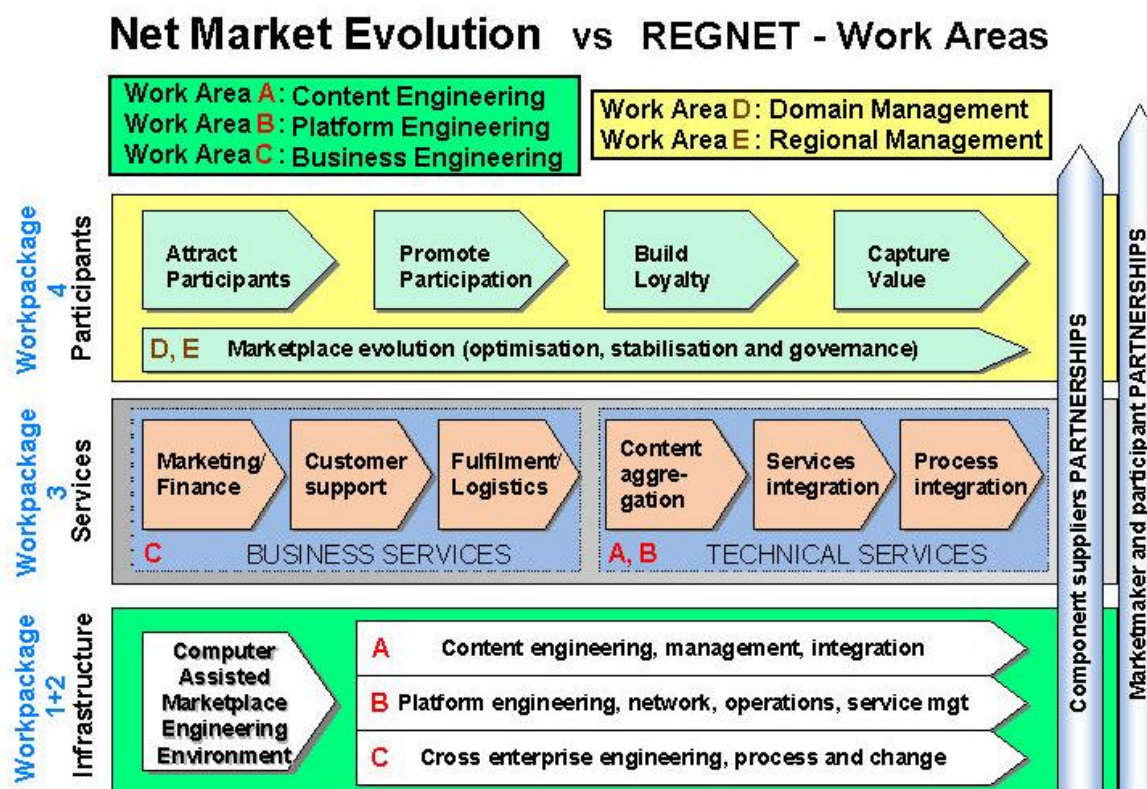
Figure 4: Net Market Evolution and REGNET

After Work package 1 (conceptual framework) and Work package 2 (main implementation phase) have finished Work package 3 had to concentrate on the future business of the REGNET Service-Network. A new type of "REGNET-Player" came up: the REGNET-service suppliers. They are hosting "Regional Poles" which also can be considered as "Regional Service Hubs" or similar, providing access to the REGNET-network.

Usage and usability related issues were mainly executed by Content Providers in cooperation with Regional Poles (at this stage: "Incubator" of a Cultural Service Centre).

The infrastructure for Service Centres was set up and the "business functions" on which the CSC-Services will be based, had to be defined (on the basis of the contract as a minimum); training, market related issues, etc were also included.

2.2 Project Partners

The REGNET project brought together 25 partners, cultural organisations and IT-industry representatives, from 10 European Union states as well as Bulgaria and Russia with AIT Applied Information Technique Research Ltd. from Austria as co-ordinator. The partners were coming from following countries: Austria, Belgium, Bulgaria(Russia), France, Germany, Greece, Netherlands, Italy, Spain, Sweden, UK. This big variety of partners gave REGNET the potential of being the kernel of a fully functioning network of service centres in the field of Cultural Heritage.

The partners of the REGNET project could be grouped in:

Group-1: **Content Providers**: ONB, LMG, NRM, KVA, ALI, MECH, GRAN, MUS

Group-2: **Developers:** SR, SI, CERT, VALT, TINC, MOT

Group-3: **Regional Poles:** SUL, CC, IAT

Group-4: **Developers/Poles:** AIT, IMAC, TARX, SPAC, ZEUS, ICCS

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The members of group-4 had two roles combined. Regional Poles were providing the technical infrastructure to run a REGNET-System and the necessary coordinating facilities within a region and can be considered as 'nodes' of the REGNET-service network.

REGNET has by now set-up a service infrastructure in 5 European regions with a potential of an extension into 2 additional regions. The regions which will be covered by a REGNET system are:

Region 1 - Middle and Northern Europe:

AIT, ONB (Austria), SUL, LMG, NRM, KVA (Sweden)

Technical Infrastructure provided by **AIT**

Coordination done by **AIT**

Region 2 - Western Europe:

TARX, MECH (Belgium), MUS (Netherlands)

Technical Infrastructure provided by **TARX**

Coordination done by **TARX**

Region 3 - Eastern Europe:

ICCS (Bulgaria), SUSU (Russia; subcontractor to ICCS)

Technical Infrastructure provided by **ICCS**

Coordination done by **ICCS**

Region 4 – Germany - Switzerland:

IMAC (Germany)

Technical Infrastructure provided by **IMAC**

Coordination done by **IMAC**

Region 5 - Southern Europe 1:

IAT, GRAN (Spain)

Technical Infrastructure provided by **IAT**

Coordination done by **IAT and GRAN**

The possible extensions are:

Region 6 - Southern Europe-2:

ZEUS, CERT, SI (Greece)

Technical Infrastructure provided by **ZEUS**

Coordination done by **ZEUS**

Region 7 - Southern Europe-3:

SPAC, ALI, CC (Italy)

Technical Infrastructure provided by **SPAC**

Coordination done by **CC**

List of REGNET Partners by country

- AIT - AIT Angewandte Informationstechnik Forschungsgesellschaft mbH (A)
- ONB- Österreichische Nationalbibliothek (A)
- SR - Salzburg Research Forschungsgesellschaft mbH (A)
- IMAC - Information&Management Consulting e.K (D)
- SUL - Stockholms Universitet (S)
- LMG - Länsmuseet på Gotland (S)
- NRM - Naturhistoriska Riksmuseet (S)
- KVA - Kungl. Vetenskapsakademien, Royal Academy of Science (S)
- TARX - TARX nv (B)
- MECH - Stad Mechelen - Stedelijke Musea Mechelen (B)
- MUS - Stichting Museon (Museum voor het Onderwijs) (NL)
- SPAC - SPACE S.r.l. (I)
- ALI - Fratelli Alinari I.D.E.A. Spa (I)
- CC - Consorzio Civita (I)
- MOT - Motorola S.p.A. (I)
- GRAN - Ajuntament de Granollers (E)
- IAT - Instituto Andaluz de Tecnología (E)
- ZEUS - Zeus Consulting SA (GR)
- SI - Systema Informatics Ltd. (GR)
- CERT - Centre for Research and Technology Hellas (GR)
- VALT - VALTECH (F)
- TINC - Terra Incognita Europa Limited (GB)
- ICCS - Institute of Computer and Communication Systems (BUL)

SUBCONTRACTORS:

- UniVie - Universität Wien (A)
- SUSU - Southern Ural State University (RU)

Figure 5: Map of partners

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2.3   Modifications

In agreement with the European Commission the tasks T2.3, T2.4 and T2.5 have been
extended till end of June 2002 in order to execute emergency procedures due to non-in line contribution of the marketing plan. Within the time plan there has been delivered a first version and a second version of D6. Discussion at the Review in Luxembourg, July 2002, showed that this schedule could not be kept, as new partners have to be involved and will contribute during the following months. Therefore it was requested (IMAC dossier to the Commission, July 2002) to schedule the delivery of the final version of D6 at the end of 2002.

Furthermore it was requested within the second Progress Report to extend work package 3 and the Tasks T4.1 and T4.2 each by two months. This extension is a consequence of the comprehensive workload for WP2 which was huger than expected and implicated a later beginning of the following tasks than initially expected. The planned buffer-span of about 3 calendar months which has been included in the original project plan allows this smooth and continuous transition from the
"Development and Implementation" phase to the "Demonstration" phase.

Nevertheless at the end the project work progress was in line with the overall project planning according to the contract. The project is by now well known in the cultural heritage field, especially in those regions where the first national test beds have been carried out, and new partnerships and cooperation are under discussion. The Cultural Service Centre EEIG, has been established on the 21st of June 2002 under registration number FN 223415b, at Graz, Austria. The EEIG will function as the strategic legal framework for the already founded and future Cultural Service Centres which will be operating as spin-offs of the REGNET project, offering value-added REGNET services to the cultural heritage domain in Europe. Even more this new organisation shall guarantee a future common working and also business platform for interested partners after project end.

Progress and Results

3 Work Package 1 – Analyses of the State of the Art and Development of Concepts

3.1 Content Creation

During this work package at first the current practices at the side of the content providers were analysed and documented in order to provide a guide on international best practice regarding the usage of digitised information as well as the usage of the Internet for the presentation of collections (search and browse), communication and interaction with potential users, e-Business transactions, etc.. This guide gives an overview about the collections be part of the REGNET-System, the used software and hardware architectures, methods and systems for data management, used data structures and standards in the different domains as well as offered products and services for different user groups (internal view). To assure an orientation of the REGNET portal also on the international *state-of-the-art* in the field of cultural heritage moreover several applications were identified and analysed (external view) to work out typical and well-established features as well as innovative ones. For all analyses appropriate methodologies were developed, e. g. questionnaires, checklists and group discussions during the project meetings. To derive and define functional requirements considering current practises and market needs was the overall goal. This was done by providing a list of use cases (use situation together with best practise examples) and concrete requirement to be considered in the technical development process.

As part of the description of requirements and desirable features of the system the theme-based approach was introduced on a conceptual basis. The idea behind is to realise a technological, legal and operational framework wherein, mainly descriptive, cultural content can be created, edited, assembled, searched and consulted in a flexible and combinatorial way by a large community of information authors and users. The aim of the themes approach is to deliver substantial added value in areas such as education, electronic publishing and virtual exhibitions.

Finally all digitising aspects were treated in this work package; this covers

- a description of different digitising models for different object types (e. g. real objects like artefacts, maps, media objects like films or photographs) and types of digitising (e. g. textual description, 2D surrogates of originals, 3D surrogates of originals, electronic texts, electronic video and audio, automatic recognition of image/video content,

- a description of (digitising) processes. In this part a digitising plan has been developed, which shows the steps in the digitising process, describes alternatives and standards, gives advice how to proceed and provides a scheme for a production plan,

- a description of tools for digitising and (technical) standards,

- a presentation of best-practice examples.

The "general" digitising plan which were created thereby serves as a guideline for all digitising activities in the REGNET project. The general policy of digitising and the selection with regard to content and technological issues are described. The digitising plan lists all tasks (which can be tackled in sequence or in parallel) valid for digitising projects in general. The "modules" of the general digitising plan should allow to convert any individual collection according to the described procedures by considering the large number of variables, driven by the priorities, the institution, user needs, technical issues and available funding. It should help to consider all things needed to build up a digital collection: from the collection itself, the data that describes the objects and the user groups. Taking this model for all content providers a customized digitising plan was developed.

Altogether work carried out lays the basis for the content production during the next work packages and states the requirements the REGNET-System must fulfil.

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3.2   State of the Art

A main objective of the WP1 was the analyses of the state of the art and a specific deliverable was produced that is covering the specific objective. The D2 "The REGNET - System: Specifications and State of the Art" includes those activities of Work Package 1 (Analysis of the State-of-the-art and Development of Concepts) which have been carried out within Work Area B (Platform Engineering) of the REGNET project. There are two parts, one dealing with "Identification of standards to be used", and the other related to "Development of the System Specifications". The latter one includes an annex which refers especially to the software engineering process (state-of-the-art development environments, programming languages, architectures, risks, web services, etc) and evolving industry standards in the field of e-Business, wireless technology, ontology, and semantic WEB.

The domain related standards in the first part of the work covers a wide range of specifications which evolved mainly during the last years and can be considered as stabilised. Because there was a dramatic evolution of standards since one of the key activities in the area of Cultural Heritage has been published (CIMI – Standards Framework, 1993) an introductory section deals with the use of standards, metadata systems, information interchange and e-Business. The Document Standards are grouped into application domains (libraries, archives, museums, artists) and especially those standards have been dealt with where commonly approved DTDs (document type definitions) are already available. Dublin Core (DC) Metadata have been selected as access points for distributed searches over different application domains since there exist already road maps supporting the mapping of DC into domain specific metadata and several projects like COVAX have already demonstrated the usefulness of this approach. On the technical side the Z39.50 protocol has been analysed and a further – experimental – development of this concept (XER: use of XML-wrappers instead of ASN.1 based Encoding Rules) has been chosen as basis for the specification of query formulations. XML and related standards have been selected as basis for all information engineering and information management procedures as they are commonly accepted and widely adopted in the industry. Publishing standards are also included in this part of the document. Since the evolution of the "Semantic Web" has generated a lot of activities several projects in the field of knowledge presentation have been looked into. The XML Topic Map (XTM) has been chosen as prime candidate for the unified implementation of "themes", thesauri, authority files, and similar applications. The practical use of the XTM-Standards has been demonstrated by testing different products (XTMServers/ Clients) available on the Market.

The second part of this document is dedicated to the development of system specifications. The originally elaborated REGNET functional architecture has been slightly modified and includes now a new component (REGNET-Connector) in addition to the others (REGNET-Portal, REGNET-Cultural Heritage Data Management, REGNET-e-Business Data Management, REGNET-Ontology System, REGNET-Electronic Publisher). This was necessary for the implementation of a REGNET Network consisting of several REGNET-sites and supports a scalable technical infrastructure of a REGNET Site according to the needs of a Cultural Service Centre (CSC). A specialised REGNET-Site (Ontology Master Site) will assure that the needed domain knowledge is available within the REGNET Network. The Ontology Node of each REGNET-Site is a very important component since it triggers most interactions with the systems, i.e.: data entry (meta data control), e-Business and searching. An adaptable search interface ("Cultural Online Browser") will be provided in case a thematic search is requested (provided XTM-formatted themes' information has been prepared and is available). Themes' related information included in the REGNET knowledge base will also be used for storyboard supported electronic publication processes. A further use of "thematic information" will be the creation of "personalised tours", which was investigated in the 2nd REGNET Work Package. External Systems (Data Bases, Collection Management Systems, e-Shop Solutions, etc) will be connected via the REGNET-Connector to the REGNET Network. This enables the inclusion of proprietary systems of commercial vendors (i.e. ADLIB, INDEX+, etc) into the REGNET Network. In different chapters of the document the REGNET-Building Blocks, the Requirements, Use Cases (related to the functional requirements), the Functional Architecture (UML-Activity Diagrams), the Technical Architecture, the System Architecture and Tools, Deployment (several application possibilities of a REGNET-Site), and Interfaces are described. To enable the interconnection of REGNET Nodes which are developed on different platforms (JAVA, PHP) the SOAP-protocol (Simple Object Access Protocol) has been chosen. For the specifications UML (Unified Modelling Language) has been used as far as possible. The UML also is a important method of the iterative development process chosen for the System development as it is derived from the Rational Unified Process and the ISO-12207 V-Model approach. Tools (Web-Servers, XML-Data Base Systems, Relational Data

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Base Systems, Parsers, Editors, etc) available in the Public Domain have mainly been chosen for the implementation process which will be carried out in Work Package 2 of the REGNET System. This should enable to run a Cultural Service Centre at low investment costs. Due to the importance of future access to Cultural Heritage, Wireless Access and Voice Access are described in dedicated chapters.

3.3   Enterprise Engineering

Activities carried out within Work Area C are split into three parts; one dealing with "Setup of the Legal Framework and Partnership Model" (part 1), the second with "Definition of supported Business Functions" (part 2), and the third is related to "Identification of Market (Segments) and User Groups" (part 3).

Part 1 describes new forms of cooperation and describes best practice models in this area as developed by the "Art Museums Image Consortium (AMICO)" or by the EU-Project within the TEN-Telecom Framework "MOSAIC-Museums Over States and Virtual Culture". Another source contributing to the concept of the future REGNET-company was the MAGNETS Study, carried out within the Telematics Application Programme of the European Union. Intellectual Multimedia Property Rights Models are discussed on basis of the "IMPRIMATUR"-Project; a reference to other relevant projects in this area is included. The international perspective related to the legal framework for the future REGNET-business includes – amongst others: The Berne Convention, World Intellectual Property Organisation (WIPO), etc. Special chapters deal with the Legal Framework in the European Unions' and CEEs' Environments. Based on this material a "Synopsis of Agreements and Recommendations" has been elaborated on which the final "REGNET-Legal-Framework" will be built upon (Work Package 2).

In part 2 high level definitions of supported Business Functions are included. Business Opportunities for European Cultural Heritage (CH) organizations and the REGNET Product Position Statement include first "Leitlinien" for the future REGNET-enterprise. The Business Modelling is done on a sound methodology (UN/CEFACT Modelling Methodology) using UML language. The Domain Analysis (Work Area D of the REGNET-Project) includes Business Areas for Museums, Art Galleries, Archives, and Libraries and the International Supply Chain as Support Area. Use Case Diagrams have been developed and include in the Museum Domain: Collection Management, Tourism, Education, Recreational Economics, Shop, Services; in the Library Domain: Collection Management (Cataloguing), Loan, Science, Research and Education scenarios. In the Archives' Domain business modelling refers to Archive management and Archive services, in the Art Gallery Domain to: Artswork promotion, Artist resources and to Research and Education scenarios.

Part 3 refers to the "Identification of Market (Segments) and User Groups" and deals with the "Cultural Sector in the EU (characteristics, volume and trends of employment)" and "ALM (Archives – Libraries – Museums) ICT (Information and Communication Technology) cultural services" amongst others. A survey of online products/services offered by museums is also included as an "initial identification of REGNET user groups" which is an early attempt to identify and describe the user groups which are potentially interested in REGNET. In the "Methodology and Roadmap chapter" the achieved results are critically analysed and a roadmap to achieve a more complete market assessment in the next phase (Work Package 2 – Work Area C) of the REGNET Project is included.

4   Work Package 2 – Implementation of the System and Preparation of Services and Product Generation

4.1   Available Content and Products

According to the plans and the guidelines elaborated in work package 1 digital content available at the side of the content providers was prepared to be available for the REGNET demonstration phase. The already selected objects as defined in the digitising plans (test data) were described ("bibliographic records") and digitised following the recommendations provided. Typical tasks carried out by the content providers comprise:

- set-up of a legal and technical framework, e. g. evaluation different digitising solutions,

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- training of staff using (new) facilities for digitising and data management,

- digitising of objects (mainly in .tiff and .jpeg formats),

- cataloguing using established standards like Dublin Core,

- cataloguing and digitising of objects for selling (museum shops)

Due to the fact that not all tools foreseen were available from the beginning on templates for the offline data entry were provided together with appropriate guidelines. Where electronic object data was already available procedures for the upload were defined. With the Museo degli Argenti (Florence) and the Capitoline Museums (Rome) new content partners enrich the REGNET collection set; in order to get further input for the REGNET demonstrator several other (external) data bases were added, e. g. the Swiss Poster collection, the database of paintings and sculptures in Swiss museums and collections. According to the theme concept introduced in work package 1 content creation covers also the work on theme structures for all selected themes, the creation of fragments to be reused in different themes and the development of thematic views for navigation which should be realised as topic maps later on.

At the end of the work package a wide range of data collections were available for processing (analysing, mapping to domain-specific standards and conversion) –stored in different formats and created by using different „tools", e. g. Excel, Access, Word, XML. As a basis for procession the REGNET data structure were developed, distinguishing between different object types. All data available were mapped to this internal structure. Online data entry tools should support the (future) entry of data also for the portal like news(letter), events, profiles, addresses and links.

4.2 The REGNET-System Version 1

The main objective of the specific WP2 was focused on providing a complete overview of the first version of the REGNET System and the functionalities that are supported by it and a specific deliverable was produced that is covering the specific objective. The D5 "The REGNET – System : Version 1" includes those activities of Work Package 2. In the first part of D5 document there is a clear description of the processes that were followed in order to achieve the specific results. This process is based on Unified Process as specified in Work-Package 1.

The second part gives an overview of the overall software architecture as established previously and the third part contain description of prototypes which has been developed in order to validate technical risks. These prototypes are used as first software version for next development steps.

The fourth part describes design models. The design model is an object model describing the realization of use cases, and serves as an abstraction of the implementation model and its source code.

The fifth part gives the implementation model. That is a description of the REGNET components. The implementation model is a collection of components, and the implementation subsystems that contain them. Components include both deliverable components, such as executables, and components from

which the deliverables are produced, such as source code files. The sixth and last part contains the deployment plan that includes the necessary operations in order to deploy and use the REGNET software.

The following prototypes has been developed and are described in next part:
- Communication:
    - APACHE/JETSPEED Portal with others J2EE based Java modules through SOAP.
    - APACHE/JETSPEED Portal with others PHP based modules through SOAP.
- EbXML messages communication for B2B interaction.
- TopicMap generation and visualisation.
- Search and retrieval.
- CatXML standard for e-Business catalogue management.
    - Technology validation for Portal based on Apache/Jetspeed and Wireless communication.
- Publisher technology validation.

The Software Architecture Document provides a comprehensive architectural overview of the system,

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using a number of different architectural views to depict different aspects of the system. As explained in deliverable D2 from WP1, the architecture is based on Web Services approach.

This following part explains interfaces of each REGNET building blocks.

REGNET Portal

The REGNET Portal had been developed in Java and making use of a Java user customisable portal tool named Jakarta Jetspeed. Jetspeed is an open source tool that provides some very use features such as for example the support for HTML and WML, the local caching of remote content, the User, group, role and permission administration.

Data Generation

A 2 step approach has been followed to achieve an integrated version of the Data Generation component into the portal. In the first step an independent Data Input tool was developed. This tool acts as prototype and the graphical user interfaces as mock-up for the 2nd version. The Data Input tool can be used also as standalone system for single a single database. The ongoing second step is to build a "strongly integrated" Data Generation component. This user interfaces of this component will be based on the prototype. The component can benefit from the user management and terminal profiling from the portal framework. The component is based on Servlet technology and uses XSL transformation for presentation issues.

The Data Generation component has connection to two other REGNET components:
1. To the Cultural Heritage Data Management component
2. To the Ontology System

Search and Retrieval

The Search and Retrieval system is strongly integrated into the portal. The main task of the component are to build a query interface and to present the results for a query. The component is based on Servlet technology and the presentation tasks are driven by XSL style sheet transformation. The real search task is delegated to the Reference Systems Search Service. The connection to this Web service is based on SOAP.

E-Business

The basic concept of the e-Business subnode is based on the ebXML specifications. Therefore our approach establishes the ebXML configuration of the e-Business subsystem, which reflects the special
needs of the REGNET project.

Our demonstrator is developed using PHP as developing language. The results are communicating with the portal and the interface of it.

It is important to distinguish the two main components of the E-Business subsystem and these are the systems that implement the e-shop and the B2B services.

Cultural Heritage Data Management

The Cultural Heritage Data Management is based on the use of the TEXTML-Server from IXIASOFT. Nevertheless the interfaces to this subsystem are designed to be open to integrate other databases into the REGNET System.

The TEXTML-Server is only available for Windows platform and the access is done via an API based on COM technology. Therefore the new .NET Framework was used to establish the connections to the database. The interoperability with the REGNET System, which is mainly implemented using the J2EE platform, is guaranteed by providing a SOAP interface to the Cultural Heritage Data Management component.

Repository Management

The Repository Management component is responsible for managing the storage and retrieval of all digital surrogates of primary ('real world') objects (i.e. images, audiovisual and audio files, text files, ...).

Reference System

The Reference System provides access to the databases holding cultural heritage meta data. It is split into to main parts:

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a) Data Generation Service (provides data generation functionalities)
b) Search Service (provides search and retrieval functionalities)

Both subcomponents are accessible through an ASP.NET web service.

E-Business data management

Catalogue management
Product Catalogue Management (PCM) is an information system, which allows the users (participants) to manage their catalogues. Their catalogues contain information about the warehouses and items in them.
The most important aspect of the PCM is usage of the SOAP protocol in the interconnections between the central (administrative database) and the remote (distributed) catalogues.

Procurement and Delivery
The demonstrator uses Apache Soap implementation of SOAP protocol. Soap server publishes business interface that different clients are able to call if they support soap.

Knowledge Base Access
The Knowledge Base System is the metadata secondary database of the REGNET System, and at the same time the core of the Ontology. Specifically, in accordance with the data format schema defined by the REGNET consortium, it consists of the REGNET *secondary data*, such as *Topic Maps*, *User Profiles*, *stylesheets* and so on. This data is auxiliary; it helps all the other nodes connected, to function properly. As an example, the Portal needs the *User Profiles* in order to perform user authentication, and the electronic Publisher requires stylesheets*, all stored in the Ontology Knowledge Base.*
The core of the Ontology can be summarized as a system that comprises of the Knowledge Base and a set of programming classes to perform essential functions against the Knowledge Base data, such as sending the data to the other nodes (with or without using the Java RMI protocol), or checking the validity of the documents stored in the correct XML format.

From a technological point of view, Knowledge Base is an *XML database*, a more specialized kind of database with extra functionality provided for XML files, such as XPATH queries. The technology selected was Xindice (http://www.dbxml.org), an open-source XML database, reliable enough for the purpose of manipulating the secondary data of REGNET. It is implemented in Java, which makes it convenient to integrate to other software systems used for REGNET, such as the *tm4j* (a Java set of packages that handle the Topic Map format).

Since Xindice cannot connect to the other REGNET nodes by itself, or perform sophisticated actions, a set of software Tools were designed, which provide the main functionality of the Ontology System such as RMI interconnection, Ontology-Portal interconnection.

In the following a set of Ontology tools is described intended mainly for the REGNET.

XTM Loader
This is a web tool written in Java for designing and generating Topic Maps to be used by the REGNET content providers. Its presence in the system makes REGNET independent of expensive commercial solutions.

Knowledge Base Management System
This is a web tool developed with PHP. It provides a graphical user interface to manage and browse the contents of the Knowledge Base (the Xindice database). The user has the options of adding and deleting collections as well as documents, and performs XPATH queries to collections.

RMI Client
This is another web tool developed with PHP, designed for simple uploads of files from the Ontology Knowledge Base to a local directory using the powerful RMI protocol.

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Electronic publisher

The external interface of the Electronic Publisher is formed by the classes PublicationObject and PublicationObjectHome. The functionality of the interfaces is used by the Servlet / Applet of the Electronic Publisher. The current version of the Electronic Publisher is dependent on the Servlet / Applet (which is the visual representation of the Electronic Publisher) to gather the needed parameter information for publishing objects from the user. Due to that the external interface is not represented via a SOAP interface as for now the communication exclusively runs over the provided Servlet / Applet. However, the interfaces defined use standard types only which can easily be mapped to the xsd datatypes.

Tools and Platform

The REGNET system has been developed using both J2EE, Microsoft/ASP and PHP technologies and making use of the following tools:

UML modelisation:
  o Rational Rose;
 Java Environment:
  o JDK 1.3 and Servlet v.2.2;
Java IDE:
  o Borland JBuilder v.5;
Http Server and Servlet Engine:
  o Jakarta Tomcat v.3.2.2;
  o Apache Server.
Portal Front-End Development:
  o Jakarta Jetspeed v.1.3.a and Portlet API
  o Jakarta Ecs v.1.4.1
XML Parser/Validator:
  o Apache Xerces v. 1.2.0;
  o JDOM v.1.0b7;
Version Control:
  o CVS and Tortoise CVS v.0.43
WAP Emulator:
  o Motorola MADK 2.0, OpenWave v.4.1
Standard Web Browsers.

Databases:
  o Relational databases Management System: MySQL
  o XML databases: TextML server and dbXML (ontology).
SOAP middleware:
  o Apache Implementation.
Operating System:
  o Linux.

4.3   System Services and Business Processes

Work done is described into deliverable 6; which synthesises the research work done for the tasks T1.5 to T1.7 and within this work phase a REGNET specific scenario and framework will be further developed. Like D3 it encompasses the work of three different areas. These are T2.3."The set-up of the legal framework", T2.4 "The business process (re-)engineering" and T2.5 "The market preparation".

In order to set up an operational e-Business network the future cooperation has to be based on sound agreements among the stakeholders doing business in the Cultural Heritage field. Within REGNET an important issue for the establishment of the partnership model was the mixture of profit and non-profit enterprises. Here REGNET intends to introduce a layer between content holders and distribution and service channels.

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Within Task 2.3 there has been developed a contracting and partnership model for a REGNET operational and strategic network. Research showed that the organization form "European Economic Interest Group" of European company law would be very appropriate for a network like REGNET. Therefore it has been decided to establish the "Cultural Service Centre Europe EEIG". The EEIG was registered in June 2002 at Graz, Austria.

Further on an initial set of agreements on international level and national level has been established. This should govern the relationships between the players/members of the REGNET network model.

The objective of Task 2.4 is the Business Process Re-engineering. This task continues and is based on the result of task T1.6 "Definition of supported Business Functions", developed during the WP1 (see deliverable D3).

Main targets are: First, the completed and detailed specifications of the selected processes to be implemented have to be provided. These business processes are represented as detailed Use Case and provided by content provider. They are divided into the following domains: Museum, Art Gallery, Archive and Library.

To do this, content providers decided and clarified the detailed workflow of each selected process. Second, the translation of the provided specifications into UML has to be done. To do this each use case has to be studied in order to identify business objects and relation among them. A class diagram of participant object is identified for each Use Case. Then categories (i.e. package of classes) are identified and classes are stored into them in order to produce the logical architecture. This logical architecture expresses complete specifications for modules to be developed.

Moreover each identified B2B collaborative process has to be registered in an ebXML catalogue. To do this we have to deduce BPSS (Business Process Specification Schema) according to ebXML rules.

REGNET will provide a wide range of services based on a new model; which is referred to as application service providing (ASP-Model). It will not merely provide functions, which are already available at the market: the synthesised form with all possibilities of customisation and the new ASP Model are an innovation in the cultural business. Especially small and medium sized organisations within the cultural sector – by far most of these organisations are SMEs - will be able to use features for their daily work which could not be afforded until now. The REGNET-System is a real innovation in the cultural business.

One part of work package 2 was dedicated to the market preparation. In different steps (iterations) a market analysis was carried out in order to set the marketing objectives, elaborate marketing strategies and derive concrete activities to be fixed in a marketing mix. The market analysis followed a well-defined methodology and reveals important development and trends in the cultural market, identifies competitors and gives profiles covering the individual product portfolio, target groups, prices, specific strengths and weaknesses etc.. Due to different circumstances important additions to the first approach were made in the last phase of the project, subjoining quantitative and qualitative information about the market segments, users and their needs. The product and service portfolio of REGNET was described with regard to the main target groups, user benefit and USP. According to this the following main product and service categories were distinguished:

- Information services (e. g. news, events, guidelines),

- Search & retrieval services (including browsing facilities e. g. for topics),

- Database services

- Publishing services

- E-Business services

For the description of the competition situation (What organisations, what products etc.) new (further) competitors were identified and described in a in-depth profile also respective strengths and weaknesses in comparison with the REGNET-System. Best practises are identified to provide a good base line for marketing of the REGNET-System. All effort related to the Market Engineering/Preparation meets in some general marketing strategies and the positioning of the REGNET system.

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5 Work Package 3 – Validation and Preparation

5.1 Validation and Preparation of Demonstration

To prepare the regular operation of the REGNET-System the REGNET demonstrator as well as the data developed and prepared in course of WP 2 should be validated. In parallel the service suppliers should set up the necessary infrastructure. The whole validation process followed a methodology which defines the single tasks to be carried out, structures the validation phase by distinguishing different test types and provides feedback forms (checklists, test cases, questionnaires). For each test type (tests based on use cases, usability tests (scenarios, heuristics, card sorting), content quality and integrity checks, technical tests) an in-depth-description were created (test profiles within the overall test strategy). Figure 6: presents the complete test strategy worked out and carried out by different test user groups.
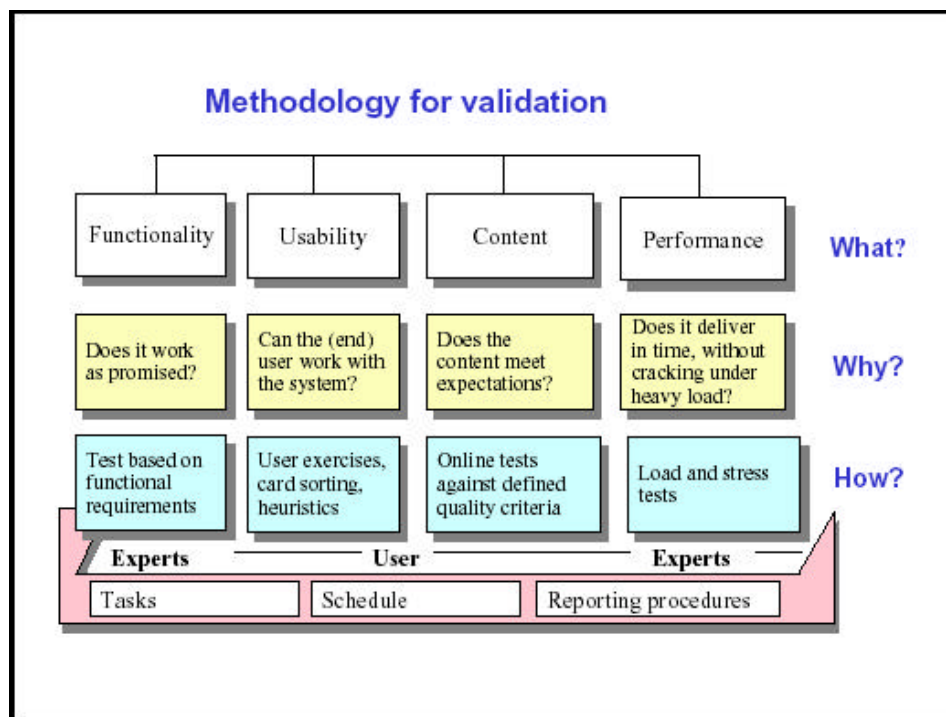
Figure 6: Test strategy for WP 3

A reporting procedure was proposed in order to enable the proper handling of all incidents and change requests occurring during the validation phase. During the first test phase (WP 3) internal test user groups were identified (the second trial will address external user groups). Test users should come from different domains (library, museum, ...), represent different levels of expertise (experts, end users, ...) and different point of views, e. g. technical experts (system administrators), cataloguing and marketing staff.

During the practical work several tests were carried out; following the reporting procedure test results were collected, prepared in test reports and sent to the technical partner also as a basis for further system development (problem solving, system improvement). In order to stress all improvements a list of strengths and weaknesses was prepared with concrete actions. As a result not only an improved REGNET demonstrator were presentation but also a redefined REGNET data structure.

During WP 3.2 all necessary actions to be able to start the demonstration phase had been undertaken, firstly the identification of the 3 CSC and supported business functions using a structured questionnaire. During the second iteration necessary material for the CSC development were provided, e. g.:

- packaging of necessary software.

- release and documentation: training material.

5.2   The REGNET-System Version 2

This part described activities fom work package 3 that have been carried out within Work Area B (Platform Engineering) of the REGNET project. The main emphasis of the work has been focused on providing a complete overview of the second version of the REGNET System and the functionalities that are supported by it. This work complete work done during previous work-package which deals with the REGNET system version 1, and develop new functionalities.

Main topics addressed in order to produce the second version of the REGNET system are:

- Internationalisation process adopted by each software module. The following languages has been taken into account: Bulgarian, Catalan, Deutsch, Dutch, English, Spanish, French, Greek, Italian, Russian and Swedish.

- The definition of a new REGNET mock-up developed in order to fix ergonomy of the system. The look and feel will be adopted by all modules.

- Enhancement done to Topic Map authoring tool.

- First implementation of the REGNET connector based on the ebXML framework. It gives a technical overview of the framework and describe the innovative work done in order to implement it.

- The following modules has been improved: ePublishing, auction, delivery, index+ gateway and cooperative thesauri.

The following manuals have been established:

- Installation manuals for new REGNET components (auction, delivery, Index+ gateway and cooperative thesauri). It describes necessary software and installation procedures.

- User manuals dedicated to the new REGNET component. Users who want to learn how to use the software can use them.

6   Work Package 4- Demonstration, Assessment and Evaluation

6.1   REGNET System Operation

This part pertains to the final test, refinement and demonstration efforts carried out within the REGNET project to put the different tools, services and methodologies, developed during the project's lifetime, into practice in a real operational environment via work package 4. This operational environment concerned mainly digitising and e-Business techniques with respect to the Cultural Heritage information resources enhanced with the application of innovative techniques. As well the technological part as the information resources part are covering a very broad spectrum of research, development and information.

A pragmatic approach with parallel action lines was applied to streamline this operation. Based on the outcome of the validation phase and the additions and changes carried out at the technical and content side, two frames of reference were set up: one defined the number and status of the technical modules, another laid down, per content provider, the set of data against which the tests and demonstrations should be carried out. This resulted in 16 technical modules and 11 databases, the latter containing sets of different types of Cultural Heritage data such as object, image and text meta data, thematic texts, images, shopping data, etc. Needless to say that this provokes a combinatorial explosion.

In order to cope with this, the rather strict methodology of the previous validation phase with fixed scenarios and reporting sheets was to a large extent taken over. At the same time content providers were categorised in groups and sets of technical modules were attributed to one technical partner for coordination. All this is reflected in the description of the methodologies applied during the test and demonstration phase and the three ways in which it was done: test beds, dedicated consortium meetings and specific local sessions. In surplus of the more guided feedback reporting, a free style

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type of reporting was encouraged. This ended up in the production of more written feedback; often in domains were the content providers were not primary responsible.

In parallel, as stated earlier, a whole legal construct and operational infrastructure had to be deployed to put it all in practice and, even more important, to guarantee continuation after the project's lifetime in a real business environment. This turned out to be not such an easy task, especially the lengthy legal treatment of setting up an organisational structure covering all Europe. Finally, this was solved by setting up different Cultural Service Centres (CSCs) in different European regions. All these centres have a non-profit status and are coordinated by an umbrella organisation, i.e. "CSC Europe", a European Economic Interest Group which turned out to fit the best the underlying envisaged business practices. Currently the following CSCs exist or are in the process of being established: CSC Austria, CSC Low Countries (Belgium and The Netherlands), CSC Spain, CSC Bulgaria and CSC Germany and Switzerland. Plans exist to establish CSCs in Greece and Italy.

During the validation phase we could perceive that the "technological" gap between the technical and the content providers remains important. This was confirmed during the demonstration phase. In this view, the envisaged demonstrations at the content providers sides had to be supported by dedicated consortium sessions under the supervision of the work package leaders. The consequence of this was that part of the foreseen demonstrations for external persons was shifted to more internal personnel of the content providers. De facto test and demonstration groups were formed between technical and content providers, reflecting already the CSC structures. This can be considered as the first prove of the validity of the CSC concept. All possible regulations on licences, copyrights and royalties concerning the CSCs mutually and with their members are conceptualised.

Despite the restricted time frame of the demonstration period, two iteration periods were built in. Valuable feedback could be gathered after the first period, making it possible to rectify malfunctioning and missing elements. Technical refinements by the technical partners resulted in a more integrated and smoothly running system.

During the demonstration phase and because of the special fully attended demonstrations it was possible to apply a supplementary methodology, namely "behavioural observation" for the usability evaluation and for the final assessment. This proved to be an important added value for the input for the final evaluation sessions.

What was really good to see is the fact that the demonstration phase gave rise to a set of real life cases. By this we mean finished products, based on REGNET modules, used by the public in real life circumstances. To name two of these realisations: a Picture Archive Card Catalogue and an Interactive Multimedia Production. The former concerns an integral picture archive card catalogue, including a web storyboard for external users of the card catalogue database including ordering facility, picture records in a separate picture archive platform database for internal use, thematic texts and pictures. The latter is an interactive consulting and navigational aid with rich multimedia content about Cultural Heritage treasures of art and architecture in a city and its locations. It is placed in one of the museums of the city.

As a conclusion we can state that this phase of the project, which is also the last one, addressed a huge number of things on different domains. The project did not achieve every single objective but went a whole way in the combined domains of Cultural Heritage and Information and Communication Technologies. Not all is done but REGNET provided a firm knowledge base, basic structures to build upon in the future and already very practical results which prove that the chosen approach was the right one.

6.2   REGNET Demonstration

This work refer to deliverable D10 which includes the final version of the REGNET prototype. It includes the changes and extensions based on the result of the validation activity (deliverable D7) as well as the modifications needed to improve the trial service. It refers to task 4.2 of work package 4.

The deliverable D10 contains the code developed during the project and necessary to run a REGNET CSC (Cultural Services Center). It includes all documentation needed to install and run the system.

Work done during the work package deals at first with internationalisation improvements. Next work has been dedicated to software ameliorations. Main improvements deal with integration of software

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components both in front and back-end point of view. Broker and connector components are described in detail, the first allows communication between software modules, and the second allows collaboration between REGNET stakeholders.

The following manuals has been established:

- Installation manuals for REGNET components. They describe necessary software and installation procedures.

- User manuals, which are dedicated to the REGNET components part of a CSC software. Users who want to learn how to use the software can use them.

6.3   REGNET Trial Services and Recommendations

Deliverable 11 which is the outcome of the REGNET Trials is dedicated to WP 4 "Demonstration, Assessment and Evaluation", task 4.3 "Analysis of the trial service, Assessment and Evaluation of the system".

Mainly, to prepare this report it has been taken into account:

- Deliverable Report 6, containing a market analysis and information about competitors.

- Deliverable Report 7, containing a validation process and information about the demonstration phase.

- Questionnaires filled during the validation phases, which provide comments and suggestions made by the testers

- Technical Responses, from where it is possible to find out the tasks that are viable or not viable to implement.

- Access Statistics, providing information acceptance of the product.

Once all this information was collected, an analysis was needed in order to establish the actual status of the system. In this stage, we established the major advantages and disadvantages of the REGNET system compared to other similar products in the market. Once all this process of analysis finished, there were identified the major weaknesses and strengths of our product.

Taken into account this analysis and the market situation and probable evolution, we worked out the opportunities and threats that the system will have to face in the future. After these two stages, a complete Swot analysis was made.

When the whole process concluded, we had the information needed to set our conclusions and recommendations.

As conclusions, we established ten statements which aim is to reflect the actual situation of the system, highlighting its major advantages and the features where more work and effort is needed.

The recommendations are based on these statements and the opportunities and threats previously identified. Knowing the actual status of the system and the probable evolution of the market, we could set these recommendations which should be taken into account when establishing future strategies for the improvement of the product.

The previous paragraphs have supplied a general overview of the different stages of the whole process of analysis, evaluation and recommendation. Now, it is necessary to comment some features that must be taken into account while reading this report:

- All the comments and suggestions made by testers have been analysed in the correct context, knowing that it much more easy to highlight the weaknesses of a tool than its strengths.

- Most complaints were related to very particular details of the tools, not with the general behaviour.

- The opportunities and threats, which have been pointed out in the SWOT analysis, are the result of a wider analysis in which we took into account several external factors.

The recommendations are related to the opportunities, threats, weaknesses, strengths and the more probable situations the system will face in the near future.

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7   Work Package 5 - Technological Implementation Plan

Activities linked with the dissemination and the use of R&D results are essential parts associated with the life cycle of the REGNET project. The Technological Implementation Plan will benefit European industry and society in general. The process to develop a Technological Implementation Plan provided here has been designed and released to support the documentation and dissemination process as well as to assist the partners in fulfilling our contractual obligations.

The TIP as requested by the IST programme has been set-up as a standard tool for describing and detailing the activities planned for the use of the results achieved during REGNET and ensuring the link with the objectives on which REGNET was selected.

In the TIP we tried to cover all the intentions of all partners related to the potential knowledge generated under the project. As mentioned in the EC Model Contract, the Technological Implementation Plan has been submitted at the end of the project. As suggested, MOT issued throughout the project duration and especially at mid-term, a draft version of the TIP, what was regularly used and updated. This practice became particularly useful because results were achieved before the contractual end of the project.

The questions we raised to set-up the TIP draft/final version were ideally suited to assist the drawing up of a co-operation agreement. They include:

What are the results (knowledge including information) of REGNET?

What needs do they address? What are the potential applications?

What stage have we reached in the development of the results and what resources do we need for further (market, environment or policy-related) development?

Are the results usable-either commercially, socially or scientifically?

What are our dissemination and use intentions and potential routes?

What part does each partner take in the dissemination and use process (manufacturing, sales and marketing, further R&D, licensing, standards, etc.)?

Do we envisage dissemination and use and/or support from outside the project team?

What information is useful for attracting potential collaborators?

Another important part of the implementation is the extent of information on the R&D results using the electronic version of the TIP. All REGNET partners intended to use or disseminate all of the results our-self, but not exclusively, and so, for further dissemination and use, it is in our interest - and of course in the interest of the European Union - to provide third parties with adequate information. This of course excludes information what must not be disclosed to safeguard intellectual or industrial property, confidentiality or legitimate commercial interests.

In addition, the information gathered in the TIP and its electronic version will be used to attract funding for further R&D or market development. This may apply to results where the REGNET consortium requires additional resources and expertise to use or disseminate our results fully; part of the results might be transferred to other applications outside the consortium's main markets.

The TIP we released covers the extent of information to be provided details, where we indicated how the project outputs could lead to applied research. As far as our results offer potential for further economic, environmental or 'quality of life' benefits, this result will be detailed in view of benefiting other social projects. Regarding the developed prototype demonstrators, it is envisaged to give detailed information on the financial and human resources necessary for producing commercial prototypes, and the possible risks involved in further development.

Due to the fact the EC has a number of activities to assist the transfer of R&D results and their further dissemination and use, the TIP will be up-load on the CORDIS database, and furthermore published using several activities like IST program-specific tools and the Innovation Relay Centres what publish R&D results for technology transfer and assist in finding partners for external dissemination and use. The information required for publication will be extracted by these services directly from the publishable parts of the Technological Implementation Plan we set up on the CORDIS server.

We are sure the Technology Marketplace Web Service offers us a service that could be taken up by other companies or organizations. We want to exploit our results through licensing, consultancy and other agreements, so that we made every effort to present the information in our TIP to maximize the chance of being selected for Technology Marketplace.

8 Work Package 6 - Dissemination Activities

The REGNET dissemination scheme has been mainly directed towards the European Union countries to strengthen the competitiveness of European industry.

8.1 Dissemination strategy

The main characteristic of the dissemination strategy defined by the project participants is the diversification of the targets (existing and potential stakeholders), the channels and the regional levels of dissemination identified in order to appropriately reflect the progress of the project and its goals, with a particular attention to the future implementation of its results.

Following the methodology outlined in the Task Brief 6.1, **a template** has been designed in order to collect the contributions of the partners to WP6 *Information Dissemination* during the project lifespan. The template is organized in categories, which correspond to different types of dissemination channels. The template has been distributed to the partners and included in **the Interim Report 6.1**, regularly updated:

- A **first updated version of Interim Report 6.1** has been presented at the first Review Meeting (month 7).

- The **second updated version** presented and analysed the dissemination activities carried out during the period 1st November 2001 – 31st January 2002 (months 8-10). The document also provided a program of foreseen activities, as reported by the partners via the template.

- The **third updated version** (named version 4) presents and analyses the dissemination activities carried out during the period 1st February 2001 – 30th April 2002 (months 11-13). The document also provides a program of foreseen activities, as reported by the partners via the template.

- This **fifth updated version** presents and analyses the dissemination activities carried out during the period 1st May 2002 – 30th September 2002 (months 14-18). The document follows the same process as the previous versions.

- The final version of the Interim report lead to the **Deliverable D13**

The dissemination for the REGNET project has been done through several means.

8.1.1 Dissemination channels

According to the indications specified in the Technical Annex, different channels have been identified in order to disseminate the progress and the results of the project. The WP6 addressed different channels, in order to disseminate the progress and the results of the project: **Publications** (printed and electronic). Publications mainly focused on the cultural and technological sections of newspapers and magazines covering a wide potential of REGNET-customers and users. In addition, lectures and publications within the standard activities of the involved partners.

Presentations at conferences, meetings, seminars. A special event has been a conference, which will was held in Vienna in Autumn 2002 and organized by the Austrian National Library. REGNET will also provide input into the Cultivate Interactive journal. In close cooperation with the Austrian node of the Cultivate Network (CSC-Cultural Service Centre Austria) the project will be presented on several occasions and also be reported on the cultivate elist.

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- **Web sites.** Linked to the REGNET website (www.REGNET.org) a specific website has been formed for dissemination purposes. This website gave the latest information about the dissemination activities and gave room for reactions and comments to the REGNET project.

- **Other conventional and/or electronic printed matter.**

- **Contribution(s) to standardization bodies and contributions to special interest groups.** There has also be information dissemination to national and international organizations like ICOM, CIMI or ICA.

- **Contacts.** Direct contacts with regional museums and archives with known interest in digitising their collections and/or possessing content suited for the development of cross-regional themes. Possible candidates are the regions of East Anglia and Buckinghamshire in the UK. Furthermore, contacts with regional and federal authorities for the further deployment of the REGNET-services.

8.1.2 Dissemination target

The dissemination has therefore two main target groups.

- o Cultural Heritage
- o New Economy

In the field of Cultural Heritage the addresses are professional at CH organizations as well as the relevant client and the organizations themselves. Both kinds of organizations bear a strong potential for both socio-economic growth and competitiveness, which the technology that REGNET has develop will be able support. The dissemination activities will therefore target on meetings, seminars and conferences of European organizations for institutions, museums, archives, galleries and/or science centres.

The second domain covers the evolving new media industries and internet and application services providers. REGNET will seek the cooperation of these organizations for common workshops as well as for the organization of special seminars (digitisation, e-Business, etc). All these activities might also rise the potential of having new customers to the REGNET network.

8.1.3 Territorial levels

The local/regional, the national and the international bases for the dissemination activities have been identified with regards to: publications, events and contacts.

- Direct contact with local, regional and national archives and museums with known interest in the valorisation of their collections.

- Contacts with local/regional public authorities for the further deployment of the REGNET solutions.

- Publications at the national and international level (submission of articles in several specialized printed and/or electronic publications). Participation to conferences, meetings, workshops at the national and international level.

8.2 Activities carried out

In the Deliverable D13 is listed and detailed the REGNET presence during the project lifespan, in all the dissemination channels mentioned.

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9 Work Package 7 - Project Management

9.1 Overview

The management structure, techniques and procedures to apply in the project had the objectives:

- To manage and control the project's resources, schedules and activities.

- To ensure the integration of the business and software related tasks.

- To check the consistency between the developments and the strategic objectives of the partners.

- To ensure the overall quality of all systems results.

- To coordinate the REGNET-network on a European scale.

The management structure was based on a small number of committees and members, with the objective of improving the overall flexibility and swiftness of the decision processes:

- **Project Control Group (PCG)**.

- **Project Management Group (PMG)**.- Formed by the Project Control Group and five Work Area Managers

- **Extended Project Management Group (EPMG). -** Formed by the PMG plus all other contractors of the REGNET Project

- **Project Team Group (PTG)**. - Formed by partners working together on task level either within the development phase (I) or demonstration phase (II).

- **Exploitation Committee**.- Formed by one management or marketing representative from the commercial partners, and will be responsible for exploitation plan and approval of dissemination activities. Other partners will occasionally participate in the meetings.

- **Users Group**.- Formed by partners acting as Content Providers or Regional Poles.

- **Task Leaders**.- Each Task will have a responsible of its specific actions (controlled by task briefs) and results. For each work package, one of the Task Leaders also acted as **Workpackage Leader** for common WP issues.

Quality assurance procedures

The following quality assurance procedures were implemented:

- A **project electronic repository** (internal web site) was accessible to the consortium members, where all common project information and shareable code of the project was stored and updated. The Coordinator, Project Manager and the Task Leaders provided and maintained all information at the project, task and deliverables levels. All project documentation is prepared and stored in the Electronic Repository.   All generic documents (deliverable, minutes, common reports, . . .) have a standard layout to maintain homogeneity in the project. The deliverables were being issued by the Task Leaders after a QA revision procedure, and released by the Project Manager.

- The **meetings** were organised by the concerning group, committees or Task Leaders, according to the needs of the project, and required pre-agenda and the meeting minutes, for comments and approval of the attendants. All project milestones produced a meeting with the EPMG and the involved Task Leaders.

- A collection of **software engineering** (Change Management, Configuration Management and application program interfaces standards) was agreed in order to ensure the correct integration of the modules developed by the different partners.

- A document detailing contact data, responsibilities nomination and related information (i.e. escalation procedure for problem resolution) was issued at the project kick-off meeting and maintained by the Coordinator (AIT).

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Allocation of management responsibilities

Angewandte Informationstechnik Forschungsgesellschaft mbH (AIT) was Co-ordinator and responsible for the **Administrative Management.** AIT delegated responsibility for the **Project Management** initially to Salzburg Research (SR) then to VALTECH (VALT). These partners formed the **Project Control Group**.

The **Project Control Group** was responsible of the performance of the following tasks:

- Production & consolidation of periodic progress reports, and co-ordination of the project final ones. Cost statements consolidation, and financial co-ordination.

- Scheduling of project resources and surveillance of resources and work-content deviations.

- Interfacing with EC officers and external reviewers. Co-ordination of the periodic progress reviews.

- Internal storage and dissemination of the information (communication strategy), plus any other common effort related to project co-ordination.

Each **Deliverable** and **Task** had a **Leader (TL)**, nominated by the corresponding partner. He/She will have technical responsibility for:

- Task specific actions and results and the adequate progress towards its functional and quality goals.

- Co-ordinate task level meetings and compile all required information from the Task participants and produce/review/approve the final Deliverables and reports for the Management Groups.

External Reports and Reviews

External reports were produced by the Project Control Group and reviewed by the PMG according to the EC contract rules, including:

- The **Bimonthly and Trimonthly Management reports** depicted the work carried out, resources used, and any deviations or problems in the referring period

- The **Progress reports** (6-month periods) included more detailed summaries of the monthly reports, overall project status plus the cost-statement reports from each partner.

Quality Assurance (QA) was included in an own task (T7.2) and is described in a separate deliverable (D14). The partner (MOT) was responsible for this and worked out at a QA-procedure at the beginning of the project.

The image of the overall management structure can be taken from the next figures:

Figure 7: Project Management (next 3 pages)

The five Work Areas had clear responsibilities (Work Area Mangers). The practical work was carried out in Project Team Groups. During the development phase (dedicated to Area B) there were 5 Team-Groups related to the five main components (building blocks, nodes; see Annex) . Each Team Group had a group leader (underlined short name). Three other team groups were dedicated to the other four work areas. One group consisted of system implementers extended by developers. One group was dedicated to Enterprise engineering only. Finally one group consisted of the content providers. The relation between groups and tasks were clearly defined in the work package/task description.

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REGNET: Project Management & Project Team Structures

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Project Team Groups involved in Work Area A, C, D, E activities.

VALT

Team-Group-8.1
AIT, IAT, ICCS, TINC
- Legal Framework

Team-Group-8.2
TINC, ONB, IMAC, ICCS
- Marketing (Engineering)

Team-Group-8.3
VALT, AIT, IMAC, MUS, ICCS, TINC
- Business Engineering

WORK AREA C: Enterprise Engineering

TARX

Team-Group-6 (-AIT+VALT)
- Demonstration

Team-Group-6 (-AIT-ICCS):
- Analysis

Team-Group-7
- Demonstration
- Analysis

SUL

WORK AREA E: Region Management

AIT

Team-Group-6 (Implementors):
IMAC, AIT, TARX, SPAC, ZEUS, IAT, ICCS
- Definition of Content
- Documentation and Digitisation Plan

Team-Group-7 (Content Providers):
SUL, ONB, LMG, NRM, KVA, MECH, MUS, ALI, GRAN (+CC)
- Definition of Content
- Documentation and Digitisation Plan

WORK AREA A: Content Engineering

IMAC

Team-Group-6 (-AIT+VALT)
- Validation of Demonstrator

Team-Group-6 (+ VALT):
- Preparation of Demonstration

Team-Group-7
- Validation of Demonstrator
- Preparation of Demonstration

WORK AREA D: Domain Management

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Project Team Groups involved in Work Area B activities.
(Tasks: T1.4, T2.2, T3.3, T4.2)

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9.2   Quality Assurance

The purpose of this task has been defining a Quality Assurance System suitable to the REGNET project. This Quality Assurance System delineates the development approach to be used, standards to be followed, documentation to be developed, reviews to be held and the metrics to be collected.

The objective of the Quality Assurance System has been to define processes to be observed in monitoring, reporting and providing consulting support for the development of the REGNET product, assuring that the established process is actually being implemented.

More specifically:

- An appropriate development methodology is in place

- Standards and procedures are used

- Documentation is produced (during and not after development)

- Changes are controlled

- Testing and verification are focused on areas of highest risk

- Defects are identified earlier.

In fact it has been proved that is much more expensive to find and repair problems after deployment. For this reason it is important to continuously assess the quality of a system with respect to its functionality, reliability, application performance, and system performance.

The development of the product and project shall follow a defined and shared process to grant that proper preventive and corrective actions are taken on time.

The basic elements of this process are: development phases and responsibility, quality gates, goals and metrics. For both phases and quality gate entry and exit criteria shall be addressed. For example an entry criteria for a phase may be the readiness of the deliverable of the previous phase. Regarding quality gate, entry criteria may be the completion and baseline of deliverables, while an exit criteria may be the removal of the identified defects.

Disciplined process development requires planning, measurement and control, based on concurrent, sequential, or recursive applications of a standard development pattern. The process shall be essentially method independent, i.e. it may be applied to projects, or tasks, using different development methods with minimal variation. The classic elements of the pattern are: requirements, design, development, and test. These elements have already been defined at a high level; but may be reapplied at a lower level in order to achieve the task goal. At a lower level, the minima elements, required to assure an effective task development, are:

- Preview and plan,

- Task activity and

- Quality Gate (or reviews) of the deliverables.

- Finally it is worthwhile to identify mechanisms for learning from the completed activities, conducted for the benefit of the project team and the consortium (Post Mortem)

Basic elements and procedures for Change and Configuration Management have also been provided; with reference, in particular, to Naming Convention and Baselines Management, a description of the REGNET Repository (Web) and the CVS (Concurrent Versions System) configuration on AIT server.

Strategies for Validation & Verification have also been provided. Verification & Validation comprehensively analyses and tests software to determine that it performs its intended functions correctly, to ensure that it performs no unintended functions and to measure its quality and reliability.

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Basic principles for Internationalisation and Localisation and a simple process for their implementation have been provided in the document. In fact the REGNET product has to be used within different countries and requires the possibility to be used by different European citizen in their own native language, for this reason it has been necessary to develop a product that could be adapted to various languages and regions without engineering changes.

Finally a key feature of the Process is the metrics program. It is associated with monitoring all products and processes during development to ensure that quality goals are maintained. By including metrics at every stage of the development process, it assures that projects are monitored against their stated goals and that required quality goals are achieved.

9.3   Deliverables

The results of each task or several tasks combined are presented in the REGNET deliverables. Each heading of the *Progress and Results* chapter of the present report describes the findings of one deliverable. Overall the project produced 17 deliverables and 3 studies connected to them. The deliverables 1 to 3 describe the Analyses of the State of the Art and the Development of Concepts. Work package 2 produced the deliverables 4 to 6 depicting the implementation of the REGENT System and the preparation of services and product generation. In preparation of the demonstration phase the deliverables 7 and 8 comprise validation and preparation and the REGNET-system Version 2. Within the demonstration phase the deliverables 9 to 11 have been issued. They cover the demonstration, its assessment and evaluation.

Work package 5 and 6 each produced one deliverable (12 and 13), the Technological Implementation Plan and the Dissemination Activities Report. The project management issued deliverable 14, the Quality Assurance Report and the present final report, deliverable 15.

Deliverable 16 was the project's web presence which was already established at the earliest stage possible. And finally deliverable 17 is the project's fact sheet, submitted in 3 updated versions during project life-time.

Each deliverable was coordinated and compiled by a responsible task and deliverable leader then sent to the coordinating institute for final lay outing, printing and release. Public deliverables can be found on the REGNET project homepage and downloaded from there. For a more detailed specification of the REGNET deliverables see the list under point 16 of this report.

9.4   Project Meetings

The REGNET meetings were organised by the concerning group, committees or Task Leaders, according to the needs of the project. A pre-agenda and the meeting minutes were set up for comments and approval of the attendants.   All project milestones produced a meeting with the extended project management group and the involved Task Leaders.

During project life-time 15 REGNET meetings had been organised. Four of them were meetings of the whole project group (EPMG) and took place in Graz (kick-off), in Florence, Barcelona and Sofia, three of them were REGNET Review meetings. The other meetings were project team group (PTG) meetings for the technical partners and the content group.

Type	Date	Location	Issue
EPMG01 Kick-off	2001-04-19 to 2001-04-20	Graz, Austria	This was the first Project Meeting for the whole consortium. Main points were the concept and idea of REGNET (REGNET building blocks, subsystems, e-Business, …) and management aspects of the project (bimonthly reports, progress reports, cost statements, …). Also the use of technical standards and formats (JAVA, PHP, Z39.50, CIMI, AMICO, MARC, …) and new evolving standards (XML, ebXML, J2EE) was discussed. The work and goals for the first work phase was described. The main aspect was the production of the interim reports for each task and the linkage to the deliverables to be published to the

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			commission. During the 2nd day two separate groups were built to discuss technical and content group specific topics respectively. The place and date for the next meetings were fixed.
PTG01	2001-06-07 to 2001-06-08	Turin, Italy	This first Project Team Group Meeting of the Technical Group was dedicated to fix the responsibilities for each subcomponent and to fix a common basis for interactions between the subcomponents. Concepts and technologies like UDDI, SOAP and WDSL were introduced to assure that interactions between different components are independent of their implementation. The choice of implementation language (JAVA, C++, PHP, ASP, …) was also an important issue during the meeting. But as general protocols (i.e. SOAP) are available for all major programming languages it was decided to try to cooperate different programming languages (JAVA and PHP) in the REGNET System. For structuring use cases functional groups of the system were established by classifying the first draft document about user requirements from the Content Group.
PTG02	2001-06-11 to 2001-06-12	Stockholm, Sweden	This first Project Team Group Meeting of the Content Group was dedicated to the steps already fulfilled in the first 2 months of the project. Each partner presented the main results of his work and pointed out problems not solved as well as open questions to be answered. Important results were reached with regard to the use cases: in small working groups typical use situations in the different domains were worked out in order to be able to classify the functional requirements. These requirements (to be derived out of the use cases on a very "high" level) should be specified step-by-step in coordination with the technical group. An important decision was that - despite the domain-specific work on these issues - the whole discussion should <u>not</u> be domain-specific but general in order to agree about a set of common functions of the REGNET portal. In order to serve this decision the use cases should be described according to the functional groups established during the meeting of the technical partners in Turin.
PTG03	2001-07-17 to 2001-07-18	Vienna, Austria	This second Project Team Group Meeting of the Technical Group was dedicated to fix interconnections between the subcomponents of the REGNET System and to develop a concept of deployment of the whole system. A general Ontology Master Site was introduced to maintain a common knowledge base for the whole system. Additionally the concept of Themes was presented by TARX as a representative of the Content Group which developed this concept. A Theme allows to generate additional meta data combining single pieces of meta data to one "story". A technical discussions how to integrate the concept into the REGNET System followed.
PTG04	2001-08-23	Den Hague, Netherlands	A REGNET workshop on Themes and the thematic approach within REGNET was conducted.
PMG02, PTG05, PTG06	2001-09-12 to 2001-09-14	Florence, Italy	The first day of this meeting was dedicated to management issues. The design of a new REGNET Web-site and a new REGNET poster was presented. Also the status and dates of cost statements, consortium agreement, reports and deliverables were stated. Detailed presentations for the Task Leaders including the presentation of the regarding interim reports followed. During the 2nd day two separate groups were built to discuss technical and content group specific topics respectively. Both

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			groups had the aim to find missing parts in their interim reports and to start integration of the interim reports into the deliverables D1, D2 and D3.
			The 3rd day was dedicated to prepare the review meeting and it was decided to have a Editorial Board Meeting in Toulouse.
REV01	2001-10-24 to 2001-10-25	Brussels, Belgium	Preparations for the Review Meeting. Organization of location and facilities at Brussels. Design of common project layout in presentation. Organization of Review schedule. Compilation of a Review CD and distribution to the Reviewers as well as to all partners by mail. Presentation of a first draft of CST1 at the Review, as well as the final PR1. The first Review Meeting ended with a green light from the commission.
PMG03, PTG07, PTG08	2002-01-28 to 2002-01-30	Barcelona, Spain	Concepts and prototypes for components were presented and discussed in two team group meetings (Content related and Technical Group). The main outcome of the meeting was a new concept of a REGNET internal data structure called REGNET DTD.
			Another main points were related to Task 1.7 and Task 2.5 (which is the follow-up task to Task 1.7). As the only remarks from the commission during the Review Meeting pertained this task a stronger control and more integration of other partners from the consortium into Task 2.5 was decided. A steering committee for T2.5 has been set up.
PTG09	2002-03-18 to 2002-03-19	Graz, Austria	The Technical Team Group Meeting was dedicated to complete the integration work for the first REGNET prototype. Therefore a tight schedule for each partners contributions to IR 2.2 and to software deliverables was set up.
			The Content Group Meeting had two main points: data conversion and general portal related issues.
			For data conversion the preparation of data from the content providers and the mapping from content provider data to a common meta data exchange format was discussed. For the portal general issues were discussed: multilingualism, navigational structure, additional services like news-board and event calendar.
PTG10	2002-05-13 to 2002-05-14	Turin, Italy	The functionalities of different REGNET components has been assessed according to the Use-Cases defined in D2. For the further development the open functionalities have been priorized to allow a concentration of the development effort on the most valuable functionalities of the REGNET system.
			Multilingual support should be available in English, Dutch, German, Swedish, Cyrillic, and Spanish.
PMG04, PTG11, PTG12	2002-06-24 to 2002-06-25	Sofia, Bulgaria	Status of all work within the project was assessed, and further planning made accordingly. Preparation for the demonstration at the 2nd Review was carried out.
			All technical components were presented. Presentation of digitising activities of the content partners was done. Status of dissemination work. Overall project management issues were discussed.
REV02	2002-07-03 to 2002-07-05	Luxembourg, Luxembourg	A Pre-Review Meeting, The Review and a common cluster meeting with OpenHeritage was conducted. The Review meeting was successful and green light was given for further proceeding.
PTG13	2002-09-02 to 2002-09-03	Mechelen, Belgium	The main intention of this Team Group Meeting was the collection and discussion of first impressions and already reporting results of the testing phase. As an addition usability testing was prepared and planned: in small expert working groups scenarios for the usability tests were worked out,

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			responsibilities were assigned to the content partners. With regard to the CSC development first activities were presented as a model for further work also in the demonstration phase, e. g. the establishment of REGNET test beds. As a contribution to the definition of the product and service portfolio of the CSCs all participants were asked to formulate their concrete needs and expectations during a brainstorming session. It was agreed upon that the discussion should not focus on products and concrete software packages, but instead on the service discussion and development (e. g. marketing services for museums, consultancy). As one necessary requirement for all future activities REGNET should produce a brand, a certification.
			From the project management point of view an important decision was made: WP 3 should be extended until the end of September, then WP 4 should start - according to the contract external users should be invited here to participate.
PTG14	2002-11-21 to 2002-11-22	Den Hague, Netherlands	Within this combined content and technical meeting a list of the technical modules and cultural heritage data types was presented together with an overview on the existing Cultural service Centres and the ones planned or in the process of being established. A methodology and strategy was set up for tool training and usability testing. Demonstration guidelines and feedback mechanisms were defined. First feedback from test bed activities were presented. Common content and technical working sessions and tutorials were carried out.
PTG15	2003-02-06 to 2003-02-07	Toulouse, France	Individual test reports of the partners were presented. The outcome of the first test bed round was depicted. Management issues for the final period of REGNET were discussed and a time schedule and deadlines for submission of final documents was set up. Furthermore latest technology integration by the technical partners were presented and new initiatives identified for future cooperation (i.e. OAI).
REV03	2003-03-26 to 2003-03-28	Luxembourg, Luxembourg	The third Review is organized in Luxembourg. On the 28th of March the final get-together of REGNET takes place where future cooperation will be outlined.

9.5   Conferences and Seminars

In August 2002 the first REGNET seminar was organized. It took place in Vienna at the Austrian national library and attracted many visitors from the cultural heritage area. The event had the title "Content and Metadata management with TeXtML Server", 5th August 2002, Vienna (http://www.cscaustria.at/events/ws0201.htm) and was especially targeted at users and developers of cultural heritage databases.
As one results several new partners for the REGNET Austrian test bed were found.

For further information on REGNET dissemination events (i.e. on the published REGNET proceedings) see point 8 of this report and the REGNET deliverable 13.

Methodologies

10 Used Technologies

Main technologies used during the REGNET project are based on object approach. They are here split into two parts and described later in detail:

- Support technologies used for development process. They are mainly Unified Process (UP) and Unified Modelling Language (UML).

- Basic technologies, used for implementation. They can be split into implementation technologies (Java, PHP, ASP), integration technologies (Web Services, ebXML), data management technologies (Textml, Xindice, MySQL) and presentation technologies (Web server, Portal).

As far as it was possible open source technologies has been used in order to be software editor independent and to provide a low cost access point.

We have to notice that **XML** technologies are present everywhere: (meta-)data representation, integration, presentation, etc. XML allows technology independent representation of information. One can say that REGNET is really a business case for XML.

10.1 Support technologies

Main support technologies used during the REGNET project are UML language, which has been used in order to represent concepts, and Rational Unified Process in order to drive the overall development process.

10.1.1 UML

The Unified Modelling Language™ (UML) is a language for specifying, visualising, constructing, and documenting the software artefacts, as well as for business modelling and other non-software systems. The UML represents a collection of best practice engineering approaches that have proven to be successful in the modelling of large and complex systems.

The UML language was developed by the Object Management Group. It is the successor of the modelling languages found in the methods of Booch, Jacobson (OOSE) and others. Many companies are incorporating the UML as a standard into their development processes and products, which cover disciplines such as business modelling, requirements management, analysis & design, programming and testing.

10.1.2 Unified process

Unified Processes are a standard form OMG dealing with the overall process of project based on object technologies.

The Rational Unified Process (RUP) is a software engineering process. It provides a disciplined approach to assigning tasks and responsibilities within a development organization. Its goal is to ensure the production of high-quality software that meets the needs of its end users within a predictable schedule and budget.

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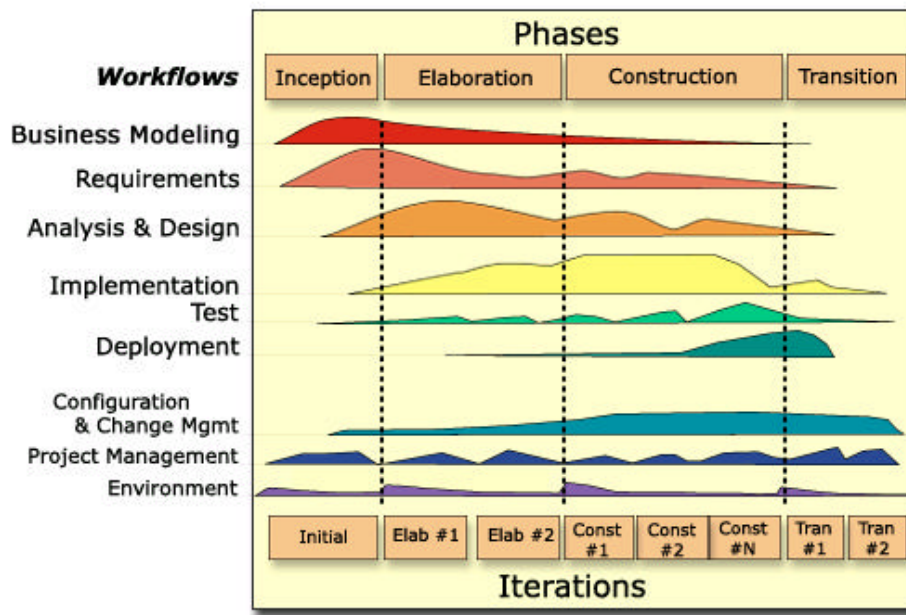
Figure 8: RUP architecture

The previous figure shows the overall architecture of the RUP.

The RUP has two dimensions:

- the horizontal axis represents time and shows the lifecycle aspects of the process as it unfolds
- the vertical axis represents disciplines, which group activities logically by nature.
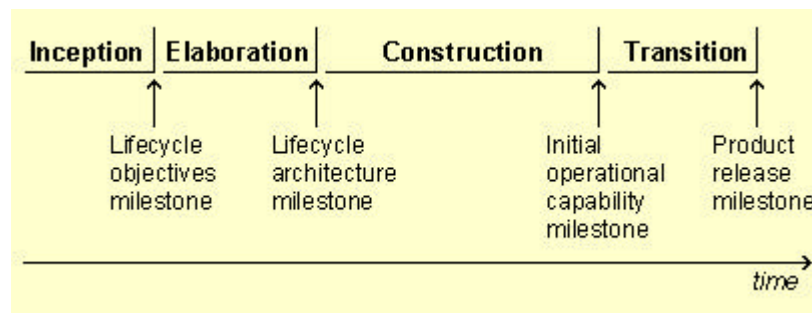
The first dimension represents the dynamic aspect of the process as it is enacted, and it is expressed in terms of phases, iterations, and milestones.

The second dimension represents the static aspect of the process: how it is described in terms of process components, disciplines, activities, workflows, artefacts, and roles.

Figure 9: The phases and milestones of a project

From a management perspective, the software lifecycle of the Rational Unified Process (RUP) is decomposed over time into four sequential phases, each concluded by a major milestone; each phase is essentially a span of time between two major milestones. At each phase-end an assessment is performed to determine whether the objectives of the phase have been met. A satisfactory assessment allows the project to move to the next phase.

Planning Phases:

All phases are not identical in terms of schedule and effort. Although this varies considerably depending on the project, a typical initial development cycle for a medium-sized project should anticipate the following distribution between effort and schedule:

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	Inception	Elaboration	Construction	Transition
Effort	~5 %	20 %	65 %	10%
Schedule	10 %	30 %	50 %	10%

which can be depicted graphically as
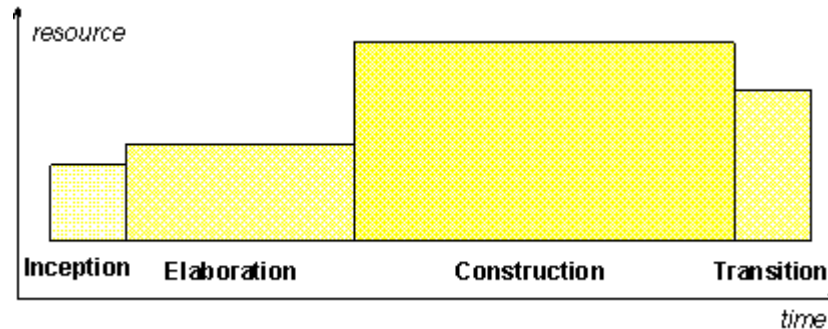
For an evolution cycle, the inception and elaboration phases would be considerably smaller. Tools which can automate some portion of the Construction effort can mitigate this, making the construction phase much smaller than the inception and elaboration phases together.

One pass through the four phases is a **development cycle**; each pass through the four phases produces a **generation** of the software. Unless the product "dies," it will evolve into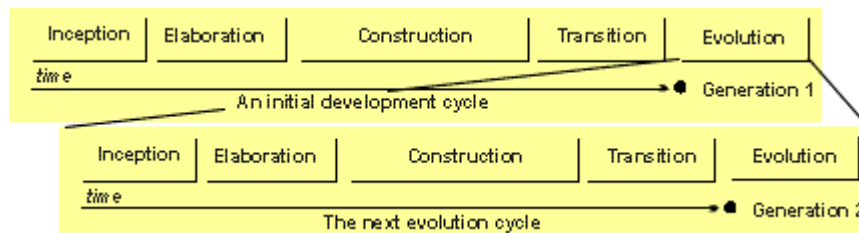 its next generation by repeating the same sequence of inception, elaboration, construction and transition phases, but this time with a different emphasis on the various phases. These subsequent cycles are called **evolution cycles.** As the product goes through several cycles, new generations are produced.

Figure 10: Project evolution cycles

Evolution cycles may be triggered by user-suggested enhancements, changes in the user context, changes in the underlying technology, reaction to the competition, and so on. Evolution cycles typically have much shorter Inception and Elaboration phases, since the basic product definition and architecture are determined by prior development cycles. Exceptions to this rule are evolution cycles in which a significant product or architectural redefinition occurs.

10.2 XML

XML (Extensible Markup Language) is a flexible way to create common information formats and share

both the format and the data on the World Wide Web, intranets, and elsewhere. For example, computer makers might agree on a standard or common way to describe the information about a computer product (processor speed, memory size, and so forth) and then describe the product information format with XML. Such a standard way of describing data would enable a user to send an intelligent agent (a program) to each computer maker's Web site, gather data, and then make a valid comparison. XML can be used by any individual or group of individuals or companies that wants to share information in a consistent way.

XML, a formal recommendation from the World Wide Web Consortium (W3C), is similar to the language of today's Web pages, the Hypertext Markup Language (HTML). Both XML and HTML

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contain markup symbols to describe the contents of a page or file. HTML, however, describes the content of a Web page (mainly text and graphic images) only in terms of how it is to be displayed and interacted with. For example, the letter "p" placed within markup tags starts a new paragraph. XML describes the content in terms of what data is being described. For example, the word "phonenum" placed within markup tags could indicate that the data that followed was a phone number. This means that an XML file can be processed purely as data by a program or it can be stored with similar data on another computer or, like an HTML file, that it can be displayed. For example, depending on how the application in the receiving computer wanted to handle the phone number, it could be stored, displayed, or dialled.

XML is "extensible" because, unlike HTML, the markup symbols are unlimited and self-defining. XML is actually a simpler and easier-to-use subset of the Standard Generalized Markup Language (SGML), the standard for how to create a document structure. It is expected that HTML and XML will be used together in many Web applications. XML markup, for example, may appear within an HTML page.

10.3 Implementation technologies

Main technologies used for implementation of software modules are Java, PHP and ASP. These tree technologies has been used because in one hand, people from REGNET consortium has different technical skill, and in the other hand because we have to deal with existing technologies.

10.3.1 Java

Java is a programming language expressly designed for use in the distributed environment of the Internet. It was designed to have the "look and feel" of the C++ language, but it is simpler to use than C++ and enforces an object-oriented programming model. Java can be used to create complete applications that may run on a single computer or be distributed among servers and clients in a network. It can also be used to build a small application module or applet for use as part of a Web page. Applets make it possible for a Web page user to interact with the page.

The major characteristics of Java are:

- The programs you create are portable in a network. Your source program is compiled into what Java calls bytecode, which can be run anywhere in a network on a server or client that has a Java virtual machine. The Java virtual machine interprets the bytecode into code that will run on the real computer hardware. This means that individual computer platform differences such as instruction lengths can be recognized and accommodated locally just as the program is being executed. Platform-specific versions of your program are no longer needed.

- The code is robust, here meaning that, unlike programs written in C++ and perhaps some other languages, the Java objects can contain no references to data external to themselves or other known objects. This ensures that an instruction can not contain the address of data storage in another application or in the operating system itself, either of which would cause the program and perhaps the operating system itself to terminate or "crash." The Java virtual machine makes a number of checks on each object to ensure integrity.

- Java is object-oriented, which means that, among other characteristics, an object can take advantage of being part of a class of objects and inherit code that is common to the class. Objects are thought of as "nouns" that a user might relate to rather than the traditional procedural "verbs".

- In addition to being executed at the client rather than the server, a Java applet has other characteristics designed to make it run fast.

Java was introduced by Sun Microsystems in 1995 and instantly created a new sense of the interactive possibilities of the Web. Both of the major Web browsers include a Java virtual machine. Almost all major operating system developers (IBM, Microsoft, and others) have added Java compilers as part of their product offerings.

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The Java virtual machine includes an optional just-in-time compiler that dynamically compiles bytecode into executable code as an alternative to interpreting one bytecode instruction at a time. In many cases, the dynamic JIT compilation is faster than the virtual machine interpretation.

10.3.2 PHP

In Web programming, PHP is a script language and interpreter that is freely available and used primarily on Linux Web servers. PHP, originally derived from *Personal Home Page* Tools, now stands for *PHP: Hypertext Preprocessor*, which the PHP FAQ describes as a "recursive acronym."

PHP is an alternative to Microsoft's Active Server Page (ASP) technology. As with ASP, the PHP script is embedded within a Web page along with its HTML. Before the page is sent to a user that has requested it, the Web server calls PHP to interpret and perform the operations called for in the PHP script.

An HTML page that includes a PHP script is typically given a file name suffix of ".php" ".php3," or ".phtml". Like ASP, PHP can be thought of as "dynamic HTML pages," since content will vary based on the results of interpreting the script.

PHP is free and offered under an open source license.

10.3.3 ASP

An Active Server Page (ASP) is an HTML page that includes one or more scripts (small embedded programs) that are processed on a Microsoft Web server before the page is sent to the user. An ASP is somewhat similar to a server-side include or a common gateway interface (CGI) application in that all involve programs that run on the server, usually tailoring a page for the user. Typically, the script in the Web page at the server uses input received as the result of the user's request for the page to access data from a database and then builds or customizes the page on the fly before sending it to the requestor.

ASP is a feature of the Microsoft Internet Information Server (IIS), but, since the server-side script is just building a regular HTML page, it can be delivered to almost any browser. You can create an ASP file by including a script written in VBScript or JScript in an HTML file or by using ActiveX Data Objects (ADOs) program statements in the HTML file. You name the HTML file with the ".asp" file suffix. Microsoft recommends the use of the server-side ASP rather than a client-side script, where there is actually a choice, because the server-side script will result in an easily displayable HTML page. Client-side scripts (for example, with JavaScript) may not work as intended on older browsers.

For Web service applications, Microsoft provides a new version of ASP support called ASP.NET.

10.4 Integration technologies

Two kinds of integration are necessary for the REGNET platform (see figure below):

- A2A (Application to Application) integration. Inside a CSC REGNET information system. Based on Web Services approach, which means that each component (Data Entry, PCM, Delivery, etc.) provides a WSDL interface and a set of services available through the SOAP protocol. The REGNET Broker describe later allow to transfer data from one component to another.
- B2B (Business to Business) integration. Between CSCs. Based on ebXML approach, it provides necessary framework in order to set up collaborations between partners from (not mandatory) many CSCs. The REGNET Connector describe later manage these collaborations. Lend process between partners has been implemented yet.

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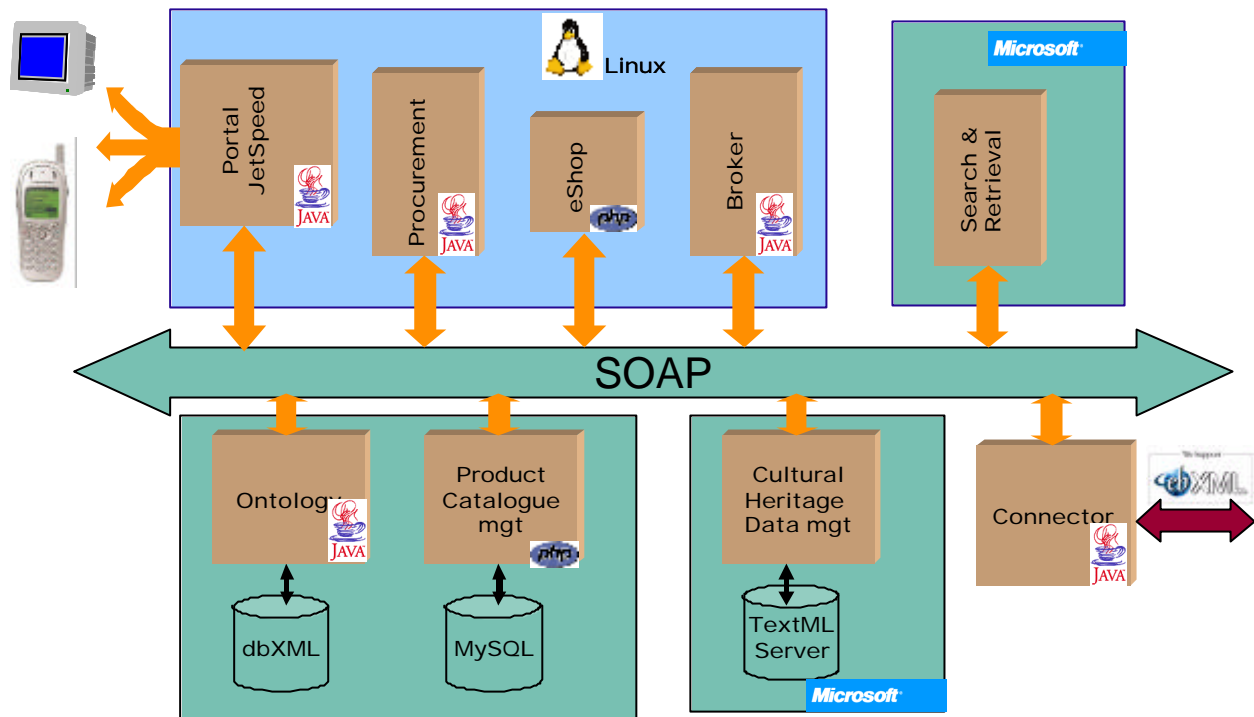
Figure 11: Integration technologies for REGNET

10.4.1 Web services

Web services technologies are mainly represented by SOAP + WSDL + UDDI.

SOAP.

Simple Object Access Protocol (SOAP) is a way for a program running in one kind of operating system to communicate with a program in the same or another kind of an operating system by using the World Wide Web's Hypertext Transfer Protocol (HTTP)and its Extensible Markup Language (XML) as the mechanisms for information exchange. Since Web protocols are installed and available for use by all major operating system platforms, HTTP and XML provide an already at-hand solution to the problem of how programs running under different operating systems in a network can communicate with each other. SOAP specifies exactly how to encode an HTTP header and an XML file so that a program in one computer can call a program in another computer and pass it information. It also specifies how the called program can return a response.

SOAP was developed by Microsoft, DevelopMentor, and Userland Software and has been proposed as a standard interface to the Internet Engineering Task Force (IETF). It is somewhat similar to the Internet Inter-ORB Protocol (IIOP), a protocol that is part of the Common Object Request Broker Architecture (CORBA).

An advantage of SOAP is that program calls are much more likely to get through firewall servers that screen out requests other than those for known applications (through the designated port mechanism). Since HTTP requests are usually allowed through firewalls, programs using SOAP to communicate can be sure that they can communicate with programs anywhere.

WSDL

The Web Services Description Language (WSDL) is an XML-based language used to describe the services a business offers and to provide a way for individuals and other businesses to access those services electronically. WSDL is the cornerstone of the Universal Description, Discovery, and Integration (UDDI) initiative spearheaded by Microsoft, IBM, and Ariba. UDDI is an XML-based registry for businesses worldwide, which enables businesses to list themselves and their services on the Internet. WSDL is the language used to do this.

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WSDL is derived from Microsoft's Simple Object Access Protocol (SOAP) and IBM's Network Accessible Service Specification Language (NASSL). WSDL replaces both NASSL and SOAP as the means of expressing business services in the UDDI registry.

UDDI

UDDI (Universal Description, Discovery, and Integration) is an XML-based registry for businesses worldwide to list themselves on the Internet. Its ultimate goal is to streamline online transactions by enabling companies to find one another on the Web and make their systems interoperable for e commerce. UDDI is often compared to a telephone book's white, yellow, and green pages. The project allows businesses to list themselves by name, product, location, or the Web services they offer.

Microsoft, IBM, and Ariba spearheaded UDDI. The project now includes 130 companies, including some of the biggest names in the corporate world. Compaq, American Express, SAP AG, and Ford Motor Company are all committed to UDDI, as is Hewlett-Packard, whose own XML-based directory approach, called e-speak, is now being integrated with UDDI.

While the group does not refer to itself as a standards body, it does offer a framework for Web services integration. The UDDI specification utilizes World Wide Web Consortium (W3C) and Internet Engineering Task Force (IETF) standards such as XML, HTTP, and Domain Name System (DNS) protocols. It has also adopted early versions of the proposed Simple Object Access Protocol (SOAP) messaging guidelines for cross platform programming.

10.4.2 EbXML

ebXML (Electronic Business XML) is a project to use the Extensible Markup Language (XML) to standardize the secure exchange of business data. Among other purposes, ebXML would encompass and perhaps replace a familiar standard called Electronic Data Interchange (EDI). ebXML is designed to enable a global electronic marketplace in which enterprises of any size, and in any location, could safely and securely transact business through the exchange of XML-based messages. The United Nations body for Trade Facilitation and Electronic Business Information Standards (UN/CEFACT) and the Organization for the Advancement of Structured Information Standards (OASIS) launched the project as a joint initiative. Its membership includes 75 companies, including major IT vendors and trade associations throughout the world.

Because ebXML relies on the Internet's existing standards such as HTTP, TCP/IP, MIME, SMTP, FTP, UML, and XML, it can be implemented and deployed on virtually any computing platform. The use of existing standards gives ebXML the advantage of being relatively inexpensive and easy to use.

A white paper on the official ebXML Web site explains that the initiative is built on three basic concepts: (1) provide an infrastructure that ensures data communication interoperability; (2) provide a semantics framework that ensures commercial interoperability; and (3) provide a mechanism that allows enterprises to find each other, agree to become trading partners and conduct business with each other. The core infrastructure specifications of ebXML are the messaging service, the registry and repository, and the collaborative partner agreement. The messaging service specification has been developed enough to enable early development work. The registry and repository and the collaborative partner specifications are nearing completion, with the complete set of ebXML specifications finished in spring 2001.

10.4.3 Comparison

One can visualize EDI, ebXML, and Web services on a continuum rather than three distinct alternatives. EDI provides a fixed, predictable message format, which with high volumes and stable business processes make a lot of sense. With ebXML, one can have the messaging features of EDI, plus a larger framework of functions combining business process models, registries, company profiles, trading partner agreements, and semantic interoperability. While ebXML offers a complete framework, companies can implement parts of that framework, without having to swallow it all at once.

Web services offer some of the same business functions of ebXML - messaging, service descriptions, and registries - but in more component form. However, they both have their respective domains. For example, Web Services messages based on the SOAP protocol do not provide for reliable messaging

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per se. SOAP does not have the same support for reliable messaging as ebXML MS v 2.0. EBXML MS has a fire and forgets function that either reliably delivers the message or detects (and hopefully tells the sender) that the message failed. In general terms ebXML is about loosely coupled document-centric business collaboration while with Web services, the API-centric (or service interface) view dominates (rather than the document-centric view as with ebXML).

By providing a set of functions that users can assemble into sets of services, Web services also have the modular features of ebXML, but without the overall structure of ebXML. The business process determines the choice and configuration of those components.

Basing technical solutions on business processes supports another feature of ebXML, namely the separation of business process from technology. This dichotomy goes back to the Open-edi Reference Model, ISO standard 14662 published in 1997, which recommends defining business processes independent of the technology. Open-edi recommends developing a business operational view (BOV) of a business relationship separate from the functional service view (FSV). The business operational view identifies the business processes, including the parties doing business, the interactions among those parties, the business messages exchanged as part of those interactions, and the semantics included in the messages. The functional service view discusses the information technology used in the interactions, in terms of functional capabilities, technical connections, and interchange protocols.

10.5 Data Management technologies

Main data management technologies used are:

- IXIASOFT/TextML server, which is a powerful XML database. Main advantages are reliability and speed, main drawback is price. We have to choose for this technology in order to support large catalogs of cultural data.

- Apace/Xindice, which is a native XML database. Main advantage is its open-souce licence, main drawback is instability. At the present time Xindice uses XPath for its query language and XML:DB XUpdate for its update language. They provide an implementation of the XML:DB API for Java development and it is possible to access Xindice from other languages using an available XML-RPC plugin. As standards in the XML database area mature Xindice will include support for those that are most important. Xindice is the continuation of the project that used to be called the dbXML Core. The dbXML source code was donated to the Apache Software Foundation in December of 2001.

- MySQL which is an open-source quasi-relational database system. Main advantages are stability, open-source licence, large community of users. Main drawback is unsupport of transaction.

10.6 Presentation technologies

Main presentation technologies used in Internet world are Web server and Portal. In the context of the REGNET project we used mainly:

- Apache Web server with, when necessary, Jakarta/Tomcat servlet container. The Apache HTTP Server Project is an effort to develop and maintain an open-source HTTP server for modern operating systems including UNIX and Windows NT. The goal of this project is to provide a secure, efficient and extensible server that provides HTTP services in sync with the current HTTP standards. Apache has been the most popular web server on the Internet since April of 1996. The August 2002 Netcraft Web Server Survey found that 63% of the web sites on the Internet are using Apache, thus making it more widely used than all other web servers combined. The Apache HTTP Server is a project of the Apache Software Foundation.

- Apache Jetspeed portal. Jetspeed is an Open Source implementation of an Enterprise Information Portal, using Java and XML. A portal makes network resources (applications, databases and so forth) available to end-users. The user can access the portal via a web browser, WAP-phone, pager or any other device. Jetspeed acts as the central hub where information from multiple sources are made available in an easy to use manner.

All these technologies are open-source.

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11 The REGNET Service Concept

11.1 Why a Cultural Service Centre?

In view of the large degree of dispersion of pieces of art within Europe and the highly fragmented knowledge and management of the collections, REGNET offers the services to create a global view based on a contextual and thematic approach. Further more the high level of accessibility combined with various levels of consultation of the information will suit the requirements of the occasional visitor, educational institutions and scientists/researchers. The different views of the same information will range from a quick referential search towards educational purposes.

The easy access and availability of this global information will boost the cross-cultural knowledge within European regions and stimulate Europeans to visit the objects in situ they discovered via the REGNET-service. This will substantially increase the culture stimuli of the citizen and at the same time contribute to a multicultural and more European awareness and feeling.

REGNET intends to reach some basic aims:

·   The dissemination of the European Culture Heritage facilitating to European citizens the access to catalogues of intellectual, cultural and scientific heritage stored in archives, libraries and museums and galleries

·   Integration of e-Business into the information systems used in Cultural Institutions

·   The development of new and exploitation of existing cultural infrastructures

·   The use of standards in the field of information structure, retrieval and e-Business

·   The interoperability between systems (interoperable access to distributed resources/catalogues: cultural & scientific content and products & services) based on the complementarities of the capabilities of each partner (group).

·   <u>The establishment of a service infrastructure which allows to develop a network of (cultural) service centres throughout Europe</u>.

The service centre concept was one of the most important visions within REGNET. This concept is deemed to be the most appropriate for small and medium size cultural heritage institutions as well as for big cultural organizations that prefer to keep up to latest technology solutions by drawing on the services of an external Application Service Provider.

The cultural service centres will offer the latest technical infrastructure and perform IT services dedicated for CH users and content providers; and store and deal with the cultural digital objects. It is the level of the general service/application provider to the REGNET users and customers. Their current work will be done in networking manner by exchanging and performing tasks, originating from the REGNET servicing network. Therefore the concept of a non-profit organization is estimated the most appropriate. The establishment of the regional CSCs will in this regard be determined by the diverse national legislative requirements.

The CSC approach determinates also the way the technical infrastructure has to be set up. It is clear that a CSC has to set up a server infrastructure with the necessary communication links towards the outside world. Every CSC has a generic portal interface towards the market place containing all necessary functionalities to cope with the communities that are active or interested in Cultural Heritage. The technical REGNET modules reside on the same server or are spread over and evoked on remote servers. A differentiation is made in the used interfaces. Every CSC has a generic interface (type PostNuke i.e.) treating as well general, often more regional or local issues as the typical portfolio of services that REGNET provided. Once in "REGNET-mode" the REGNET portal is evoked and depending on the type of the user, i.e. the standard, looking for information, end user or the more professional oriented one, often contributing to the content, a corresponding appropriate interface is launched with connections towards all specific modules.

As already stated in other points, the CSCs form a network of services, not only technical but also logical and business-wise. This means that a CSC does not have to contain all functionalities provided by the REGNET project. Every CSC will have its specific functionalities and competences.

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However, via the interconnections with the other CSCs all functionalities and competences are at the disposal of every single CSC. The matrix list as presented in the previous chapter can be a guidance for the definition of every CSC's services portfolio.

A CSC must also have the potential to offer an adequate off line infrastructure in order to carry out presentation, demonstration, education and test sessions to dedicated groups of persons or potential customers.

Mutual back up between CSCs databases should guarantee all issues related to redundancy, safety and security.

11.2 The CSC umbrella organisation

Research on the establishment of the overall REGNET legal and partnership framework mainly focussed on the adoption of an very open and flexible structure which would allow the cooperation of a wide variety of partner types (as museums, archives and libraries, cultural heritage professionals, research institutes, technology providers, independent committees etc.). At the end of the evaluation process it was found that the company model of the European Economic Interest Group, EEIG, would support such a specific type of light trans-national cooperation that allows the partners to keep their legal and economic independence but nevertheless establish an independent legal entity with own legal capacity. The common activity of an EEIG should be mainly ancillary to its members and this is exactly in the spirit of REGNET.

The CSC Europe is intended to form the international platform for all CSCs already established or in the process of being established. In order to start the network at the earliest possible date the EEIG has already been founded with its seat in Graz in June 2002 by AIT, IMAC, TARX and CSC Austria (mainly the technical Region 1 and Region 2 partners). It is open for everybody from the project to join, and especially for every REGNET CSC that will be established. In a future step even only the CSCs might remain as full members of the CSC Europe EEIG. The legal framework of the CSC Europe EEIG is constituted by internal agreements and the CSC Europe EEIG statutes (the statutes can be found in the IR2.3 and D6).

Find below an excerpt of the CSC Europe EEIG contract (regarding the object of the EEIG):

§ 3. OBJECT

(1) The primal target of the Cultural Service Centre Europe EEIG is to develop and promote a set of cultural service centres throughout Europe providing services dedicated to cultural heritage and related organisations. These centres will operate by networking their services, repositories and technical infrastructure. This aim will be reached by means of research, promotion and the development of new concepts, services and products for the digitisation, widespread circulation and establishment of cultural heritage networks.

(2) The purpose of the Cultural Service Centre Europe EEIG is to assist its Members in:

building and maintaining a distributed REGNET European Digital Library of multimedia resources documenting works of art and culture;

achieving a critical mass of digital or physical goods to be promoted through the REGNET portal;

enabling the trading services/products to be offered and sold on-line through its e-Business infrastructure.

(3) In addition, the Cultural Service Centre Europe EEIG may carry out any actions that serve directly and indirectly its purposes and/or those of its members. Its activities must, however, be linked to those of its members and the EEIG must act solely to support them. It is not the purpose of the EEIG to generate profit for its own ends.

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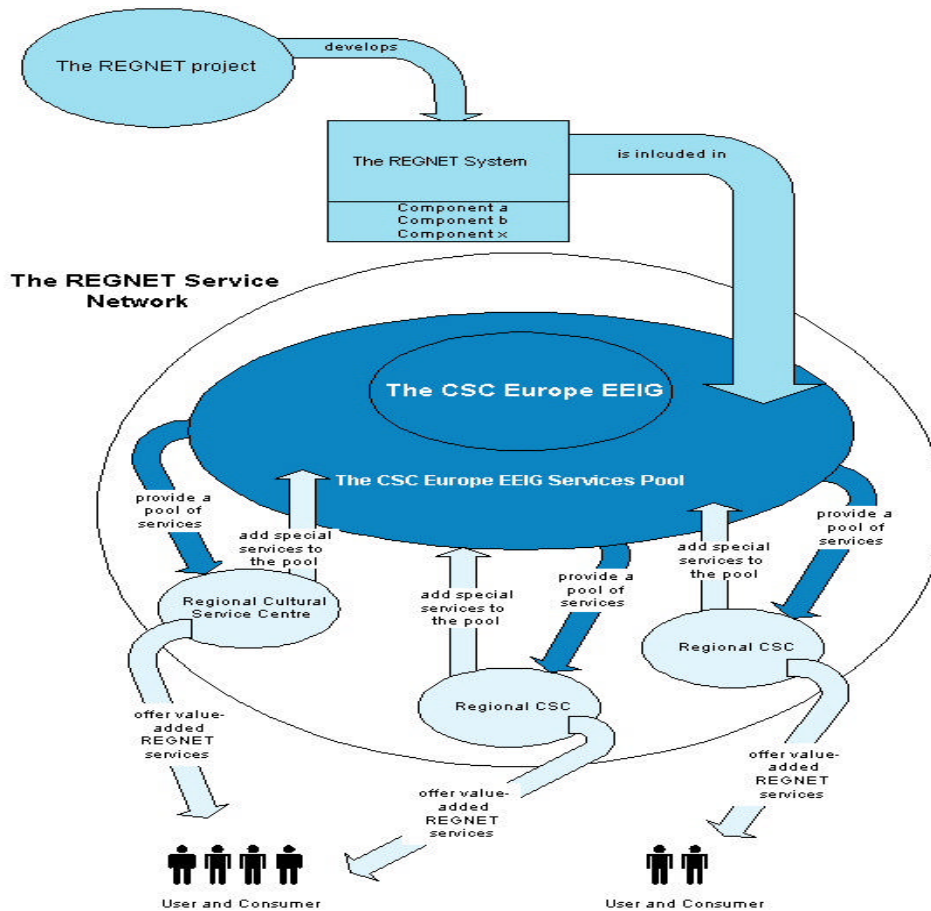
Figure 12: Services flow between REGNET CSCs

The figure shows the pool of services which will be generated through the cooperation of the different regional service centres with the CSC Europe EEIG and the input of the REGNET project. While the CSC Europe EEIG governs and further develops the REGNET system and provides it to the Service Centres, the Service Centres themselves contribute other value-added services not included in the basic REGNET System to the CSC Europe EEIG Services Pool. These services might be for instance special knowledge in standards, theme-based research, Topic Map Generation, digitalizing or other. Being member of the CSC Europe EEIG each Service Centre can profit from this wide variety of services which otherwise would be nearly impossible to offer.

European Added Value

12 Lessons learnt form working together in a European project

12.1 AIT – Angewandte Informationstechnik Forschungsgesellschaft (A)

Working within a European project and even more coordinating the project gave a more than valuable input to the AIT everyday work and project experience. The management of the efforts and administrative obligations of very different international partners has to be clearly defined right from the start in order to achieve the results envisaged. For REGNET this was already defined to a high degree within the contract and in the end it proved to be essential for the project success.

But detailed guidelines would have been worth nothing if not all the partners would have stuck to them and put their effort and collaboration for reaching the common aims within the project. More than that the support for the extensive administration of the project was outstanding and deadlines were kept as a rule! This made the coordination work not only a big responsibility but also fun doing it.

As a technical partner AIT did learn a lot through the cooperation with very different technical institutions world wide and through the input of big and well-known content provider partners, cultural heritage institutions, to our technical development work. These relationships will lead us further to future co-operations within this field of research past the project.

12.2 ONB – Austrian National Library (A)

For the Picture Archive of the Austrian National Library (ONB), REGNET was the first European Project it ever participated in. Although other departments of the Library have already gathered experiences in European Projects at an earlier stage, European Projects were a complete novelty to the Picture archive, which so far has had only experiences (mainly as a coordinator) in national projects.

Another important factor of the project is the concept for an international web portal including the development of a customer friendly workflow which enables ordering, information gathering and scientific work. The international aspect and access to the regional data will also foster and ease international scientific cooperation and exchange. The common platform also eases the provision of data from low-budgeted institutions, which are not able to implement a complex database and structure on their own.

The REGNET concept also seems to meet the needs of the actual tendency to globalisation and neoliberalism and their pressure to internationalisation.

In retrospect, it might be said that especially such a big consortium definitely needs a strong supervision and monitoring. Although we were sceptical at the beginning concerning the paper work involved, it became soon clear that especially the administrative tasks such as documentation and reporting are vital to the success of such an ambitious project as REGNET. For a successful coordination of a project of this order, clear tasks, responsibility definitions and time schedules are crucial.

Nonetheless, it also became clear that it takes more than abstract ideas from a project coordinator to bring such a project to life: it takes personal commitment, which was supplied by all the partners involved, but certainly most by Prof.Koch.

This personal commitment by all partners was very much strengthened by the project meetings. Such a heterogeneous group in terms of academic training and background (technicians, content providers, managers) and also language couldn't have established a common basis of understanding without face-to-face meetings. ONBs contribution to the project would also not have been justified without a minimum of personal commitment, as ONB spent more efforts to make this project a success than expected at the start of the project.

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The exchange of experiences and information on a trans-national as well as a trans-cultural level has in our view benefited all partners, not least in understanding other viewpoints and partner problems. But our main motivation for participating in this project was the involvement in the on-going elaboration of international technical standards and metadata definitions, especially in the picture sector.

Those expectations were more than fulfilled. Even without taking into account all the results achieved within the project, the "side-effects" of participating in this project (such as valuable contacts, information and possible future co operations with single partners) can be considered an ample reward. The future development of the project is also an opportunity for fruitful and stimulating cooperation which is strongly supported by the ONB (see also "Evaluation and Outlook / Partner Experiences").

12.3 SR – Salzburg Research (A)

The following points summarize the experiences SR gained from the co-operation in an European project of the scale of REGNET.

- We gained experience in applying software engineering methods in a highly distributed and loosely coupled development environment which requires a high degree of co-ordination between the participating partners.

- Due to that, the collaborative development of a system like REGNET needs strong co-ordination in such a big consortium, not only on the technical but also on the content provider side.

- Encouraging partner to partner communication while at the same time ensuring compliance with the overall technical outcome of the project needs adequate tools (i.e. mailing lists and forums) and face to face meetings for managing the necessary adaptations of the task briefs.

- During off-line communication, different cultures of different European regions need to be carefully considered.

- Systems integration needs to be considered in an explicit work package or task with explicit responsibilities and budget.

Last but not least, the meetings, which took place in different places all over Europe gave us the possibility to experience the great variety of European culture and life.

12.4 IMAC – Information & Management Consulting e.K (D)

European projects have to scope with different challenges:

- different working times,

- different holiday periods,

- different cultural approaches,

- different mental and working attitudes for different circumstances

For IMAC it was a very interesting experience, to have developed a strict methodological approach, which had to be put in practice by the different partners in the different European countries: from Sweden to Greece. In different countries there exist different conditions and approaches, this has to be taken into account when managing this task to avoid problems, like mentioned before.

As well it was an excellent exercise to learn, how the formal, informal, symmetric and asymmetric types of communication have to be combined in order to achieve at excellent results. This is a process, which has to be addressed as well as the challenges mentioned beforehand do have as well an effect on the performance of this relationship.

Last, having so many different partners from different European countries in a consortium, this requires a lot of bureaucracy. On the best, clear approaches, systematic and structured forms and a clear timetable is necessary to handle this complex project management task. We had a good chance

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to learn this in the project REGNET, an experience which will surely be of great value in future projects.

12.5 SUL - Stockholms Universitet (S)

The cooperation between the partners in the REGNET project has been very rewarding and stimulating from SUL:s point of view. The very size of the project has been an advantage as it has featured so many different organizations and enterprises covering most areas within IT-development, management, marketing and samples of cultural heritage collections in Europe. Making the European cultural heritage known and accessible is of vital importance and the REGNET project has succeeded in producing good models how that can be done.

The meetings have provided excellent opportunities for getting to know other cultural heritage organizations in Europe and SUL has also profited from the know-how from the other partners, technical partners as well as partners from the management side and content providers.

SUL has co-operated closely with the Royal Swedish Academy of Sciences and has through the REGNET project had an opportunity to work with the rare books collection in the library. This collection has been hidden away in the stacks of the library but by the help of the REGNET project it has been possible to market the collection to a wider audience.

12.6 LMG - Länsmuseet på Gotland (S)

The cooperation between the partners in an EU-project of the size of REGNET has ben a new and stimulating experience from LMG:s point of view. For LMG, being a small regional museum in Sweden, outlook towards Europe is essential for the organization to take advantage of the latest development and technology.

LMG has profited from the know-how from the other partners in the project, technical partners as well as the content providers – experiences that can be put to use in the further work on digitization development of the e-shop.

12.7 NRM - Naturhistoriska Riksmuseet (S)

The meetings and the co-operations of the partners gained to this European project has been very stimulating although we have not all got the same work and goals to do. The experiences of doing something together have been very beneficiary. We haven't really become more technically capable but we see the usability and the future of the concept. Future projects can be more efficiently carried out. We can also see future cooperation and developing with our Swedish partners in B2B according to e-shop business.

12.8 KVA - Kungl. Vetenskapsakademien, Royal Academy of Science (S)

Taking part in REGNET and cooperating with the other partners in REGNET has proved to be both rewarding and stimulating. A project of this size gives the opportunity to address a lot of questions. The mere size of it has made it possible for us to get in contact with the development and ways of working with these questions in different organisations from many places in Europe. Especially there has been ample opportunities to work with different partners i.e. cultural heritage organisations, IT-development companies, partners dealing with management and marketing etc., and all of this done within the European framework.

Together with SUL, KVA has through the participation in the REGNET project had an excellent opportunity to make public, its vast collection of rare books. The rare book collection is one of the richest in Europe when it comes to rare scientific books. The books belong to KVA but are taken care of by SUL. In addition KVA has made public its large collection of old scientific instrument. Digitising of other parts of the collections was also possible. The cooperation mentioned above concerning the rare books collection has invigorated the cooperation between KVA and SUL. Both organisations has been more aware of the richness of the rare books collection during the project. Thus REGNET has already had an important impetus for the regional cooperation.

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On an international level the differences in approaching a project like the REGNET might initially give rise to suspicion. However these differences has in the end proved to be fruitful. Divergence in opinions have resulted in a better analysis and also helped to focus on the end result. This has been possible through a continuous series of meetings face-to-face – something that has tended to strengthen the contacts between the partners.

KVA's role has been as content provider, and our expertise lies within the historical understanding of our collections, we have still learnt a lot from interacting with the technical partners. The work by the technical partners has been mediated very ambitiously by the management partners providing the necessary interface between the two different types of providers in the project. Thus in a technical aspect KVA has gained new experiences and knowledge in working with emerging standards like XML, in learning about digital watermarking techniques, etc. We have also gained further experience in digitising a large amount of material and working with databases on servers, as well as using topic maps.

12.9 TARX - TARX nv (B)

Three levels of European added value could be perceived for TARX. The first concerns the application area addressed by the REGNET project. Through the multitude of content providers involved in the REGNET project TARX got acquainted with a broader range of Cultural Heritage domains and particularities than it should have been the case when focusing on the local market alone.

Secondly, through the frequent mutual contacts, it became obvious that there are many common themes between regions and countries suited to be addressed by the thematic approach for the information gathering, storage and presentation. This is definitely a cross border matter. Culture and art are not limited by country borders, especially not in European Cultural Heritage where we can refer to the numerous changing borderlines through history. It was a pleasant feeling to detect commonalties between the different regions expressed in common thematic realizations.

Last but not least, as an SME it was very fruitful to collaborate with other European companies on different technology levels, especially in information and knowledge engineering and e-Business techniques. The experience and skills of the personnel of TARX was substantially boosted and speeded up through the participation in the REGNET project.

As a direct consequence of this, business opportunities came already out during the project, especially in the e-Publishing domain, and the portfolio and reach of the company was broadened by taking part in the establishment of two new organizations: CSC Europe, a European Economic Interest Group, and CSC Low Countries (together with MECH and MUS), a non-profit organization covering activities in Belgium and The Netherlands. The latter was only possible through the participation in a European project such as REGNET and forms a guarantee for continuing

12.10 MECH - Stad Mechelen - Stedelijke Musea Mechelen (B)

The municipal museum of Mechlin (MECH) was involved in the REGNET project as content provider and had to contribute the content of the inventory of the museum-collection, as well thematic texts on several subjects.

To fulfil all REGNET-tasks a collaboration was needed with a Mechlin technical partner from the region Mechlin but also with AIT from Austria, giving us the needed technical advices.

It was certainly very useful to learn what kinds of different standards are used as Dublin Core, XML…

During the project the Mechlin Museums had the opportunity to meet other European museums and archives with similar aims, objectives and collections as the Mechlin ones.

Moreover, the Mechlin participation in the REGNET project gave the Mechlin Museums the opportunity to collaborate with other European partners to work out some of the chosen themes, a collaboration that will be continued in new projects.

In that way, Mechlin was working out some thematic texts concerning the Mechlin botanist Dodoens, which could be contributed to the Swedish Botany-Linnaeus theme. This theme will be further worked

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out in future. REGNET was the engine starting up the collaboration enriching the contents of both partners.

With MUS, Mechlin was working out some cross border themes and composing topic maps especially about SAINTS and GODS and about LEATHER and GILTLEATHER and the links between them. So has been worked out a common thesaurus for the topic maps SAINTS and MASKS. In future this work will be developed and will possibly result in permanent collaboration. Working this way, mutual impregnation of ideas, points of view, methods is a fact and often very surprising and refreshing.

Working in a European perspective the Mechlin Musea were enabled to enlarge their knowledge on several subjects.

Cross border-working is most interesting and it certainly creates a surplus value to the habitual museum work.

12.11 MUS - Stichting Museon (Museum voor het Onderwijs) (NL)

The co-operation of the multitude of partners in the REGNET-project has been very stimulating. From the management point of view the meetings were very beneficiary. As to be able to have direct contact with and be better able to sense the motivation and reference points of our colleague partners meetings and seeing each other face to face are a valuable experience.

The meetings also have the strong potential to make a consortium more one group with one common goal, the REGNET consortium has most certainly achieved this goal. We became more then just people from another far away company. In this respect European unity, at least at this project level has been reached.

The differences of approach of the work may at first seem difficult but clearly several aspects of analysing, looking beyond the domain of your own company has been very stimulating.

From the technical point of view Museon has become more knowledgeable in relation to standards like XML, ebXML, etc. Not that we became real technically more capable in this area, but the potential, the use and the consequences for our organisation have become clear. In future we now know were to find the right sources of information and technical capability. Because of this future projects and plans can be more efficiently carried out due to the experiences gained in this European project.

Also the opportunities the further develop this project (See hereunder "Evaluation and Outlook": Museon's participation in the CSC-LC) and initiate new one have been made possible due to the REGNET-project.

12.12 MOT - Motorola S.p.A. (I)

We were pleased to work in this project since the consortium is heterogeneous, in particular it is composed both by technology oriented partner and domain (cultural heritage) partners. This gave us the opportunity to learn needs of the domain expert partners and tentatively support them with our knowledge and expertise, jointly with other technical partners. We have experienced a strong collaboration among all partners and this is a valuable result obtained from learning each other needs in such wide consortium.

Nevertheless, another lesson learnt here is that co-operation is never an end in itself and the proclamation of the benefits and needs of collaborative work does not substitute the active establishment of real incentives towards collaborative work.

From the beginning of Motorola establishment in Italy, our Turin centre dedicated itself to research activities in the context of European funded projects. REGNET project appeared different for the elevated number of involved partners. Quite soon as a consequence, the complexities regarding project management and communication raised.

Nevertheless, project management was successful, thanks to the experience of the project coordinator and the availability of all the partners to stay on the plan. Project planning was well defined from the beginning of the project and, even if some delays were accumulated during the life

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cycle, the breakdown structure was never contradicted. Partners were divided into functional groups, and responsible partners for each group were identified.

Regarding communication, two thematic channels were set up in order to split very different flows of discussions: the one related to contents management, and the one related to technical development. Several meetings were conducted in both the areas, reinforcing the partners' awareness of overall project achievements and status, and driving subsequent actions.

One main challenge was the alignment of quality processes of the different partners. Among the great number of participants, there were partners in different conditions, from those that are committed in satisfying particular quality standards, to those which follow quality common practices without a real awareness of an institutionalised quality process. The challenge was to find a common language to share the quality concepts and to achieve a common process not too far from each participant experience and consolidated practices.

12.13 SPAC - SPACE S.r.l. (I)

SPACE has taken the occasion to participate in the REGNET project to exchange experiences and knowledge with operators involved in the management and the development of museums, museum networks, archives and libraries, better understanding their needs and expectations.

SPACE consider the REGNET experience as a mean to highly valued the dynamics of cultural economics, and considers the latest developments in multimedia technologies and the Internet key points for the innovation and enhancement of cultural resources, and tourism. SPACE pays particular attention to the minor players in the cultural heritage sector, focusing on technologies that leverage group resources for distributed applications. The purpose of SPACE best fit with the REGNET aims to transform the cultural and environmental assets of Europe into resources, promoting a global system, so that these assets can become the engine of a sustainable and lasting development.

Combining products, industrial and reusable solutions, and a deep, encompassing knowledge in the research and development field as REGNET has done, gives SPACE the tools to help define strategies for expansion and internationalisation of socio-economic development in Europe and throughout the Mediterranean.

This identity is unique in Italy, and perhaps in Europe as well. The REGNET experience gives SPACE the necessary knowledge and experience to handle the varied situations arising in today's uncertain world of development for territorial resources such as tourism, arts and leisure.

12.14 ALI - Fratelli Alinari I.D.E.A. Spa (I)

Alinari has deepened its expertise (due to the project) in :

1-Usability matters: all the expertise gained trough the project have directly influenced all the systems that were going to be started up. The importance of the end user has become the focus centre of the company's interest.

2- Testing new systems, protocols and languages have been of great interest and an occasion to evaluate and compare other solutions to the internal ones.

3- New technologies: some of the architecture solutions and software, even if not directly applicable to the internal protocols, have been of interest and suggested new inputs for the company's researches.

4- Cooperation and contacts : the cooperation with other companies has been of great importance. Both opening to new approaches to problem solving and to new cooperation activities on commune areas of interest.

12.15 CC - Consorzio Civita (I)

The CC partner has supported the REGNET content provision through the works stored in two of the most important Italian museums, Musei Capitolini (MC) and Museo degli Argenti (ARG) of Florence, which have joined on a voluntary basis the REGNET project.

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For Musei Capitolini the lessons learnt from working together in a European project are related both to technical aspects and to the ones concerning a work model.

In the first case, MC has valued the employment of cooperation instruments (tools) and the "off acquisition" of the other partners' contributions.

In the second case, the REGNET project has represented for MC a work model in the sense that the cooperation and the integration with European different museums and cultural organisations during the creation of data bases have offered to MC the possibility to know other museums to compare notes with and to comprehend their issues, at times similar at times different from one's own.

For what concern Museo degli Argenti, joining the REGNET Project was a very good occasion for the Museo of Florence to start a close dialogue with another Italian museum like the Musei Capitolini of Rome and to fit with a more wide scene, facing with other European partners.

A large number of partners took part in REGNET project and in each meeting which was held during the project, to point out final objectives and strategies so that to define common requirements and methodologies needed interesting discussions which, at the end, brought us to a full agreement. What we also tried to achieve was a system to let all the institutions share their resources and to export their data in different format, for different uses.

12.16 IAT - Instituto Andaluz de Tecnología (E)

Although, previously to REGNET, IAT has a quite remarkable experience in participating in transnational projects already, there were some particularities into REGNET project which have taught us some new lessons, as the following ones:

a)   The large number of partners into the consortium (larger, by far, than in most other previous IAT experiences). This aspect of REGNET has had some interesting consequences into the intra-consortium organization:

?   Tasks and processes need to be especially well defined, so that any participant has the right information and indications that might affect its activities.

?   The work need to be developed in perfectly defined stages.

?   After that, flexibility is at the same time an essential tool to be present during the project.

?   The proper use of Information Technology for communicating in such a large and heterogeneous consortium is probably the only way to assure consistency in the activities at low cost.

b)   Complementarities and harmonization between members is an essential factor for a successful development and result in this kind of consortia, when different fields of knowledge, expertise, missions and roles are involved.

c)   Protocols and rules are of an extraordinary importance when dealing with this kind of work, with partners from various nationalities, with different know-how. We would like to point out:

a.   The establishment of communication protocols

b.   The definition of the project's common/official language

c.   The creation of technical and non-technical indicators to evaluate the course of the project.

d.   The observance of the time deadlines, on-time comments on the work development and exchange of information.

d)   Taking into consideration the complex developments/activities included in REGNET, we must outline the following relevant issues:

?   Technical capability of entities involved in the project in order to establish a "common language".

?   Existence of leadership, vital to establish a true teamwork. Capability of positive human dynamics.

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? A project should have the same importance to all elements of the team in terms of goals, perspectives, culture, implementation.

12.17 GRAN - Ajuntament de Granollers (E)

It is not the first time that GRAN (the City Council of Granollers) has been involved in a European project. We had already experience working in similar environments. Are examples of this the next projects:

- V Framework Programme "Intelligent environment for diagnostics, treatment and prevention of eating disorders –SALUT (IST-2000- 25026)

- V Framework Programme " FOMOFO - Four Motors Foresight Exercises". STRATA Programme.2001.

- V Framework Programme "RASTEI- Regional Adjustment strategies to technological change in the context of European integration". (2000-actual)

- IV Framework Programme "Networks, Collective Learning and RTD in regionally-clustered high-technology SMEs". Research area J.1.1998

- ALFA, "Knowledge's Flows and Sociotechnical Constituencies in National Innovation Systems: Comparative Studies in Europe and Latin America. 1998

Like in the other projects, one of the most important things to work in such a big project is to strengthen and to re-learn how to work and deal with such amount of different people from different countries, that use different methodologies and have different visions of how to manage a project of these characteristics.

We were working using new technologies as a way to communicate us, to exchange information, data, opinions and ideas, in a democratic way, by means of a kind of forum, and with satisfactory results for the project.

Another important added value is the opportunity to follow with the relationships that we have created among partners in order to start new collaborations in other European projects or in other internal projects among regions or organisations.

In fact we have used our relation with ICCS – Bulgaria, in order to put in contact two very well known groups of theatre of these two different regions, Catalonia (La Fura dels Baus) and Bulgaria (the Theatre of Bulgarian Army). They are very important and famous in Catalonia and Bulgaria with excellent reputation and well known abroad.

It has been a opportunity to generate new relationships and exchanges between cultural organizations and also technological ones. It is the case, the relation created with IAT in Seville. The Andaluz Institute of Technology is a good partner in order to develop ecultural projects. It can be a way to follow with our progressions acquired in the REGNET project.

Also the partners of the project can be a useful link to us in order to find future collaborations in their countries. The European projects are a really good chance to open our borders to the world.

12.18 ICCS - Institute of Computer and Communication Systems (BUL)

To work in an international consortium, to share responsibility and to perform works, which coincide with the overall project plan is a big challenge and origin for experience and benefits. Working in common with all participants of the project insists to define and to follow your personal duties in a way, which will benefit the entire project, respectively all your partners. For our team, the project goals were reached thanks to the strong behaviour of the partners, the clear decomposition of the tasks, the availability to launch initiatives, the perfect coordination work and in general the decisions for joint actions, in relation with the project meetings. During the REGNET project there were organized many working meetings, where analysis, distribution of work and exchange of knowledge were under way. Nearly all partners organized project meetings where discussions, debates, mutual work and personal contacts leaded from a number of different partners to one common group with the knowledge that we have to work together like a strong unit. We think that except professional satisfactory of these

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meetings, the main memories are related with the hosts of the meetings, their will to organize better and better everything. Because except the hard working hours we had few once for relax, when we touched to the culture of the different countries, their museums, historical sights. This project enriched us not only with the culture heritage of the different partners, but mainly with the excellent impression of the people, taking part in it.

Now we are confident that we can work together in a big consortium, to share the workload, and we can all benefit from the common work. We would like to thank to the European Commission for giving us the opportunity to work together and we'll be sincerely grateful for giving us another chance for international work.

12.19 ZEUS - Zeus Consulting SA (GR)

Within REGNET we reached some of the following basic aims:

- The dissemination of the European Culture Heritage facilitating European citizens;
- The access to catalogues of intellectual, cultural and scientific heritage stored in archives, libraries, museums and galleries;
- The integration of e-Business into the information systems used in Cultural Institutions;
- The development of new and exploitation of existing cultural infrastructures
- The establishment of a service infrastructure which allows to develop a network of (cultural) service centres throughout Europe.

The REGNET network offers support to the emergence of a true European cultural identity and co-operation between cultural institutions, archives, museums, libraries and other public organizations, and even private enterprises, IT-enterprises, internet service providers and tourist offices, not only at the European level but also nationally and internationally.

The interaction between the Commission and REGNET was ensured the dissemination of European Commission policies among the participating countries and gave strength to national, regional and European co-operation on the preparation of proposals. REGNET identified organizations at European and national level involved in policy making in the area of cultural heritage.

REGNET worked at European level to ensure that in each country full account is taken on how European objectives and results relate to national priorities and vice-versa. Furthermore within REGNET project we had the opportunity to follow with the relationships that we have created among partners in order to start new collaborations in other European projects or in other internal projects among regions or organizations.

In addition within REGNET we received and exploited new skills and experiences in multinational level in order to work and develop future products and applications within our company that should disseminated in national and European area.

A European project brings benefits and challenges for the staff of a local or regional authority. So all project participants should gain from their experiences by becoming more open-minded and learning many new things. Also the communication between the partners is very crucial and that means that partners should speak a common language and have an email connection in order to contact each other directly and quickly. So in REGNET project by fostering closer contacts between representatives of different interests, we have facilitated the exchange of factual information and, in so doing, have created an environment of greater trust and confidence.

So in ZEUS within REGNET project the major lessons that we have been learnt is

- the value of involving all interested parties,

- the difficulties in achieving a common purpose

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12.20 SI - Systema Informatics Ltd. (GR)

This project was the first for Systema to be involved with a very large number of partners. The number of partners that participated in the REGNET project was a challenge in itself. The management of the coordinator was strict and very well organized and the way the project was managed was a very good experience to learn from and it can be used as a future reference in future projects that Systema may be involved in.

12.21 CERT - Centre for Research and Technology Hellas (GR)

CERT was involved in the REGNET project as a technical partner and gained valuable experience through its cooperation with both the technical and the content providers organizations. The share of knowledge between the technical partners was very well planed within the project and resulted to the improvement of the CERT team's skills in various technological areas such as XML, XTM and Ontologies.

Also, one of the major achievements of the consortium as a whole was the integration of all REGNET modules into one entity by using the SOAP protocol through the Ontology module that is the backbone to the REGNET system. CERT has developed the ontology module in REGNET and has gained considerable expertise with the cooperation with the responsible partners for all the other REGNET modules.

The direct contact with the content providers and their needs was also very useful and during the project we have realized that the main target of a tool such as the "Topic Maps Generator" that we have developed within REGNET should be to achieve a high technological outcome (main effort of the technical partners) without however ignoring its usability (main requirement of the content providers).

The project management was exemplary both in financial and technical issues. This is due to the very high experience of the coordinator in project management and to the commitment of the WP leaders to the project.

12.22 VALT - VALTECH (F)

Main lesson we learnt deals at first with functional domain, I mean Cultural which was not previously part of Valtech sector. We learnt a lot from this users and hope that they also learnt from us about new technologies.

Second lesson was about working with a large group of organisation distributed all over Europe. This imply to set up strong and clever management that was done in an impressive way by AIT. We learnt a lot from them during these two years.

Evaluation and Outlook

13 Partner Experiences

13.1 AIT - Angewandte Informationstechnik Forschungsgesellschaft

Our technical work within REGNET focused on the development of the data entry tool and database management system as well as the definition of a service structure for cultural service centres. In the course of the project we also decided to put some effort into the development of e-Business and e-Auction systems for content providers.

The Data Entry tool primarily focuses on the target group "expert user". There are two ways to display the search result: the detailed view as now available in nearly all REGNET databases and the summary as now available in the SUL application (http://csc000.cscaustria.at/sul).

Following feature have been developed for the ONB application (http://csc000.cscaustria.at/onb):

- a differentiated display of the search result. First of all so-called header cards are displayed and after selecting one or more header cards the user sees the index cards that refer to real objects/pictures.

- the user can select items, specify his needs for publication of the image and send an order to ONB.

Within the REGNET system object data is mapped into DublinCore fields that are contained in a separate section of the object xml record. We have now implemented a feature called "synchronization" for automatic update i.e. of DC contents in case of changes in the object data fields. This feature is implemented using Xpath.

Late in 2002 we started to organise the REGNET Austrian testbed and find external users for the system. The feedback on this is still dropping in and so far we are coaching 8 testbed participants. It was decided to carry the testbed on after project end as the reaction time of participants can be longer than expected and there is high interest in the service. The services that we are offering through the CSC Austria in this first test phase are described in the success story of the Austrian testbed in point 14 of this report.

The outcome and success of the Austrian testbed will further influence our performance on this market segment. AIT will for sure benefit from the knowledge we gained during the project in the development of e-Business and e-Auction systems as well as database management and topic map generation for different cultural heritage requirements. Here we can enter the market with innovativ and powerful tools on the forefront of research and development.

The fruitful relationships that could have been built with internal partners and external test users during the project lifetime will for sure carry on and moreover help us to transport the vision of the service centre concept to the global market.

The future cooperation for partners of REGNET and service centres to be established will furthermore be ensured by the activities and support of the CSC umbrella organization CSC Europe which's establishment is regarded as another important outcome and success for the project.

13.2 ONB – Austrian National Library

Within the project, ONB acted as a content provider contributing extensively digital picture data and metadata, especially the integral picture archive catalogue (1,4 mio catalogue cards). ONB gained valuable experience in the digitisation process, defining new digital workflows, thus reacting to changing customer needs.

The integration of the Picture Archive's catalogue into the REGNET system was our first experience in structuring and storing this data according to XML standards (as well as in Dublin Core standard). This integration into the REGNET system included the generation of different interfaces according to the different users (library staff, customers). As ONB was in parallel involved in another digital project

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with the aim of setting up a digital image archive both for end user needs (web-shop) and it's own purposes (data administration), ONB worked out user-friendly storyboards, layouts for the end users view of the system and formulated requirements for the picture database. These experiences were shared in the REGNET project.

The experience made by ONB with the REGNET system database in relation to it's capacity to store and represent it's data (especially search and retrieval) was very convincing, especially compared to the then already existing database of ONB, a commercial product developed specifically to meet the needs of cultural institutions such as museums and libraries. In the end, it was this experience that prompted the ONB not to invest anymore in it's existing database and look for alternatives.

ONB profited too from the necessity to carry out tests on the delivered parts of programming. Creating test scenarios and carrying out intensive tests was something completely new for the Picture Archive and the so gained experiences will be a benefit for future projects.

The conversion of a traditional picture archive into a digital image archive necessitated for ONB the procurement of a high-tech archival scanner. In the end, a Homrich Scanner was chosen, a state of the art product working on the basis of a digital camera. Also extended Memory Space (1 Terrabyte) had to be purchased to meet the rising needs of a digital picture storage. Throughout this process, close cooperation with technical partners, but also informal information shared by other content partners such as ALINARI were extremely valuable to ONB.

Through the project, ONB became thus familiar to emerging technologies in standards and programming languages such as XML, ebXML and Java, enabling web-based services. These experiences are extremely useful and can be integrated in present and future internal workflows as well as third-party co operations.

In the end, ONB's main results within the project may also be summarized as having created newly digitised content, as many pictures have not been available in digital format before. This data is now structured in a semantic way (such as in the topic map "Primisser", the genealogical tree of the House of Habsburg from the 13th to the 16th century) respectively in XML (such as the picture archive catalogue). The picture archive catalogue can now be viewed via the Internet, and tems may be ordered from an end-user. The realized web-portal (see below "Success stories / ONB") is a functional basis for a fully blown web-shop.

Intended further use and exploitation

ONB plans to define metadata formats for all the different databases that exist within the Library and all it's collections and import all these databases into an XML-based system. This way, the data can be easily exported to other systems and cooperation with other databases is greatly facilitated. The XML-structures that have been established within the REGNET project for the ONB picture database will undergo a further development, enabling comfortable administrating of the system and the data.

At the start of the year 2003, ONB has commissioned a study performed by technical experts to evaluate technical solutions that fit best to the needs of the picture archive and it's projects. As a preliminary result, the further use of single components of the REGNET system was advised with a perspective of extending the system functionalities by adding new workflows and features.

Another goal of the Austrian National Library's picture archive is to upgrade it's end user web portal based on the REGNET XML-database to a professional state of the art e-commerce solution, enabling secure transaction, price calculation on the fly, fast delivery of digital images including watermarking. This ambitious goal also includes building up a connection between the database and the existing accounting software and combining it with the ORACLE-system (which is ONB's server software).

ONB will also join the local CSC in Austria, and thus keep in touch with at least a great number of the partners of the REGNET project. It is expected by ONB that the CSC will promote REGNET's principal idea of clustering smaller cultural institutions and foster their presence in a digital area, providing many different services such as e-publishing, catalogue conversion and management, e shops and eprocurement. This way, the CSC will also establish a firm contact to stakeholders in these different areas.

We firmly believe that the technical progress will require a special competence especially in IT-services. Even for a big institution such as ONB this is already quite challenging, although ONB is in

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the happy position to have it's own IT service centre. For smaller institutions, this rising demand of technical knowledge must be considered an even bigger obstacle to the presence in the minds and the markets. In our view, the REGNET basic system has the potential to become a competence centre that is able to promote smaller cultural institutions and support them in various cultural activities. By concentrating the member institutions within REGNET, facilitating market entry for those institutions, REGNET might become a competitive market player enabling efficient B2B, B2C etc. trade for its members in the growing internet trade world.

13.3 SR – Salzburg Research

Technical Project Management

The technical management of a project of a size as REGNET is difficult with respect to

- the number of the participating partners and
- the size of the envisaged final system.

To ensure the smooth development of the REGNET system, all participating partners need to have a common vision of the final product and thus require a high degree of communication for co-ordination. As off-line communication is not sufficient in a project with a cultural variety as REGNET, regular face to face meetings are necessary to ensure the smooth development. As already identified in the risk analysis at the beginning of the project, the requirements specification and the change of requirements demand careful consideration.

However, in an innovative project as REGNET, the change of requirements is inevitable and thus needs explicit co-ordination from the technical management.

During the project life time SR found it increasingly difficult to keep track of the overall system development as the partners developing different sub-systems communicated directly with one another. This is mainly due to the fact that SR was responsible for a component that was architectural situated on the periphery of the REGNET system.

This problem was addressed insofar as VALT, the responsible partner for the e-procurement subsystem, took over responsibilities of the technical management.

With this structural change in place, the technical management was able to ensure a requirements focused development of the REGNET system.

Electronic Publishing

SR was taking part in the REGNET project as task leader of the E-Publishing component. We developed a web-based multilingual E-Publishing Prototype as a proof of concept based on open source software and open standards. However, the development has shown, that the existing open source technologies need considerable improvement to match the variety of the used content as well as to come up to the expectations of the content providers. Thus, the second phase of development was focused on the integration of professional publishing tools.

In the REGNET publishing process several subsystems of the REGNET system are involved and are co-operating. The Java prototype was fully integrated into other REGNET components such as the Ontology or the Search & Retrieval Component via the SOAP (Simple Object Access Protocol), a lightweight W3C protocol for exchange of information in a decentralized, distributed environment based on XML (http://www.w3.org/TR/SOAP/).

REGNET data, retrieved from the Search & Retrieval subsystem, can be organized by using different storyboards based on the LATCH (Location-Alphabet-Time-Category-Hierarchy) information structuring principles of Richard Saul Wurman. The value added information can be stored in the system by the Ontology Component. To meet the requirements of the integrational approach we had to work together with the partners developing these components.

Finally the prototype generates publications based on HTML for online publications, PDF for print outputs and SMIL (Synchronised Multimedia Integration Language) for which a SMIL player was adapted by SR.

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These publications can be viewed online by any Java enabled browser or downloaded for local viewing.

To sum up, the prototype offers the following features:

- Web-based definition of publication prototypes
- XML based publishing structure for exchange of information
- Relies on widely accepted open standards
- Online presentation of publications using Web-Browsers, PDF viewers and a SMIL player
- Download of presentation for CD-ROM production

Accompanying to the technical development the following documents were created:

- REGNET Publishing Process Document: Introducing the REGNET online publishing process
- Storyboard Scenarios Document: In this document the definition of a storyboard is mapped onto the functional architecture of the REGNET publishing prototype.
- User Manual for the prototype

To meet the professional requirements of the REGNET content providers, we evaluated integration possibilities with a commercial publishing systems, namely Macromedia Director, into the REGNET system. This system enables solutions for the design and production of content rich products that can be distributed via CD, DVD or the Web. However, Macromedia Director, as a standalone tool, offers limited possibilities in terms of online development of different publication types.

To be able to integrate Macromedia Director and, at the same time not restricting the REGNET system to just this publishing tool, we realized a data exchange functionality between Macromedia Director and the REGNET system. We developed a generic template enabling the integration of REGNET data into Macromedia Director. To be open to other XML structured content as well, this template can be customized to any XML structured file, enabling the publisher to use additional content for publishing.

In parallel to the development work a user cookbook, showing the possibilities of the integration of REGNET data into the development cycle of Macromedia Director, was developed.

Summarizing the development of the REGNET epublishing subsystem, our efforts resulted in a web-based online prototype based on open source software and open standards capable of producing prototypical publications serving as demonstrators of the possibilities of online publishing. In addition, the integration of a commercial publishing product for professional users allow the production of web capable publishing products that can be tailored and offered to different customers.

Exploitation

We found the LATCH principles suitable for organising many kinds of content and therefore we will continue to further investigate the topic of LATCH organising of data as i.e. in the VICODI IST-project.

Furthermore, we found SMIL to be a suitable language for media rich presentations and we plan to further develop and enhance the SMIL player with additional features to adapt it to other projects dealing with multimedia presentation. In this work we will investigate the suitability of SMIL in interactive environments.

As XML schemas became widely accepted as a means of data exchange between legacy applications and publishing environments in many application domains, we will continue to investigate XML based data exchange with Macromedia Director publishing environments, i.e. in the domain of health care systems and hospital information systems.

13.4 IMAC – Information & Management Consulting e.K (D)

Description of role and tasks

IMAC was involved in the REGNET project in an intermediate position between content engineering and technical development: coordinating the content input mainly in the first phase, providing methodologies for data description, best practise analysis and system validation were the tasks and contributions to the project. IMAC was responsible for the following work packages or tasks within a work package:

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- WP 1: Analysis of the State-of-Art, Task 1.1 Definition of content to be provided and Task 1.2 Development of a documentation and digitisation plan for content creation and management

- WP 2: Implementation of the System and Preparation of Services and Product Generation, Task 2.1 Preparation of content and products & 2.5 Market preparation

- WP 3: Validation of the REGNET-Demonstrator and preparation of the demonstration, Task 3.1 Validation of the REGNET-Demonstrator

In WP 1 our work mainly covered the provision of questionnaires for an information audit and a best-practise analysis together with the analysis and interpretation of results (respectively reporting). Later on content providers were guided to generate a customized digitising plan – a production plan for the future content creation tasks and processes. During work package 2 the content creation process were guided (e. g. consultancy in the usage of standards, provision of an appropriate framework together with other partners). For the market preparation (WP 2.5) IMAC provided the general methodology for the market analysis and the definition of general marketing strategies. Work in WP 3 was dedicated to the development of a validation concepts, its realisation (testing of the tools, reporting of results) and the compilation and interpretation of all test results.

Project management activities refer moreover to the organisation and lead of meetings, the controlling of required contributions and reporting. According to our competence profile we were asked to work on information and knowledge management aspects of the REGNET system and to contribute to the development of products and services adapted to the needs of cultural organisations which build our core target group and are an important part of our actual customer base.

Conclusion

Participating in REGNET project was of highest interest for IMAC for many reasons:

- we could contribute our knowledge on cultural heritage institutions into an innovative European project

- we saw the chance, to work with several other European organisations on the following topics:

- development of new business models for the difficult cultural heritage area

- development of new software tools for the management of cultural heritage data based on international standards

- development of multilingual web applications with distributed search facilities.

Further to that we could gain experience in the management of rather big European project, which requires excellent skills in formal project management techniques. Our contribution to the project was fulfilled according to the plans. We could integrate our technical, methodical und business knowledge on a very broad scope to the project. The common project offered to us an excellent test bed to apply the methodologies which we developed for example for digitisation projects, evaluation of information systems and usability engineering.

Implementing the developed software tools, i.e. portal site, shop system, auction system provided us with the opportunity to enlarge our knowledge on new technologies and standards. This does strengthen our market position in the cultural heritage area, we can offer to other customers not only a wider spectrum of services, but also knowledge.

On the other hand, we learned in this project several new partners, which enables us to develop common policies to address the European market, which would not be possible for a SME like us. Only through this cooperation we have the chance to act as an European company, addressing an European market. Of course we can harness as well our participation in the REGNET project as an excellent reference, which does open further doors to new projects und new customers. Through our extensive publishing on this project and presentations at different conferences our image as a leading company in the cultural sector was significantly improved.

For IMAC the REGNET project provided a milestone in its history and our participation is definitely an important step to our further development as a successful European company.

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13.5 SUL - Stockholms Universitet (S)

Sul has been a content-provider in the project with the specific role to deliver contents and content descriptions, which fulfils the requirements of the project, single out Best Practices for the catalogue, test the developed tools and prototype and give feedback to the developers. SUL has also had a certain coordinating role among the Swedish partners.

Motivation for joining the project

Stockholm University Library joined the REGNET project to have the opportunity to work with other Cultural Heritage organizations in Europe and be able to get the know-how to start digitisation of the Rare books collection in the library. This collection is actually owned by the Royal Swedish Academy of Sciences but housed and cared for by the library. The collection features unique books in the natural sciences, but has not been much known for the outside world, and we saw this as an opportunity to market the collection at an international level.

SUL:s contribution to the REGNET project

SUL has contributed to the project by researching on best practice for catalogues on digitised images, digitised some hundred images from the rare books collection and provided 250 records in English and Swedish describing images and authors according to the Dublin Core format. SUL has also tested the functions of the catalogue and provided feed-back to the developers.

SUL and KVA have been jointly responsible for the Linnean theme in the REGNET project and produced texts and links for the Linnean topic map.

Benefits from the REGNET project

SUL

- Has gained experience in digitising

- Has gained experience in working with modern technologies to present content, such as XML-standards, topic map schemes and so on.

- Has had an opportunity to market the Rare books collection

- Has an opportunity to offer images for sale through the e-shop

- Has got to know other cultural heritage organizations in Europe and gained knowledge from them

The experiences gained have made it possible for us to take further steps into the field of digitising content in other various projects in the future. As a consequence, this will in the end, increase the public access to our collections. A result that coincides well with the purposes initially set up when we decided to take part in the project.

As the central and important aspect of our overall goal in connection with taking part in the REGNET project has been to increase research on and access to our rare book collection on a national and international level.

Conclusion

SUL intends to exploit and use the REGNET tools further in accordance with the already stated aims and goals. SUL also intends to join a Service Centre set up by REGNET, if it is financially viable for the library to do so.

13.6 LMG - Länsmuseet på Gotland (S)

LMG has taken part in the project as content provider with a special interest in the e-shop development. The museum has provided 110 records and images for the eshop and also provided texts and images for the Saints theme (58 texts and 56 images).

Example of two of the shop items to be incorporated in the E-shop.

Figure 13: Digitisation example LMG - 1

Jewellery, Birdman, Silver. Repro from picturestone. Hammars, Lärbro parish. The Viking Age

Figure 14: Digitisation example LMG - 1

Jewellery, Pendant, Ship, Silver. Repro of picturestone. Lillbjärs, Stenkyrka parish. 700 - 800 AD.

Figure 15: Example of one of the Saints items - LMG

SCULPTURE, SAINT MADONNA

OAK-WOOD. 106 CM HIGH. RIGHT ARM OF THE MADONNA MISSING. RIGHT ARM OF THE CHRISTCHILD MISSING, THE LEFT ARM DAMAGED.

LMG has had the opportunity to take part in a couple of project meetings and found the cooperation between partners rewarding and stimulating.

Conclusion

LMG considers that the results of the project will be a valuable asset in the future for the museum. The REGNET project features three different eshops, which can be seen as a strength of the project

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– each has been customized for different purposes. LMG has found that the e-shop developed by AIT is the development best suited to the museum's needs and would be happy to use that in the future.

13.7 NRM - Naturhistoriska Riksmuseet (S)

Our role has been the one of a content provider in order to developed an e-shop business into this REGNET -project.

The museum shop sells about 2000 and in the next few years approximately 3000 different items. 127 of these items have been chosen to be the representative of the museum shop. Due to less personnel the museum was not able to take photos and digitise pictures of the items. An extern company has digitised all of the 127 items.

Our contribution has been to test the CSC database and REGNET e-shop. After establishing the test group NRM has carried out test on the various tools resulted in usability tests and bug reports.

NRM had the opportunity to try two different e-shops. One made by ZEUS and one made by AIT.

We found that the AITs e-shop is more suitable for our purposes.

NRM has participated the project meetings in Graz, Sofia, Mechelen, den Haag and Toulouse in which aspects for users and content providers were on the agenda.

NRM believes that the project has succeeded in its goals: to deliver services to cultural institutions as libraries, museums, archives and galleries and to establish cultural e-shops.

13.8 KVA - Kungl. Vetenskapsakademien, Royal Academy of Science (S)

Experiences

KVA has gained several and various experiences by taking part in the REGNET project as content provider. Most important are the following:

- KVA has gotten further experience in digitising content.

- KVA has gained experience in working with modern technologies to present content, such as XML-standards, topic map schemes and so on.

- KVA has had an opportunity to publish the instrument collection database on the net.

- KVA has gotten the opportunity to digitise previously non-digitised content.

- KVA has through the cooperation with SUL managed to create a renewed interest in its Rare book collection.

- KVA has gotten to learn a lot about other cultural heritage organisations in Europe, and how they are dealing with their collections. This is not explicitly addressed within REGNET but still very rewarding. So KVA has enjoyed and learnt a lot from cooperating with the other cultural heritage organisations taking part in the project.

Benefits

The experiences gained has made it possible for us to take further steps into the field of digitising content in other various projects in the future. As a consequence, this will in the end, allow for the public to gain easier access to our collections. A result that coincides well with the purposes initially set up to take part in the project. The access will not just be easier but it will also be possible to present the material in a richer way, more contextually, than would the mere publication of a printed catalogue would have been previously.

Motivation

A central and important aspect of our overall aims and goals in connection of taking part in the REGNET project has been to increase research on our collections. This is due to the ambition, that we in the end will have a better historical understanding of the human dependence on scientific experience in our modern world. One way to fulfil this wish is to make it easier for researchers of all kinds to gain access to the collections, in order to draw fruitful conclusions from the provided material.

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In connection with this, it shall be pointed out that the REGNET is about to make it possible to reach an even larger group of potential researchers, not only on a local or regional level, but also on an international one. The REGNET has with other words, helped us stretch the borders for the availability of our collections.

<u>Contributions</u>

KVA has contributed to the project on the basis of our expertise, that is the historical understanding and interpretation of our collections and the history of science in general, and particularly the history of KVA. We have contributed with the writing of original thematic texts and with previously non-digitised content. We have also made available already existing database information.

KVA intends to exploit and use REGNET further in accordance with the already stated aims and goals i.e. to make available for research:

- archive information such as documents, maps, prints, correspondence, etc.
- already scanned card catalogues.
- object collections other than the scientific instrument collection.

<u>Conclusion</u>

We have perhaps not gained further expertise in our field of expertise, but we have learnt a lot on how to make use of our expertise in publicising information about our collections. We have also learnt about the various technical possibilities for exploiting our collections. This is crucial.

In accordance with the above the REGNET has proved to be an operational and useable instrument to go further with our intentions. The KVA-SUL looks forward to take part in the improvements and exploits of this instrument in the future.

13.9 TARX - TARX nv (B)

Within the REGNET project TARX evolved quickly from a rather pure technical partner to a hybrid technical-content partner. This was due to the fact that we saw that the knowledge gap between the technology oriented partners and the content partners turned out to be more substantial than expected.

This intermediary role between technical and content partners was implemented on different levels. First TARX got acquainted with the typical domain and method of working of the museum world and later of the archival world. Besides the used standards and collection management systems the generation of content was studied in detail and TARX took part in the process via contributions to the content production of the "Saints" theme. Once involved in this process it was easier to make the connection with the technical modules developed in REGNET because a sufficient overlap was created between the technical and the content world.

The abovementioned approach was largely adopted in all concerned domains to the subgroup that exists of the Municipal Museum of Mechlin, Belgium and the Museon of Den Haag, The Netherlands. The involvement with other content partners was more on a case-by-case base: i.e. GRAN for off line data entry and topic map generation, ONB, SUL and KVA for topic map generation.

The subgroup MECH-MUS-TARX introduced the thematic concept in the REGNET project. It concerns here an approach in which the content production is dictated by a certain specific theme instead of an arbitrary one by one generation of mostly unrelated items. Another important aspect of this thematic approach was the possibility to create texts aimed for different audiences in different sizes and languages and suited for being displayed on a variety of end user equipment (desk top, mobile, etc.). The highly granular approach in this generation process made reuse of all produced texts possible in other contexts or in different storyboards.

An off line data entry was developed for entering meta data on collection objects, images, object and thematic descriptions. This system was based on a spreadsheet with a macro for the conversion to XML. The outcome of this conversion was then mapped into the REGNET data structures. The main goal of this system was to start the data production prior to the full availability of the on line data entry system. It can still be used for those organizations not disposing of an Internet connection.

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Originally not foreseen but very quickly detected as an enormous added value to the delivered information sources by the content providers was the addition of a knowledge layer on top of these information resources. This knowledge engineering part was studied and developed by AIT, TARX and CERT. The decision was made to use the upcoming Topic Map paradigm for the realization of this new objective. Besides the accommodation time to get used to the new paradigm, it was especially the conceptualisation of knowledge into the topic map standard that took a lot of effort. TARX did the conceptualisation of topic maps for the themes SAINTS, INCIVICS, LINNAEUS and HABSBURG-PRIMISSER.

The concept for the ePublishing part was worked out by TARX as well as an example based on the concept. Initially REGNET aimed at an own development tool for multimedia productions. Soon we saw that within the time span of the project this was an impossible task. Therefore we studied the market of multimedia authoring tools. Our external tool choice felt on Director from Macromedia. In the mean time this tool gained large attention within the Cultural Heritage community for making presentations and interactive guides. TARX developed a methodology, guidelines and templates that can be used together with Director as a total concept for the generation of interactive multimedia productions suited to be viewed on different channels (CD/DVD, kiosk, Internet). The same concept allows the generation of similar productions in other domains.

Based on the concept described in the former point TARX and MECH developed an interactive multimedia production about "Faydherbe", a Mechlin sculptor and artist who lived from 1617 till 1687. The objective was to make a highly interactive discovery guide of the traces of the artist in Mechlin together with large thematic texts about his life, his value as a sculptor and as an architect. At the moment of writing (mid Feb 2003) this realization is finished and will be placed in one of the Mechlin museums for consultation by the public. An Internet version will follow soon. The production allows as well a quick consultation of the content (occasional visitor) as a more in depth reading of the artist's realizations (cultural tourist, educational objective). Special attention was given at a full bilingual version for the navigation and the content.

Because of the intermediary role of TARX between the content and the technical partners, several content related actions were carried out. This pertains mainly to three levels. Firstly, TARX participated in the content production of a part of the SAINTS theme by editing texts about the life, the cult and the iconography of different saints. Secondly, the knowledge parts of different topic maps were completely worked out, i.e. the overall concept, the taxonomy and ontology, the naming of the topics and the bi-directional associations. Thirdly, a series of contextual thematic texts were written for the Faydherbe production.

Special attention was also given to the internationalisation-regionalisation aspects of the content. In this view a substantial effort was spent to the multilingualism of the user interface, the topic map naming and the multimedia production. TARX contributed to the Dutch and English versions of all the above-mentioned items.

CSC Europe is a European Economic Interest Group founded in June 2002. Together with AIT, IMAC and CSC Austria, TARX was one of the founding members. It represents an umbrella organization for the deployment of regional CSCs throughout Europe for the exploitation of the REGNET results.

One of the regional CSCs is in the process of being set by TARX, MECH and MUS. It concerns CSC Low Countries and covers Belgium, Netherlands, Luxembourg and parts of Northern France.

The most important success coming out of REGNET with a direct impact on the market and business opportunities for TARX is without any doubt the methodology and tool for interactive multimedia productions. The reactions on the obtained result are very positive and this is reflected in the fact that the Municipal Museum of Mechlin insists strongly to put the "Faydherbe" production as soon as possible in place in a real life environment. Several requests by different cultural heritage institutions for new developments based on the same approach were already received. A more detailed description of the "Faydherbe" production can be found in the final report contribution of MECH.

A second important issue for TARX is the knowledge gained in the domain of knowledge engineering, more specific the topic map paradigm. This is a very promising new technology and possesses all the capacities for a breakthrough in the very near future on putting knowledge layers on top of Web information resources. The same approach can also be applied in other than Cultural Heritage application areas. Whereas the ePublishing part has an immediate market potential, the knowledge part is more medium term because this is rather new and needs some stabilizing and maturing.

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Last but not least, a thorough knowledge was built up on all aspects of information engineering, standards and work flow of Cultural Heritage institutions. The market for museums, archives, libraries, art galleries and cultural heritage related organizations can now be approached with an important portfolio of knowledge, services, consultancy, on line service providing and tools.

13.10 MECH - Stad Mechelen - Stedelijke Musea Mechelen (B)

The municipal museum of Mechlin (MECH) was involved in the REGNET project as content provider and had to contribute the content of the inventory of the museum-collection, as well thematic texts on several subjects concerning Saints, Gilt leather, the top-pieces of the museum in a 'Tour d' Horizon' and later on also Lucas Faydherbe (as Mechlin sculptor and architect who was working for the clergy and made a lot of statues of saints).

Mechlin started up the digitising of the theme-related objects of the museum- and churches-collection.

At first instance theme-related objects of the museum collection have been put into ADLIB, a collection-management system frequently used in the Low Countries which has been upgraded in order to export XML-files to the REGNET-database.

To fulfil all REGNET-tasks in the right way a collaboration has been set up with technical partners AIT and TARX, giving MECH advise and assistance when needed.

For the museum management REGNET was an important stimulus to accelerate the evolution of the digitising-process of cultural heritage-data in the ADLIB database, while in the same time, the museum administration and -staff were able to take notice of new technologies.

Working on the REGNET-project, the collaboration between different cultural departments in Mechlin has been stimulated. Especially the collaboration with the Municipal Mechlin Archives which resulted in thematic texts concerning the Mechlin botanist Dodoens, contributed to the Botany-Linnaeus theme, can be mentioned and will be further worked out in future.

During the project the Mechlin Museums had the opportunity to meet other museums and archives with similar aims, objectives and collections as the Mechlin ones.

Moreover, the Mechlin participation in the REGNET project gave the Mechlin Museums the opportunity to collaborate with other international partners to work out some of the chosen themes, a collaboration that will be continued in new projects.

With TARX and MUS, Mechlin was working together to compose topic maps especially about saints, gods and the links between them. So has been worked out a common vocabulary for the topic maps SAINTS and MASKS. In future this work will be developed and will possibly result in permanent collaboration.

One of the most important realisations of the MECH participation in REGNET is the development of a handy and attractive medium to guide interested people through a theme.

As demonstration-case was set up a general concept of a guided tour around the theme '**Faydherbe's traces in Mechlin'**. Faydherbe was a 17th-century Mechlin sculptor and architect, living and working the most of his life in Mechlin. He was a pupil of Rubens and usually had his orders from the clergy. He constructed several churches in Mechlin and most churches and the Mechlin Museums contain some of his works.

The Faydherbe–demo will guide people on a walk through the town concerning the pieces of art and architectural realisations of the Mechlin artist.

Herein were generated supplementary items as city maps and church ground plans with according texts as support for the already delivered images and texts of the REGNET database.

The content related to several churches in Mechlin has been digitised as third party collection to the MECH Museum collection. This will serve as a support for the 'Torens aan de Dyle' (Towers at the river Dyle) project, an initiative to disclose the Mechlin churches and their treasures.

The system contains four main categories of information:

a.   the life and person of Lucas Faydherbe

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b.   the city of Mechlin in maps and images and the tracks in architecture Faydherbe left there

c.   Faydherbe as a sculptor.

d.   Faydherbe as an architect

With a simple 'click' on a defined item one can ask information about almost every subject concerning Faydherbe in Mechlin.

Example of a scenario:

'Click' on Mechlin: the city-map appears with different marks on it (= the places where Faydherbe's architecture can be visited)

'Click' on one mark: this will be highlighted on the map, but also an image of that place in the town appears accompanied by text with some explanation about the subject.

When the asked subject is a church, the ground plan of that church appears with marks on the places of the Faydherbe sculptures in the church that can be highlighted as well and on which some explanation is given.

By one click, all inside-information can be translated from Dutch into English and vice versa.

The great importance of the whole system is that has been paid a lot of attention to the re-usability of the designed system in other contexts.

Firstly the demo-guide can be used as well in the museum content of the Busleyden Museum where at this moment it has been put in the museum hall where several sculptures of Faydherbe are presented, as installed in the different churches in town with sculptures and links to Faydherbe.

Afterwards the demo of 'Faydherbe' can - with a minimum of changes - be transformed for use for example in the Brusselpoort Museum to show town maps of Mechlin with all archaeological rests of buildings made of stone, to show all city-monuments with their story, to explain changes in town-structure during the ages, to demonstrate how people lived in earlier times, etc.

And for the newly built visitor-centre in town, the application will be used to make visitors aware of the beauty and importance of the whole of Mechlin's cultural heritage.

The new-designed performances and the scientific investigations created the possibilities for Mechlin to participate in the discussion and preparations to start up and to co-operate with the new CSC-Low Countries.

13.11 MUS - Stichting Museon (Museum voor het Onderwijs) (NL)

Museon has entered the REGNET-project as a content provider and user with the specific role to contribute to the user requirement, single out Best Practises, deliver content which fulfils the requirements, integrate into its organisation the experiences and organisational consequences deriving from this; as to reach an more effective organisation, test the developed tools and give feedback on them.

Motivation

The driving force of the Museon to enter this project was the believe in the benefits to be gained from the REGNET-concept: Establishing a group of Service Centres supporting cultural institutions and industries. Contributing to achieve this goal would not only lead to the realisation of this concept but just as importantly give the Museon the possibility to co-direct the way in which the system and it infrastructure were to be realised. A second, but not less important factor to participate is the mission of the Museon to be and stay one of the for runners in the museum field in ICT- and organisational developments both on a national and international level.

Contributions

In the first period one of the major issues for our museum was the agreement reached with TARX and MECH on the need to incorporate via topic maps the contextual presentation of the data stored in the REGNET database. Museon in co-operation with TARX and MECH worked out in various versions the concept and practical procedures as how to reach this goal. The result of this has crystallised in the topic map application which is now part of the REGNET-system.

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As part of our task to contribute to the user requirements Museon carried out a Best Practise research on E-shops. For this purpose over 50 online eshops were investigated. This resulted in 7 in depth analysis. From this a proposal for an "ideal" e-shop was produced.

After consultations with the other content provider themes and collection data were defined which were to become part of the content material for the project. A few examples, collection data related to Saints, Measuring, Masks & Amulets and Leather were selected. For these data thematic (contextual) text were made as to facilitate the production of the content for the topic maps.

For the collection database Museon has transferred 55.000 records to be integrated in the REGNET system.

For the establishing of the use cases Museon worked out several organisational and operational models for i.e. lending museum objects, producing educational products, tourism, shop etc. One of the direct benefits for our museum was the establishment of a digitisation procedure in our museum resulting from consulting and analysing the various examples.

After establishing the test groups Museon has carried out tests on the various tools this resulted in bugreports and Usability tests. After the adjustments made by the technical partners more tests were carried out as to further improve the tools.

Museon has participated to most of the project meetings in which aspects for users and Content providers were on the agenda. Museon has also organised one of the meetings (Den Haag, November 2002).

As also is mentioned in the conclusion Museon is now actively involved with TARX and MECH in establishing a CSC for Region 2-Western Europe.

Conclusion

The Museon is fully convinced that the project has succeeded in its primary goal: to establish a firm, flexible and effective instrument to deliver services to cultural institutions (REGNET-SYSTEM) and at the other hand have it based on a economically B2B sound basis as to assure its continuation and expansion in the near future.

As a prove of this Museon has entered the CSC-Low Countries as a founding member. Museon will actively promote and stimulated the further growth and influence of this concept in the firm believe that it will help Memory institutes gain more access to their public and will facilitate more efficient use of knowledge and resources needed to fulfil their tasks.

13.12 MOT - Motorola S.p.A. (I)

The first six months of the project lifetime were dedicated to a deep investigation of the state of the art for several technical key aspects. These key aspects, resulted from the analysis of the REGNET "problem", covered a wide spectrum of technological topics; from wireless network QoS and capabilities, to development approaches for web/wireless systems, finally to subjects related to presentation and graphical interfaces.

This first investigation period was so valuable for Motorola, as we had the opportunity to asses, under the REGNET overall objectives focus, the actual status of our technologies. Previous projects (taking into consideration the early life of the centre, built in 1999) tackled one single issue (among those listed above) assuming a given solution for the others. We have had modelling and management activities on wireless networks, development of software systems for wireless operator infrastructures, and researches about novel aspects of graphical user interfaces, especially regarding the handheld terminals. REGNET gave Motorola the opportunity to take into consideration the development of an end-to-end system with presentation requirements, for wired and wireless infrastructures, and flexible enough to exploit different hardware solutions.

As a first result, a detailed state of the art deliverable was produced covering WAP and web architectures, J2ME and JSP technologies, WML and VoiceXML languages, and finally GPRS, UMTS, and Bluetooth.

While technologies and solutions were introducing into the REGNET scenarios, the first feedbacks came from those partners with their main business in the Cultural Heritage domain. This gave us the

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chance to learn what is needed in this domain from a technical point of view, and to propose novel solution taking part to discussions with other technical partners and the domain experts.

Thanks to the prototype approach, optimum solutions came up easily during the project life cycle. As an example, regarding the application interworking functions, solutions based on HTTP or RMI showed clearly their inadequacy. On the contrary, Web Services and SOAP demonstrated to satisfy the integration requirements of such a multi-component infrastructure as REGNET it is.

In particular, the investigation activities in the area of Web Services were important to demonstrate and produce innovative network architectures for the Cultural Heritage domain. These architectures are re-usable in other domains as well, and we are in touch with our business sectors to explore possibilities of further internal exploitations.

The specific parts we were involved, the infrastructure entry point, the security layer, the internationalisation functions, the WAP prototype, etc. gave us also the opportunity to go in further technical details and produce valuable assets to be used in this context and in similar ones. The REGNET infrastructure entry point took the form of a web/WAP portal really functional and configurable, with a wide spectrum of integration solutions with the rest of the REGNET system.

The portal can be a thin presentation window, gathering the access points of set of tools that constitute the major resource of the system, or it can be a complex presentation and application layer, performing business functions and exploiting the integrated repositories offered by the system data layer.

To widen the access to the REGNET system we were also in charge of doing the task for the web portal internationalisation, which was a great experience where we gave our contribution, and took benefit from real examples and tentatives.

Working on REGNET solutions, we were always aware that, concerning the data services, it is not clear yet which applications will be the symbols of this technological progress of today's mobile communication systems. While wireless networks migrate toward the IP world, it becomes real the risk is to encourage the comparison between Internet services available for wired terminals and those available for wireless terminals.

REGNET research consolidated the understanding that, while developing Internet applications for the wireless world, it is imperative to address the needs of mobile users before the requirements of the mobile devices. As a consequence, it emerged a particular category of services characterized from being tied to services the user can access also from fixed terminals. These value added services enrich in some ways the fruition of other services for fixed terminal, are configurable through the classical Internet, and in general address the requirements of the roaming users.

While the REGNET project focused the effort mainly to the web accessible solutions, as they are rapidly effective for the business of partners in Cultural Heritage domain, we conducted our research and development activities toward the realization of a common infrastructure for both classical portals and wireless portals, with the common management of user profiles on which the system usage is based.

Among the research outcomes, a definition of Wireless Integrated Services could be generalised, as services addressing wired and wireless terminal connected to the Internet, characterised by tight interaction at the data layer, tight interaction at the business logic layer, adaptable presentation layer, able to deal with (very) different kinds of user terminals, and complementary respect what it is possible to do from a fixed terminal or while roaming.

REGNET solution is Motorola earliest example of Wireless Integrated Services philosophy. The portal platform will be revised in order to generalize its application context also to other kind of domains other than the Cultural Heritage world. System modules will need to be reviewed in order to support a wider area of behaviours, thus addressing as much Motorola customer scenarios as possible.

Internationalisation mechanisms will increase the demand for Motorola tools among its internal customer acting in a worldwide scenario.

Web Services exploitation will fill the gap between 2G and 2.5G presentation oriented solutions (represented by the WAP approach), and the 3G and beyond 3G systems, having a more application oriented perspective. Generalized REGNET platform will expose and exploit Web Services for the

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new generation of enhanced terminals, being capable to support part of the system logic (i.e. Java enabled phones).

Finally, with the advent of Commissioner Busquin's project on the European Research Area, which offers a new horizon for scientific and technical activity and for a research policy in Europe, Motorola-GSG is after REGNET well positioned and prepared to offer to its customers a competent scientific and technical base of expertise and an impartiality.

13.13 SPAC - SPACE S.r.l. (I)

SPACE is a software development company involved in research and development of products and services that combine multimedia, communications and advanced integration solutions.

Today, SPACE is one of the very few Italian-based industrial companies exclusively focusing on the development of technologically advanced models, projects, solutions and services, all oriented towards a better management of our cultural heritage.

SPACE is currently engaged in studying socio-economic models that can be applied to the analysis and the development of cultural assets, the design of computer systems and networks, the digital media development, the fine-tuning of multimedia solutions, electronic publishing on CD/DVD formats and network services, and the implementation of Internet-based Application Service Provider Centres to manage territorial cultural systems.

SPACE was conceived as an innovative company dedicated to the research and development of new technologies.

SPACE holds a specific place among the different activities of the Atlantis Group, an advanced laboratory that works on models, solutions and information technology services for territorial development. Inside the Atlantis Group, SPACE aims to exploit and improve the cultural and environmental assets of a given area through advanced solutions in computer science and telecommunications. It is also a highly specialized laboratory inside which all kinds of research project are conceived and managed.

Inside the REGNET project, SPACE has validated the bridge technology with the OpenHeritage platform (the Index+ gateway web service) and delivered dissemination results supporting the consortium strategy in the field of the new culture economy. This will greatly facilitate the spread of SPACE's solutions such as the OpenMuseum multimedia system for museum automation by the clustering with the OpenHeritage project.

Space has been facing the strategy to approach the field of the European research, in order to set up the most advanced and innovative methods for the development of minor territories/institutions, acting especially through the potentialities offered by the cultural heritage as an engine to activate tourist processes and business opportunities. So, the real challenge has been the one to believe in prospective business opportunities coming from an historically no profit field as the cultural heritage is.

13.14 ALI - Fratelli Alinari I.D.E.A. Spa (I)

During the wp1 Alinari has defined the content to be provided.

A deep analysis of the content and cataloguing metadata has been produced. Contributing significantly for a large documentation and a digitisation plan for the following phase of content creation. Alinari's experience in both cataloguing and digitising has been shared with the partners. Moreover, Alinari has contributed strongly to the definition of standards so far taking part to the technical group meetings and gave contributions to the legal framework as well with the internal best practices.

After the first step of definition of standards, contents and models, the following step (wp2) had been the content generation. In few time a large number of images have been digitised and catalogued. The integration has not been easy, but the results gave great satisfactions.

The validation of the system (wp3) requested a strong effort and some difficulties were found and solved. Early in this stage, Alinari's personnel followed a workshop on testing and evaluating

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methodologies (VNET5) in order to strengthen its contribution. Then, after selecting the users from different domains and also from the archive domain, a full set of tests were executed and reported. This phase required more efforts than the previous ones. So far some efforts had to be anticipated from the wp4.

Lastly, Alinari has contributed fully and with deep involvement to the dissemination activities. At any event or external meeting Alinari has presented the project goals and opened round tables (when possible) to discuss and find new solutions, ideas and agreements that could someway benefit the project.

Conclusions:

Alinari took part to an important experience with the REGNET project, so much that the experience is going to be developed to renewed projects coherent with it. Some multicultural instruments with regional attention (languages, products...) are going to be set up. The good contacts have been enforced and are now flourishing into new cooperative researches.

13.15 CC - Consorzio Civita (I)

As content provider, CC has involved two Italian museums in REGNET project: MC and ARG.

The experience of Musei Capitolini of Rome (MC) has delivered different results and achievements which have benefited the museum.

The Musei Capitolini is the most ancient public collection (1471) in modern world and one of the most important Italian cultural institutions.

Therefore, the main achievement reached by MC is the wide dissemination of its cultural heritage, facilitating European citizens the access to catalogues of cultural heritage stored in the museum.

Another achievement is the MC's opportunity to participate to a CSC (Cultural Service Centres): it would be a matter of an Italian CSC, set up and managed by CC, or MC should be simply a part of an interest group, mainly based on cultural institutions, to join a Europe CSC. This will support the integration process of MC inside local and international networks of "active" cultural institutions.

These two options are still in an evaluation phase.

REGNET system offers other important results to MC, such as:

- The opportunity to use the REGNET e-Business subsystem to sell digital and physical goods (i.e. goods from museum stores) as well as services (experts, exhibition planning, etc) and products (museums shop, copies of real objects, etc);

- The effort to integrate the merchandising trade into the information systems used in Cultural Institutions;

- The opportunity to participate to an internet auction system, offering different items i.e. duplicates of posters, etc.

Further more, the experience gained working in the REGNET project encourages MC to participate to other projects related to cultural heritage.

In this way, MC could use REGNET experience in the order of other possible international and national financings/projects aimed to realize local network concerning cultural heritage.

Museo degli Argenti

What the Museo degli Argenti intends to do in the next few months is to apply the same methodology, which was studied and structured for the data provided to the REGNET Project. The first step will be the entry of the images and the metadata in a data-base; then we intend to organize some virtual exhibitions which could be shown in the museum via intra-net and through the REGNET services via inter-net.

The museum could also use the REGNET system to exploit its E-Business services (selling images of the objects, renting its representative rooms for cultural events...). Actually the Italian law for the Cultural Heritage do not allow the museums to make business by themselves but, looking for a quick

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changes, the museum is planning to be ready in time, to offer new services to its users in a very next future.

These services (guided tours, thematic exhibitions...) could be offered directly in the museum through a multimedia direction - system and/or by Internet.

The museum is also considering the possibility to propose itself as a service provider, which could play as a content provider (on items related to its collections) joining other partners in a Service Centre.

The Museo degli Argenti dissemination - plan aims to spread the information about the REGNET Project through the Museums of the Pole of Florence (the Silverworks Museum, the Uffizi Gallery,...) and its departments (the Didactic Department, the Catalogue Office, the DTA ...). The Museums Pole of Florence entrusted Artconservation (which is collaborating with since a long time) to plan the data structure, the requirement and the dissemination for the Museo degli Argenti in the REGNET Project; thanks to this collaboration, REGNET has been known from the partners of others projects, such as SCULPTEUR which involves the Uffizi Gallery of Florence, and it has been published on its web site (http://www.Sculpteurweb.org) and on the Fad project web-site http://www.Fadcultura.net/.

The Fad project joins Cultural Institutions from Florence and Prato such as the Crusca, the Lisio Trust, the Textile Museum, the Science Institute and Museum, the Science and Technique Trust, the Comunale Theatre and Artconservation. A recent conference has been taken place in the Ravello (Salerno)

Moreover, two written contributions have been prepared, where REGNET is presented and explained:

a paper for the Italian Ministry of Cultural Heritage about new technologies and services for cultural heritage, which has been published in the *Agenda 2003 Le Nuove Tecnologie*, and a paper for the proceedings of the meeting held in Sofia in June 2002, which has been published by the Bulgarian Institute of Computer and Communication System: Raffaela Rimaboschi, *The Collections of the 'Museo degli Argenti' in Florence*, in REGNET Proceedings, Institute of Computer and Communication System, Sofia 22-26 June 2002, pp. 129-134.

The REGNET Project has already been published on the Artconservation web-site, www.Artconservation.it and the next objective is its on - line publishing on the Museums Pole web - site www.sbas.firenze.it/argenti.

On the 28 January 2003, Dr. Ssa Raffaela Rimaboschi (Artconservation) presented the REGNET Project in a conference held in Ravello (Salerno) at the *The European University Centre for Cultural Heritage.– The Mediterranean Programme*. The item of the conference, which was addressed to a group of representatives of Cultural Institutions from the Mediterranean basin, was: *European Projects in the 5° Framework Programme.* After the presentation possible strategies for a future exploitation of the REGNET System were also discussed.

13.16 IAT - Instituto Andaluz de Tecnología (E)

Summarising in a few words, the experience of IAT during REGNET has been excellent and very valuable. And as much (or maybe more) considering the tasks developed during the project than for the opportunities open for the future, as is usual in RTD projects.

It is clear that the way followed has not been free of difficulties, like those ones coming from the continuous alterations in the work team in the project, that has forced us to make additional efforts, initially not anticipated.

There is also the fact of not having a bigger ampler budget for travels, that have forced us to reduce to the essential the direct contacts with the rest of the partners, that have been mainly made during the months and phases in which IAT had the greater responsibility.

IAT is a CIT (Centro de Innovación y Tecnología – Innovation and Technology Center) that joins the REGNET consortium mainly because of our interests in everything related to e-commerce (by 1998 we already had our own implementation/model). But also because the project was a huge opportunity of having new experiences which now are going become useful opportunities to undertake new activities for the improvement of the performance of companies and institutions in our region, which is the main objective of IAT.

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In general terms, it cannot be denied that a full and good accomplishment of activities and results has been reached. And it is evident that after the accomplishment of such as ambitious project as REGNET, IAT (like, we suppose, most of the participant partners) has acquired a wide base know-how in subjects that initially were far from our usual activities and corporate objectives, such as those ones related to the diffusion of information about cultural and historical heritage.

Although the mission of IAT has no previous direct cultural dimension, innovation and competitive improvement are very present in REGNET system and these are two of our main objectives. Because of these, even if IAT is not going to act as a content provider, the possibility of inducing new tools and alternatives to the traditional methodologies in cultural firms and entrepreneurs (including artists) offers IAT new possible courses of action.

Furthermore, REGNET has made possible that IAT continues advancing, almost without intention, towards the Internet/e-Business enterprise model, process which at the moment IAT dedicates a great amount of resources to.

Although already detailed in the different periodic activity reports of the project, some especially remarkable activities and experiences of IAT in the different WPs could be:

WP1: Identification of the standards to be used and development of users requirements and system specification, as was agreed at the initial meeting. Study focused on enabling the usage of low cost hardware and reusability of available components. (both hard- and software).

The standards (existing and emerging) investigated related to the system development, storage and exchange of cultural heritage related data. With respect to the publishing component, standards in the area of multimedia authoring, storyboards and multimedia document models were also analysed.

WP2: IAT carried out the digitalisation, correction and enhance of CH objects provided by GRAN. We arranged to include watermark so to prevent possible illegal uses of the images.

IAT has also collaborated to set up a Legal Framework and Partnership model. We contributed establishing a national and international agreement in the filed of the European Union for the Consortium Model.

WP3: Organisation of user group involved in task 3.1: "Validation of the REGNET-Demonstrator". Several bugs were reported to the responsible technical partners.

Realisation of "Card Sorting Experiments" at request of IMAC.

Training and testing of the tools, bugs reported

Translations of the different tools of system into Spanish (multilingualism).

WP4: Training (Den Haag Meeting - November 2002) in the use of the tools.

IAT was the task 4.3 leader: "Analysis of the trial service, assessment and evaluation". The deliverable 11 was elaborated, which includes the collection and analysis of questionnaires done by end-users and content providers, validation reports, analysis of opportunities and threats of the system and identification of a user profile.

A "Work Package 4 Deliverable Meeting" was held at IAT's premises (20-22 February,2003) with TARX and IMAC, in order to synchronise our respective documents.

WP5: Multiple contacts were established with some firms/organisations to get information about social, scientific and commercial use of REGNET services. To be reinforced during the CSC Spain operation.

WP6: IAT has made contact with some cultural entities in order to organise meetings where we introduced the REGNET Services. The system was presented as an innovative portal, putting a special emphasis on the business and commercial part of it. The technical part of the system was also disseminated in more specialised events.

An article about REGNET was published in a regional Innovation Magazine.

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Dissemination activities in relation with the project were held in numerous and different events, such as technical congresses, seminars, conferences, meetings with other enterprises, bulletins and IAT's web site.

A web page was constantly updated and nowadays is used as a provisional entry of the CSC-Spain.

CSC: IAT and GRAN started conversations in November 2002 in order to define the basis of the future CSC-Spain. Although we have not reached a final agreement, we have already included INCIVICs Collection and the main tools of REGNET system and in a site that works as the basis for CSC-Spain. (Please visit web pages at http://www.iat.es/REGNET)

Since the main role of IAT into the REGNET consortium was closer 'content provider' but not being one of them, the real experience begins now, as we said above, after the formal conclusion of the project and specially due to the course of the CSC Spain. We are sure that this second part of the experience will be as important as first.

Our main goal for the next phase will be the improvement of CSC Spain's procedures and quality of service. To some extent, from now on the processes involved can be considered as technology transfer, a field in which IAT has a wide experience and possibilities of performance. Here we could mention the participation of IAT in SEIRC - South European Innovation Center- Relay and IAT long trajectory of actions in the system Science-Technology-Enterprise and not only at a regional level.

It will be necessary to start developing the data base for CSC, consolidation of the corporate image and the web site, online services that provide an added value to the clients. Among these services to be developed property rights and promotion actions should be included.

A very wide diffusion of the project has been made (and it will continue to be) through training courses, seminars and info days organised and run by IAT, most of them pointing towards innovative SMEs and entrepreneurs. In these events we have presented the basics and the possibilities of the REGNET system CSC Spain, which resulted in the increasing of awareness and the number of clients (cultural-contents providers). These activities have also contributed to a better knowledge of the Andalusian cultural and business environment.

The transregional/transnational character of our REGNET consortium has been very satisfactory. From our point of view, every partner has developed with professionalism an important role into the project. Furthermore, the integration and complementarity between members have been paradigmatic.

In addition, we are sure that in the future the relations established with other members of the REGNET consortium will be useful to address new projects in collaboration between our organizations.

Apart of that general consideration about the members of the consortium, from our side we should mention a relevant and very positive issue: the close relationship initiated or established with some entities and organizations external to the REGNET consortium. Some of these relations are surely to be developed more widely when CSC Spain is fully functional (from March/April 2003) as:

? FIDETIA that has supported IAT in some technical tasks. This relationship was formally established by signing a framework agreement that will allow future co-operation.

? IAPH - Instituto Andaluz del Patrimonio Histórico. (Andalusian Regional government).

Prospects for the future

Besides the characteristic activities of CSC Spain, IAT is very interested in studying the possibilities of new uses of the already done REGNET developments in other fields not necessarily related with Culture. We would particularly like to study the potential uses of metadata and REGNET-like system in industrial environments. Hopefully this will lead us to establish new ways of co-operation with some other REGNET partners in the future.

In the political area, IAT will follow up by strengthening relationships with regional government and socio-cultural agents. Despite the regional focus of the Instituto, this will not only be studied at regional level, but the possibilities of extending the model to some other regions suitable for new CSCs are already under consideration.

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13.17 GRAN - Ajuntament de Granollers (E)

Two main teams, the technical partners and the content providers composed the REGNET project. The City Council of Granollers took part of the project as content provider giving access to the art fund of a group of emergent artists called INcívics.

The intention of GRAN was to achieve some important objectives for the development of the Culture Department of the City Council in the Cultural Heritage's field.

The City Council of Granollers wanted to take advantage of the opportunity that REGNET project provided us in order to give a new dimension of the INcívics project through the network fostering their professional dissemination and exchange of knowledge and experiences among artists and professionals.

We wanted to achieve some goals that finally have been performed by the consortium and the project:

- We have catalogued and digitised the artworks of 20 INcívics artists that have been used as testbeds of the systems.

- We have and we will promote the artists using the new system of REGNET, fostering the dissemination of the works giving the change to create and request some products related to the artworks.

- We will foster the e-Business among cultural organisation offering our products and starting new ways to spread art.

- We expect to make contact with professionals through the portal and to establish some educational resources in the visual art's field to make more accessible the contemporary art to the regular audience.

The project has harnessed new possibilities to GRAN having a model in order to hold municipal projects in the net. It has been a way to collaborate with other partners of other regions that are used, because their business, to the technological field. Also, it has been the opportunity to start a new way to work and to evolve the City Council in the technological paradigm, very important for our municipality because we are just developing us in this field.

We began, taking advantage the inertia that the REGNET project gave us, to continue with different technological projects with the will to create very innovating Web Sites within the broadband technology.

The main experiences that GRAN has developed and lived have been next:

- Analysis of all the collections available to be provided to REGNET and selection of one of them. Analysis of the collection together with Incivics Artists and Art Galleries to define which sort of content-information should be considered. Analysis of the collection's content according to REGNET project methodology.

- RN_T11v01 GRAN_worksheetbestp:r Finalisation of the document (work sheet audit) about the *Description of collections and definition of user requirements*.

- RN_T11v01 GRAN UseCases *Description of the REGNET system: Use cases and features.* Elaboration of a document describing a *use case* in the field of art collections.

- Finalisation of a document exposing the user requirements concerning GRAN collection to explain the development of the REGNET project to the artists and art galleries.

- Cataloguing and digitising the INcívics collection from the Granollers City Council. It includes 20 artist with 90 artworks (it means 112 digitised images). This digitisation has been done together with IAT partner and a private company "Produccions Planetaries".

- Elaboration of the field list / templates with close collaboration with TARX

- RN_DR1v01 GRAN Deliverable Report. Document delivered to IMAC partner. Contents related with the thematic texts and the general contents to support the pieces digitalized and catalogued.

- Definition and agreement of the govern commission from the Granollers City Council. First phase of the concrete legal framework related to the INcívics collection in REGNET. This was approved the last 19th of January of 2002.

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- Second phase of the legal framework. Signature of the adhesion letter from the participating agents (artists and galleries) to the project.

- Validation of the REGNET-Demonstrator: Identification of the possible test user groups and users within our organisation: Experienced users with the project, Experienced users with computers, With no experienced users with the project and computers (outside of the organisation).

- Validation of the REGNET-Demonstrator. The main task of GRAN was to test different parts of the REGNEG website, in the Demonstration phase. Our scopes were: e-Publishing, e-Shop, PCM, Procurement and Auction.

- First of all we made the **Card sorting tests**, and afterwards we started with the rest of the tests.

- Preparation of the Demonstration Phase: We have designed with TARX the topic Map that concerns to the GRAN's collection of emerging art: INcívics. As a demo.

- First implementations of two fully worked out topic maps (SAINTS and INCIVICS) for the demonstration phase. The reference is the topic map TM_SAINTS_MECH_TARX.

- Editing the GRAN's database.

- We have to prepare the Usability Test for the areas chosen in the REGNET meeting in Mechelen: Data Entry and e-Shop. The staff of GRAN has carried them out.

- During this period GRAN has held 8 content meetings: Estocolm, Florence, Barcelona, Sofia, Mechelen, Den Haag and Toulouse.

- In order to do the assignments of the Sofia meeting (24th – 26th of June 2002), we produced a CD of the INcívics collection displayed in the REGNET project. Afterwards the meeting, the CD was distributed in the local TV, "Granollers TV", and has been broadcast during these months. Also, the past 14th of September within the presentation of the cultural season in Granollers, the video was showed again in front of the local citizenship in Granollers. Hereafter you'll find the technical information:

Author(s)	Pere Báscones, Montse Grau and Vanesa Freixa
Title	INcívics. Emerging Art
Kind of contribution	Video
Support	CD
Lenght	22 min.
Producers	Granollers City Council REGNET (Cultural Heritage in Regional Networks) – IST-2000-26336
Abstract	Presentation of the INcívics' collection that has been selected for the REGNET project. There are 18 interviews to the 20 artists that take part in the project. They speak about their work, the expectations (the wills and the hopes) that they have in the REGNET project and also their future projects or plans. Also the video shows a sample of the artworks of the collection that will be showed in the REGNET website.

- Elaboration of the thematic content related to the artists and their artwork.

- Translation of the documents related to the artists in two more languages: Spanish and English.

- We took part in the expert group in charge of the B2B and B2C, and the e-Publishing tests.

- We were one of the responsible institutes of the translation of the interface in Spanish.

- Execution of the demonstration phase. We continued testing the system carrying out different test on the e-Shop tool and the Data Entry & Search and Retrieval tool.

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- Even though the City Council of Granollers wasn't obligated to develop a CSC we took the decision to create a new one CSC-Spain/Catalonia. We didn't want to loose all the information that we had created and also not disappoint the INcívics' artists.

- Since the last meeting in Den Haag, GRAN and IAT worked together to develop the system and to integrate all the contents. We have created a new one till we receive it. You'll find it in the next URL: http://www.iat.es/REGNET/#.

- In the next 2 months we are going to configure our CSC and to train the future managers of the portal: art dealers and artists in the Technological Center of Granollers in order to let them know how the system works.

13.18 ICCS - Institute of Computer and Communication Systems (BUL)

One of the most interesting of professional point of view lessons to ICCS's work in REGNET project is related to learning, developing and applying the newest Information Technologies.

-Different international standards have been developed and applied in REGNET by ICCS.

-Like Content provider ICCS presents Contemporary Bulgarian Art's objects, described in XML format according to Dublin Core standard. Using this, the structured information can be used of clients, applying XML standard.

-Working and managing in an international team in the CH Domain is realized.

-Mutual international work allows the Portal to be seen in English and Bulgarian.

-New Technologies for publishing have been learned and applied using Topic Map Generation.

* ICCS creates a Demo of the Contemporary Bulgarian Art on the address http://csc000.cscaustria.at/topicmap_AIT/ticcs

-XML technology has been learned, developed and applied by ICCS.

-Z39.50 standard has been learned, developed and applied by ICCS for distributed search. It is performed distributed search between

·Databases in Bulgaria and Austria and

·Databases in Bulgaria and Greece.

-SOAP protocol has been learned, developed and applied by ICCS for the e-Business functions.

-PHP decisions have been learned, developed and applied by ICCS for the e-Business functions, using MySQL for Database managing.

13.19 ZEUS - Zeus Consulting SA (GR)

ZEUS developed a version of tools dedicated to e-Business in the field of cultural heritage oriented services which will allow ZEUS to penetrate the significant add-value market of cultural heritage Internet systems. REGNET distributed in the market of culture activated public and private organizations in order to develop both B2B and B2C electronic applications.

Moreover, within REGNET we allowed to strengthen our market position in the field of e-Business. The development of the REGNET system will enable ZEUS to penetrate in the wide market of Internet tools for B2B electronic applications.

The main experiences that ZEUS has gained within REGNET project can be the following :

- Development of E-Business components for B2B and B2C transactions such as an eshop, an auction system, B2B services.

All this stored information within e-Business component is available to the end-users using RPN queries in order to access the distributed information. More specifically we developed the following:

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- Z39.50 server. Special software meant for the receiving queries (RPN) from the z39.50 client and transfers them into the SQL queries to the relational database. Receives the sets of data, as a result of searching from the relational database, convert them into the XML format and sent via the z39.50 protocol to the z39.50 client;

- Z39.50 client based on the PHP/YAZ module. Meant for the receiving the text queries from the user then convert them into the RPN queries and sent them to the chosen z39.50 servers. Receives the results from the z39.50 servers, parse them from the XML format and presents these results to the presentation level.

In addition instead of the above solution (Z39.50) that we offered in order to take the specific information from content providers we developed also a solution that based in the usage of SOAP protocols. In particular in order to integrate the strongly integrated components had been necessary to know the interfaces offered by each component and to developed the suitable SOAP client.

- An information system (product catalogue management system) which allows the users (participants) to manage their catalogues. Their catalogues contain information about the warehouses and items in them. The most important aspect of the PCM is usage of the SOAP protocol in the interconnections between the central (administrative database) and the remote (distributed) catalogues.

- An ontology client, implemented in JAVA programming Language in order to connect our main components (PCM, E-SHOP, AUCTION, B2B) with the ontology system that contains all the personal information for users (i.e. profile)

- CSC Greece node

Several contacts have been made with museums, galleries, cultural organizations and libraries regarding the establishment of the Greek Regional Pole and the CSC Centre in Greece.

31 cultural organizations (museums, galleries, libraries etc.) have been contacted from ZEUS, in order to arrange their participation in the demonstration phase of REGNET.

Several meetings with these cultural organizations and the representatives from ZEUS have taken place, where information material has been distributed and several presentations of the project took place.

The process for finalizing the participation of these cultural organizations is still in progress, while at the same time ZEUS is trying to find and contact more cultural organizations for the development of a strategic CSC Centre in Greece.

- Implementation of E-Business functionalities with CSC Greece

- Legal Framework for B2B and B2C in Culture Heritage domain

- We prepared the following Studies within REGNET project

    Study 1: "Cultural Heritage and E-Business: a standards framework"

    Study 2: "Cultural Heritage and e-Business: Doing Business in the Global Market"

    Study 3: "Cultural Heritage and e-Business: The impact of modern access technology"

13.20 SI - Systema Informatics Ltd. (GR)

Systema Informatics S.A. participated in the REGNET project as part of the technical team. Systema was mainly involved in two areas of the development cycle: the development of the Ontology Node and the implementation of the EDIT component to be integrated in the Electronic Publisher. The following paragraphs describe briefly the steps to achieving the desired results and also the experienced and benefits gained from Systema's participation in the project.

Technological Approach

The main task allocated to Systema was the development of the Ontology Node. In the beginning of the project it was necessary for Systema to make an in depth research on ontologies since its experience in the field of web ontologies was limited at that time. The research was mainly

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concentrated on current technologies that support web ontologies, methodologies and techniques of visualizing the ontologies (user-interface design).

The detailed research on existing Ontology systems and methodologies showed that two technologies were suitable for the development of the Ontology Node. These were: the SHOE (Simple Html Ontology Extensions) technology and Topic Maps. These technologies were brought to the REGNET consortium for exploitation and after detailed discussions with the technical partners it was decided that the SHOE technology was not going to be used and that it is more suitable for the project to use the Topic Maps technology.

As a result of the Ontology Node implementation Systema produced several prototype applications. Firstly a visual interface for Topic Maps has been developed. The first version was based on 3D visualization.

Systema had developed a tool (TopicMapToVRML) that allows the transformation of a Topic Map file to VRML format. The use of VRML allowed the creation of a 3D visual interface on the web that can display large amounts of data (topics). The end-user was able to interact with the 3D model. The comments from the consortium were positive. However, a 2D version of the visual interface was proposed by the consortium. Therefore Systema produced a 2D interface for Topic Maps based on open source technologies.

Systema had no prior experience in web ontologies. The participation in the development of the Ontology Node provided Systema with experience in a new area and also the challenge of communicating with a large number of partners was another important gain advantage.

Systema developed a SOAP interface that allows the publication of the query results that the users will perform. The EDIT component was not completely used by the consortium because it was decided that the open source solutions currently cannot produce high quality results as far as the Electronic Publisher is concerned. Even though the EDIT component was not finally integrated to the REGNET platform it was a good opportunity for Systema to explore how to deal with large amounts of record sets.

Systema was also responsible for the testing and validation of the WAP component produced by MOT. Systema contributed in the PCM Test document where the results of the testing process were documented.

Benefits and exploitation of results

A major issue in the beginning of the project for Systema was the clarification of tasks and responsibilities. When the project started, the first issue was to clarify tasks and responsibilities of partners responsible for the ontology implementation. At that point the roles of the technical partners were not clear. After addressing this issue to the partners it was decided that the technical roles will be specified as the project progresses.

Systema participated in most technical meetings, with more emphasis given during the development phase. In addition frequent communication with all related partners took place in order to discuss the development progress and refine the development of the Topic Maps viewer and the EDIT component

A major pay back expected from the REGNET work for Systema is that of anticipating a variety of market needs. In fact, it is in our intention to integrate all the heterogeneous technologies used and experiences gained during the project into a common platform for creating small scale applications based on the project results.

Conclusion

The key benefit during the project was the enhancement of Systema's know-how and skills in the area of Cultural Heritage.

This know-how and skills coupled with those Systema already possess in the implementation of Cultural Heritage systems and applications will allow the company to develop, integrated applications for many diverse areas.

In addition, the opportunity to be exposed to the perspective emerging technologies and evaluation methods is expected to contribute to the enhancement of Systema's efficiency in development of new concepts and the ability to provide them in real world settings.

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Finally, Systema gained substantial experience in the field of Knowledge Management Systems and will use this experience in several commercial projects.

13.21 CERT - Centre for Research and Technology Hellas (GR)

CERT was involved in the REGNET project as a technical partner and was mainly involved in the specification, design and development of the Reference System and the Ontology System of REGNET. CERT, as a research Institute focused its work within REGNET in the research and development of innovative tools in the area of information processing and knowledge management.

The main motivation of CERT for participating in REGNET was to enhance its research and technological potential in the field of cultural heritage data management. Experience gained working in this new application field for CERT is considered to be very high and is expected to be the start-up for CERT in extending its directions further in cultural heritage issues.

CERT has participated in the definition of the use cases and the technical and functional specifications of the Reference System and of the Ontology System for Node-4.

At the beginning of the project CERT has worked on the specification of the Reference subsystem, which supports management of Cultural Heritage metadata and search on distributed repositories in one Cultural Heritage Data Management node.

In the same period we have worked on the specification of the Ontology System, which consists of a knowledge base and a set of rules and tools that perform management on the knowledge base data. The Ontology System node is central to the REGNET architecture, as it controls, to a great extent, the integrity and the logic of the system, by providing the necessary meta-data and tools to check the validity of user input, native REGNET data and actually the system's output. The topic map technology was concluded to be the most appropriate for use in the REGNET ontology system.

By participating to the definition of the use cases and the technical and functional specifications of the system, CERT has gained valuable experience regarding the UML, which is the top industry standard for specifying large software systems, such REGNET. Also, by studying the existing state of the art technologies that are used in REGNET, CERT has carried off the know-how on new methods and new technologies that weren't within our field of knowledge.

CERT has also worked on the development of the Topic Map Generator Tool, which is a web tool for authoring Topic Maps in order to be used by the REGNET content providers. The development of this web-based authoring tool for topic maps was essential since it facilitates one of the main tasks that the content providers have to undertake. This authoring tool gives to the content providers an easy way to produce XTM files and store them automatically in the Knowledge Base for immediate use by all REGNET modules. By developing this tool, CERT has enriched its knowledge on Ontologies, Topic Maps, native XML databases, TM4J API and SOAP protocol and understood the importance of those technologies.

Another achievement of CERT within REGNET is the development and management of the Ontology Knowledge Base. The Knowledge Base System is the metadata secondary database of the REGNET System, and at the same time the core of the Ontology. Specifically, in accordance with the data format schema defined by the REGNET consortium, it consists of the REGNET secondary data, such as Topic Maps, User Profiles, stylesheets, etc. The core of the Ontology can be summarized as a system that comprises of the Knowledge Base and a set of programming classes to perform essential functions to the Knowledge Base data, such as sending the data to the other nodes or checking the validity of the documents stored in the correct XML format. A tool was also developed for the communication of all other REGNET modules (portal, electronic publisher, search system, etc.) with the Ontology Knowledge Base, based on both RMI and SOAP communication protocols.

In terms of exploitation of the results of our work within REGNET (the Topic Map Generator Tool and the Ontology Management tool) CERT plans to analyse the ways and methods to attract the initial clients and the specific patterns of cooperation among them, as well as other cultural heritage related organization that will help make the product known (i.e. portals, e-commerce sites, sports rings websites, etc.). The specific issues that will be examined within this task are the suitability, scalability and cost effectiveness of the results generated, their practical viability after the project implementation, the replicability and multiplier effects these results may have on other ventures, the

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recording of the key findings, the search of the most suitable market actors for taking advantage of the project outcomes, as well as other issues that may arise during the project implementation.

Based on the above and the fact that Greece allocates enormous possibilities regarding the cultural content and by using the knowledge that we gained in REGNET it will be easier to organize, unify and distribute the cultural content. The need for unified access and commercial exploitation is an imperative in our country given the expected enormous purchasing demand for cultural digital content before, during and after the 2004 Olympic Games.

Awareness and dissemination activities of the project results will include: (a) registration of the product's website to several national, European and international search engines and dedicated directories, (b) design and promotion of banner ads in portals and other frequently used national, European and international sites, (c) participation and presentation the product's benefits in major conferences and exhibitions, (d) preparation of a high-quality presentation for further dissemination (in printed and electronic form) by parties who may be interested.

As a follow-up CERT also plans to develop an information package consist of a general description of the system and its components, the benefits of using the system and a demo presentation of the results. This info pack will be produced in Greek and English, and will be distributed to museums and cultural organizations. It will also be sent to websites of cultural content, as well as during relevant in scope and content exhibitions / conferences.

REGNET has an educative and cultural nature and this fact expands its application fields and the population and profile of its potential users. The activities for dissemination and promotion should be multidimensional in order for the highest possible result to be achieved. The most important step that CERT intend to do for further exploitation of the achievements is the possibility of creating a spin-off company for the commercialisation of the REGNET system, with parallel activities in the cultural information applications sector in case of course that there exists interest from the local market.

13.22 VALT - VALTECH (F)

Main results and exploitation plan for Valtech are the following:

- The REGNET system: a set of e-Business software components managed through a portal. This software will be use, as it, if we have clients or may be re-used as basis for further developments.

- Increase technical skill in the following domains: XML, ebXML, Web Services. We are going to use this knowledge into our many businesses: training, consulting and project development.

- Increase knowledge of the application of e-Business to cultural heritage domain. We are going to use this knowledge in order to gain new business from new clients coming from the cultural sector.

- Technical management of large, multiple countries, consortia. This international knowledge will be very helpful in order to obtain business from large European industries such as Airbus which is a very important client for Valtech Toulouse.

- European partnership with others industries.

14 Success stories

14.1 Demonstration Case I: The Spanish Portal   GRAN

This is a short report in order to explain the different steps and progresses that the City Council and the group of artists INcívics have done in order to develop the different tasks that GRAN has been involved in these two years of the project. The main objective of these steps, were focused in the development of the future CSC in our region. Granollers has acted in the project as a content provider, giving different types of contents all of them related with the contemporary art. The contents have been of two kinds: text files and images files with a total of two hundred files plus two Topic Maps and different files describing the organization.

Experiences carried out with the INcívics artists throughout these two years:

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Since the first contact with the project, the City Council of Granollers started a number of meetings with the actors that were going to take part in the project, the artists (INcívics) and the art dealers, future managers of the artworks of the artists.

We wanted to put in contact the art dealers and the artists in order to generate news relationships in order to foster future economic and cultural relations among them.

The City Council of Granollers since 1996 has followed a cultural policy of support to the emergent artists of Granollers and its surrounds. The REGNET project fostered us this function and amplified it.

The firsts meetings had an informative aim in order to explain the REGNET project and its intentions. We request to them some works to be digitised because they were going to take part in the portal as contents. They would be part of the system that was going to be a best practice in the cultural field.

The INcívics artists wanted to reach as main goals: to disseminate and promote their art and to sale their artworks through the net. For all of them this medium to sale art were new and they had put a lot of expectations on it. We really believed in this system and for this reason we bet for it.

The last June of 2002 we proposed to produce a promotional video of the INcívics in the REGNET project with the intention to disseminate the project among the citizenship of Granollers and also to the artistic community. This video was disseminated in the next medias: Granollers TV and in the event "Culture in course" (presentation of the cultural programming for the season 2002-2003) the last 14th of September in Granollers.
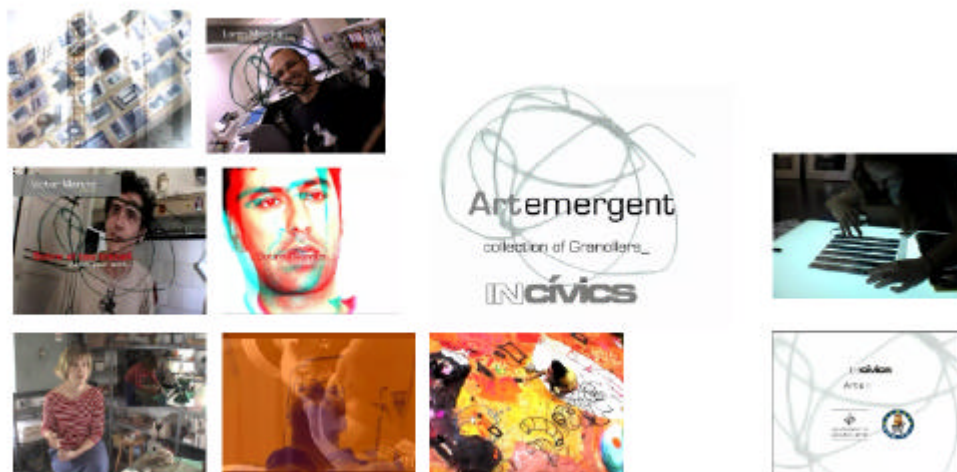
Figure 16: Some shoots of the GRAN video

In December of 2002 we considered the possibility to create a new CSC in Spain with the collaboration of IAT-Seville, starting a provisional portal where we were going to integrate all the contents that we had at the moment about INcívics in REGNET, plus the developed tools as the official portal, the data entry, the Topic Maps, the e-Shop and information related to the project, the organization and about the artists.
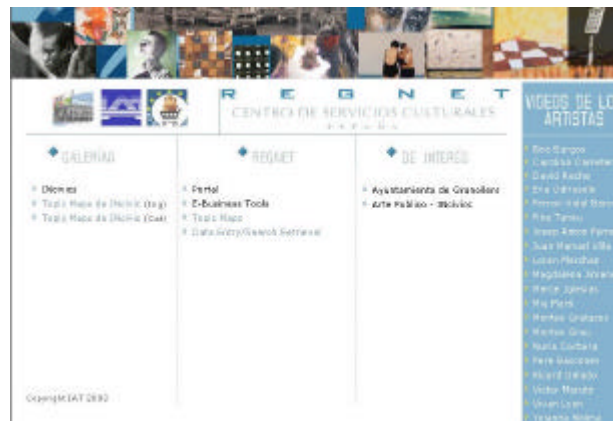
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Figure 17: Provisional portal of the CSC-Spain

Figure 18: Detail of the portal

Next steps

The next steps that we are going to carry out are focused in the training of the artists and art dealers in order to train them to manage the system without the cultural technician's help of the City Council. They have to be capable to manage the portal, the artists managing data (updating) and the art dealers managing the e-shop and the Procurement. This training is going to be done in the next weeks in the new Centre of Technology in Granollers.

Also we are planning further utilities of the system in order to take advantage of this platform created in the REGNET project. It's very important for us the educational function that the portal can offer taking into account the French experiences in their museums of contemporary art.

14.2 Demonstration Case II: The Bulgarian Portal ICCS

REGNET project has a great influence of the development of ICCS's skills in the professional, software, applied, e-Business, social area. The main achievements, representing ICCS's success story, could be classified in four common directions: I) Attracting potential users; II) Creating CSC-Bulgaria; III) Transfer of Technologies; IV) Dissemination Activities.

I) Attracting potential users

Contemporary Bulgarian Art presents Bulgarian culture heritage in REGNET. The CH objects are designed and given by the Union of Bulgarian Artists – the largest Bulgarian union, gathering about 2700 artists of all generations in different sections of art: painting, graphics and illustrations, sculptures, ceramics, textiles, woodcarving, etc. That is why the activities of ICCS to attract potential

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users in Bulgaria to REGNET system were directed to the customers, related to Artists, Art Galleries, Exhibitions, users, dealing with the art domain. There were organized meetings and workshops, presenting the targets of REGNET system to deploy informational services in the culture domain. Thus we tried to disseminate the goals of the project and to raise interest from the Artists' auditory.

Subcontractor of ICCS is the Southern Ural State University (SUSU), Chelyabinsk, Russia. SUSU participates in REGNET like Content provider, supplying Russian Art. Thus the regional objects, concerning the art domain has been extended with the region of Russia. SUSU established links with famous Russian Galleries and Museums and acted in the REGNET project as a content provider. Thus the collections have been extended with world known art objects and reproductions.

Till now the potential Users of CSC-Bulgaria, being acquainted with the functionalities of the REGNET system and which expressed their will to use REGNET system, are the following institutions:

- The Union of Bulgarian Artists
- Ethnographic Institute and Museum
- Bulgarian Secondary Applied School of Art
- Silvena Art Gallery- Russe city of Bulgaria
- Sofia City Art Gallery Hall

- Southern Ural State University (SUSU), Chelyabinsk, Russia

   with LOCAL PARTNERS of REGNET project

   • SUSU Division of WAN Technologies
   • Chelyabinsk Region Picture Gallery
   • Perm State Art Gallery
   • Nevyansk Museum of Local Lore and History
   • Museum of Nevyansk Icons (Ekaterinburg)
   • Fine Art Museum (Ekaterinburg)
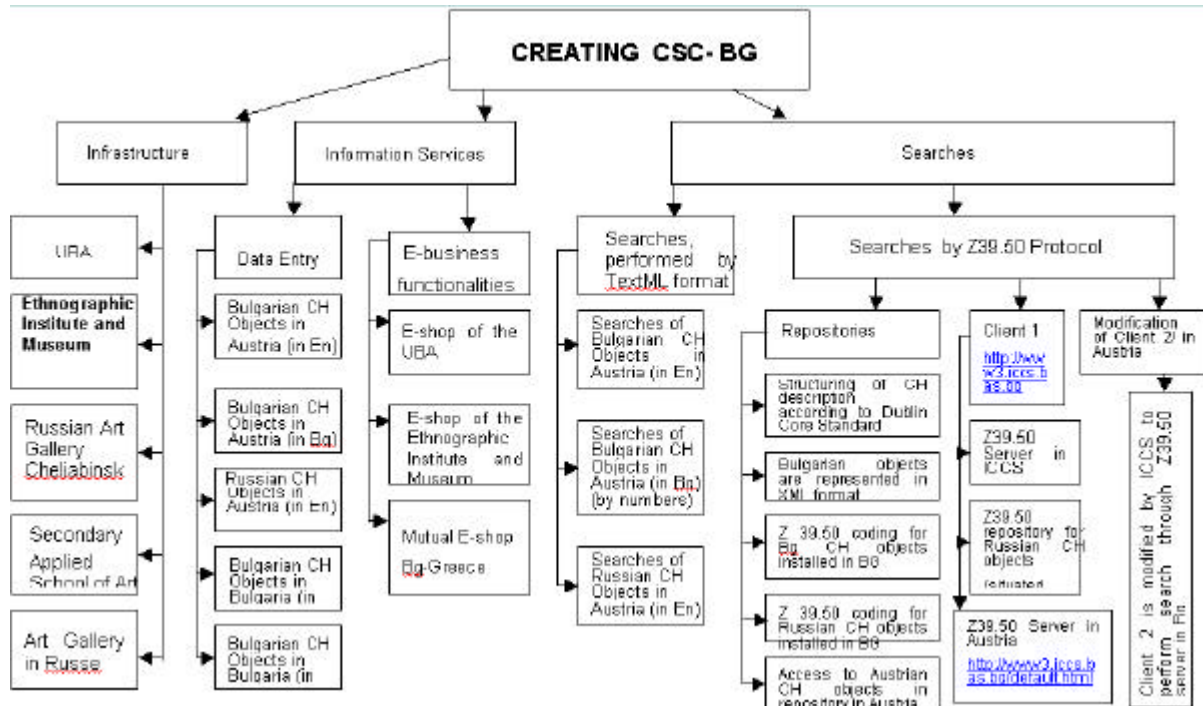   • Contemporary Art Gallery "OkNo" (Chelyabinsk)

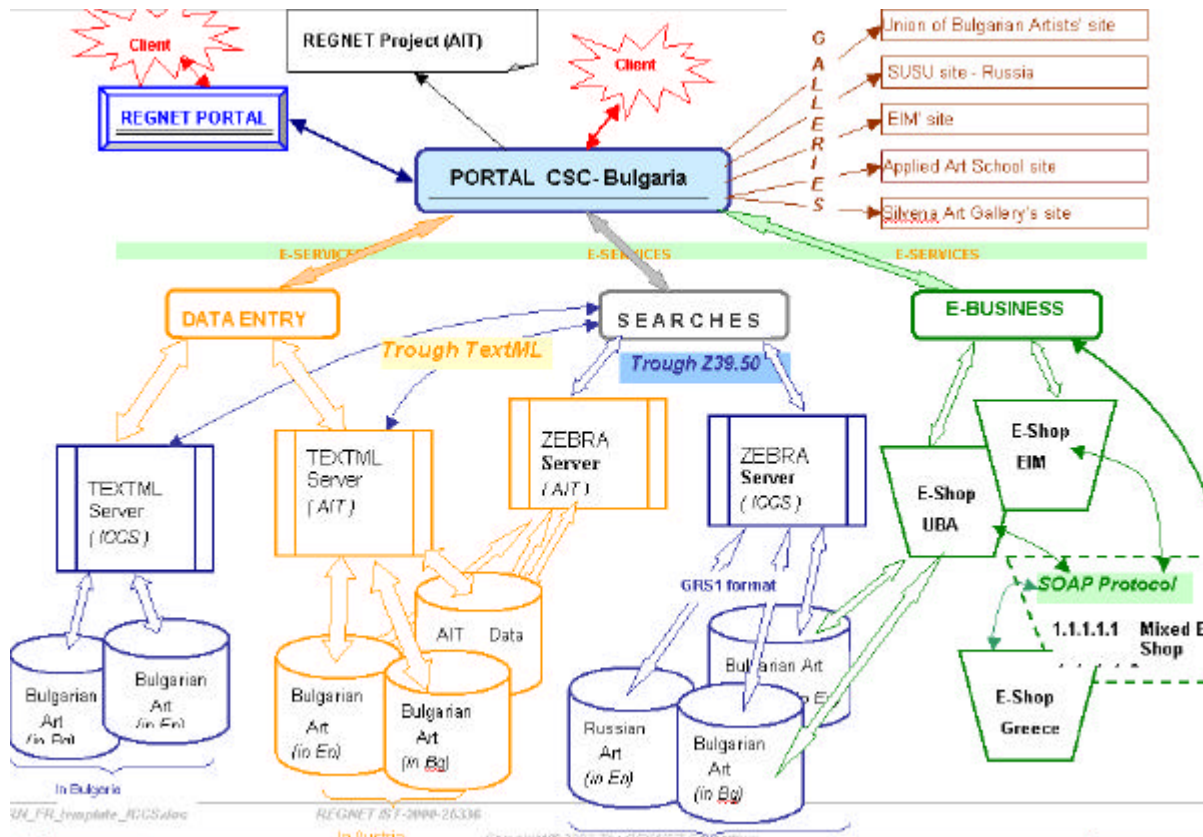## II) Creating CSC- Bulgaria

1/ Infrastructure

ICCS has designed a hardware and software infrastructure of Bulgarian Portal of E-services , Figure 1a, Figure 1b bellow. This portal is working on-line and can be seen on http://www3.iccs.bas.bg , the Figure bellow.

Figure 19: The Bulgarian CSC portal – web presence

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Figure 20: Creating the CSC Bulgaria

Figure 21: The CSC Bulgaria portal structure

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Here are the Websites of some of the potential users of REGNET like

- The Union of Bulgarian Artists : http://hs39.iccs.bas.bg
- Ethnographic Institute and Museum : http://hs41.iccs.bas.bg
- Secondary Applied School of Arts : http://hsh.iccs.bas.bg
- Russian Art Gallery – Chelyabinsk : http://REGNET.org.ru , developed by SUSU .
- A Gallery in town of Rousse-Bulgaria: http://www.silvena.net/

2/ Information Services

Data Entry in Culture Heritage repositories

Here are presented in TextML format Bulgarian and Russian CH objects as follows:

- Bulgarian CH objects in Austria (in English): http://csc000.cscaustria.at/iccs

- Bulgarian CH objects in Austria (in Bulgarian): http://csc000.cscaustria.at/iccs-bg

- Russian CH objects in Austria (in English): http://csc000.cscaustria.at/susu

- Bulgarian CH objects in Bulgaria (in English): http://hs19.iccs.bas.bg/iccs

- Bulgarian CH objects in Bulgaria (in Bulgarian): http://hs19.iccs.bas.bg/iccs-bg

E-Business functionalities

- E-Shop of the Union of Bulgarian Artists – http://hs19.iccs.bas.bg/UBA_Shop
- E-Shop of the Ethnographic Institute and Museum – http://hs19.iccs.bas.bg/Eth_shop
- Mutual E-shop Bulgaria-Greece - http://hs19.iccs.bas.bg/e-shop

Searches

There are realized two kinds of searches: using Textml format and applying Z39.50 protocol.
Searches, performed by using TextML format.

- Searching of Bulgarian CH objects in Austria (In English) - http://csc000.cscaustria.at/iccs
- Searching (by numbers) of Bulgarian CH objects in Austria (In Bg)
  http://csc000.cscaustria.at/iccs-bg
- Searching of Russian CH objects in Austria (In En) http://csc000.cscaustria.at/susu

Searches, performed by using Z39.50 protocol

1/ Repositories

- Structuring of CH descriptions according to Dublin Core standard is performed

- The Bulgarian objects are presented in XML format

- Z39.50 coding for Bulgarian CH objects, installed in Bulgaria

  http://www3.iccs.bas.bg/default.html

- Z39.50 coding for Russian CH objects, installed in Bulgaria

  http://www3.iccs.bas.bg/default.html

- Access to Austrian CH objects in repository in Austria

  http://www3.iccs.bas.bg/default.html

  a/ Client 1

This Client is developed by ICCS and can be seen at http://www3.iccs.bas.bg/default.html .
It allows access to :
- Z39.50 server in ICCS
- Z39.50 repository for Russian CH objects (situated in Bulgaria)
- Z39.50 server in Austria – http://www.cscaustria.at/demo/z3950.05

  b/ Modification of Client2 allowing access to Bulgarian Z39.50 repositories

  Client2 is situated in Austria and it is working by Z39.50 standard for searching. It is
  modified by ICCS to perform search through Z39.50 server in Bulgaria
  – http://www.cscaustria.at/demo/z3950.05 .

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III) Transfer of Technologies

One of the most interesting of professional point of view successes of ICCS's work in REGNET project is related to learning, developing and applying the newest Information Technologies. We mentioned this in p.13.

IV) Dissemination Activities

ICCS has a large experience in advertising the REGNET system in different areas: reports on International Conferences, Papers in Journals, Papers in Catalogues and Bulletins, Presentations in front of large auditoriums, Web site presentations, shortly classified in Table 1.

ICCS organized the submission, edition and preparation of a REGNET proceeding, edited by Todor Stoilov and Walter Koch. It has been published under the assigned number ISBN 954-9641-29-5. The REGNET Proceeding consists papers, related to the achievements of the REGNET Partners. The REGNET Proceeding was published by attracting additional resources, which are not dedicated REGNET funds. The additional support was obtained by the Bulgarian Agency - ICT Development Agency – Sofia, which is a government institution under the framework of the Ministry of Transport and Telecommunication of Bulgaria .

Type of dissemination	Number
Publications in Journals (printed)	2
Publications in catalogues, bulletins (printed)	2
Reports on International Conferences (printed)	4
Reports on International Conferences (to appear)	3
Papers in REGNET PROCEEDING	4
Presentations in front of Large Auditoriums	4
Web sites, Links to REGNET, Links to Bulgarian Portal	15

All of these dissemination activities are described and illustrated by images of the event's proceedings, programs, journals see Deliverable 13 – dissemination report.
See below one example: The REGNET Proceedings of June 2002:

Kr. Trichkov Application of Z39.50 protocol for Global Network Services. Proceedings of the Project Management Meeting, REGNET, EC-IST-200026336, 24-26 June 2002, ICCS-BAS, p.34-41.

M. Cenov. Implementation of SOAP protocol in E-services. Proceedings of the Project Management Meeting, REGNET, EC-IST-200026336, 24-26 June 2002, ICCS-BAS, p. 42-48.

T. Stoilov. Evolution of Web Services in the Project REGNET. Proceedings of the Extended Project Management Meeting, 24-26 June 2002, Sofia, Bulgaria, ICCS-BAS, Ed. T. Stoilov, W. Koch. ISBN 954-9641-29-5, p. 67-78.

K. Stoilova. Content Management of the Bulgarian Art Objects in REGNET project. Proceedings of the Project Management Meeting, REGNET, EC-IST-200026336, 24-26 June 2002, ICCS-BAS, p. 121-128.

T.Stoilov. Organised, Collected, Edited,

Published REGNET Proceeding with papers of REGNET Partners, Assigned ISBN 954-9641-29-5

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14.3 Demonstration Case III Austrian Test bed   AIT

In autumn 2002 AIT started activities for the REGNET Testbed Austria. The aim of this very early market approach as a service centre was to get a first feedback on the services recently developed. The market study was not sufficient enough, particularly the situation in Austria could not be estimated before. We wanted to find out how close the system is to the needs of memory institutions, which services have to be adapted, which are not really important and which ones are mainly used.

At this time the fully integrated REGNET system was not available yet, but we decided to start offering the single modules. Based on these software tools our services were developed and we decided during this first phase to provide the full range of services possible.

The range of services offered:

1. Creation of electronic catalogues: transformation and import of existing data into the REGNET data entry system,
2. Transformation and import of existing data from other systems into an online XML database,
3. Search and retrieval over distributed databases,
4. Co-operative work on thesauri, semantic webs, etc. via the web,
5. Consulting for the use of international standards,
6. Support for building-up digital assets,
7. Production of metadata,
8. Support with e-publishing,
9. Support with e-Business,
10. Presentation of the institution in the web,
11. Information services: forum, newsletter, mailing list,
12. A continuous helpdesk service (phone, e-mail).

Participants were asked to sign an agreement thus declaring their intention to participate and agreeing with the conditions for participation. The most important items are:

➢ the participant will contribute test-data to the system,

➢ the participant will attend a workshop that introduces them to the system,

➢ the participant declares that these data is not copyrighted by other people/organizations,

➢ data will be transformed into XML,

➢ the participant will test the system while working on his own data,

➢ the participant will write a short report on his experiences,

➢ the information about the project as well as the results of the test phase have to be treated confidentially,

➢ the participant agrees that his report will be added to the report of the REGNET demonstration phase,

For preparation of the testbed we produced information material: a website containing information about the services and the testbed, a folder and the form for declaring participation. We sent out the folder, an invitation for participation, at least to about 900 libraries, museums and archives. In addition the pilot project "service network" was presented at several events.

As a result presently eight institutions are members of this testing phase:

1. The library of the veterinarian university, Vienna: two databases were set up, one containing descriptions of archival material that was originally created as MS Access database. The other one is the result of a digitisation project managed by AIT and it contains 70.000 digital

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catalogue cards and their OCR texts. We are now planning to digitize some of the oldest books of the library dating from 16th and 17th century.

2. <u>The library for welfare-educational literature and child literature:</u> contributed their whole database.

3. <u>The Austrian association of catholic libraries, Salzburg:</u> like the previous library they already have an elaborated online system, but they want to jump on the chance to participate in a project using new technology.

4. <u>Village museum Straden, Styria:</u> the (unsalaried) curator of this collection faces the challenge of a collection that is not documented at all and the collector died without leaving any helpful material. The curator produced digital images of the objects and we created a database containing already the images for future documentation.

5. <u>Museum for pre- and early history Deutschlandsberg, Styria:</u> in this museum too the curators want to build up an object documentation. Up to now just some digital images and describing texts in MS Word format are available and this material will be integrated into their database.

6. <u>Sigmund Freud museum, library and archive, Vienna:</u> this institution has sent us all their databases in order to set up XML databases.

7. <u>Archive of the diocese Gurk, Carinthia:</u> this archive is just building up with our help an online system for documentation of their archival objects.

8. <u>Africa collection of the order of Hl. Franz von Sales:</u> this museum is related to a catholic school and the responsible monk is just beginning to define the requirements for the documentation of their collection. In addition the feature of co-operative work via the web will be important for the future.

We are now in the middle of the pilot phase and step by step it becomes more obvious, that most participants are aiming at joining the regular service centre at the end of the pilot project.

Currently we can add another success story that resulted from the REGNET project. During autumn 2002 Walter Koch held a presentation at a conference that concluded with a short introduction into the REGNET project and the present results. Among the audience there were official representatives planning a project of a unique electronic catalogue of cultural heritage objects within a whole region. After they had heard the presentation they stopped the efforts done up to this point and restarted the project in collaboration with AIT members.
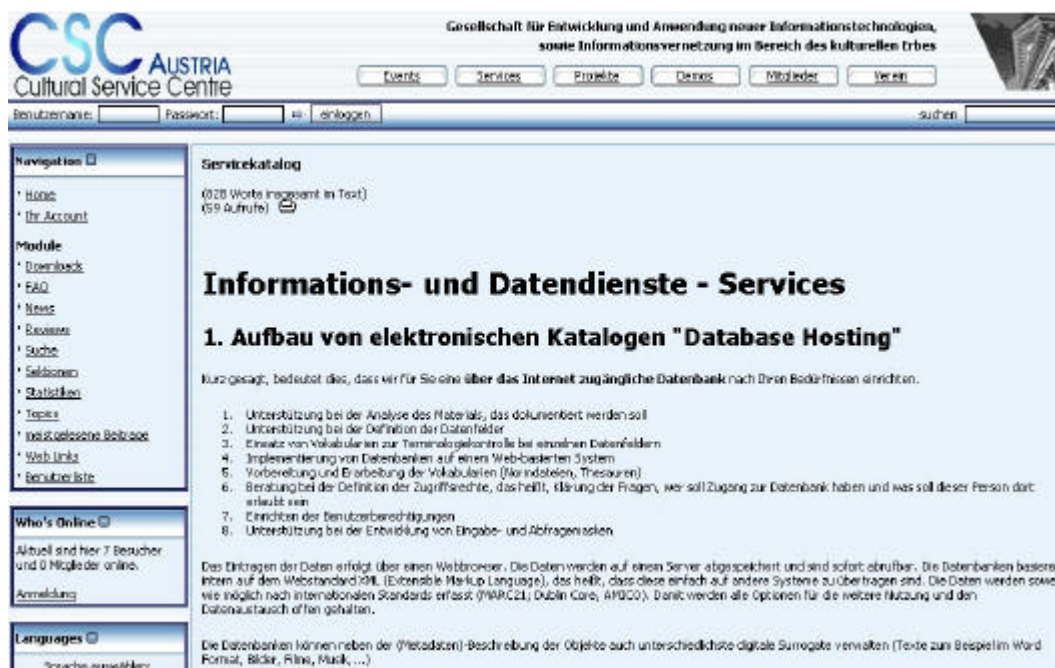

Figure 22: The CSC Austria Service Portal

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14.4 Demonstration Case IV German Test bed   IMAC

The „Testbed Germany & Switzerland" was established by the CSC Representative Germany & Switzerland (IMAC), the hosting of concrete applications was provided by the responsible technical partners (no own application server used). The campaign started in October 2002 and was mainly introduced by two means:

- an information event for Swiss CH organisations, Zürich, Landesmuseum (2002-10-24)

- a booth and presentation during EVA 2002, Berlin (2002-11-06 – 2002-11-08)

Information event: The event was dedicated to the presentation of the project and the demonstration of the tools developed so far. Using different address pools (including museums, libraries, archives and other organizations and companies) potential interested parties were invited. The goal was to find (external) partners to participate in the REGNET Testbed for German-speaking countries; that means to integrate new collections (test data) and test users in order to get feedback to the tools and the needs of cultural organizations. The participants mainly belonged to the domain "museums" (mostly, but not only small museums), moreover representatives of archives, libraries and universities attended the event (about 60-70 participants). More information about the event could be found in D6 (case study).

EVA conference: The conference EVA (Electronic Imaging & Visual Arts) Berlin 2002 belongs to a series of conferences which take place around the world to bring together especially scientists and interested people from museums, galleries, libraries and public administration. The main topics of EVA 2002 event in Berlin were: Digitisation and Visualization, Preservation of the Cultural Heritage, Edutainment and Transfer of Cultural Knowledge, Use of Mobile Information Technologies, Communicating and Navigating in Digital Worlds and Internal Cooperation. The event which runs 3 days was divided in a 1. Workshop day, 2. Conference Day (with an accompanying exhibition of PC and Internet applications) and 3. Cooperation Day (for the presentation of EC-projects and networks). 37 exhibitors presented their products and projects, approx. 50-80 attendants visited conference and exhibition - mainly museum & heritage organizations, research institutions and university representatives and suppliers of databases, online information services and multimedia & processing systems. The REGNET project was presented in two ways: 1. During the exhibition with an own booth organized by IMAC and 2. During the cooperation day with a presentation of the actual status and the testbed activities. The main goal was to enhance the publicity for the project and with regard to the testbed campaign to find new partners. The exhibition included facilities for the demonstration of the REGNET system (online). Project flyers in English and German were laid out together with registration forms for the participation in the testbed campaign.

For the information and online-registration a web site was set up (in German) covering the follow subject matters:

- project information

- testbed information

- registration form

- contact form

To be accessed by URL: http://REGNET.arte24.ch it was meant to be an interim solution, later on to be detached by a more comprehensive service platform under the brand of the CSC (Europe). Figure 23 shows screenshots of the interim site as well as of the envisaged new site (actually under construction). The new portal site should be augmented in order to service all information and communication needs of interested parties, participants and customers. Using an open source portal management and content management system (Postnuke) highest possible interactivity should be guaranteed. The information base contains product and service information, FAQs concerning the REGNET system solution as well as news, articles about related themes, events and recommendations. All visitors could contribute using the forum/discussion board, transmitting links and articles and customize the site according to their needs (registration required). It is planned to position this site as a central access point to all matters related to the CSC Representative in Germany & Switzerland. Offering information not only in German the platform can easily be enhanced and adapted to the needs of other geographical target groups (markets). Other accompanying

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activities were carried out to promote the testbed campaign, e. g. a distribution of registration forms and project flyers during the „Herbsttreffen zur Museumsdokumentation – German Museum Organisation" (2002-10-21 – 2002-10-23).
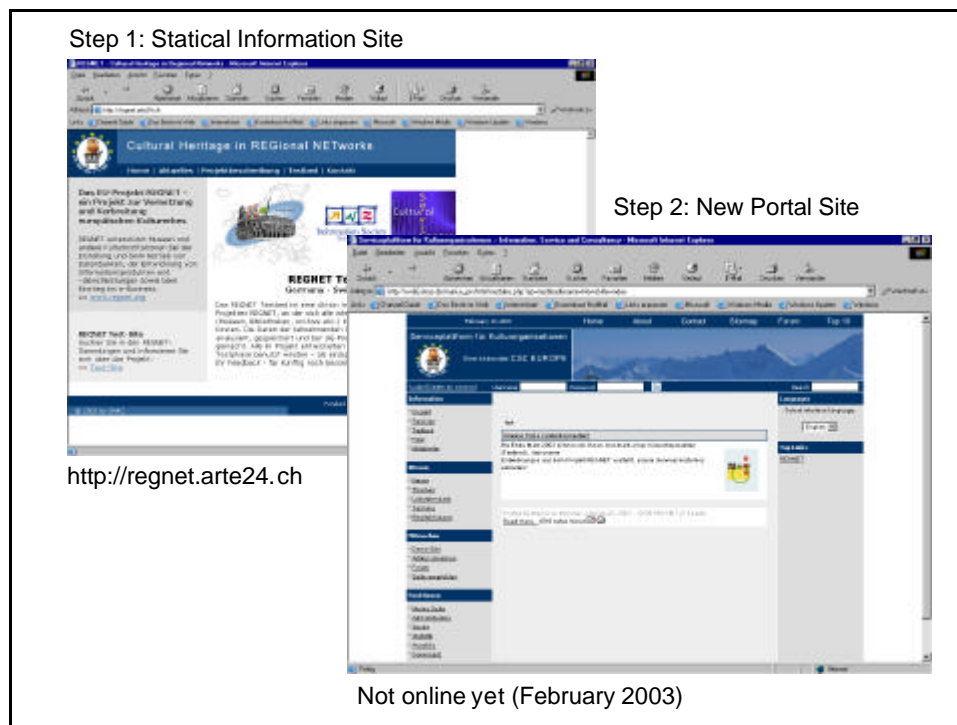
Figure 23: Testbed Germany & Switzerland – Web access

Assessing the testbed campaign as one possible demonstration activities it could be concluded that this is/was an adequate mean to attract potential customers. In general a great interest was detected and a lot of valuable feedback collected. Taking this as a further input not only conclusions could be drawn for the functionality and usability of the REGNET-System but also for the re-definition of the product and service portfolio of the Cultural Service Centres.

14.5 Demonstration Case V ONB

As mentioned above (Partner Experiences / ONB / benefits), before getting involved in the REGNET project, ONB was already preparing the conversion of the picture archive's card catalogue into a digital image archive, accessible via the internet. As a public institution, ONB is bound legally to award contracts to suppliers according to the national federal law of awarding contracts. Following this procedure for discerning the best system as the ONB future image database and collection management system, twenty-three offers were received in this tendering process by potential suppliers, many of them specialised in the field of image databases. In the end, an American museum retrieval software sold by a German company was selected as the best offer.

During the next two years (2000-2002), together with the supplier, ONB adapted this software to the needs of the ONB picture archive. All database index and digital picture data was integrated in the museums database, and after extensive project work and the elaboration of a storyboard for a web-presentation of the picture archive, a test version of an internet web-portal based on the conventional picture archive card catalogue and on-demand digitisation including an ordering facility was launched.

Although this project was successful both in terms of user response and media feed-back, ultimately it became clear that the chosen software product was in the end not ideally suited to fulfil all the tasks it had to perform. Although the purchased product was a search and retrieval software, the search performance was sometimes critical, especially with mass data and multiple requests (stress tests). Another problem encountered was the complex structure of the card catalogue and it's user-friendly representation in the internet. Even after extensive project work and new programming, the results were still not entirely satisfactory.

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In parallel, the results achieved in the REGNET project and the experiences made by ONB within the REGNET database were very promising. The integration of the picture archive card catalogue into the REGNET system and it's representation in Dublin Core and in XML-structures was achieved in a very fast and efficient way.

We especially enjoyed the close collaboration with AIT, both from the technical as well as from the content management point of view. Although a technician by academic background, Prof.Koch has been involved in cultural heritage projects for a long time. His life-long experiences as a technician in the IT-branch and software development for cultural institutions was extremely beneficial. It did not take long to communicate the needs of the picture archive, as he would be aware of the basic problems at once. The risk of misunderstandings and long explanations was very little, and so it was no less than stunning for ONB, especially in comparison to the project difficulties we were just facing with our existing database, what little amount of time it took to realize a new version of a database prototype designed especially for the ONB picture archive catalogue.

The flexible representation of the database in different user interfaces (end user, ONB staff) was achieved by close collaboration of ONB and AIT. For the end-users view, ONB could suggest an elaborated storyboard. Where this encountered technical problems in the realization, ONB and AIT agreed on a common procedure. Throughout the whole process, we got the impression that AIT was overcoming problems by suggesting and realizing alternative ideas of their own, rather than taking refuge in technical problems as an excuse for not realizing requested functionalities.

This enjoyable project experience has contributed to the ONB decision not to invest any more time, money and effort in the purchased software. In mutual agreement, an arrangement was therefore made between ONB and the supplier to rest the still ongoing project work for an undetermined period of time.

This came not as an easy decision to ONB, as much time, money and effort were already spent on this product and it's adaptation. Furthermore, this software was designed to be the future collection management system, supporting many different functionalities such as cataloguing, administration of loans, assignments, management of object storage etc., none of those existent in the then available REGNET prototype. It was clear though that, especially compared to the REGNET prototype, the purchased software was in the long run not attractive and powerful enough. ONB was aware that this meant abandoning the idea of a collection management system at least for a while. Still, we are convinced that this decision has been the only right one in the long run.

As the next logical step, the picture archive's virtual presence in the Internet was based on the REGNET database system, switching from the then existing database to the new one. This change hardly affected the layout, as the layout stayed the same throughout.

Still, the changes "underneath" were tremendous: the user enjoys additional functionalities, not least the English version of the website. In fact, an easy, all time available switch can be made between the German and the English version. Other functionalities such as personalising one's picture archive's login, editing the personal user data and segmentation of search results were added. Our customers also very much appreciated the new search functionalities which distinguishes between simple, expert and advanced search, enabling fast and efficient searching and reliable search results.

Even without officially re-launching the picture archives website (http://www.bildarchiv.at), user response was instantly very positive. Although this change of database and the switch to the new application was made hardly more than 4 weeks ago (29th of January 2003), the rising demand for the service was significant.

In this period of four weeks, 15 additional customers were gained and more than 200 additional orders (compared to the same period of time before the change) could be registered. In our opinion, this is not least due to the new English interface, as about 50% of our customers are from foreign countries, especially from the Anglo-Saxon world. Even orders from Japan were placed.

From the technical point of view, no difficulties were encountered when performing internal mass tests before launching the new system. Throughout the last four weeks where the REGNET system has been in use as ONB's main picture archive database, the system has been very stable.

In order to determine clearly the future technological architecture of the picture archive, ONB has mandated a study by external technological experts with a profound knowledge in the evaluation, but also in the realization and implementation of IT solutions.

This group of experts also tested the REGNET system as it is in use as the picture archive database and also, very successfully, separately as a project database. The mandated study took into account many of the positive aspects of this system (like being web-based, scalable, easy to use, mighty in search and retrieval) and evaluated it in a positive way, emphasizing it's potential.

So in conclusion it might be said that the results of this project will certainly outlive the projects duration. It has to be acknowledged that the REGNET system is not yet a fully fledged collection management system. It is our main concern though to finalize the existing solution in this direction in close cooperation with Prof. Koch and his team at AIT. On the basis of the work already performed, we are also confident that future cooperation of ONB and the local Cultural Service Centre, which will be joined by ONB, is on good terms aside the project.
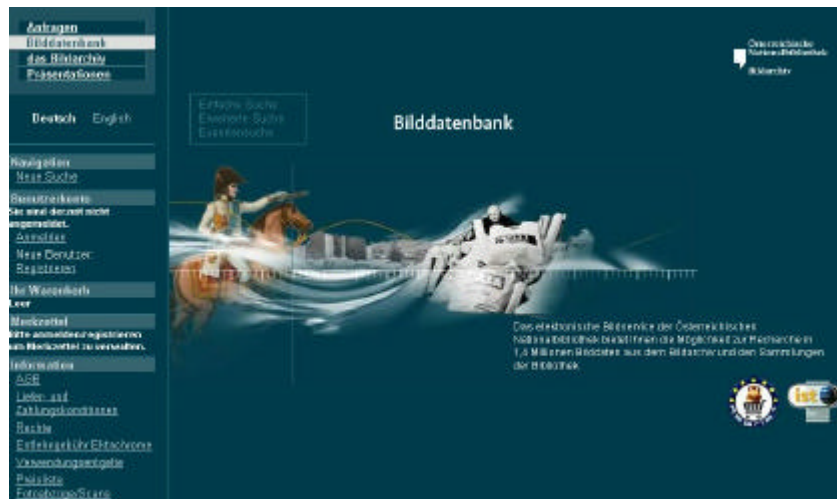

Figure 24: The REGNET system applied at the ONB picture database

14.6 Content Case I NRM Shop

General e-shop

In this day and age when internet is a tool that most people are accustomed to we believe its our duty to provide a complete internet service for our customers. We are also convinced there is an actual demand for this kind of service. Let us state a few examples;

- schools in need of educational material

- out of town visitors

- collectors

- the comfort of shopping in your own home

The latest data from the trading institute shows us that more and more people are turning to online shopping. As people grow more accustomed to online shopping they also come to expect this kind of service. There are also several advantages for shopping online, while an item might be temporary sold out or maybe your schedule just do not allow an actual visit in the shop while visiting the museum you are now able to 'revisit' the shop from your own home. This could also be great around holidays when you are on the lookout for unique and exceptional gift ideas. We offer a wide range of products, especially in the mineral and fossil department that could be of interest for collectors from all over the world. To summarise we believe this will be of great use for creating new business opportunities as well as providing great and sought after service.

Another aspect well worth mentioning is that our line of products reflects what kind of museum we are and helps project a positive image of our work and mission as a natural history museum. A part of our mission as an educational museum is to offer information for schools, the e-shop will provide a service for schools making it possible to order interesting and educational material before visiting the museum. This will ensure well prepared teachers and students and in the end maximize their

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museum experience.

AIT e-shop

We feel that the AIT e-shop fully provides the service we want to offer our visitors. We conducted a series of tests including;

- browsing

- searching for different items

- adding and deleting items from cart

- creating an account

- placing an order

- purchase using a credit card

All of the above actions worked to full satisfaction.

Our conclusion is that the e-shop is fast and reliable and is easy to navigate as well as gives a good overview.

14.7 Content Case II: Topic Map   SUL/KVA

The concept of a topic map was chosen to illustrate and guide the user of the REGNET system. A theme was chosen that could illustrate the possibilities of connecting several sources of information, as well as having several of the REGNET partners participating in the theme. The Linnaeus theme was chosen for this purpose.

Although the theme "Linnaeus and the Linnaean Tradition" in the REGNET project is centred around the famous Swedish natural historian Carl Linnaeus, the theme should be understood in a broader European (scientific) context, enabling other content providers to take part in this theme and contribute with their texts, objects and images. Thus, the theme has incorporated objects relating to scientists and scientific activities all around Europe from the 16th century until today within the Natural sciences , Botany and Zoology.

The theme "Linnaeus and the Linnaean Tradition" has been led jointly by the Royal Swedish Academy of Sciences (KVA) and Stockholm University Library (SUL). Other contributors to the Linnaean theme are The Austrian National Library, the Museon in Haag. The theme structure features thematic texts on Natural history, Scientific Societies, Scientific travels, about Linnaeus, Classification/Taxonomy, Botany, Zoology. All these texts were originally produced for the REGNET project. To illustrate these themes the participating organizations have chosen and digitised images from books and manuscripts in their collections. Ca 150 images have been digitised and several hundred records in English, Swedish, German and French have been produced as fragments and descriptions on images and books. The records have been registered according to Dublin Core standard and linked to the thematic texts.

The thematic texts, Dublin Core records and images have resulted in a topic map around Linnaeus. Approximately 310 occurrences were produced for the Linnean topic map. We believe that the topic map concept gives an immediate and clear overview on the Linnean theme.
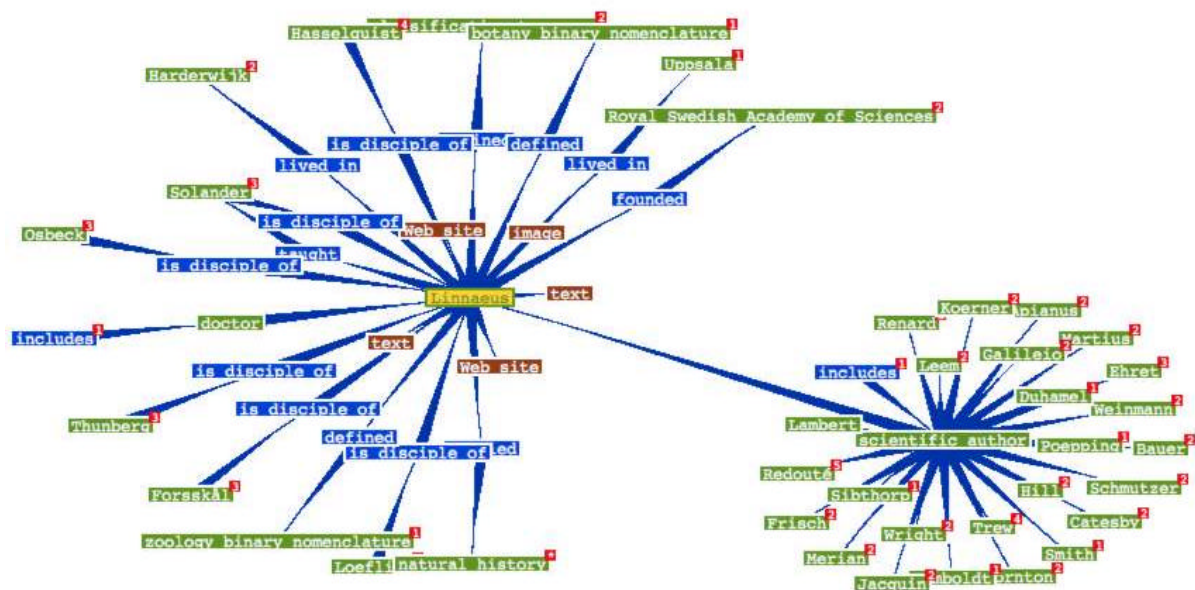
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Figure 25:Topic Map display of the Linnaean theme

14.8 Content Case III: E-Publishing   MECH/TARX

Interactive multimedia production: "Faydherbe's traces in Mechlin"

For the demonstration phase of the REGNET project MECH and TARX evaluated different types of demo-candidates. From the beginning of the project the thematic approach prevailed. The most elaborated theme with MECH Cultural Heritage data was "SAINTS" and to a lesser extent "GILT LEATHER" and the "TOUR d'HORIZON" (top ten pieces of art). In order to combine as much as possible earlier efforts within the REGNET project with a very practical, useful demonstration with clear relationship to the region of Mechlin and also aimed at a broad range of end users, it was decided to go for an interactive multimedia production: "Faydherbe's traces in Mechlin" designated to be installed in a kiosk or public terminal.

The basic rationale behind this is quite obvious when you consider the fact that Faydherbe was a Mechlin sculptor and architect being extremely active in religious related works of art in the 17th century. Many of his realizations are still visible and can be visited in the streets, museums and churches of Mechlin. So, the above-mentioned "SAINTS" theme delivered already a substantial part for the input material of this production. A natural inclusion of this production into the existing workflow of the museum activities could be achieved.

A second reason to go this way was the strategy of MECH to boost the city of Mechlin as one of the Flemish "Culture cities". This production could be as well a supporting aid for visitors as a marketing tool to attract interested persons or organizations.

The third reason relates more to the educational and scientific applications of such productions. Initially the production is aimed for the "standard, interested" visitor. The way the underlying structure and data are build up allow to extend easily the current level to a level suited for educational or scientific purposes.

Once decided on the theme and the objectives, MECH and TARX started to develop respectively the content and the content structures (MECH) and the multimedia authoring and the Dutch-English translations of the texts. In surplus of the existing material in the REGNET database, supplementary items had to be generated in order to comply with a pleasant look and feel and a comprehensive navigation structure.

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The "Faydherbe's traces in Mechlin" multimedia production is fully bilingual Dutch-English. This means that at any moment and at any place during consultation the language can be switched from one to the other.

There are four main parts constituting the main menu:

1. Traces in Mechlin

2. Life and schooling of Faydherbe

3. Faydherbe the sculptor

4. Faydherbe the architect

The main focus lies on the first part: "Traces in Mechlin". Starting from a city map of Mechlin, different places, containing "traces" of Faydherbe, can be chosen. On clicking on the name in the list of locations or the location itself on the map, an image of the location will appear. Every location can then be "entered" by a simple click. The same scenario applies for visiting these individual locations. A map or ground plan is presented wherein a specific location can be chosen. On clicking on the location or the name in the list, an image and an accompanying text is shown.

The three other parts, life and schooling, sculptor and architect, are more contextual contributions concerning the person of Faydherbe and his works and serve as supporting material for the interested visitor or navigator.

At the final stages of the production cycle and after thorough testing, MECH and TARX realised that the result surpassed the pure demonstration level. It was decided to put the production immediately at the disposal of the public in one room of the Busleyden museum, Busleyden being the museum that contains most of the Faydherbe sculptures.

Because the production spans locations all over Mechlin, copies or part of the production could also be installed at other places. This pertains mainly to other museums, main churches and buildings and tourist offices.

At the same time another decision was made to reuse the same scenario with minor adaptations for other productions characterised by great similarities. Possible candidates are:

*   same city but other artist and his works of art

*   same location with all the residing works of art (not only Faydherbe)

*   same city but other topic (archaeological findings)

The most urgent following step is to make the current production available on the Internet. This will be realized though the Cultural Service Centre Low Countries wherein TARX and MECH are founding members. This CSC will offer the means and experience to cultural institutions to realise, among other functions, similar productions.

The experience gained with this ePublishing effort allows as well MECH as TARX to extend their current potential to realise their objectives in the Cultural Heritage World. Commonly developed (virtual) exhibitions with partner museums and delivery of new productions for other cultural institutions are only two of the potential benefits that both partners can realise.

15 Clustering

Two projects dealing with the creation of technological service infrastructures for small cultural heritage institutions have been financed by The EC and clustered in order to leverage the synergies existing between them: OpenHeritage project (IST-2000-25136) and REGNET project (IST-2000-26336).

The REGNET Project is going to deliver a system, providing a technological and organizational infrastructure to service centres aimed at supporting cultural institutions and industries.

One of the main objectives of the Open Heritage project, instead, is the development of dynamic, computable models of territorial cultural systems to assess and valorise the qualities and strengths of each regional or local cultural system.

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The development takes care of integrating an innovative solution for collections management and user access in memory institutions based on existing systems developed by two of the partners. The deployment of Territorial Service Centres supporting memory institutions through facilities management, customer relationship management, storage, promotion and transaction services (a new model of cultural Application Service Provider (ASP)) is an other key point of the project.

The final output of the Open Heritage is the launch of a global "OpenHeritage.com" enterprise for the exploitation of the European CH through an advanced portal encompassing both traditional "community" features and B2B areas for the trading of rich media assets

The two projects provide a support for memory institutions pushed in the uncomfortable position of having to compete (in terms of entertainment and experience value) in a new, unusual setting driven by the market forces of the new "cultural economy", based on intangible services and on accessible, on-demand "experiences.

The new-economic climate, combined with the great value of cultural content, well recognized as it relates directly not only to culture in general but to important and vast markets, mainly education, tourism, entertainment and research, makes a proper grounding in management essential for museum and cultural professionals.

At the same time development of new interactive multimedia solutions, joint with wide access opportunity and delivery of valuable content has transformed the traditional cultural heritage scenario in the last years.

The new scenario raises several critical issues, pertaining to management, protection and exploitation of digitised cultural content. These include essentially the critical problem of IPR (Intellectual Property Rights), protection and the unauthorized use and exploitation of digital data.

In this framework the OpenHeritage and REGNET projects have been clustered in order to leverage the synergies that exist between the two projects, aiming at defining the best possible method for demonstrate that scale economy and new business models can be brought and adopted in the cultural heritage environment opening new ways for exploiting one of the most valuable and yet misused sources of potential revenues: cultural heritage in itself.

15.1 Objectives of clustering

According to both Technical Annex, objectives of clustering activities have been defined to improve awareness and co-operation within the global socio-economic tissue sharing methodologies and results from the two clustered projects. The definition of the activities carried out on in this task have been have been identified to be the following ones:

> ➢ **Integration of technical tools**, mainly in the collections management area.

> ➢ **Legal framework.** Where REGNET has focused on its development and OpenHeritage on its validation and implementation**;**

> ➢ **Territorial Service Centers (TSC):** each project have pointed out its own peculiarities, with support and tourism functionality clearly belonging to OpenHeritage, while meta-collections access, workflow and e-Business models and practices clearly carried out by REGNET. For what concern e-commerce it has been carried out by both but distinguished in focus and target;

> ➢ **Portals:** OpenHeritage has clearly specialized in providing community services and media brokering services for professional operators, while REGNET has focused on general portal.

15.2 Clustering actions

The action has been directed to the four points mentioned in the previous chapter. For what concern the integration of technical tools, a software component has been developed by SPACE to be integrated into the REGNET platform.

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The component, named Index+ Gateway is a web service that fulfill with the requested bridge technology to let the REGNET platform to access the Index+ database belonging to the OpenHeritage platform.

Index+ is a powerful software toolkit for creating systems to manage structured and unstructured text, data. It features fast searching, high storage capacity, a robust, network orientated, server-client architecture and a range of application development tools.

Index+, created by System Simulation Ltd (partner of OpenHeritage project), has evolved as a toolset for building a range of applications for demanding clients. This range of applications and the continuous evolution of the Index+ system have ensured that it is very well suited to the requirements of the modern information economy. It enables the creation, development, management and exploitation of information and knowledge assets of any kind. System Simulation Ltd's business is now largely focused on partnerships with clients to optimize their use of information assets and maintain Index+ as a leading-edge technology.

The Index+ gateway is a web service, which allows the Cultural Heritage Management Node to search and retrieve information from remote Index+ databases.

The clustering technical activities covered into this area, focusing also on the exchange of experience between the two project concerning the definition and integration of core technologies for collections management at the object and catalogue levels (mainly adopted into the OpenHeritage project), and on the ontology (metadata) topics and on data entry/harvesting themes (mainly adopted into the REGNET project).

Additionally the OpenHeritage team has favoured the use of the OpenMuseum technology for physical museums in the REGNET consortium.

It has been defined an integrated legal framework for the establishment of relationships between memory institutions and commercial services/initiatives. This activity has been dropped by OpenHeritage and has been carried out by REGNET, while effort devoted in OpenHeritage aim at integrating the socio-economic model developed here with the results of the research on the legal framework carried out within REGNET.

The definition and prototyping of a technical infrastructure for the TSC has been carried out. In this area a few main sub-activities have been identified:

➢ System&network management and other technology-based support functions (CRM, remote assistance, etc.). These were specifically carried out by OpenHeritage;

➢ Client access and tourism-oriented representation functionality. Work in this area, including 3D large-scale virtualisations of art cities and places, has been carried out specifically by OpenHeritage;

➢ Union catalogue, network-wide access to meta-collections, data exchange, meta-search functionality. This task has been based on activities carried out by R REGNET egNet. The integration between OpenHeritage and REGNET has been assured by the introduction of Index+ as one of the enabling technologies the REGNET architecture rely on. This make the CSCs perfectly compatible with the core collections management technology established by OpenHeritage for use at the local level;

➢ Workflow and e-Business models and practices (i.e., for on-demand electronic publishing): these belong exclusively to REGNET;

➢ e-commerce functionality: in its general aspects both projects will apply e-commerce solutions to the cultural domain, but in the case of OpenHeritage there will be a clear finalisation towards the provision of B2B brokering services for the trading of cultural images and other rich media to professional operators (TV channels, portals, educational actors, publishers, etc.).

All these set of results have been carried out through exchanging of documents and a clear design of an overall architecture is now ready.

The last activities foreseen has been the definition and prototyping of a global portal for the delivery of community services and for the trading of cultural rich media through the implementation of B2B functionality. Both projects acknowledge the importance of defining and implementing a facility of this kind, through which the underlying components of the architecture ('local' systems and service centres feeding the media pipeline) can find a suitable exploitation channel. The activities related to this component therefore have been

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shared between the two projects (with OpenHeritage playing a leading role) and harmonised through the supervision of the Cluster Committee. OpenHeritage's portal will also be more focused on the brokerage services.

15.3 Clustering benefits

We believe that REGNET and OpenHeritage projects have brought a new freshness into the cultural sector that has been in place for a long time. The two proposed approach and solutions are aiming to achieve the integration of services to offer them on-demand through territorial or regional centers, while granting also the highest degree of flexibility.

We are conscious that an accurate analysis of the underlined synergies presented in the cluster will help to better understand the overall platforms and benefit from the proposed business model.

Both projects tried to take into account also market and technology evolution trends, quality assurance issues and integration aspects which are underestimated in many occasions.

The main benefits resulting from using the clustering, concerns the convergence of all the mentioned details into a commercial agreement in which both project exchange their services within agreed terms and conditions. The clustering served also to test and consolidate both projects in terms of technical support and legal framework.

OpenHeritage and REGNET project can be ideal business partner. Both project could take new customers in an area which the other does not cover. Moreover, complementary activities and commercial relationships could be possible. We hope to have a chance, over time, to prove that the clustering has been the starting point for many success cases.

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Conclusion and Future Plans

The REGNET-Project followed the Concept of "Net Market Evolution" (www.ontology.org/main/presentations/sweden-may2000-ia-for-netmarkets.ppt) which comprises three main "layers": Infrastructure, Services, Participants (below).
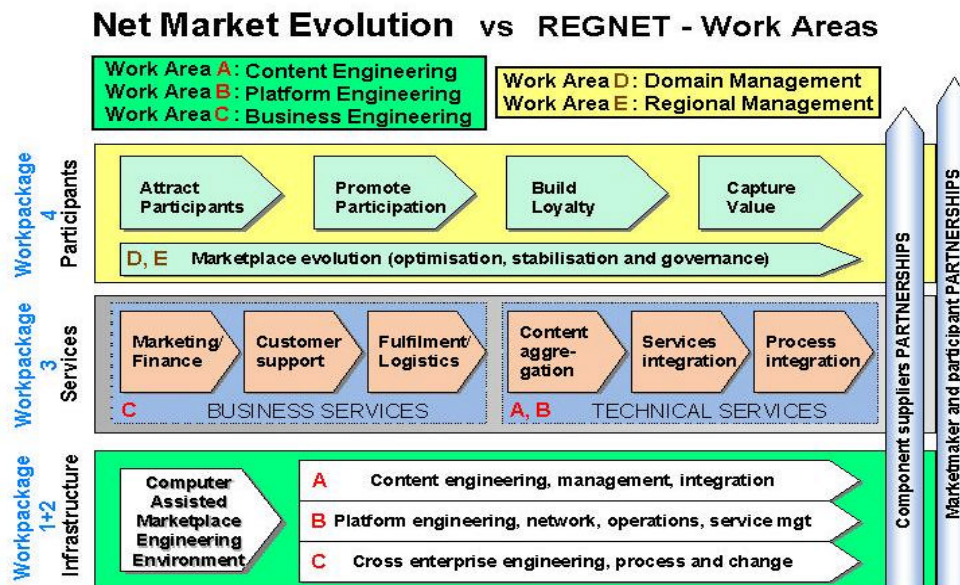
Figure 26: The Net market and REGNET

The REGNET-Development activities have been executed within work packages 1 and 2 and delivered useable results for setting up a the "Service-Layer" within the overall concept.

The content engineering activities delivered not only valuable content held at the REGNET-content providers sites (museums, libraries, archives) but also a workable concept for relevant data structures based on XML-technologies.

The platform engineering delivered a state of the art concept and implementation how to set up a technical infrastructure to interconnect different platforms and WEB-based services (SOAP, WEB-Services, etc).

The business (cross enterprise) engineering delivered a workable framework for cooperation on the global market and a European Economic Interest Group ("Cultural Service Centres – Europe EEIG") and extensive definition of relevant business processes in the cultural domain.

The Integration of external components and partnerships has been investigated by a potential future cooperation possibility in the publishing area: data from the REGNET-data stores have been rearranged by an US-located publisher producing a WEB-Catalogue of images which also can be published in PDF-Format. On a technical basis (as one example) the integration of an external publishing tool (Macromedia) has been tested during the production of a CD-Rom using input generated by the REGNET-data-entry tool.

All REGNET activities delivered such promising and valuable results that it was already during the project life time possible to act on the "global market place"; for example the CULTIVATE-Services offered during the demonstration phase brought in several external partners and feedback from real business operations.

Future activities will be offered by the CSC-Europe-EEIG as organisational and technical framework for new project operations as well as for regular business activities. For example contacts have already been made with RLG (Research Libraries Group, USA) regarding future cooperation or with the just evolving DLM-Network EEIG to cooperate within projects in the European Research Area.

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16 References

16.1 Acronym and General References List

ASP	Application Service Provider
B2B	Business to Business
B2C	Business to Consumer
CSC	Cultural Service Centre
CVS	Concurrent Version System
D	Deliverable
DNS	Domain Name System
EbXML	Electronic Business XML
EDI	Electronic Data Interchange
EPMG	Extended Project Team Group
EU	European Union
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
OAI	Open Archive Initiative
OPAC	Open Public Access Catalogue
PCG	Project Control Group
PHP	PHP Hypertext Pre-processor
PCM	Product Catalogue Management
PTG	Project Team Group
PMG	Project Management Group
R&D	Research and Development
REGNET	Cultural Heritage for REGional NETworks
RMI	Remote Method Invocation
RUP	Rational Unified Process
SME	Small and Medium Enterprises
SOAP	Simple Object Access Protocol
SWOT	Strengths, Weaknesses, Opportunities and Threats
TIP	Technology Implementation Plan
UDDI	Universal Description, Discovery and Integration
UML	Unified Modelling Language
USP	Unique Selling Point
WP	Work Package
XML	Extensible Markup Language
XSL	Extensible Stylesheet Language
XTM	XML Topic Map
WAP	Wireless Application Protocol
WSDL	Web Services Description Language

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16.2 List of Figures

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17 Table of Appendices

Appendix 1 -   **Tabular list of Deliverables**

                         Deliverable 16 – Web presence

                         Example of Dissemination action