Project no. FP6-028038

PALETTE

Pedagogically sustained Adaptive LEarning Through the exploitation of Tacit and Explicit knowledge

Instrument: Integrated Project

Thematic Priority: Technology-enhanced learning

D.IMP.08 – Instances of implementation of PALETTE scenarios

Due date of deliverable: November 30, 2008
Actual submission date: January 8, 2009

Start date of project: 1 February 2006   Duration: 36 months

Organisation name of lead contractor for this deliverable: EPFL

	Project co-funded by the European Commission within the Sixth Framework Programme	
	Dissemination Level	
R	PUBLIC	**PU**

Keyword List: scenarios, service integration, service interaction, support services, pair-wise integration, interoperability, Web desktop, reification, debate and decide, animation, CoP

Responsible Partner: EPFL

MODIFICATION CONTROL			
Version	Date	Status	Modifications made by
0.1	9 Oct 2008	Draft Annotated Plan	S. Sire
0.2	10 Nov	Introduction + Generic Scenario for team 1	A. Daele, CRP-HT contributors, S. Sire,
0.3	11 Nov	+ sections on Identity management, CroSSe and CAKB	CRP-HT contributors, S. Sire
0.4	12 Nov	+ sections on Generic Scenarios for team 2	M. Tsagarakis, S. Sire
0.5	14 Nov	+ section on Common Repository	N. Karoussos, S. Sire
0.6	17 Nov	+ all missing parts (team 2 scenarios, pair wise integration components)	A. El Ghali, A. Boukottaya, S. Sire
0.7	20 Nov	Version for internal review	S. Sire
0.8	27 Nov	Version for SC review	S. Sire
	5 Jan 2009	Final Version	D. Malengrez, S. Sire

Deliverable manager
- Stéphane Sire, EPFL

List of Contributors
- Manolis Tsagarakis, Nikos Karoussos CTI
- Jérôme Bogaërts, Jean-David Labails, Yannick Naudet, Alain Vagner, Géraldine Vidou, Marie-Laure Watrinet, CRP-HT
- Stéphane Sire, Micaël Paquier, EPFL
- Adil El Ghali, INRIA Sophia
- Cécile Roisin, Jan Mikac, INRIA Grenoble
- Amaury Daele, Aida Boukottaya, UNIFR
- Déborah Malengrez, ULg

List of Evaluators
- Bernadette Charlier, UNIFR
- Denis Gillet, EPFL

Summary
This document presents the instances of implementation of PALETTE scenarios. Three generic scenarios are developed into scenario instances and scenario situations. The later ones are contextualized for a particular Community Of Practices (CoP), while the former ones are more abstract and should be applicable to different communities in different contexts. These scenarios are the result of the interactions between all the project members and the CoP members, most of the situations have been tested. The document also presents the functional and user interface modifications made to support some chains of interaction between services as required per the scenarios. It presents the corresponding four support services and the pair-wise integrations of two services. The four support services are an identity management service (Single Sign-On), a common repository, a search engine over common services (CroSSE), and a Cross-Awareness Knowledge Base (CAKB). To some extent this report can be read as a synthesis of the preceding D.IMP reports on interoperability. It can be read by anyone interested in combing services to support CoPs.

Table of Illustrations

1 General Introduction to (D.IMP, D.PAR).08 and D.PAR.06

At the end of the PALETTE project, different WP1 and WP5 objectives and tasks converge. This convergence is made concrete by three deliverables:

- Instances of Implementation of PALETTE Scenarios (this document);
- Analysis of Instrumental Genesis Lived by the CoPs (D.PAR.08);
- Learning and Organisational Resources: Conceptual Instruments for Self-Analysis, Learning and Developments of CoPs (D.PAR.06).

Each of these deliverables tackles a common issue from a different point of view. Indeed, the main issue at the end of the project is not only to report what has been done with the CoPs we have collaborated with but also to propose consistent analysis and guidelines for other CoPs and stakeholders involved in varied domains and interested in CoP issues. The challenge here is to provide the reader with a more general and analytic view of the PALETTE outcomes that could be used in other situations by other stakeholders. In other words, at the end of the project, we have to switch from activities, analysis and development of "specific" CoPs to a more "generic" approach. This is both related to the scientific objectives of PALETTE (supporting CoP development and the CoP members' learning) and expected impacts of the project for organisations and society, as per the DoW (pp. 4-8).

In D.IMP.03 (Deschryver, 2007), we introduced and defined the difference between "specific" scenarios for CoPs (i.e. scenarios answering specific needs of CoPs) and "generic" ones (i.e. scenarios answering similar needs of various CoPs). This distinction then informed the writing of the D.PAR.03 (Deale, 2007) and the organisation of the second half of the project with multi-disciplinary teams and CoPs. In D.IMP.05 (Esnault and Karousos, 2008), we set up a method for developing and validating Generic Scenarios. We also identified three of such scenarios from the specific scenarios of the CoPs we are collaborating with and organised working teams for designing, developing and implementing each of them:

- "Reification" scenario that is related to the production, enrichment, search for, and reuse of CoP resources;
- "Debate and Decide" scenario that is related to debating and arguing about an issue and collaborating for decision making;
- "CoP identity building and animation" scenario that is related to the management of CoP activities and the resulting development of CoP identity.

Even if they lead to the development and implementation of characteristic activities and services for CoPs, these three generic scenarios are strongly interrelated. From the Wenger theory (Wenger, 1998), reification and participation are two processes at the heart of a CoP's practice negotiation. Following this author, there is no practice reification without members' participation and conversely. The articulation of reification and participation lead to "negotiation of meaning" within a CoP: the members discuss the meaning of their practices, views, ideas, vocabulary, etc. and so highlight the way they experience their domain of activity. The outcome of this discussion is a progressive definition of the CoP identity: it is through negotiation that the CoP members can define their objectives and precise domain regarding other external groups. It is also on the basis of this identity that the CoP will continue to evolve, organise further activities, and recruit new members.

In the introduction of the third PALETTE implementation plan, we have described the relations between D.PAR.08 and D.IMP.08 which are summarized on the figure below.

Step 1:
CoP mediators summarise CoP activities according to specific scenarios
Each team propose an instantiated scenario of its generic scenario
Consensus on the alignment between CoP activities and instantiated scenarios
Outputs:
- Description of instantiated scenarios validated by CoPs mediators and technical partners
- Implementation plan produced by each team (beginning of the implementation)
- First version of the technical charter
Deadline: 30 May

Review of instantiated scenarios

Beginning of the implementation of instantiated scenarios

Step 2:
On the basis of the produced implementation plans, CoP mediators produce trial scenarios as well as a detailed timing for their organisation
Outputs:
Description of trial scenarios related to each CoP (with a detailed timing)
Deadline: End of May (M 28)

Step 3:
Produce the first version of **implemented** instantiated scenarios (software available)
Outputs:
- First version of **implemented** instantiated scenarios
- Updated version of the technical charter
Deadline: M 30

Beginning of the Trials according to the availability of implemented parts of instantiated scenarios

Step 4:
Feedback on **conducted** trial scenarios
Outputs:
- Feedback on **conducted** trial scenarios
- Updated version of trial scenarios
- Feedback on new services functionalities
Deadline: M 33

Continuing the Implementation of instantiated scenarios and the conduct of trials to collect final feedback

Step 5:
Produce the final version of **implemented** instantiated scenarios
Produce the final version of **conducted** trials scenarios
Outputs:
- Final version of **implemented** instantiated scenarios (D.IMP.08)
- Final version of **conducted** trials scenarios (D.PAR.08)
- Final version of the technical charter
Deadline: M 34

Figure 1.   Summary of the method for developing and validating Generic Scenarios.

D.IMP.08 is about the technical implementation of the generic scenarios and their instantiations. D.PAR.08 is about how the specific scenarios have been trialled with each CoP and what the analysis of these trials shows about the appropriation of the services by the CoPs and the changes that occurred within them. In addition, it provides an inter-case analysis highlighting the conditions of use of the PALETTE services in the trials. This inter-case analysis shows the conditions in which the scenarios

will conduct to the intended improvement of the CoP's practices. This inter-case analysis will be useful for external CoPs that are interested in more generic considerations on the use of the services.

In addition to these two complementary deliverables, D.PAR.06 describes the development and trial of Learning and Organisational Resources (LOR) that aim at providing the CoPs with concrete scenarios of activities for members' learning, activities organisation and choice of tools.

Regarding the implementation of the PALETTE Participatory Design Methodology, these three deliverables highlight:

- How the PALETTE services met CoP specific needs;
- How the CoPs changed and developed through the use of the PALETTE services;
- How the PALETTE services evolved and changed through the collaboration with CoP members;
- How other CoPs and stakeholders could benefit from the experience of PALETTE designers and CoPs.

In parallel to these three deliverables, D.EVA.06 (January 2009) will adopt a global and critical point of view and describe PALETTE methodology and main outcomes regarding the project main objectives and expected impacts.

This document, D.IMP.08, presents the instances of implementation of PALETTE scenarios. It is divided in two main parts. The first part presents the generic scenarios from an abstract form down to some concrete situations which have been identified with some pilot CoPs as directly applicable to their context. These situations have been used as targets driving the integration efforts of the available services. The second part presents the components which have been developed specifically to allow the trialling of some of the situations picked up by the CoP mediators.

In summary, the first part gives a non-technical view of WP5 efforts, while the second part gives a technical view. The first part should be readable by anyone interested in learning what can be done to support CoPs with the available services. The second part should be readable by anybody interested in learning which software components can help to reinforce the integration between a PALETTE of services.

The reader not familiar with the PALETTE services is invited to have a look at the first Annexe section that gives a short description of each of them.

1.1   Acronyms

- CAKB: Cross Awareness Knowledge Base

- CoP: Community of Practices

- CroSSE: Cross Service Search Engine

- ICT: Information and Communication Technologies

- ICTE: Information and Communication Technologies in Education

- LOR : Learning and Organizational Resource

- PRep: PALETTE Repository

- SSO: Single Sign-On

1.2   Reading conventions

References by author, like (Fielding, 2000), appear in a bibliography at the end of the deliverable. References by code, like (URL: ALU), appear in a "webography" (list of Web links), also at the end of the deliverable. For instance (URL: GS1) is a link to the Sweetwiki page of the Generic Scenarios of Team 1.

2 Generic Scenarios

2.1 The role of Generic Scenarios in PALETTE

As stated in D.IMP.05, a generic scenario describes a chain of operations and associated functions of services and the way they interact to answer a generic CoP need or intention (Esnault & Karousos, 2008).

Generic scenarios are written and implemented according to the Participatory Design Methodology. Their role is to generalise the CoP-specific scenarios and to go further toward the "genericity" of the services. Three generic scenarios have been considered: Reification scenario; Debate and Decide scenario and Animation scenario.

A generic scenario takes into account the intentions which drive the activities and uses of services in order to sustain the CoPs functioning. A generic scenario is especially focused on the description of the relationships and interactions between users and services through Human Computer Interfaces. It is situated, adaptable and provides information about situations where it can be applied. Generic scenarios constitute the basis to demonstrate how services can support and/or change CoPs practices. That's why they are generic and applicable to several CoPs. As shown in the next sections, the former scenarios have been instantiated and implemented in specific CoPs contexts using specific PALETTE services in order to show their utility and applicability in CoPs environments.

2.2 Presentation of the Scenarios

Each of the three scenarios is presented at three granularity levels, from a more abstract to a more concrete view. The purpose of presenting first a generic description, then a description of several potential instantiations of the scenario and then some concrete situations, is to augment the applicability of the scenarios to other contexts. For that reason:

- *the description at the generic level* is independent of a given service and of given artefacts and/or context;

- *the description at the instantiated level* explicitly cites some categories of services (such as document editor, classification tool, repository, etc.) but is still independent of given artefacts and/or context. It may also introduce a specific PALETTE service instead of a category (such as mentioning SweetWiki instead of a Wiki), but in theory it should be applicable with an equivalent service;

- *the description at the situation level* (or specific scenario level in D.PAR.08 terminology), explicitly cites some services and some artefacts (for instance a "meeting minute document") and describes the context.

The exposition of a situation may use fake users names. A situation may be the application of a single instantiated scenario, or it may mix some elements from several instantiated scenarios. The situation level has also been introduced to make some concrete propositions of trials for the CoPs.

Each situation has a status which can be:

- Discussed: the situation has been discussed with some members of a CoP who have been presented with the services;

- Tested: the situation has been tested in the field by CoP members using the deployed services.

Moreover, some of the tested situations will be analyzed in D.PAR.08, to draw some general conclusions about the conditions in which these generic scenarios could be applied with other external CoPs.

The implementation feedback section briefly summarizes the end user's feedbacks that have been taken into account during the development phase of the services to make them available for the trials.

2.3 Reification Scenario

The reification scenario deals with the major concern of capturing and sharing a community's collective expertise through the collaborative production of electronic documents. The term "reification" refers to the transformation of explicit and tacit knowledge about practices into electronic documents. The purpose of reifying knowledge is to facilitate the propagation of knowledge inside and outside of the community.

The reification scenario is well described as a cyclic process composed by four basic steps: find/create, organize, share, and use/reuse (Burk, 1999). The "find/create" step concerns the creation of knowledge/information gained through research and/or industry experiences, expertise, publications, focus groups, meetings, etc. The goal of the two next steps in the cycle, "organize" and "share", is to first filter and organise expertise (e.g., creating different categories of knowledge related to specific purposes, linking such knowledge with available resources, etc). Second, the expertise has to be shared for wide availability, making use of the Internet and other techniques of information sharing. The final phase of the cycle, "use/reuse," enables shared expertise to be used and reused in order to minimize information overload and maximize content usability, which decreases time, effort and cost. The results are then captured as part of learned lessons and new expertise is created which enable the cycle to begin again.

In PALETTE, the reification scenario is supported through two different approaches: the document structuring and the document classification approach. The document structuring approach aims at producing structured documents. By structured, we mean document that contain well defined and negotiated elements which are described by document templates. Hence the production of the document templates is also a collaborative process which helps community members to formalize their knowledge. The document classification approach aims at producing set of keywords organized into an ontology that can be used to classify documents. Hence the production of the ontology is also a collaborative process improving the formalization of a community knowledge.

The challenges of the PALETTE integration of services to support reification are to allow to search for documents either by exploiting their structure or their classification, and to support the evolution of the documents and of the classifications as the community updates its templates and its ontology.

After the reorganization of WP5 teams, the following scenario instances and situations have been elaborated by the first team (URL: GS1).

2.3.1 Reification Scenario Instances

Document Template Production and Evolution Scenario

In this instantiation of the reification scenario, the community members agree on the elements that must compose a given type of document. This is materialized into a document template. That document template must be created first with a specialized editor. Then, the community members can create document template instances based on that template using template based editors.

As the community uses the document template to produce its first documents, it also negotiates some modifications to the template. These modifications are required, for instance, to improve the presentation of the document templates, to add more information to the templates, or to rename some parts of the structure to improve the search criteria.

As the modifications are agreed, they are applied by one of the community member to the document. The challenge is then to ease the modification of all the document instances that were produced before so that they are all updated to reflect the new template.

Some variants of the document template production and evolution scenario have been described in the literature, as in (Haake & al., 2005) where it is applied in the context of literature teaching with a special type of Wiki. In PALETTE template based editors are Amaya, DocReuse, and LimSee 3 for multimedia content.

Document Reuse Scenario

In this instantiation of the reification scenario, a document is first produced by a service that does not focus on a given document template. This can be for instance a document produced in a service external to PALETTE, for instance a MediaWiki document, or a document produced within a PALETTE service, such as a SweetWiki page. The document is then loaded into a service that allows to transform it so that it follows a given document template previously created by one of the community members. The resulting document template instance is then advertised to the rest of the community, where it can be searched. Eventually, the structure of the document can be exploited to search for terms that must appear only in some specific parts of the documents to increase the precision of the search result. This will encourage the community members to progressively structure their legacy documents to benefit from this advanced search feature.

This workflow can be extended with an additional step where automatic extraction tools are available to easily cut and paste similar parts in multiple documents to create a synthesis document. That synthesis document can then be combined with other parts from other documents, or it can be manually completed to produce a new document.

The challenge of this scenario instance is to support fluid chains of interaction to ease the transitions of documents from external services to the structured editors during all the reuse processes, and finally to make all the documents of the CoP searchable. The PALETTE services most concerned with the document reuse scenario are the structured document editors Amaya and DocReuse, and the Portal.

Document Classification Scenario

In this instantiation of the reification scenario, the community members agree on a classification for their resources. Indeed the community possesses a lot of resources, the members want to classify them in order to retrieve them efficiently. As the resources are numerous, and cover a lot of subjects but all related to the same domain, the classification, based on ontology of the domain exploited by the community, enables documents to be categorized according to multiple criteria linked to each other.

Besides the classification need, the community members also want to be aware of the actions made in the community. In fact members want to know when actions occur in the community, such as adding of new resources, or sending of new messages. They also want simplified access to this information.

The challenge of this scenario instance is on the one hand to propose a classification adapted to the community, and that can evolve with the community needs, and on the other hand to offer "targeted" awareness to the community. The PALETTE services most concerned here are BayFac, the Cross Awareness Knowledge Base (CAKB) and the Portal.

2.3.2   Conceptual Integration for the Reification Scenario

The diagram below shows the PALETTE services best fitted to the reification scenario (in rounded corner rectangle boxes), and the electronic artefacts they can consume or produce. The arrows show some potential data and/or some information flows between services. The team 1 has used this diagram during the design phase, as a vector to discuss the integration of services with the CoP mediators and to elaborate the situations which are described in the next section.

The diagram also represents the set of services that has been picked up by different communities to experiment with their reification needs. Didactic has focused on Amaya, DocReuse and the Common Repository. Cope-L has focused on BayFac and the awareness services. Learn-Nett has focused on BayFac and SweetWiki. ePrep, not shown on this diagram, has focused on LimSee3.

The diagram shows that with a rich PALETTE of services, each community can develop its own approach to reification by picking up different set of tools. The selection of the proper set of services is also a by-product of the participatory design process. In practice that selection can itself be supported by the provision of a service browser to help locate and install the services, which has been described in D.IMP.06 (Naudet, 2008). It can also be supported by the provision of tutorials and handouts such as the LOR described in D.PAR.06 (Ashwin and Daele, 2008). A similar approach can be seen within the iCamp European Project that has developed the iCamp Help Center application (URL: IHC).
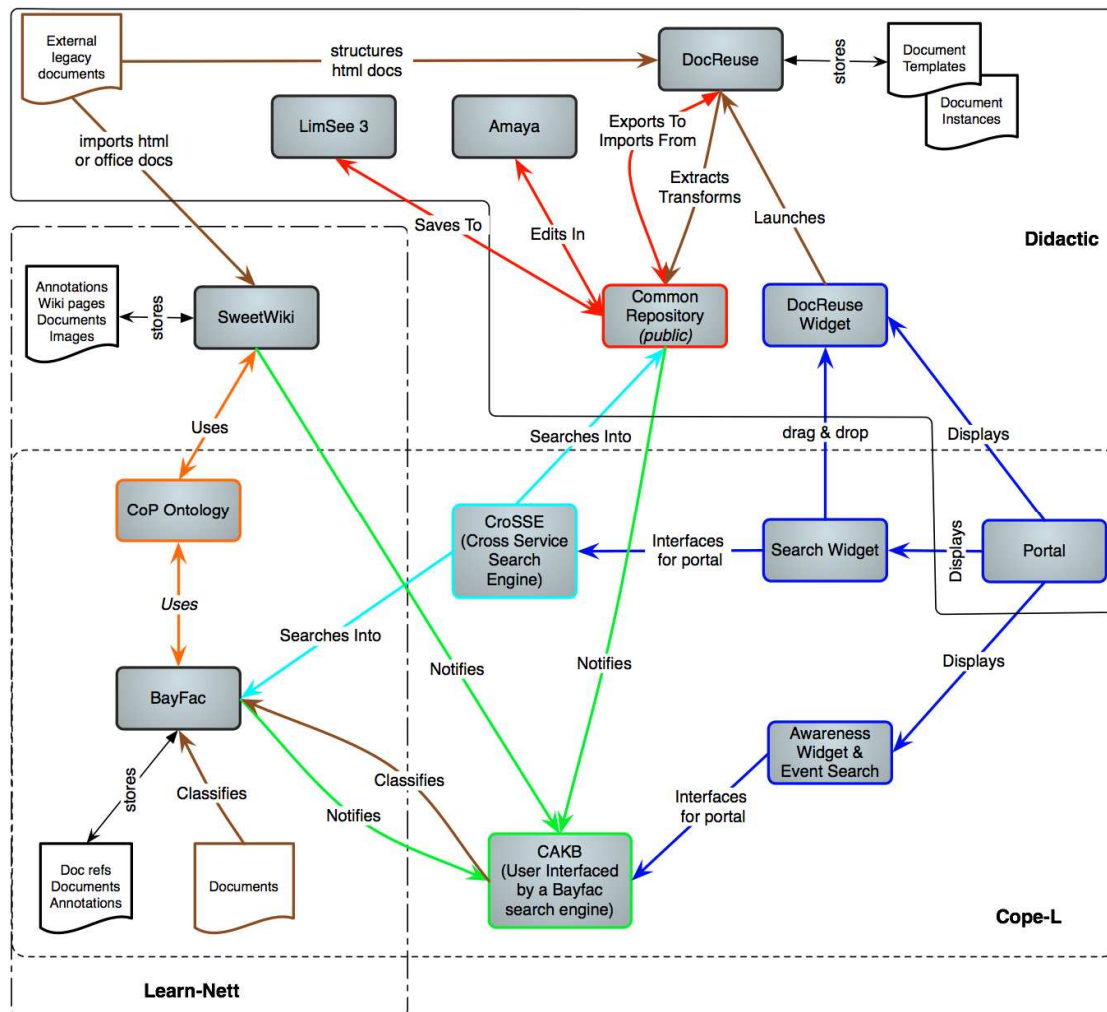
Figure 2.   Conceptual Diagram of Integration between services for the Reification Scenario.

The situations presented in the next section describe more precisely the interactions between the services in the context of each CoP.

2.3.3   Reification Scenario Situations

Form@HETICE, TIC-EF and TIC-FA Classify, Share and Search Information

Status: tested

In this situation, a given community has produced a lot of resources other time. The community then decide to classify all these documents in a BayFac space in order to retrieve them more easily. So they have first to upgrade the first ontology dedicated to their CoP focusing on the domain they deal with. Then, the mediator and some CoP's members classify some resources and test the accuracy of the search engine and the Bayesian system.

This situation has been tested by the Form@HETICE other the three hundred documents they had produced during the last year on Information and Communication Technologies in Education (ICTE). Plenary meetings and the Form@HETICE newsletter permitted to let the members better know and use the BayFac services.

A variant of this situation is to classify and share the reference documents for the courses of the community like scientific articles, theoretical models, etc., in a common place. Similarly, the CoPs'

animators have first to prepare documents to be classified and to define the "ontology" of the CoPs' domain. In the case of TICEF & TICFA CoPs, these "ontologies" were transmitted to the developers of BayFac to create the facets and values used into their spaces (URL: BAY-SPA).

The variant also consists in giving instructions to the CoP members to define a question, search resources in their BayFac space using one or more facets, write down the obtained results, for instance with Amaya, examine the accuracy of the information and finally upload and classify their analysis.

In the case of the TIC-EF CoP members also explored the BayFac space of the Form@HETICE CoP since the domain of this CoP is very close to theirs. Later these CoPs' members will provide documents to be uploaded and classified by themselves or by the animators. This also shows that it is easy to combine the spaces of different CoPs once they share similar ontologies.

Learn-Nett Collaborative Experience Sharing

Status: tested

This situation is twofold with two activities. The first activity aims at formalising the daily practices of the Learn-Nett tutors in order to identify the issues they face with their students' groups and the solutions they find and implement. The issues can be pedagogical (interactions with students and other staffs) or technical (use of the Learn-Nett platform and tools) as well as related to communication within the distant course. The reified practices could then be searched and used by other tutors facing the same issues or new tutors.

The collection of described issues is also used in the tutors' training held each year in December before the students' groups phase. For this purpose, SweetWiki is used by the tutors. The coordinator has designed a common structure for the description of the situations and their solutions. Once a situation appears, a tutor describes it into a Wiki page and proposes his/her solution. S/he tags the page. Other tutors can then comment the proposed solution or propose new solutions. As the tutors go along the project, new situations appear. Before describing a new situation in a Wiki page, they search for possible related situations and solutions with the Wiki tags.

The second activity of reification is to gather in one place the documents produced in Learn-Nett since its beginning in 1998. There are different types of documents (PDF, DOC, JPG, HTML, URLs, etc.) and their contents are varied (students' groups reports, students' individual reflective reports, Learn-Nett pedagogical or technical guides, research papers of any type, presentations in conferences, tutors' or students logbooks, external resources used by tutors or students, etc.). Some resources are public, others are private i.e. available only for Learn-Nett coordination team members. The target public is also varied within Learn-Nett or external. The purposes of this archiving are to enhance the visibility of the Learn-Nett products that are currently disseminate on different Web sites based in different countries, inform the pedagogical choices of the coordination team while making pedagogical decisions from one year to the next, allow researchers (tutors or coordination team members) browsing within potential useful data (students' reports, logbooks, etc.), circulate the students' groups reports to new students, and inform new staffs (tutors, local coordinators, etc.) about the history, identity, and products of the Learn-Nett.

For this purpose, the BayFac service is used on the basis of an ontology of Learn-Nett documents elaborated beforehand. The ontology has first been elaborated and discussed within the Learn-Nett team. Then, it has been created into a dedicated BayFac space. The Learn-Nett members then uploaded documents into the base and classified them. Finally, all members of Learn-Nett (students, tutors, professors, coordinators, etc.) as well as external public can browse the base and search for interesting documents.

Didactic Meeting Capitalization

Status: tested

In this situation the Didactic community organizes meetings to talk about the teaching experiences of its members. The community has agreed on a document template to represent the experiences discussed as a structured document where they can easily spot the potential problems that can occur to

a teacher and different solutions to handle them. The CoP animator, Anne, first creates the template with Amaya. Then, during a face to face meeting, one of the meeting participants, Pascal, takes the role of a scribe. Depending on personal preferences, he can choose to directly take the meeting minutes using the template produced by Anne using Amaya, or if he prefers, he can also type the notes in a plain textual unstructured document. In that later case, Pascal will later open the raw text document with DocReuse and structure the notes he had taken during the meeting with DocReuse, using the template created by Anne.
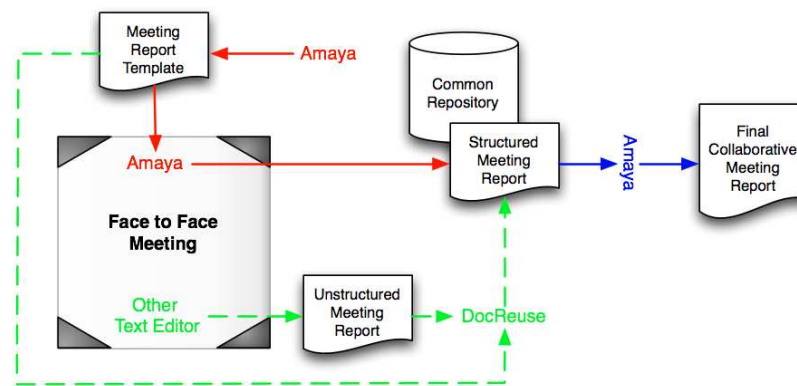

Figure 3.   Meeting Capitalization Situation Synoptic View

After Pascal has produced the first version of the meeting report, he puts it on a common server where the community stores its electronic assets and advertises them. Then, the other CoP members can complete it using Amaya to directly open and save the document from and to this common server, and using email for instance to coordinate their interventions on the document.

The Meeting Capitalization Situation requires some interoperability between Amaya and DocReuse through the use of a Common Repository support service to share the document templates and the document template instances.

Didactic Meeting Reports Synthesis

Status: test in progress

The Didactic community has now been producing meeting reports for a few months, and after 14 meetings, they estimate they have enough material to prepare a consolidated report on the best practices in teaching. They want to produce this report for two purposes. First, they want to quickly display it on their public Web site, to show the results of their group thinking. Second, they want to turn it into a book, that they will complete in the next months, to produce a guide that they expect to publish at the end.

To speed up the process, instead of manually collecting the 14 meeting report and cut and paste the interesting parts, they use the extraction module of DocReuse to specify which structural element they are interested in each report instance. To speed up the process even more, they delegate to DocReuse and to a Common Repository the identification of all the report instances which are available and linked to the most recent template they used. So finally, their only action is to select a meeting report template from the Common Repository widget, drop it into the DocReuse widget to open the extraction module, configure the extraction parameters and launch it.

The result of the extraction is available under two forms. The first form is an XML document that they can directly publish on their site with a style sheet created by Patrick, one of the community member knowledgeable in XSLT style sheets. The second form is an HTML document. This document made of pieces extracted from all the other document instances, can be further edited to be turned into a book. This book can be edited by one author alone, for instance Anne, or it can be shared on a

common repository from where it can be collaboratively edited with Amaya, as they did to complete the individual meeting reports.
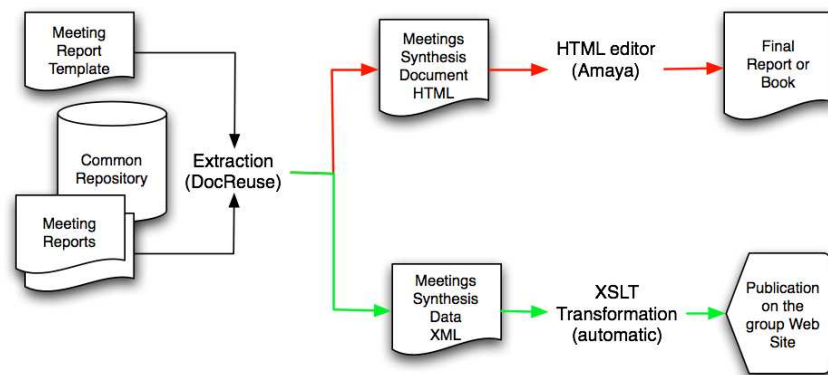

Figure 4.   Meeting Reports Synthesis Situation Synoptic View.

The Meeting Reports Synthesis Situation has required the development of a new structured document extraction service. This service is a key service for augmenting the benefit of producing structured documents for a CoP. As illustrated in this situation it allows to quickly reuse multiple documents content to create new documents. The main challenge of this situation is to setup an efficient repository that allows to link document templates with their instances, so that the extraction service can automatically query all the document instances.

Didactic Meeting Reports Evolution

Status: discussed

The Didactic community keeps its documents in the long term. As it progresses in its understanding of its subject matter, some members suggest additions of new section to the documents, reordering of sections or eventually renaming or deletion of sections. Usually these operations are costly to apply to a set of legacy documents, and progressively the older documents fade away as they are less and less consulted because their content does not reflect the current representation of the community interests.

For instance during the first 6 months of the project, the meeting reports included an account of the decisions taken during the meeting. After the first 6 months, the community members decide to add directly to the report a feedback section for each decision taken. To simplify their work, they wish to have a tool that automatically inserts a feedback section next to each decision, pre-filled with the content "no feedback yet". This way when they visualize the older meeting reports, they look like the most recent ones. Another side effect is that if Pascal, who has some time, decides to add a feedback for all the decisions taken during meetings he attended to, he can use a structure based search engine to find meetings reports where he is in the attendee list, and with some feedback sections with a content of "no feedback yet".

The document evolution situation has led us to develop a specific evolution service in DocReuse applicable to all the documents that a community has created using document templates. In a way, the evolution service is one of the added values that can be proposed to encourage a community to structure their documents. The main challenge of the evolution situation is to setup an efficient repository that allows to link document template with their instances, so that by applying modifications to one template, all the instances are automatically updated.

Cope-L Faceted Search

Status: tested

The CoPe-L community changed its management context at the end of 2007, and took advantage of this opportunity to renew the support services of management and animation.

The CoP animators decide to introduce new services that replace the Yahoo group, in order to improve the resources management and communication. As a first step, the service BayFac has been identified to cover the problem of the resources management. The ontology used by BayFac has been created with some CoP members and a researcher. After that, to generalize the access of all services used by the CoP, namely a blog, a calendar, BayFac, and a list of contact, a Portal has been installed. The portal for the CoPe-L contains a widget for all services, and two "awareness" widgets, which are respectively linked to the last messages posted on the blog and to the last resources added on BayFac. Thus the CoP members have access in one view to the blog, and can see the last messages sent, to the functionality search of BayFac, and to the last documents uploaded on this service, they also have access to the list of all CoP members, and they have a view of the agenda of the CoP, which relates events related to e-learning and meetings of the CoP. They have the possibility to configure the number of last messages sent on the blog, and the number of last documents added on BayFac.

Concerning the "awareness" demand, a CAKB, linked to BayFac, has been installed for the CoP animators, in order to enable them to follow the different actions (creation, reading, updating, deletion) occurring in their community. They can search the actions made by author, type or date, or they can have a view of the actions made on one document.

ePrep and Didactic Annotated Audio and Video for Multimedia Reification

Status: tested

Some communities use some face to face training situations. For instance, ePrep teachers have to prepare students for competitive oral examinations. The preparation consists mainly in training the students with several oral tests during the year. For instance, one of Didactic motivation is to understand and enhance teaching practice (how to start a session in order to capture the audience? how to make my course more lively and interactive?). For that purpose, the community organizes short teaching sessions simulated between teachers to be then analyzed and discussed.

When the oral tests or the simulations are not recorded, they are lost and cannot be reused by the community. Sometimes, they are not totally lost as some written notes may be taken during the event. This suggests that if an audio and/or video recording of the face to face session was recorded, it could be conserved together with the written notes taken during the session for later reuse. An even greater exploitation of the resulting materials would be to combine them together into a multimedia document, for instance consisting of the audio and/or video shoots augmented with the text annotations synchronized with the other media. It is also possible to author navigational links and keyword additions to make the document more reusable. Of course this situation also requires some means to package, to publish, to retrieve and to playback the resulting multimedia documents in multiple standard formats.

As for structured documents, the process of producing multimedia documents requires specialized tools and some know how which makes it difficult for most of the CoPs. That's one reason why one of the PALETTE service, LimSee3, has been designed to extend the concept of document templates to multimedia documents. This way it allows CoP members to record and annotate their face to face meetings.

For instance, the ePrep community has designed a multimedia document template for authoring student oral presentation augmented with the textual annotations. For instance, the Didactic community has designed a template to allow meeting participants to annotate pre-recorded teaching sequences that they want to analyse during a face to face meeting. In that later case, the meeting can be built not simply with the video of the pre-recorded teaching session but with a rich multimedia document resulting from the merge of all the participant annotations and the video.

TIC-EF and TIC-FA Production of Logbooks

Status: tested

The purpose of this situation is to help the CoP's members to produce some tracks of their learning process during the activities. By keeping a logbook, the students can reify and analyze their own experience of learning.

To sustain the members' reflections, the animator of the CoP gives them some instructions but they have the freedom and the possibility to be creative about the logbook presentation. The logbook contains two parts: one private and one shared. The personal section is based on individual variables (Charlier,1998) that the learners could not want to share with the CoP animator. The second part of the logbook leads each learner to take a new look at oneself and reflect on one hand, on the training activities compared to their expectations and on the other hand, on topics such as their ICT mastery, the production of documents, the collaborative edition, the usability and the acceptability of the proposed technological resources and the collaborative learning. These reflections are conserved in their portfolio where they capitalize their productions.

Every week, the members fill their logbook and send them to their teacher. Each version of their document is edited with Amaya which in the TIC-EF and TIC-FA cases proved to be useful to create a logbook easy to share with others.

TIC-EF and TIC-FA Production and Searching of CoPs' Pages on ICT Invariants

Status: tested

In this situation the CoPs' members are confronted to the concept of ICT invariant (Poisseroux, Lassaux & Vandeput, 2008; Vandeput, 2006; Vandeput & Colinet, 2005). First, the animator creates a general page within SweetWiki. Then, the CoP members make some hyperlinks from this page to other ones they create and where they give their personal definition of invariant and some examples. They annotate each page with the tagging functionality; they search and find their productions and/or the others' ones to complete theirs.

In this situation that was tested with the TIC-EF and TIC-FA CoPs, the use of SweeWiki gave a unified access to a common capital of knowledge located in the wiki pages of the two CoPs. Some resulting pages are available online (URL: INVA).

2.3.4 Feedbacks on Implementation

The development of several PALETTE services have been directly influenced by the definition of reification situations. The services the most impacted have been Amaya, DocReuse, BayFac, SweetWiki, the Common Repository and the Portal. Following are a few examples of significant results:

- Before the generic scenario work was done, we had only unified the template language syntax between Amaya and DocReuse for data interoperability purpose. As some user's feedback complained about the difficulty to recognize the same template opened with Amaya and with DocReuse, we have finally homogenised their representation in both environments. As such, the icon set to represent repetition, optionality or composition of structural elements are the same in both services.

- Some end users have been recorded on video while they interacted with the DocReuse structuring module as described in the Meeting Capitalization situation. The video recordings have allowed us to turn some of their questions into a list of FAQ entries. These entries have been added as help pages inside DocReuse.

- The initial version of the Portal was developed as a mean to visually integrate some minified versions of the services. This can be used for instance to give awareness on the last actions performed in these services, or as a convenient way to launch a service from a central location. As we reflected about the document reuse instances of the scenario, it appeared that it would be very useful to also have a drag and drop capability between widgets. For instance, it allows users to start the DocReuse application from the portal with pre-selected document templates and/or document instances with a minimal number of actions.

- For the CoPe-L situation, a Cross Awareness Knowledge Base (CAKB) has been setup to track the submission of new resources to a BayFac document classification service (El Ghali, 2007) at the disposition of the community. The return on usage has lead to integrate a validation workflow in order to verify that the classification of the added resources by some

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members is correct. In fact, the persons responsible for validating the classification can access directly to the last created resources in BayFac by selecting the "create" action, and the service concerned from the CAKB user interface.

- The activities led by the TIC-EF and TIC-FA CoPs' members and animators permitted to test several scenarios allowing a reification process with BayFac and SweetWiki, returns of experience have been transmitted to the developers.

2.4 Debate and Decide Scenario

The goal of the debate and decide scenario is to enhance the group discussions in a CoP. A discussion, that can be a debate or a decision making process, is more efficient when the participants have a wide access to resources related to the topic they are concerned with.

Collaboration and mediation services, like CoPe_It! (Karacapilidis, 2008), that support debate and decision making in a CoP allow the members to discuss about a topic by building a workspace where they can present their ideas and points of view, but also by providing to other members resources about the discussion topic. However, since the CoP can use many different services to produce resources and to store them, providing the CoP with an easy-to-use mechanism to enrich a discussion workspace with external resources of the CoP will improve the debate and decision-making processes.

The scenario focuses on facilitating the access to external resources from the discussion workspace in CoPe_It!. The external resources are located in other Web applications used by the CoP, they can be for instance, Wiki pages in SweetWiki, documents in BayFac or the common repository, as well as assets in eLogbook. A generic mechanism to access external resources from a discussion workspace is provided depending on the users needs and the nature of the discussion.

In order to provide access to external resources we need (i) in each discussion space to define the topic of the discussion and to characterise its components. In CoPe_It! this can be easily done relaying on the annotations that users associate to a workspace or to components it includes. That information is then used (ii) to retrieve from the CoP space the relevant resources for the discussion or for a particular component, this can be done by using semantic services or Generis to search the semantically annotated resources (in SweetWiki or BayFac for instance) or the CroSSE (Cross Service Search Engine) to retrieve non annotated resources (in the common repository or eLogbook for instance). Finally, we (iii) add or display the retrieved resources in the workspace.

After the reorganization of WP5 teams, the following scenario instances and situations have been elaborated by the second team (URL: GS2).

2.4.1 Debate and Decide Scenario instances

Augmenting a Debate with related Resources

In this scenario instance, the CoP members debate with an argumentation tool about how to solve a problem. The discussion workspace contains local items that represent the discussion and Ada, a member of the CoP, introduces a new proposition in the discussion. She annotates her proposition using the CoP ontology and folksonomy. She can use a semantic search engine to retrieve resources of the CoP related to her proposition. She selects some of the returned resources and chooses either to copy or to link them in the discussion workspace.

In PALETTE the CoPe_It! service supports argumentation workspaces. It also uses the annotations provided by its users to update the tag cloud of the workspace containing popular tags from other semantic services related to the included resources. The challenge of this scenario is to allow a seamless integration of external resources with the argumentation workspace.

Decision Making Support with Relevance Scores

The CoP should take a decision about an issue IS1, Ada and Charles have different positions concerning IS1 (P1 and P2 resp.). Both of them annotate her/his proposition and use semantic search services to retrieve the resources pros her proposition and cons the other.

A further step is to retrieve and/or compute a relevance score for the imported resources with the help of the semantic search services to allow the argumentation service to compute a score with P1 and P2 in order to help other users to decide between Ada's and Charles' propositions.

This scenario instance is an extension of the previous scenario.

Awareness to Support Discussions

This scenario instance is based on the idea that during any kind of discussion, it is useful to be aware on what happens in the CoP environment. When starting a discussion in one service, the moderator of the discussion can setup some RSS feeds that will keep the participants informed about what happens in the CoP environment. For example, s/he can setup an RSS feed coming from another service with a set of tags related to the discussion topic and display this feed in the workspace of the discussion. This RSS feed keeps the CoP members aware about the resources related to their discussion which appears in the second service. This scenario can be expanded to any number of services, as long as a service publishes events through RSS feeds, those can be integrated to the discussion.

In PALETTE several services produces event feeds, among which SweetWiki and the CAKB. These feeds can be integrated into a discussion workspace into CoPe_It!.

2.4.2 Conceptual Integration for the Debate and Decide Scenario

The figure below shows some of the interactions between PALETTE services in the debate and decide scenario. The services providing external resources (in grey boxes) can store semantically annotated resources (in SweetWiki for instance) that we search using semantic search engine (e.g. semantic services), or other resources (e.g. documents in the Common repository) that are accessed via the CroSSE. Other sources of information can be injected into a discussion workspace, for instance awareness information provided by the CAKB, or tag clouds from semantic services.

The arrows show some possible information flows between the services. For example, the semantic queries sent by CoPe_It! to the search engine is constructed using the topic of the discussion and the annotations of its components, and encode the nature of discussion (debate or decision making).
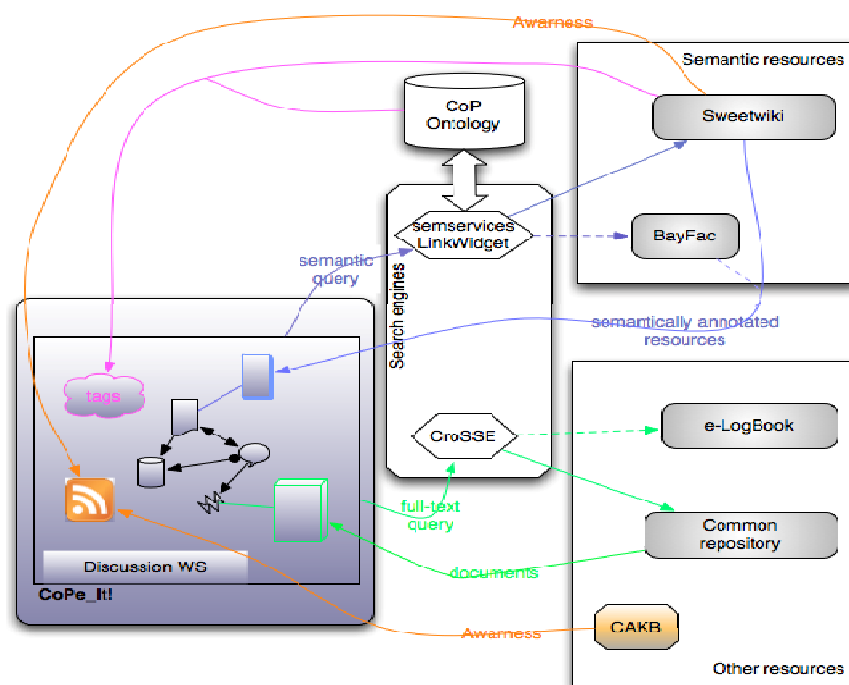

Figure 5. Conceptual Diagram of Integration between services for Debate and Decide.

2.4.3   Debate scenario situation

TIC-FA Debate about the Feeling to belong to a CoP

Status: tested

This situation aims at freshly created CoPs' of students that want to increase their sense of belonging to a community by debating between themselves. The members discuss on the evolution of their CoP and their feelings related to its emergence. The exchanges of the members' representations take place within the CoPe_It! service. The students have to search/find and to interact on some publics workspaces as well as to insert and to share resources about this topic. The CoPe_It! service supports these activities by offering a place where the members can interact about their respective roles, their common interests and purposes, their modes of exchange and functioning, and theirs behaviours within the CoP.

In that purpose, the mediator of the CoP divides the community into several groups of three students. Then s/he creates one workspace for each group and asks these groups to edit the workspaces in a synchronous way.

In applying this situation with the TIC-FA CoP, a researcher of the CRIFA introduced the service by a demonstration of the goals and functionalities of CoPe_It!. Moreover, he had defined the various types of objects to be used in CoPe_It! to avoid ambiguities. The practice and applied methodology sustaining this activity relates to "shoring" ("étayage": Bruner, 1993) and to learning / teaching event "guidance/practice" (Leclercq and Denis, 1998; Denis and Leclercq, 1995).

TIC-EF and TIC-FA Analysis and Comparison of Educational Environments through Two Document Models

Status: tested

This situation consists in **analyzing four educational environments**: DES-TEF (URL: DES-TEF), e-Woccq (URL: e-Woccq), Learn-Nett (URL: Learn-Nett) and "Préparation de conférence" (Sprummont, 2007). It also consists in **comparing** the four environments **with two theoretical models**: the "DIAMANT" (Leclercq & al, 2000) and the "Sept piliers de l'auto-formation"(Carré & Pearn, 1992). Two Amaya templates are used to produce some analysis documents and DocReuse is used to make the comparison between them. This scenario aims at likening the results of the analysis and visualizing the differences and the similarities between the analysis made by the members of the CoP about the same learning environment and the same theoretical model and another one.

To do it, the CoP's animators designed two templates recovering the theoretical models cited above; templates which were finally created by the developers of the Amaya tool and corrected by the DocReuse developers to be usable by this service. Then, they allocated to different pairs of learners the analysis models and the learning environments. The CoP's members analysed them and produced a well-structured document by filling the templates with the Amaya tool.

This situation is in fact a blending of the Reification and of the Debate and Decide generic scenarios which has been adapted in a common situation for the TIC-EF and TIC-FA CoPs. It illustrates an emerging use of DocReuse for comparing documents.

2.4.4   Feedbacks on Implementation

The "debate about feeling to belong to a CoP" situation is a debate one, but it also contributes to the animation and identity building of the CoP. In summary, we can say that, even if its acceptability is not optimal, the learners, who practice it only once, recognize nevertheless many assets to the underlying services. CoPe_It! gives the opportunity to the CoP members to live a collaborative activity with the use of a technological tool and this, in a synchronous way. The users appreciate the conceptual chart allowing a total visualization of the debate. The "Time-entered" view, with the historical of the exchanges, is considered by the learners as an important function of the service in particular when a member intervenes on the workspace after a long time (asynchronous discussion). Finally, the learners estimate that the service allows the creation and the development of a CoP.

Nevertheless, difficulties of usability represent brakes to its use including three major problems which have been communicated to the developers for ongoing improvements to the service. More details are available in D.PAR.08.

2.5 Animation Scenario

The aim of the animation scenario is to encourage CoP members to participate into collaborative activities. It is also to create engaging collaboration environments that span across services and that remove traditional barriers that hinder participation. In the context of the animation scenario, these issues are related to the concern of identity building within CoPs.

Identity building focuses in particular on facilitating the management of entire CoPs, individual CoP member as well as their activities and events. The emphasis is on overcoming obstacles to participation and engagement that emerge in environments where CoPs collaborate with interoperating services.

In situations where CoPs make use of various tools to support collaboration, the number of tools may imposes additional overhead in setting up the appropriate context that makes the actual use of these tools (for example sharing of resources) possible. This additional overhead is due to the need to configure appropriately each tool for the use within a CoP and which includes tasks such representing the CoP within the tool, setting up accounts for each CoP member, managing CoP activities, the related resources and events. Lack of supporting such tasks in an easy-to-use and efficient manner may hinder the participation and engagement of CoP members and ultimately may lead CoPs in avoiding the adoption and use of existing PALETTE tools, even if they provide advanced and useful interoperable functionalities.

After the reorganization of WP5 teams, the following scenario instances and situations have been elaborated by the third team (URL: GS3).

2.5.1 Animation Scenario Instances

User Registration and User Login

Many services require users to register to the service before they are able to use it. Registration is the procedure by which an appropriate account is created and which entails the setting up of the user's profile, a set of fields related to the user's personal data (such as name, surname, homepage, email, etc). The aim of the registration process is to gather the necessary information with which the user can be identified during collaboration sessions. Registration is provided on a per tool basis and is in general a mandatory step before using the tool. As users hesitate to repeat the registration procedure, providing ways with which such obstacles can be removed is important.

In this scenario instance users are able to start services without requiring the manual creation or maintenance of their profile information. Deploying widely adopted technologies, such as OpenId (URL: OIP), is an advantage as users will be able to register to any service with a single account. In addition, whenever a user updates his/her profile information, such as their homepage or email, the respective changes should be automatically propagated to the profiles that the user maintains in other services.

In the context of PALETTE, this scenario has been particular relevant to eLogbook, CoPe_It! and SweetWiki that all require to create the same kind of profile. It has led to the development of a specific support service and some pair-wise integration between services that will be discussed in chapter 3.

Ubiquitous and Pervasive CoP Management

In this scenario, a CoP is using a first service to support its collaborative activities and in which the animator has already defined the CoP in terms of memberships and roles. Now, the animator wants to setup and prepare a new service in order to be ready for use by the CoP. Setup and preparation in this context means that s/he has to model and represent the CoP within the new tool, associate users with the CoP, managing their membership and their roles.

As the animator has already carried out such steps in the tool that the CoP currently uses, there is the need to easily instantiate the CoP within the new tool simply based on the settings of the first service that the CoP already uses. This scenario suggests the interoperability of tools in a way that enables the management and administration of CoPs in one service from within another and in addition the synchronization of the status of CoPs (in terms of memberships and roles) between the services.

In PALETTE, such abilities are in particular useful for CoPe_It!, eLogbook and any other third party tool, such as Web based forums, that permit group and membership management.

Management of Activity related Resources

In this scenario, a CoP engages in a collaboration session that transcends a single tool and hence the CoP's activities are scattered across tools. This situation may impose additional cognitive overhead in requiring members to keep track of where each activity takes place and what its current status is. To avoid such circumstances, there is the need to associate activities that belong to the same collaboration session but nevertheless are hosted in different tools.

In the context of PALETTE, this scenario has been particularly relevant to eLogbook, CoPe_It! and SweetWiki, that all allow to create workspaces linked with an activity.

2.5.2   Animation Scenario Situations

Torre Guaceto community Ubiquitous and Pervasive CoP management

Status: tested

Torre Guaceto is a community of farmers that collaborate on various issues related to enhancing their biological production income in a agricultural area in the south of Italy (Puglia region, Brindisi province). The main goal of the farmers is to build a repository of best practices to be used to inform potential customers about the agricultural production and its biological value, then hopefully enhancing the sales of the Torre Guaceto local products. The main objective for the farmers' group was to increase the profit gained from the biological production. The community makes already use of ICT tools to create and populate a repository of best practices that constitutes its past and present project history. These tools include Web based forums to support the communities' discussions and Compendium (URL: COMP) to capture the deliberation process.

The community was interested in using CoPe_It! as one additional tool for capturing the deliberation process as it complements the abilities of Compendium. In particular, the ability for Web based deliberation, synchronous collaboration and reasoning algorithms were of particular interest.

Since the Torre Guaceto community already deploys ICT tools to support their collaboration, the community wished to speedup the process of configuring CoPs within CoPe_It! in order to set up the appropriate environment with respect to user accounts and CoP memberships. In particular, all community member were already registered in the Web-based forum, the community is already using and the need were expressed to import existing users into CoPe_It!. In addition, any new user that would register in the Web-based forum should be automatically added to CoPe_It! and added to the appropriate CoP.

The user management module of CoPe_It! was used to address this need. More precisely, the CoP animator of the Torre Guaceto community initially created a CoP in CoPe_It! (named "TorreGuaceto"). Then he imported all users of the Web based forum into it, thus creating for each registered forum user a CoPe_It! account. This action simultaneously populated each profile with the appropriate information. During this procedure, all imported users were automatically added to the "TorreGuaceto" CoP.

In order to automatically add any new user, that would register to the communities' Web-based forum and to CoPe_It!, the Torre Guaceto community integrated the user management services of CoPe_It! into its forum software. The software forum invokes CoPe_It!'s user management services each time a user registers to the forum. As a result, every time a new user registers to the communities' forum, an account is automatically created – with the respective profile information – into CoPe_It! and set as

member to the CoP named "TorreGuaceto". This way any user of the forum becomes also a user of CoPe_It! with the same profile.

This is an example of Ubiquitous and Pervasive CoP management, as described previously.

TIC-EF and TIC-FA CoPs Adaptation of "Yellows pages"

Status: tested

This situation is an adaptation of the Learning and Organizational Resource (LOR) named "Yellow pages" (URL: YP). This LOR deals with the management of members through the constitution of a repository of contacts by creating personal pages in SweetWiki. Each member provides information on his/her current work, professional qualifications, main interests… To complete his/her profile page, s/he adds a photo and creates links towards other resources (example: another Web page). S/he also has to tag his/her pages in order to facilitate the retrieval of colleagues or specific expertise. This situation contributing to the building of the identity of each CoP has been tested with the TIC-EF and TIC-FA CoPs.

TIC-EF and TIC-FA CoPs News Editing about the ICT in Education

Status: tested

In this situation the learners are asked to edit particular information on ICTE (innovations, last novelties…). In that purpose, they have access to the SweetWiki service where a specific page is dedicated to the news concerning the domain of their community. To guide the learners in the layout of the "WikiNews" pages, the animators give them a common structure to describe the news (title, source, description and author with the publication date). This service allows to animate the CoP by providing editing activites based on a "WikiNews" template page.

The news editing situation represents a continuous activity for the TIC-EF and TIC-FA CoPs. You can find some public examples of edited pages online (URL: NEWS-FA and URL: NEWS-EF).

TIC-EF and TIC-FA CoPs Creation of Netiquette Pages

Status: tested

In this situation the creation of "Netiquette" pages with the SweetWiki service allows the learners to undergo an activity of collaborative editing. This one consists in conceiving charters collecting recommendations about the use of four types of services: Wiki (1), chat (2), email (3) and forum (4).

The animators create four different pages (one per service) in SweetWiki for each CoP (URL: NET-FA and URL: NET-EF):

- NetiquetteWiki
- NetiquetteChat
- NetiquetteCourriel
- NetiquetteForum

As SweetWiki is not designed to be a synchronous collaborative editor, the animators propose a planning which makes the pages available at different moments to the members of the community during the course, to avoid conflicts of simultaneous editing of the same page. In their respective CoP, the learners constitute groups of about three people who carry out a first draft of recommendations in SweetWiki. Then, a change of group participants takes place but a member remains for each topic. Once the new groups formed, the learners exchange and agree on the proposed rules in order to edit out improvements in SweetWiki. This activity is finished by a collective discussion with all CoP's members.

2.6   Summary of the Situations

The situations described in this chapter have been chosen for their illustrative purpose. They are summarized in the table below. Of course, more situations could be imagined, however the combination of the scenario instances is a powerful matrix to generate new situations as needed in the

context of a given CoP. Some of these situations, and a few others, are described and analyzed in the companion deliverables D.PAR.06 (Ashwin & Daele, 2008) and D.PAR.08 (Daele, 2008).

Situation	Generic Scenario	Status
Form@HETICE, TIC-EF and TIC-FA Classify, Share and Search Information	Reification	Tested
Learn-Nett Collaborative Experience Sharing		Tested
Didactic Meeting Capitalization		Tested
Didactic Meeting Reports Synthesis		Test in progress
Didactic Meeting Reports Evolution		Discussed
Cope-L Faceted Search		Tested
ePrep and Didactic Annotated Audio and Video for Multimedia Reification		Tested (ePrep) Discussed (Didactic)
TIC-EF and TIC-FA Production of Logbooks		Tested
TIC-EF and TIC-FA Production and Searching of CoPs' Pages on ICT Invariants		Tested
TIC-FA Debate about the Feeling to belong to a CoP	Debate and Decide	Tested
TIC-EF and TIC-FA Analysis and Comparison of Educational Environments through Two Document Models	Debate and Decide & Reification	Tested
Torre Guaceto Community Ubiquitous and Pervasive CoP Management	Animation	Tested
TIC-EF and TIC-FA CoPs Adaptation of "Yellows pages"		Tested
TIC-EF and TIC-FA CoPs News Editing about the ICT in Education		Tested
TIC-EF and TIC-FA CoPs Creation of Netiquette Pages		Tested

3 Services Integration Components

3.1 From generic scenarios to components for integration

The situations describe concretely how the generic scenarios can be applied through the use of some of the PALETTE services together. However, putting that vision to work has required some extra efforts in addition to the design and development of the individual services. It has required to finally achieved the interoperability of the services. Following the technical guidelines for interoperability which have been set during the course of the project, and which have been extensively discussed in the previous deliverables, we have deployed our efforts towards formulating interoperability into more abstract properties that make software "socializable" (Sire & al., 2008).

To make the reader "feel" these properties, this section is presented around four main questions that the user will ask to herself each time her participation to the community involves the interaction with several services. These questions evolve around:

- the management and sharing of one or more identities in each service (by identity we also mean the belonging to one or more groups);

- the awareness of the last events in the community and of the individual actions;

- the sharing of resources between several services;

- the localization of the resources.

As we address each of the points above, we present the concrete underlying integration components in two steps. First, for each question, we present the support service which has been developed. A support service is a specific service which allows to integrate any number of services together. The integration of a new service through a support service simply requires to develop a connection between that service and the support service. In a second step, we present some specific pair-wise integration components that have been developed to interconnect two specific services together.

Although this section presents some technical details, it has been written with the potential end user in mind. For that purpose it tries to present as often as possible some concrete examples, at the user interface level, of the presence of software functionalities targeted at interoperability.

3.2 How to Share his/her Identity between Services ?

The first contact between a user and a service is most of the time the registration or the login form. This may become a concern in our context, where we try to encourage community members to spread their activities and resources onto several services. As each application comes with its user accounts, its login form, etc, it can be difficult for a user to keep track of the overwhelming number of logins and passwords. A way to lower this barrier entry is to allow users to share the same identity in multiple services, this is known as single sign-on (SSO). Some solutions can also go beyond and allow to also share all the account information between the services, this is known as identity profile aggregation.

3.2.1 OpenId Identity Management

Goal of the service

The objective of the OpenId identity management service is to allow users to connect to different services with the same user identifier. Thus it is a single sign-on solution. Our component is a basic OpenId server (identity provider) that has been implemented for PALETTE. We have designed the service in such a way that it is possible for the user to connect only once to the identity provider and then to allow other applications to log in the user without having to ask him the usual login/password authentication process.

Technical requirements

When we analyzed the problem of SSO, we identified the following requirements.

Mainly Web applications: In the PALETTE project we are mainly dealing with Web applications. Some standalone applications are available (Amaya, Limsee3) but their usage is limited to document authoring and these documents are after handled by other PALETTE services on the Web. This requirement can be considered as a simplification assumption, since we keep our action space on the Web, and we do not encounter platform or OS incompatibilities, cross-platform implementation support, etc.

Distributed: As discussed before, in the context of a CoP, it does not seem sensible to keep all identity information in one central place. As the different systems involved are heterogeneous, it is mandatory to build all the identity information exchanges on loose coupling.

Lightweight: The solution should be kept simple, so as to be easily adopted among technical partners.

Respect of the Laws of Identity: The Laws of Identity (URL: LOI) are well-known principles implemented in most modern identity management systems. Their main concepts are the following:

- *Control of the identity information disclosure*: each user should be able to control the disclosure of its identity information to third party applications.

- *Minimum information needed released*: The system must restrict automatically the amount of information it discloses to third party to the minimum required for a transaction to succeed.

- *Impossible to automatically link up all information's about a person, multiple identities*: Once a user has disclosed some of its identity information to a third party, this one should not be able to gather other identity information from this user. For example if you buy something at Ebay, Ebay should not be able to read your purchase history at Amazon. One solution to this problem is to have multiple identities, containing the minimum of information needed for each type of transaction.

- *Choice of the identity provider*: It is important for a user to trust his identity provider, so he cannot choose it by default.

- *System simple and understandable for users*: Also related to the trust problematic, if a user cannot understand its identity system, it seems difficult to trust it. If it is simple, it will be less error prone.

Our solution

According to these requirements, we selected the OpenId protocol (URL: OIP). it is a widely adopted, free and open standard that relies on a distributed architecture.

In an OpenId infrastructure, there are three main actors: the user, its identity provider, and a relying party, as known as a service provider. The user wants to log in to the relying party by using his identity coming from his identity provider. The identity of a user is represented by a URI provided by an identity provider, and a user can have multiple identities stored in one or more identity providers. The protocol is based on RESTful Web services communications and is thus coherent with the PALETTE architecture.

When a user wants to log in to a relying party, he provides in the login form its OpenId identifier. From this identifier, the relying party identifies the identity provider and contacts this service so as to gather identity information about the user. The user is redirected to its identity provider. If it is not already logged in, he has to log in. Then he is prompted to confirm the fact that he agrees to connect to this relying party. Finally, the identity provider redirects the user to the relying party and transmits the identity information if the user authorized the connexion to the relying party.

A basic OpenId server (identity provider) was implemented for PALETTE, whose main objective were to streamline this process and to provide a simple and understandable interface for this kind of service. The technologies involved in this implementations are PHP5 / MySql, and the JanRain PHP OpenId library, that is a reference implementation of the OpenId protocol, thus enabling a maximum compatibility with other OpenId components.
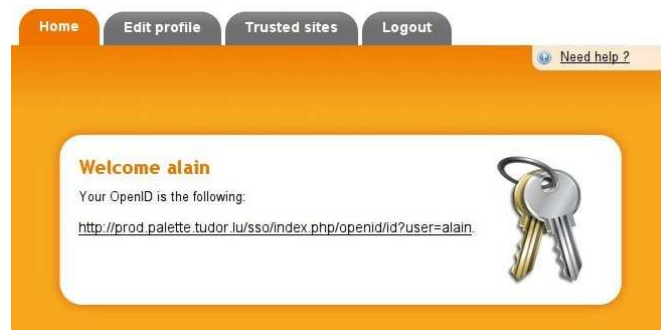
Figure 6.　　Main screen of the PALETTE Identity Manager

We streamlined the OpenId process by adding an option to remember the user's decisions, the « trusted sites » functionality. When a user authorizes the connexion to an application, it is by default a one-shot connexion, but he has the choice to trust the application and thus remember his choice for future connexions. In the case he is already logged in his identity provider and he acknowledged an application A as a trusted site, when connecting to A with its OpenId, he will be immediately logged in without having to perform the usual login/password authentication process.

Figure 7.　　Trusted site confirmation dialog.

Figure 8.　　Dialog and selection box to permanently trust a site.

For this server to work, it is necessary to make PALETTE services compatibles with the OpenId protocol: they must behave like relying parties. So different PALETTE partners implemented the OpenId compatibility in their services, including BayFac, the PALETTE portal, SweetWiki and eLogbook.

Related Works

There are well-known solutions to this kind of problem, like single sign-on and identity profile aggregation. The first one consists in consolidating login forms and providing a mechanism enabling the user to be logged on the whole set of services at the same time such as WebSSO (URL: WSSO).

The second one permits the services to be based on a single repository of user accounts such as LDAP (URL: LDAP). In this classical architecture, authentication and identity repository are centralized components.

It seems really difficult to put in shape a centralized identity infrastructure in the context of a CoP, where it is possible to add and remove services and to have them deployed on different servers. So we concentrated on lightweight and decentralized solutions. You will find a more detailed overview of the existing solutions in an Annexe section at the end of this report.

3.2.2 Transparent Profile Synchronization between CoPe_It! and eLogbook

Goal of the service

The objective of the profile synchronization between CoPe_It! and eLogbook is to permit an aggregation of the profile information in both tools, even when this information changes in one of them. CoPe_It! and eLogbook require from every user to setup and maintain the user's profile that keeps information regarding his/her identity (such as his name, home address, email, homepage etc). Such profile information is especially critical in collaborative environments and users put efforts in keeping it up to date, in case of changes. Yet, as the number applications increases, so does the number of profiles users have to maintain, imposing overhead which they are rather unwilling to pay. To address such situations, the transparent profile synchronization service permits the automatic update of a user's profile in CoPe_It! whenever the same user changes his profile in eLogbook, and vice versa. One of the goal of profile sharing is to encourage users of one service to adopt the second service by avoiding the cost of repeating profile data entry in both services.

Profile synchronization approach

The profile synchronization service between CoPe_It! and eLogbook is optional and users may request it by appropriately configuring their account settings. The figures below show how users can enable profile synchronization in CoPe_It! and eLogbook. When configuring the synchronization service from within one tool, users must provide the appropriate credentials of the other, which the system uses to designate the profile to which changes will be propagated. Profile synchronization may be bidirectional (i.e. changes from any tool are propagated to the other) or unidirectional (i.e. changes only from one tool are propagated to the other). Once properly configured, every modification of a profile in one tool is automatically propagated to the appropriate profile maintained by the other.

Figure 9.   Option to enable profile synchronization in CoPe_It!.

Figure 10.   Option to enable profile synchronization in eLogbook (b).

Profile synchronization is achieved by invoking services that each tool publishes, whenever changes are made to some parts of a profile. For this, each tool publishes a set of REST based services, dealing with the authentication of users and the management of profiles. A RESTful approach has been adopted by both tools, due to its implementation simplicity and its straightforward semantics.

The transparent profile synchronization is a form of identity profile aggregation described in D.MED.07, p13 (Chiu Man Yu, 2008).

3.2.3   Sharing CoP identity and artefacts between CoPe_It! and eLogbook

Goal of the service

The objective of the service is to facilitate the creation and management of CoPs and their members between CoPe_It! and eLogbook. The aim is to support activities as those outlined in paragraph entitled "Pervasive and ubiquitous CoP management" in the Animation Scenario instances of section 2.5.1. This service can be seen as a form of profile aggregation that goes beyond the scale of the user to encompass its community and some electronic artefacts created by the community.

Design and implementation

CoPe_It! and eLogbook support the creation and management of CoPs and its members and this particular service attempts to facilitate the easy relocation of CoPs in order to facilitate the adoption of tools. In particular, when a CoP has setup its members and roles in the context of an eLogbook activity, it is possible to import these settings in CoPe_It!, so that the same CoP with the same memberships are available in CoPe_It!. Besides creating the CoP and its members, the service instantiates also a workspace with the appropriate roles and rights where the CoP can collaborate. The URI of the newly created workspace is added as a link into the eLogbook activity hence interlinking collaboration spaces across tools.

3.3   How to Know what Happened in the CoP ?

3.3.1   The Cross Awareness Knowledge Base (CAKB)

Goal of the Service

The CAKB is a service for the CoP animators[1]. It allows them to follow the CoP's activity. Indeed it allows to see the different actions (creation, updating, access and deletion) that have been performed on the resources, by whom, with which service and when. The events can be filtered by service, by date, by actor, or by action type. Information about the resources are returned whether the resource has been deleted or not. This support service crosses the boundaries of the existing CoP services, as new services can be registered at any time, to publish their events into the CAKB.

At the time of redaction, only the BayFac service has been connected to the CAKB through the specific RSS event feed mechanism designed for that purpose. Nevertheless, it has been tested and deployed for the CoPe-L community and new functionalities have been developed in consequence. Its use is now cantered on a user who is a community animator, wishing to follow what happened on the services of his CoP.

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[1] in this context we use the term animation as « breathing life into something » (URL: ANIM)

User Interface for Administration

This interface linked with the back-end provides functionalities to manage the CAKB. This interface has only functional purpose since it is not intended to be used by "normal" end users and is targeted at the user that setups the CoP environment.

Figure 11.   Administration User Interface.

The graphical interface for the management of the services registered with the CAKB in shown on the figure above. It provides a form for registering a new service and a list of already registered services. The "New service" form permits to add a new service to be plugged on the CAKB. For that, the new service has to be specified with its name, URL and the specific RSS intended to the CAKB.

In the list of services appearing on the bottom part of the screen, we can see links to services already registered in the CAKB. A service already declared can be updated by clicking on its name on the listing. We are then able to check the service and its RSS state (working or not).

The other functionalities are accessible via links in the top menu bar:

- *Update*: manual update of the CAKB; Normally, it is not useful since updates are done automatically through a notification system (see next part), but in case of problem or for testing purposes, the administrator could need to make an update at a precise moment.

- *Clean CAKB*: this function aims at cleaning the Knowledge Base of the CAKB service. This means that it deletes instances of the classes "Action", "Resource", "REST" – that ontology is described in D.IMP.06 (Naudet, 2008) – "FacetVector" and "FacetVectorItem" –the facet ontology is described in D.KNO.04 (El Ghali, 2007). At the beginning, this function was not proposed to end-user because it can be quite dangerous. It was just a development function aiming at having a clean CAKB in order to enable tests. Now, since the KB stores every action (creation, consultation, deletion, or update) for each service, it appears it can increase its size in an exponential way. It could be then useful to be able to clean it from time to time.

- *Consultation*: two links are provided on the right of the horizontal menu, one to the faceted search interface, BayFac, and one to Generis to be able to manage the ontology in a closer way.

User Interface for CoP animators

End users, such as CoP animators, navigate in the history of actions and resources submitted by the registered services to the CAKB with a faceted search user interface shown below. That user interface is a specialization of a BayFac user interface based an ontology describes actions and resources managed by the CoP' services (El Ghali, 2007).

Figure 12.   CAKB faceted search user interface based on BayFac.

The faceted search user interface has been a little bit modified to allow the update of the CAKB through a single button "Update from known services". It can be found in an administration menu as shown below. Additionally, there is also a link ("CAKB administration"), pointing to the CAKB management interface, presented in the previous section.
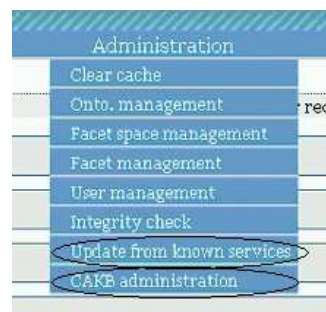

Figure 13.   BayFac administration menu customized to enable CAKB functions.

Moreover, in order to develop new functionalities for the CAKB and to have a more pleasant interface, a timeline is now present to show all actions executed on a particular resource. It is based on the Simile timeline (URL: STL). It presents these actions on a scrollable chronological line. Thus a graphical overview of all actions done on a resource is available by clicking on the link "view Timeline". The link is present in the description of the resources, when the search is made on the resources and not on the actions.
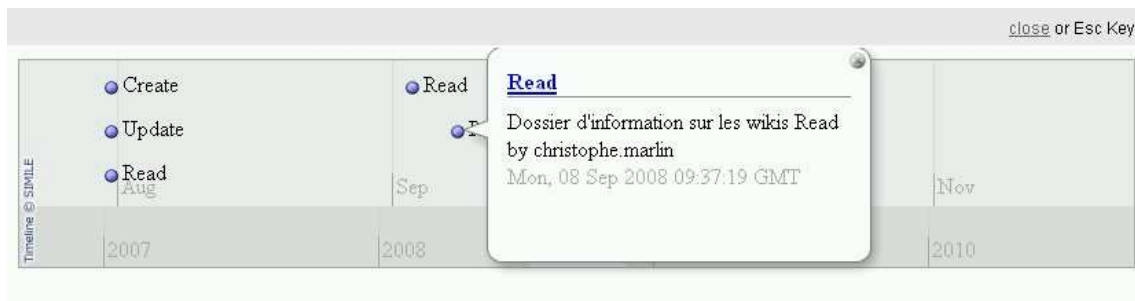
Figure 14.   TimeLine view of a resource.

Awareness Widget

The awareness widget can be integrated within the portal. It displays the 10 last actions known by the CAKB.

Figure 15.   CAKB awareness widget.

How to connect a service to the CAKB ?

Four mechanisms allow a service to send it's awareness events to the CAKB. They are all based on a RSS format enhanced with CAKB metadata. The four mechanisms are the following ones:

- *RSS on demand*: the service must publish an RSS event feed informing the CAKB of its latest actions. The feed contains all the information to populate the CAKB ontology. The feed must be provided on demand from the user, for instance when the user clicks the update button of the faceted search user interface.

- *Push*: the same data as above is pushed directly into the CAKB via a Web service. This means that the service, on which a new action has been performed, sends an XML message to the CAKB describing it. As a result, for each action a message is sent to the CAKB for the integration of this new action. The definition of the message is given below.

- *Cron*: some updates are scheduled by the CAKB at a fixed frequency. That means the CAKB will retrieve the RSS feeds from the known services once a day, at midnight for example. This scheduling is enabled by the Cron system on a Linux server.

- *Ping*: the service that wants to notify the CAKB of new events sends a message to the CAKB which is interpreted as a demand for it to read its new feed[2]. Each time the CAKB receives this message, it launches the import of the calling service feed.

As an example, here is a sample message that could be send by a service, using the *Push* method, to notify it that the user "albert" has read the report on "General relativity analysis":

---

[2] this is done with a CAKB REST service which can be mapped to this URL for instance
   "http://www.cop.com/**cakb/index.php/Update/updateService?pServiceName=BayFac."**

```
<item rdf:about = "http://nameSpace.rdfs#Read1219921225">
        <title>Read on 2008-08-28 13:00:25 by Albert Einstein</title>
        <link>http://cop.com/BayFac</link>
        <description>
                Report of the "Read" action on the "General relativity analysis"
                resource, on the 2008-08-28 13:00:25 and by the user
                with the login: albert
        </description>
        <dc:date>2008-08-28 13:00:25</dc:date>
        <dc:type>Read</dc:type>
        <ocop:member>
                <dc:identifier>
                        http://nameSpace.rdfs#a.einstein
                </dc:identifier>
                <dc:title>
                        a.einstein
                </dc:title>
        </ocop:member>
        <cakb:isExecutedOn>
                <dc:identifier>
                        http://nameSpace.rdfs#generalRelativityAnalysis
                </dc:identifier>
                <dc:title>
                        General relativity analysis
                </dc:title>
        </cakb:isExecutedOn>
</item>
```

This message is simply a copy of a single item of an RSS event feed. It must be sent to the CAKB via a conventional REST POST request at a given URL.

3.4   How to Share Data between Services ?

Most of the reification situations which have been described in the first part of this report involved producing data, or documents, with one service, transferring this data, or documents into another service for modification or classification, and eventually moving them back to the first service or to another one. All these actions require the ability to share data, or documents, between services. To be efficient these actions must be as transparent as possible.

3.4.1   The PALETTE Common Resource Repository (PRep)

Goal of the Service

The PRep (or Repository) targets to support the exchange of data between services in a predefine way that has been accepted by all the project partners. It was specified, designed and finally developed in the context of the implementation of the "single store" support service that has been first presented in the D.IMP.05 first version of the generic scenarios (Esnault and Karousos, 2008). The main goal is to support the ability for PALETTE services to archive resources and make them retrievable from within various PALETTE services.

The resources that are stored in the Repository come with a set of meta-dada providing information about the kind of the resource, the creator of the resource, the application which uses the resource and other additional information that any customer service requires to attach. Requestors are able to upload, search, and restore resources. Searching in repository can be achieved by composing one or more searching criteria and getting involved both predefined and custom attributes.

With respect to the "PALETTE Project Implementation Plan V3", the Repository is a Web service itself. It is a RESTful server that listens to HTTP GET, POST and PUT Web requests.

PALETTE services that need to exchange resources are required to integrate the "single store" functionality by providing two more options in their existing User Interface: The first one is the "store

to Common Repository" option that uploads a resource to the Repository and the second is the "retrieve from Common Repository" that downloads the resource. Moreover, the ability to support search for resources is also available for all the PALETTE services.

Resource Description

The primitive entity that can be handled by the repository is the "PALETTE Resource". PALETTE resources are mainly documents or other type of files that are being produced and modified by the end-users of the PALETTE project using the available PALETTE tools. Apart from the resource content (file), when uploading a resource, users can also upload a set of several attributes. These are presented in the PALETTE Resource schema that follows:

```
<xs:element name="TResultResource" type="TResultResource" nillable="true"/>
<xs:complexType name="TResultResource" mixed="false">
 <xs:complexContent mixed="false">
  <xs:extension base="TResultRepositoryObject">
   <xs:sequence>
    <xs:element name="id" type="xs:string" minOccurs="0"/>
    <xs:element name="link" type="xs:string" minOccurs="0"/>
    <xs:element name="title" type="xs:string" minOccurs="0"/>
    <xs:element name="description" type="xs:string" minOccurs="0"/>
    <xs:element name="author" type="xs:string" minOccurs="0"/>
    <xs:element name="pubdate" type="xs:dateTime"/>
    <xs:element name="filename" type="xs:string" minOccurs="0"/>
    <xs:element name="mimetype" type="xs:string" minOccurs="0"/>
    <xs:element name="creator" type="xs:string" minOccurs="0"/>
    <xs:element name="source" type="xs:string" minOccurs="0"/>
    <xs:element name="attributes" type="ArrayOfTAttribute" minOccurs="0"/>
   </xs:sequence>
  </xs:extension>
 </xs:complexContent>
</xs:complexType>
<xs:complexType name="ArrayOfTAttribute">
 <xs:sequence>
  <xs:element         name="TAttribute"        type="TAttribute"        nillable="true"        minOccurs="0"
maxOccurs="unbounded"/>
 </xs:sequence>
</xs:complexType>
<xs:complexType name="TAttribute">
 <xs:sequence>
  <xs:element name="name" type="xs:string" minOccurs="0"/>
  <xs:element name="value" type="xs:string" minOccurs="0"/>
 </xs:sequence>
</xs:complexType>
```

Resources can be by identified by the resource "id". This is a unique identifier that is generated automatically after the upload of the resource. In case that the requestor wishes to use a particular name for the identification of the resource, the repository sets that name as the value of the resource id.

The element "link" contains a direct http link to download the content of the resource. Concerning the support for extra attributes, the resource schema contains a list of composite elements namely TAttribute that consist of two simple elements: name and value. In this way, it is possible for the requestor to attach an open set of additional resource information while uploading the resource.

Integrating the PRep into another service

The PRep is a service that targets towards the integration with any service that needs to share its resources. For that purpose, it offers some RESTful Web methods to access the following functionalities:

- Download a resource

- Get Metadata of a resource
- Search for resources
- Upload a resource
- Delete a resource

The requests to the repository follow the HTTP GET/POST protocol. In particular, the methods "download" and "get resource metadata" are invoked via HTTP GET while the upload method requires POST. Moreover, upload a file can be also executed using HTTP PUT method. Finally, the search method can be invoked via both GET and POST, however, in cases that search query is too long POST request is more suitable. The following table shows three request examples.

Download resource	**Get Resource Metadata**
Sample 1: Direct Link	Sample 1: HTTP GET
http://PALETTErep.cti.gr/report_registry	http://PALETTErep.cti.gr/?id=report_registry&meta=1
Sample 2: HTTP GET	
http://PALETTErep.cti.gr/?id=report_registry	

Search resources
Sample 1: HTTP GET
http://PALETTErep.cti.gr/?q=and%20pubdate>1%2F1%2F2007%23and%20mimetype%3Dapplication/msword

Apart from the request for download, for all other requests the Repository answers with an XML formed document into the HTTP message body. This document contains a result element (that is used in cases of wrong requests) and a list of resource elements that are returned as the matched resources.

Finally, the Repository also supports responses in RSS format (for the search operation) in order for tools like the Cross Search Engine to communicate with it without any alteration.

As an illustration of a successful integration, the image below shows the end user's dialog which has been added to DocReuse to export (resp. import) document templates and their associated document instances to (resp. from) the PRep.
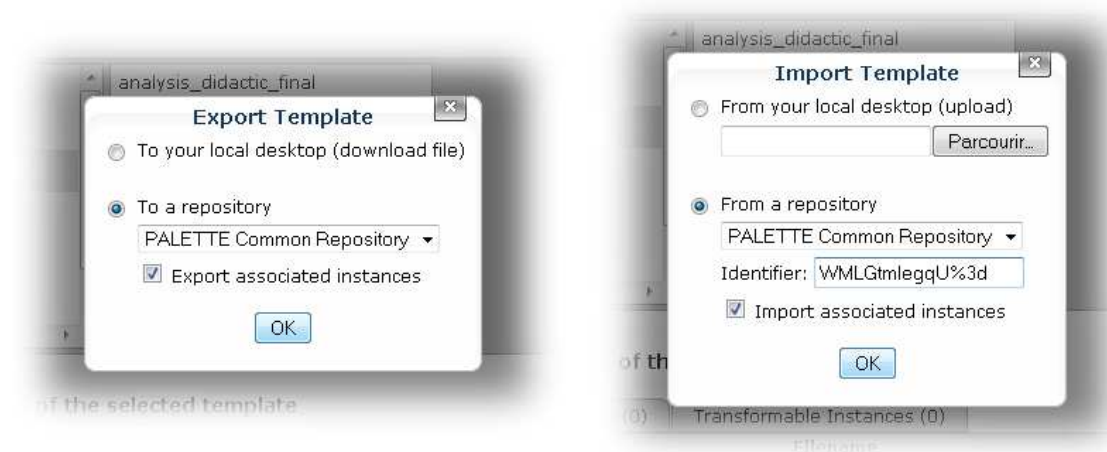

Figure 16.   DocReuse integration with the PRep.

Related Work

There is a variety of existing resource repositories that are used as Web based file storages. Some commercial ones give the ability to upload and download any kind of files by using a very specific API such as RapidShare (URL: RSH) while some other WebDAV based services such as Apache Jackrabbit (URL: AJR) or Subversion (URL: SVN) focus on providing complete functionalities on content management, keeping directories structures and handing version control. However, the option to design and implement a specific service to support the aforementioned functionality was based on the following requirements:

- provide a non-complex service that supports a particular set of functionalities and has a simple API;
- support both HTTP POST and PUT protocols for uploading a resource;
- use a specific Resource Description XML Schema that has been adopted by all the available PALETTE tools;
- have the ability to customize the Resource Schema;
- support custom behaviour of the Repository in case of uploading or downloading resources of specific content-type;
- assure the physical access to all the uploaded resource by the creator of the repository;
- assure a particular backup policy for the uploaded resources;
- support RSS based responses.

Current Version and future tasks

The PRep (v1.2) is already implemented and in operation (URL: PREP). It's API documentation together with some technical details and demonstration of method invocation is presented on a developer's Web site (URL: PDEV).

Some issues that will be addressed in the future are:

- Improvement of search capabilities. Searching can be improved by supporting alternative ways of query expressions that are more human readable than the current one.
- Parsing resources (of specific type) and extracting resource information while uploading a resource.
- Support resource deletion by both HTTP GET and HTTP DELETE protocols.

Currently, most of the PALETTE services and tools are being integrated with PRep in order to provide the "single store" functionality.

3.4.2   Drag and Drop between Widgets in the Portal

Properly speaking the PRep does not have a User Interface as it is a support service targeted at being integrated with other services as discussed above. However, in order to better supports the chains of interactions in the Didactic situations, a PRep widget has been developed. The widget shown below allows a CoP member to search resources in the repository. As the users types, the widgets displays the resources with a matching name in a dynamic result list. The "Starting with" checkbox limits the results to the resources with a name that starts with the current entry. The "Templates" checkbox filters the resources which are document templates.

The resources from the result list of the PRep widget can be drag and dropped into a DocReuse widget which has been developed to launch DocReuse with pre-selected files and/or actions. The current version of both widgets are shown below. The Portal support for a drag and drop communication between widgets has been described in D.IMP.07 (Naudet Y. and Karousos, 2008), this is an innovative feature of the PALETTE Portal compared to the other existing portals.
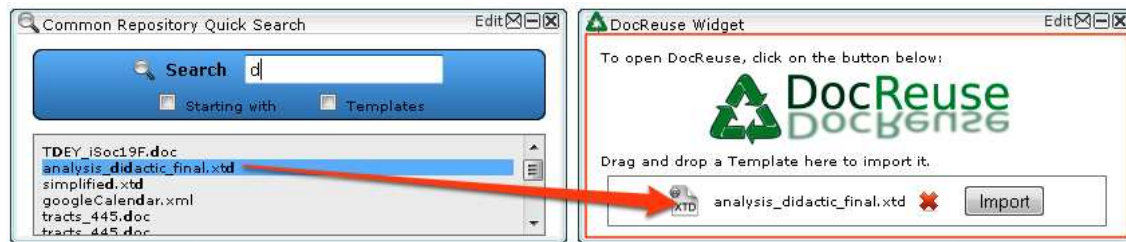
Figure 17.   Drag and Drop of a Resource from the PRep Widget to the DocReuse widget.

3.4.3   Importing an Ontology for collaborative annotation of items in CoPe_It!

Goal of the service

The objective of the service is to permit the semantic annotation of resources that are brought into discussions in CoPe_It!. The aim is to permit semantic processing of resources and thus to augment existing CoPe_It! services such as search, views and transformations of discussions. Initially, these services of CoPe_It! were simply keyword based resulting in rather poor performance. By taking advantage of the knowledge management services in PALETTE, these services could be promoted to operate at a semantic level. To achieve this, the ability to integrate the ontology that was developed in the context of knowledge management tools was added to CoPe_It!. The integration of an ontology permits the tagging of resources in workspaces of CoPe_It! with concepts found in the designated ontology.
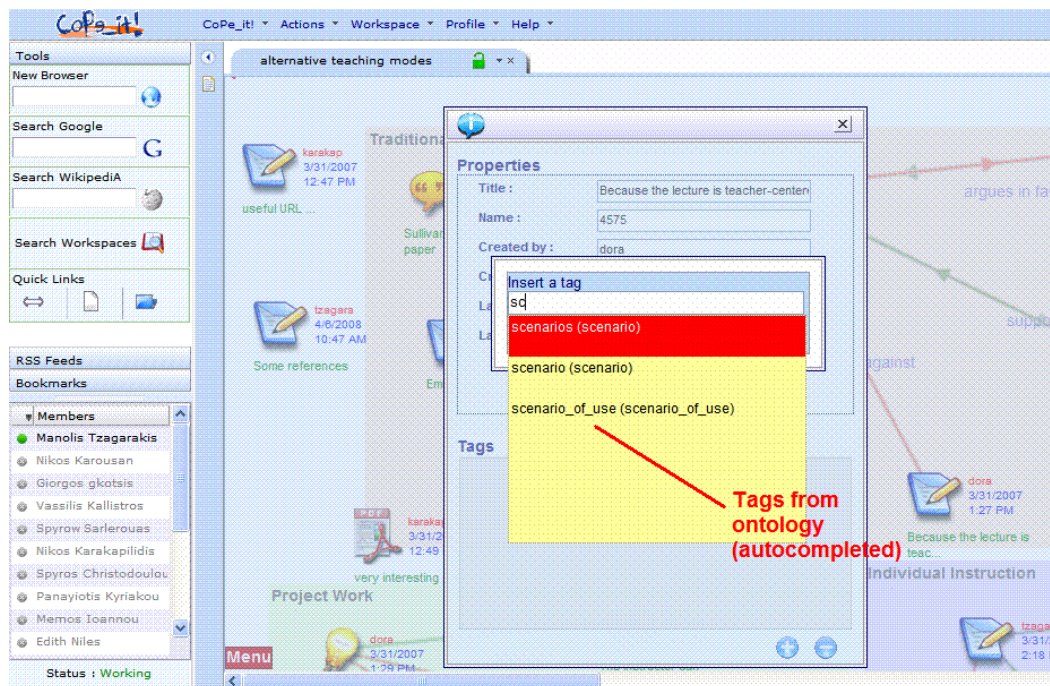

Figure 18.   Suggesting concepts from an ontology for tagging individual workspace resources.

Design and implementation

CoPe_It! allows each workspace to be associated with a number of ontologies (via their URI), that are created by CoPs and maintained by knowledge management tools, with which individual resources of a workspace can be annotated. Users may choose concepts from a designated ontology that can be added as tags to individual resources. An autocompletion approach has been adopted to suggest existing and valid tags: as the user types the letters of the desired tag, CoPe_It! queries the ontology

and suggests concepts whose name starts with character entered. The figure above shows an example of suggested ontology concepts. Users may then choose one of the suggested concepts.

Ontologies associated with CoPe_It! workspaces are not stored locally by the tool. Instead, they are kept and maintained by the knowledge management tools. CoPe_It! invokes ontology services, that are published by the respective tools. The knowledge management tools publish these capabilities as Web Services by providing appropriate WSDL files. Based on the available WSDL files, stubs were created and integrated into CoPe_It! tag management module. Every time a user enters a character during the process of adding a new tag, CoPe_It! queries, via Web Services, the knowledge management tools for appropriate concepts (whose name start with the characters entered). The result of this query is then displayed to the user from which he is then able to select the appropriate one.

3.5   How to Search for the Resources of the CoP ?

The scenarios emphasize the fact that users need to find a resource that has been embedded or referenced into a service, or a resource that has been created in a service, such as a page in a Wiki, and this without knowing in advance in which service(s) it is.

In theory, one can build a Google custom search engine (URL: GCS) limited to the resources stored in the sites of a CoP. However there are several reasons this is not currently an ideal solution. One reason is that in most cases CoP members want to protect the access to some of their resources and hide them from public search engines. Another one is that this kind of search does not yet benefit from the annotations which may be associated with the resources, such as social tags. Another one is that it does not allow to fine tune the presentation of the results. And finally, in some services, some resources may be hidden behind database requests giving access to internal repositories.

As a consequence, we have chosen to develop a centralized support service for making cross service searches. It is presented in the next section. We have also started another approach based on automatically creating presentation pages in a Wiki associated with newly created resources. This augment the opportunity for the user to find the resources by browsing, and may eventually augment their visibility in the search engine result list. It is presented in the last section.

3.5.1   The Cross Service Search Engine (CroSSE)

Goal of the Service

The Cross Service Search Engine (CroSSE) makes searches into multiple services at once. It is the central point where CoP members can find resources stored in the different CoP services. When a CoP member wants to locate a resource, he can realize a keyword search on the CroSSE where results can then be focused by service, type or date. When clicking on a result resource, it will be directly accessed on the service where it is stored. For example, if a corresponding result has been found in CoPe_It!, the resource will be opened directly in CoPe_It!.

The CroSSE is a composite service, which aggregates individual keyword search Web services provided by some PALETTE services, namely BayFac, CoPe_It!, PRep, eLogbook and PALETTE Learning Platform. Technically, it acts as a query dispatcher to the services linked to CroSSE, allowing a single access to data and information handled by them. It can take into account services proposing a RESTful keyword search Web service returning their result in a commonly agreed format. This format is described in an annexe section.
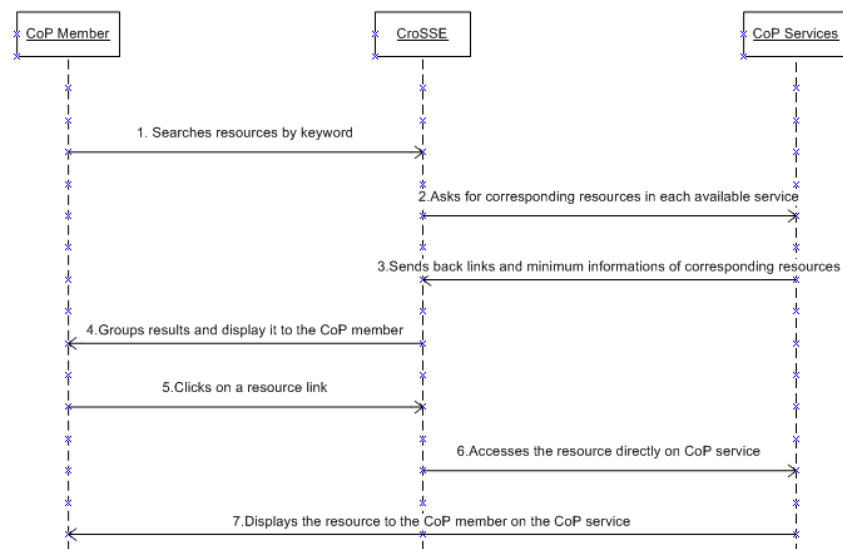
Figure 19.   CroSSE Use Case.

Architecture overview

The CroSSE search engine can be divided in three layers. The first layer is constituted of PALETTE services' keyword search Web services. The second layer is the engine itself, dispatching queries and aggregating results. The third layer is the presentation with 3 alternatives: a Web application, a Portal widget and a Web service. When receiving a query from one of these access points, the CroSSE engine searches in all available PALETTE keyword search services, aggregates the results and displays them to the user.
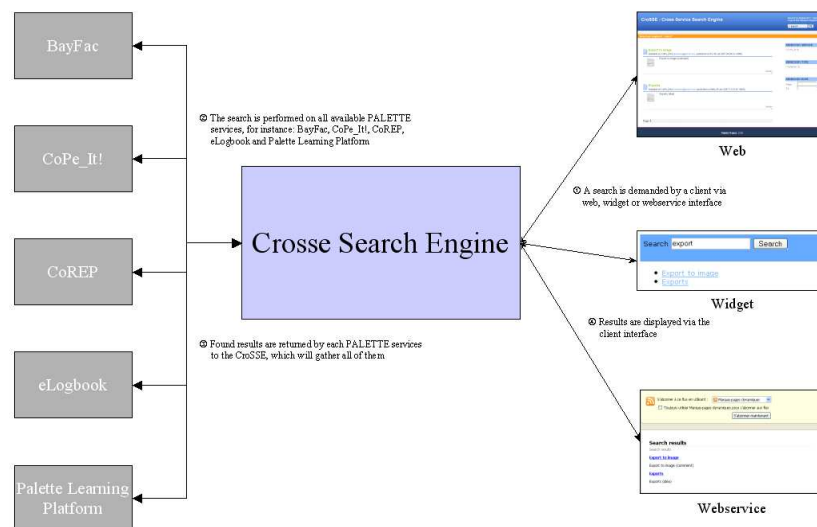

Figure 20.   CroSSE architecture.

If a service cannot be connected with the CroSSE, because it does not offer the proper keyword search primitive functionality as a Web service, then it can still stores its resources within the Common Repository so that they are searchable via the CroSSE.

The CroSSE Web Application

The CroSSE Web Application provides basic search by keywords, or more advanced search by PALETTE service, type or date.

Figure 21.   CroSSE Web application User Interface.

The keyword search is available on the upper part of the screen. The advanced search, available only when the keyword search has been performed, is visible on the right part of the screen. Services and types shown are the ones associated to the keyword search results. Indeed, services and types not existing in the keyword search results won't be displayed.

Figure 22.   CroSSE advanced search detail.

The advanced search is realizable via a "OR" condition: it is not possible to make an advanced search on more than one criteria at a time. "Search by service" filters the results, showing only those corresponding to the selected service. It's the same for type and date. Filling the "From" and "To" fields of the "search by date" allows to show results for the given time interval.

The advanced search by date allows the selection of a "from - to" interval. One or both limits can be filled in, permitting thus to select results starting from, or up to a given date, or in the given interval. The advanced search panel shows the number of associated resources found, beside the service name and the type name, in parenthesis.

The following information is displayed for each search result:

- title;
- source of information (where information is available);
- author (its email);
- publication date;
- description;
- an icon is associated to the resource type (a mouse over will display the type);
- the resource is accessible by clicking the title, the icon, and "Details".

Figure 23.   Search result detail.

For each search, the search criteria are visible just below the upper part of the screen, on an orange background. Pagination is also available.

The CroSSE widget

A simplified search is proposed as a widget for the PALETTE portal. This search proposes a search by keyword, and shows the list of corresponding resources, with the resource title and a link to details.
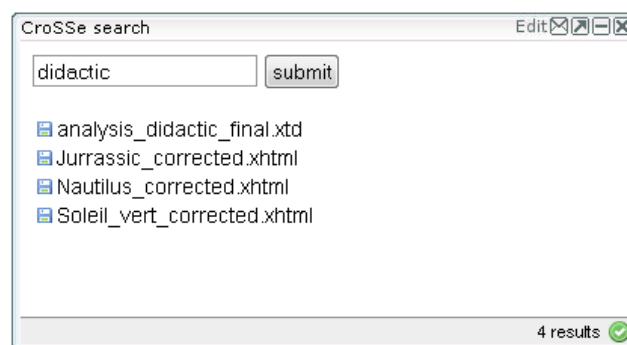
Figure 24.   CroSSE widget.

A click on [icon] allows to access the CroSSE Web application, described in the previous section.

During the development of this widget, we made special efforts in order to provide a more interesting end-user experience, and reinforce interaction between the services by implementing Drag and Drop possibilities provided by the Portal. Indeed, each search result displayed by the CroSSE widget can be dragged and dropped to other widgets accepting those kinds of user interactions.

For instance, an X-Tiger document (depicted as a search result) can be dragged from the CroSSE widget, and dropped in an X-Tiger Template Preview widget that will react to this user interaction by forwarding him to a preview of the dropped document.

The CroSSE Web Service

The CroSSE Web service gives the possibility to embed a CroSSE search functionality inside a custom application. It allows to perform a search by keywords and returns a RSS view of the results. The RSS output takes this form:

```
<rss version="2.0" xmlns:dc="http://purl.org/dc/elements/1.1/">
 <channel>
   <title/>
   <description/>
   <link/>
   <item>
          <title/>
          <description/>
          <link/>
          <author/>
          <pubDate/>
          <dc:creator/>
          <dc:source/>
          <dc:format/>
          <enclosure>
   </item>
 </channel>
</rss>
```

The individual services that are connected to the CroSSE must use the same format in response to a search by keyword method call by the CroSSE. The meaning of each element is detailed in an annexe section at the end of this document.

Summary and availability

As said previously, the CroSSE can be accessed in three different ways:

- a widget, via the PALETTE portal (URL: CRWI);
- a Web interface (URL: CRWE);
- a keyword search Web service (URL: CRWS).

The widget proposes a light interface with a simple keyword search, when the Web interface also proposes an advanced search by service, by type or by date. The Web service proposes an embeddable keyword search functionality. Obviously, some things could still be improved, like e.g. an "AND" search operator in advanced search, or the possibility to narrow a search to a specified service.

3.5.2 Automatic Media Indexing by SweetWiki

Goal of the Service

A CoP may use SweetWiki as an entry point to reference and to describe the other resources of the CoP. For instance, it can use it as an augmented bookmark where some multimedia resources available elsewhere are described by a SweetWiki page. As a side effect, the resources indexed this way can also be tagged and searched with the knowledge management services of SweetWiki.

The pair-wise integration service presented in that section aims at encouraging CoP members to reference the multimedia resources they create with LimSee3 into SweetWiki. For that purpose it automates the referencing process in order to save the author with the burden of manually publishing multimedia resources on one side and producing related metadata for the Wiki on the other side. It is also directly integrated with the exportation of the resource to a common repository to minimize the amount of user's actions.

End User's Interaction with the Service

The implemented process makes use of the export service and the packaging service of LimSee3, as described in D.INF.07 (Boukottaya & al., 2008), together with the upload service of SweetWiki. It works as follows:

- once the author has finished his authoring step with LimSee3 authoring service (for instance to produce a multimedia course), he calls the packaging and export service of LimSee3;

- during this step, the author has to select several options: the publication format (SMIL, XHTML+Timesheets), the type of packaging (with all the resources, with only local resources, etc.), the target repository (for instance PRep), and possibly a SweetWiki page publication;

- if this last option is selected, LimSee3 inter-operates with SweetWiki to allow published documents to be referenced on SweetWiki: a Wiki page describing the document is automatically generated and uploaded by LimSee3.

Figure 25. LimSee3 packaging and exportation dialog.
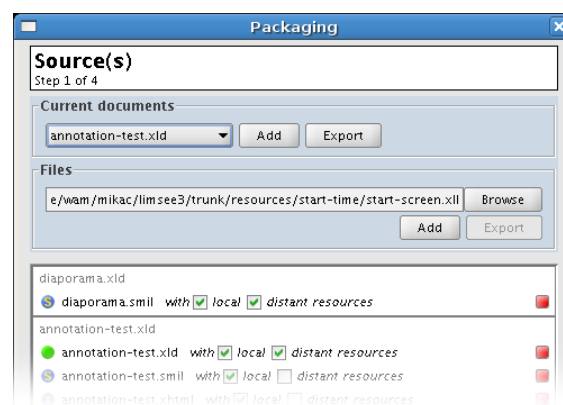
The screen shot of LimSee3 above shows the beginning of the packaging dialog. The option for creating a SweetWiki page is not shown on this figure, it is still under development.

Implementation

The description is based on document meta-data, which is partly calculated by LimSee3 and partly provided by the user. The description also depends on the document model.

4 Conclusion

This document reflects the dual approach of the workpackage on implementation of PALETTE services and scenarios. On one side it shows, through the scenarios, the directions to follow for the integration of the services. Written in a familiar language, these scenarios are an ideal vehicle to continuously adjust the end user's expectations with the developer's plans. On the other side it shows, through the description of the components for integration, the functional and user interface enhancements that can augment the perceived value of the environment in a multi-services setting.

From a more distant point of view, we can say that the WP5 answered the interoperability issues with a multidimensional approach. First, in order to enhance the sharing of information and knowledge between the set of services, the use of XML standards-based formats has been adopted. Second, the provision of platform-independent Web services, that expose the business logic and/or the semantic models, clearly distinguishing the separation of the data and the user interface, reinforce their reusability. And third, the integration of services at the presentation level is encouraged by the use of a customizable Web portal. The services can be exposed as small applications called widgets into the portal, and the support for drag and drop operations within the portal allows to link services together. The portal can be customized in multiple ways: on a per community basis, on a per individual basis or on a per task basis.

We identified a set of support services that act as value enablers in an integrated environment. These are services to give a transparent access to the end users through unified login and identity management, services to support content search across service boundaries, services to reuse, quote or advertise content to the outside world, services to embed subsets of other services into one service (the portal is one kind of such service) and, finally, services to trace users presence and build a group memory. In this new world of Web 2.0 applications, the challenge to support a community is to turn the perception of the infrastructures into that of a social place, or at least that of a living conversation between its users.

Finally, the reader interested by the analysis of the group and learning benefits of using such heterogeneous environments to support their online community should read the companion report D.PAR.08, "Analysis of instrumental genesis lived by the CoPs" (Daele, 2008).

5   References

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5.2   Webography

All the Web references have been accessed in January 2009.

PALETTE Links

BAY-SPA: BayFac - ticef ticfa - Recherche de Documents,
             prod.palette.tudor.lu/ticef/bayfac/index.php/

CRWE: Crosse Service Search Engine Web interface, prod.PALETTE.tudor.lu/p/crosse/

CRWI: Crosse Service Search Engine widget, can be found in the Portal (URL: PPORT)

CRWS: Crosse Service Search Engine Web service,
             prod.PALETTE.tudor.lu/p/crosse/webservice.php?keywords=

DES-TEF: Diplôme d'Études Spécialisées en Technologie de l'Education et de la Formation,
             www.stecrifa.ulg.ac.be/destef/

e-Woccq: e-Woccq formation à distance et aide-en-ligne, campus-woccq.ulg.ac.be

GS1:   SweetWiki workspace of the Generic Scenario Team 1,
             argentera.inria.fr/swikiPALETTE/data/TeamGS1/TeamGS1Home.jsp

GS2:   SweetWiki workspace of the Generic Scenario Team 2,
             argentera.inria.fr/swikiPALETTE/data/TeamGS1/TeamGS2Home.jsp

GS3:   SweetWiki workspace of the Generic Scenario Team 3,
             argentera.inria.fr/swikiPALETTE/data/TeamGS1/TeamGS3Home.jsp

INVA: Les invariants du TIN selon les étudiants des cours TICEF et TICFA,
             argentera.inria.fr/swikiulg/data/Main/InvariantS.jsp

Learn-Nett: Plateforme de formation collaborative orientée pédagogie par projet,
             ute2.umh.ac.be/learn-nett/

LOR: SweetWiki workspace of the Learning and Organizational Resources,
             argentera.inria.fr/swikiPALETTE/data/Lor/LorHome.jsp

NET-EF: "Netiquette" pages of the TICE-EF,
    argentera.inria.fr/swikiulg/data/Main/Netiquette{WikiTICEF, ChatTICEF,
    CourrielTICEF, ForumTICEF}.jsp

NET-FA: "Netiquette" pages of the TIC-FA,
    argentera.inria.fr/swikiulg/data/Main/NetiquetteWiki{Wiki, Chat, Courriel, Forum}.jsp

NEWS-EF: Public pages of the WikiNews of TIC-EF,
    argentera.inria.fr/swikiulg/data/Main/WikiNewsTICEF.jsp

NEWS-FA: Public pages of the WikiNews of TIC-FA,
    argentera.inria.fr/swikiulg/data/Main/WikiNewsTICFA.jsp

PPORT: PALETTE Portal online version, prod.PALETTE.tudor.lu/p/portal/

PREP: PALETTE Repository (PRep v1.2) online version, http://PALETTErep.cti.gr

PDEV: PRep Documentation and API for developers, 150.140.18.39:91/repository

YP: LOR1 - Yellow Pages and map of competences,
    sweetwiki.inria.fr/swikipalette/data/Lor/YellowPages.jsp

External Links

ANIM: definition of animation from the encyclopaedia of informal education,
    www.infed.org/animate/b-animat.htm

AJR: Apache Jackrabbit, Content Repository for Java Technology (JCR),
    jackrabbit.apache.org

COMP: Compendium Institute, compendium.open.ac.uk/institute/index.htm

GCS: Google Custom Search Engine, www.google.com/coop/cse/

IHC: iCamp Help Center application, helpcenter.icamp.eu

LDAP: Lightweight Directory Access Protocol,
    fr.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol

LOI: Laws of identity, www.identityblog.com/stories/2004/12/09/thelaws.html

OIP: OpenId Protocol, openid.net/developers/specs

RSH: RapidShare, A commercial Web-based file hosting, rapidshare.com

STL: Simile, The Timeline project, simile.mit.edu/timeline

SVN: Subversion, Open source version control system, subversion.tigris.org

WSSO: Web Single Sign-On (WebSSO), hitachi-id.com/concepts/websso.html

Annex I   Description of the PALETTE services

This section gives a short description of the PALETTE services which have been extensively cited in the report.

Amaya is a Web editor, i.e. a tool used to create and update documents directly on the Web. Browsing features are seamlessly integrated with the editing and remote access features in a uniform environment. This follows the original vision of the Web as a space for collaboration and not just a one-way publishing medium.

> Contacts:
>
> Irène Vatton (Irene.Vatton_at_inria.fr)
> Vincent Quint (Vincent.Quint_at_inria.fr)

Web site: www.w3.org/Amaya/

BayFac provides semi-automatically indexing of textual documents (documents, emails, forum posts, wiki pages, blog posts, etc.) regarding a vector of concepts relevant to a CoP, hence allowing classification according to multiple facets.

The benefits for the users are to have incoming documents automatically classified according to known useful categories, and to be able to search information in a more efficient manner thanks to this indexation.

> Contact:
>
> Jean-David Labails (jean-david.labails_at_tudor.lu)

Web site: www.PALETTE.tudor.lu/wiki/doku.php/bayfac

CoPe_It! is a Web-based system that attempts to assist and augment collaboration being held among members of Communities of Practice by facilitating the creation, leveraging and utilization of the relevant knowledge. The system follows an argumentative reasoning approach, which complies with collaborative principles and practices.

> Contacts:
>
> Manolis Tzagarakis (tzagara_at_cti.gr)
> Nikos Karacapilidis (karacap_at_cti.gr)

Web site: copeit.cti.gr

DocReuse (Document Reuse) is a tool enabling the semi-automatic reuse of structured documents. In our work, document reuse is the problem of restructuring existing documents initially structured for a given purpose to be used in a different context, thus improving reusability and information sharing between communities of practice.

> Contacts:
>
> Aida Boukottaya (aida.boukottaya_at_epfl.ch)
> Micaël Paquier (micael.paquier_at_epfl.ch)
> Stéphane Sire (stephane.sire_at_epfl.ch)

Web site: docreuse.epfl.ch

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eLogbook is a collaborative Web-based environment offering mediation & awareness services to communities of practice. It consists of an activity-oriented shared space where members can manipulate stored assets.

> Contacts:
>
> Denis Gillet (denis.gillet_at_epfl.ch)
> Sandy El Helou (sandy.elhelou_at_epfl.ch)

Web Site: eLogbook.epfl.ch

LimSee3 is a new-generation open source template-based multimedia authoring tool relying on the SMIL standard. The project is carried out by the INRIA WAM team, as part of a european research project, PALETTE. LimSee3 development benefits from the team's experience acquired with LimSee2, an already established SMIL editor.

> Contacts:
>
> Jan Mikáč (Jan.Mikac_at_inria.fr) technical contact
> Cécile Roisin (Cecile.Roisin_at_inria.fr) scientific contact
> Vincent Quint (Vincent.Quint_at_inria.fr)

Web site: limsee3.gforge.inria.fr/public-site/

Portal provides users with a way of customizing access to PALETTE services by adding and removing PALETTE widgets, i.e. small Web applications that provide a summarized view and an access to current tools used by CoP members.

> Contacts:
>
> Alain Vagner (alain.vagner_at_tudor.lu)
> Jérôme Bogaerts (jerome.bogaerts_at_tudor.lu)

Web site: sim.tudor.lu/portal

SweetWiki (Semantic WEb Enabled Technology Wiki) is a new wiki engine written in java. It has been developed around the semantic Web technologies by researchers from the Acacia research group at INRIA and from the Mainline reseach group at the I3S laboratory.

> Contacts:
>
> Adil El Ghali (adil.elghali_at_sophia.inria.fr)
> Michel Buffa (Michel.Buffa_at_sophia.inria.fr)
> Fabien Gandon (Fabien.Gandon_at_sophia.inria.fr)

Web site: www-sop.inria.fr/edelweiss/wiki/wakka.php?wiki=SweetWiki
argentera.inria.fr/wiki/

Annex II List of the CoPs involved in the definition of the Scenarios

There are 13 CoPs actively involved in the PALETTE project. These CoPs represent four professional domains: Teaching, Management, Engineering and Health. They have contributed directly or indirectly to the scenarios which have been presented in this report. Some of them have been trialling specifically some of the situations as reported in D.PAR.08.

ADIRA is a professional association that regroups executive from medium to large companies in Rhone-Alpes (including Rhone-Alpes subsidiaries of large companies) in the IT area, both on users' side (mostly CIOs, but also General managers) and on the suppliers' side.

Contact: Liliane Esnault, EM LYON.

APCdE is an emerging CoPs that regroups people who accompany entrepreneurs in their projects of creation of a company. This CoP is embedded in the Centre des Entrepreneurs of EM LYON.

Contact: Liliane Esnault and Naïma Cherchem, EM LYON.

@pretic is a CoPs of Belgian teachers involved as resources persons to support the uses of ICT in schools

Contact: Stéphane Rieppi, Étienne Vandeput, ULg.

ARADEL (Association Rhône-Alpes des professionnels du Développement Economique Local) was created at the request of the local economic developers to favour the exchanges of experience and their professionalization.

Contact: Liliane Esnault, EM LYON.

CoPe-L (CoPe-Learning) is a Luxembourgish Cop of 30 representatives of public and private organizations working on e-learning, education and training. This community has as objective to share practices about e-learning in Luxembourg and to promote e-learning activities.

Contact: Stéphane Jacquemart, CRP-HT.

Did@cTIC is a CoPs of university teachers and lecturers involved in a staff development programm.

Contact: Bernadette Charlier, UNIFR.

Doctoral Programme Module at the Department of Educational Research (Lancaster University) - The community is a group of 25 higher education teachers and managers completing a taught doctoral programme on higher education teaching and learning. The group attends Lancaster University 4 times a year and is supported remotely by Web-based resources and electronic mail.

Contact: Murray Saunders, CSET Lancaster.

ePrep is a non-profit French association founded in 2001. Its mission is to promote and coordinate actions, in France and abroad, for the development of " Classes Préparatoires aux Grandes Ecoles " (CPGE - a first higher education cycle preparing students for the competitive entrance exams to the French " Grandes Ecoles ") through the use of information and communication technology (ICT).

Contact: Nathalie Van de Wiele, ePrep.

FORM@HETICE (FORMAtion dans les Hautes Écoles aux Technologies de l'Information et de la Communication pour l'Éducation) is a network of teachers of the High Schools of the French Community of Belgium. It mainly concerns contact persons in Information and Communication Technologies in Education (ICTE) working in the educational department of these schools where the training of future teachers is organised.

Contact: Jacqueline Poisseroux, ULg.

Learn-Nett (Learning Network for Teachers) gathers teachers and researchers in the field of educational technology from five universities to build and share collective practice. Since 1997, other universities joined the network that now covers Belgium, France, Switzerland and Democratic Republic of Congo.

Contacts: Amaury Daele, UniFr.

TFT is an association of professionals of the health domain (hospitals...) that gathers teachers and workers concerned by the management of new incomers and learners during in practice training. Around 30 institutions, both school and health institutions, are members of the CoP "Transition-Formation-Travail".

Contacts: Étienne Vandeput, ULg.

TIC-EF is a community of practice gathering learners and teachers of the course of « Technologies de l'Information et de la Communication pour l'Éducation et pour la Formation » (TIC-EF) at the first master in Educational Sciences from the Faculty of Psychology and Sciences of Education at the University of Liège (Belgium). This CoP deals with the use and the integration of ICTs in school training and learning contexts.

Contacts: Brigitte Denis and Perrine Fontaine, ULg.

TIC-FA is a community of practice gathering learners and teachers of the course of « Technologies de l'Information et de la Communication pour la Formation d'Adultes » (TIC-FA) at the first master in Educational Sciences from the Faculty of Psychology and Sciences of Education at the University of Liège (Belgium). This CoP deals with the use and the integration of ICTs in adults training and learning contexts.

Contacts: Brigitte Denis and Perrine Fontaine, ULg.

Annex III Single Sign On and Identity Profile Aggregation solutions

We identified two main families of identity solutions: the first one is more oriented towards big industrial systems and encompasses several protocols like SAML, WS-Federation, Liberty Alliance ID-FF, the second one is more lightweight and comes from the Web, it is often called Identity 2.0, and is constituted of several protocols like OpenId, Yadis, LID, Sxip.

In the first category, most of the protocols are based on XML and SOAP, and their main concept is Identity Federation: in the framework of a federated identity environment, it is possible to have multiple identity providers and relying parties but they have to be tied into "circles of trust".

Liberty Alliance is one of the first initiative to push an open standard in the domain of identity management. The main concepts of its ID-FF specification are included in the current SAML v2 specification, that has been ratified as a standard by OASIS. WS-Federation is a concurrent and equivalent specification pushed by Microsoft, that is based on the WS-* stack.

The federation principle is less generic that a completely distributed system, and is an intermediary solution between a completely centralized solution like LDAP and a fully distributed solution like OpenId. This kind of system is mainly targeted to medium to large enterprises, where the circles of trust are important and must comply with the security policy, and where the principle of federation can be used between different sections of the same enterprise, or in the case of mergers and acquisitions.

These heavyweight protocols currently implement full SSO and SLO3 mechanisms and are able to store complex metadata in identity profiles. When a user logs into its identity provider, he is automatically logged in all the applications available in the same circle of trust, what is not possible in an Identity 2.0 protocol, because of its distributed nature.

Most of the users of this kind of solutions are enterprises, it is important to note that they did get a really small interest from the Web users (very small market shares).

On the other side of the landscape of the current identities solutions, there is the Identity 2.0 family, that came as a disruptive innovation [disruptive innovation] in the old well-established centralized or federated identity landscape. In this identity family, we can find not only the well-known OpenID, but also Yadis, Lid, XDI and Sxip. All these protocols provides less functionalities than the prior ones, but are consequently more lightweight and more adapted to the massively distributed environment of the Web. For example, all these protocols do not support by default the concept of "circles of trust", and thus we cannot really talk of SSO or SLO: when a user wants to log in an OpenId relying party, he has to provide at least its OpenId identifier even if he is already logged in its identity provider, so the user experience is here a bit worse than the one of a real SSO. The main idea of these protocols is to create a thin identity layer on top of current Web technologies. Currently, the most supported protocol in this category is OpenID, and in its latest version it gathered the main concepts from the other ones.

The two last technologies that does not fit well in the two main families we already described here are CardSpace and OAuth.

CardSpace does not really provide SSO, like in the Identity 2.0 family, but only unique and interoperable identity identifiers. Based on the concept of the identity metasystem [identity metasystem], CardSpace can sit on top of the identity federation protocols or Identity 2.0 protocols and provide a coherent user experience to the users.

OAuth is a lightweight protocol that could fit in the Identity 2.0 family, but it has different use cases.

Its main goal is to authenticate users on Web API levels. For example if a user of an application A needs data from an application B, A can connect to B via Web services but need user's credentials to connect. With OAuth, A can provide a login screen coming from B, and get its data without requiring

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3 SLO: single logout: when a user logs out of its identity provider, he is logged out of all applications in the same circle of trust.

the user to give its credentials directly. In a sense, OAuth is not really concurrent with OpenId but rather complementary, it is in fact possible to combine OAuth and OpenId in the same applications.

Links

Disruptive innovation: en.wikipedia.org/wiki/Disruptive_technology

Identity 2.0: identity20.com

Identity Metasystem: www.identityblog.com/stories/2005/07/05/IdentityMetasystem.htm

ID-FF:
www.projectliberty.org/resource_center/specifications/liberty_alliance_id_ff_1_2_specifications

Laws of identity: www.identityblog.com/stories/2004/12/09/thelaws.html

LDAP: fr.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol

Lid: lid.netmesh.org/wiki/Main_Page

Oasis: www.oasis-open.org/home/index.php

OpenId: openid.net/developers/specs

SAML:
www.oasis-open.org/committees/download.php/13525/sstc-saml-exec-overview-2.0-cd-01-2col.pdf

Sxip: www.sxip.com

WebSSO: hitachi-id.com/concepts/websso.html

WS-*: en.wikipedia.org/wiki/List_of_Web_service_specifications

WS-Federation: msdn.microsoft.com/en-us/library/bb498017.aspx

Yadis: yadis.org/wiki/Main_Page

Annex IV CroSSE search result list format

Plugging a new service into the CroSSE is as simple as providing a RESTful keyword search Web service for that service and manually adding its URL to the CroSSE engine. The full procedure is described in the deliverable D.IMP.05 (Esnault and Karousos, 2008).

The service must return the result list using the following RSS format, which is also the format used by the CroSSE search Web service to return the list of the aggregated results:

```
<rss version="2.0" xmlns:dc="http://purl.org/dc/elements/1.1/">
 <channel>
   <title/>
   <description/>
   <link/>
   <item>
        <title/>
        <description/>
        <link/>
        <author/>
        <pubDate/>
        <dc:creator/>
        <dc:source/>
        <dc:format/>
        <enclosure/>
   </item>
 </channel>
</rss>
```

Where elements in <channel/> can be described as:

- ❖ <title/>: title of the PALETTE service proposing the search (for example eLogbook)

- ❖ <description/>: item's description

- ❖ <link/>: link to the service, url encoded (for example link to CoPe_It!, eLogbook)

And elements in <item/> can be described as:

- ❖ <title/>: title of the search result

- ❖ <description/>: description of the search result

- ❖ <link/>: link to the search result url encoded (direct link to the element in the PALETTE service where it was found, for example direct link to "Getting Started" in eLogbook asset. If the access needs an authentication, this can be specified with a message linking to login page)

- ❖ <author/>: document/information's author email, if available

  Example: <author>lawyer@boyer.net (Lawyer Boyer)</author>

- ❖ <pubDate/>: publication date (meaning creation date, or modification date if the document has been modified), if available

  Example: <pubDate>Sun, 19 May 2002 15:21:36 GMT</pubDate>

- ❖ <dc:creator/>: used for CoREP only. Specifies the name of application which stored data to CoREP, so the "real" source of data.

- ❖ <dc:source/>: used for CoREP only. Specifies the website link application which stored data to CoREP, so the website of "real" source of data.

- ❖ <dc:format/>: represents the kind of document (mime type). Default values are:

  - o application/pdf for pdf documents

- o application/msword for word documents
- o application/vnd.ms-excel for excel documents
- o application/vnd.ms-powerpoint for ppt documents
- o text/html for html documents

Mime-types: (URL:MIM)

Example: <dc:format>text/html</dc:format>

- ❖ <enclosure/>: used for eLogbook resources only. Describes a media object that is attached to the item. It has three required attributes. url specifies where the enclosure is located, length says how big it is in bytes, and type says what its type is, a standard MIME type. **Only for use for eLogbook resources.**

    The url must be an HTTP URL.

Example: <enclosure url="http://www.scripting.com/mp3s/weatherReportSuite.mp3" length="12216320" type="audio/mpeg" />