



Project no. 027087

TENCompetence

Building the European Network for Lifelong Competence Development

Project acronym: Integrated Project TENCompetence

Thematic Priority: 2.4.10

D4.7 Methodology for implementing lifelong competence development situations based on TENCompetence outcomes

Due date of deliverable: 31-10-2009

Actual submission date: 11-01-2010

Start date of project: 01-12-2005

Duration: 4 years

Fundació Barcelona Media Universitat Pompeu Fabra

Version 1.0

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Project Deliverable Report

D4.7 - Methodology for implementing lifelong competence development situations based on TENCompetence outcomes

Work package	WP 4 – Pilots with the integrated system and validation of the project		
Task	T. 2, 3		
Date of delivery	Contractual: 31-10-2009	Actual: 11-01-2010	
Code name	D4.7	Version: 1.0	Draft <input type="checkbox"/> Final <input checked="" type="checkbox"/>
Type of milestone	Report		
Security (distribution level)	Public		
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Abstract (for dissemination)	<p>The goal of this deliverable is to serve as a <i>getting started</i> source for organizations adopting the TENCompetence infrastructure to implement competence development solutions in the domains of eLearning, Personal Competence Development and Knowledge Management. In particular, this document describes a set of real scenarios (pilots and business demonstrators) implemented with previous versions of the TENCompetence tools. These scenarios are useful examples focused on one of the three domains or on combinations of them. The deliverable also provides some methodological indications that take into account the experience learned from pilots / demonstrators and the latest version of the tooling. The methodological indications also refer to other TENCompetence outcomes and deliverables for further reading. The TENCompetence reference implementations are strongly recommended to be checked together with this document in order to understand the full potential of the TENCompetence outcomes.</p>		
Keywords List	Testing and Validation, Pilots, Business Demonstrators, Cycle 3, usability, Competence Development		

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1. Introduction

This first chapter introduces the D4.7 deliverable titled “*Methodology for implementing lifelong competence development situations based on TENCompetence outcomes.*” After explaining its purpose and relationship with other TENCompetence deliverables, the chapter revises the main TENCompetence terms that readers should know in order to understand the TENCompetence approach and infrastructure. Then it presents a brief description of the three main domains addressed in the project and an overview of the main tooling available in the achieved Personal Competence Management (PCM) infrastructure. The structure of the deliverable is explained in the last section of this chapter.

1.1 Purpose of this document and relationship with other TENCompetence deliverables

One of the problems defined in the initial TENCompetence project plan (Description of Work) was that there was little unifying work to integrate approaches in the areas of Knowledge Management, Human Resource Management and eLearning to provide solutions for competence development during learning and working and across a lifetime. The updated definitions of TENCompetence use case models provided in project deliverable **D2.4** (Mendez et al., 2009) take into account these three fields and define three domains in which the TENCompetence infrastructure can be applied. These domains are: eLearning, Personal Competence Development (including Human Resource Management scenarios) and Knowledge Management. The TENCompetence usage profiles exposed in **D2.2** (Koper et al., 2008) can be mapped onto these domains. Moreover, **D2.4** also indicates which combinations of the PCM tools / portlets and Liferay facilities can be typically used in an integrated way when configuring solutions in the three domains. The description of the latest realisation of the TENCompetence software is presented in detail in **ID3.24** (Vogten et al., 2009). WP2 in collaboration with WP10 have also coordinated the development of PCM **reference implementations (integrated Liferay configurations) illustrating an application for the three domains**¹. WP3, WP9 and WP10 have also provided outcomes leading to sustainability. In particular, WP9 has created a series of user manuals, see **ID9.22** (Kalz, 2010), while WP3 has elaborated the installation, configuration, maintenance and monitoring manuals, see **ID3.27** (Alberts et al., 2009). Besides, **ID10.2** (Krekels et al., 2008) and **D10.3** (Kew et al., 2009) deal with the business models proposed in the context of the project.

Together with the previous outcomes, the goal of this deliverable is to serve as a starting point for organizations adopting the PCM to implement competence development solutions in the domains of eLearning, Personal Competence Development and/or Knowledge Management. In particular, it provides samples of real scenarios implemented with previous versions of the TENCompetence components (pilots and business demonstrators, see **D4.6** (Hernández-Leo et al., 2010)). These scenarios can be focused on one of the three domains or on combinations of them and offer readers some **examples of good practices drawn from real experiences** that can be followed when implementing their own solutions. Updating the implementation methodology presented in **D4.5** (Hernández-Leo et al., 2009b) and taking into account the lessons learned from pilots / business demonstrators and the latest version of the tooling, this deliverable also provides some **methodological indications for implementing competence development** situations in the three domains (or combinations of them) based on the TENCompetence outcomes. The methodological indications make references to the previously mentioned deliverables and represent some initial guidance on how to adopt and apply the TENCompetence approach and infrastructure.

¹ <http://pcm.tencompetence.org/>

All documents referenced above are available in the TENCompetence project repository at <http://hdl.handle.net/1820/496>.

1.2 Main TENCompetence terms

TENCompetence uses the following definitions for these main terms:

Competence profile: A set of Competences that define the minimum requirements for a specific function/job.

Competence: A Competence is defined as the ability (‘disposition’) of an actor to act effectively and efficiently upon the events in an ecological niche (an occupation, a hobby, a market, a sport, etc.). In short: the ability to perform effectively in a situation.

Learning path: A learning path is an ordered set of activities and units of learning that have to be (or are) followed to attain a certain Competence. When it is particularized to the needs of an individual, then it is called a personal competence development plan.

Community: Typically a learning network representing a certain profession. Users can collaborate within the context of a certain community. As such, each entity exists in the context of exactly one Community.

A summary of the TENCompetence domains, described in more detail in D2.4, are collected in next section.

1.3 Summary of the TENCompetence application domains

The TENCompetence project work was already organized taking into account three aspects, perspectives or domains of interest in the area of competence development for learning and work across the life time: eLearning, Personal Competence Development and Knowledge Management. The TENCompetence infrastructure enables the use of the three aspects in an integrated system, but it also allows the configuration of any of the domains separately.

- **eLearning:** The eLearning perspective is mainly assumed in a formal learning setting, with an institutional education provider, programme structure, and distinct roles of teachers/tutors and learners. The dominant use cases here are ‘study for a new job’ and ‘developing specific competences’. Though the learner may initially have selected the programme and/or courses from a catalogue, from there on personal flexibility is limited. In terms of TENCompetence the emphasis here is on the tools developed by WP6, which are based on the implementation of IMS Learning Design (IMS-LD). The WP5 tool-set to manage learning resources also plays an important part in this scenario. The IMS-LD toolset (ReCourse, SLeD..., see section 1.4) developed under TENCompetence allows for considerable flexibility and personalization, even within a formal eLearning setting.
- **Personal Competence Development:** The Personal Competence Management perspective emphasizes continuous professional development, self-directed, typically within a larger professional community (such as a professional organization or a labour union) or a Human Resource Management / organizational perspective. The dominant use case therefore is ‘keeping up to date in my field/profession’. In terms of TENCompetence this perspective emphasizes the types of tools (see section 1.4) developed by WP7 (tools around personal development planning) and WP8 (Goal Orientation, Social Help...), while shared (community-based) resources management also requires WP5 tools (LearnWeb).
- **Knowledge management:** The Knowledge Management Domain provides to professionals, learners, knowledge managers (KM) and providers an interface to register, validate, modify, comment/discuss, rate, tag and search and share knowledge resources within the system.

Knowledge management is mainly supported by the tools developed in WP5 (LearnWeb), though TENTube (WP8) can be also used for video-driven knowledge sharing purposes.

1.4 Overview of the TENCompetence infrastructure

The Personal Competence Manager (PCM) is built on top of the open source Liferay Portal. This system provides substantial built-in support for community based applications, and can be integrated into enterprise systems. To this TENCompetence adds the functionality required to manage competence development. *An extended description of the infrastructure can be read in ID3.24 and D2.4*, this section presents brief descriptions of the tooling in order to provide a comprehensive document.

The main TENCompetence portlets for Liferay are:

Goal Orientation portlet: It provides a user with an overview of the competence development opportunities offered by the learning network based on personal preferences for certain activities, contexts and interests. These resulting competence profiles can then be further investigated through for example the Assessment portlet to get a first personal positioning on the profile.

Test portlet: A portlet that allows a user to take tests in order to self-assess aspects that are relevant for example determining a goal, like aptitude, motivation, personality, learning style, etc. These tests are created using the QTI Editor portlet. The outcomes of the Test portlet are informative, and not directed at a specific competence.

Learning Path Editor portlet: A tool for defining a course of actions which will help the learner to attain a particular set of competences. These actions may be formal (i.e. certified), non-formal (e.g. creative course, sports club training), or informal (e.g. ask a colleague). The result is a learning path compliant to the TENCompetence Learning Path specification. These pre-authored learning paths are input to the creation of personalised development plans with the Activity Navigator portlet.

Competence Model Editor portlet: This editor lets an author create and manipulate the competence model entities. It includes the definition of competences, competence levels, competence profiles and competence profile levels. These entities are input for all tools that are dealing with competence development.

QTI Editor portlet: Lets an author create QTI assessments, according to the IMS QTI 2.1 specification. The tests that are created in this way can then be accessed by users through the Test portlet and the Assessment portlet.

Goal Selector portlet: When a user has decided what competence profile he/she wants to achieve, the goal selector is used to select a certain competence profile as the goal for their personal development. Reflection on a chosen goal can be done by maintaining the motivation for a goal. The defined goals are reused in the next step of the personal development planning, creating a plan to achieve the goal.

Progress portlet: The Progress portlet provides different configurable overviews on user data. User data include progress information about competences, competence profiles, learning activities and evidence (added data that provides proof for the mastery of a competence). The portlet has two main modes. A “journal” mode, where progress can be monitored in detail and a “current” mode, only presenting the current state of a user. The portlet is very flexible and can serve many purposes.

Activity Navigator portlet: The Activity Navigator is the portlet that supports a user in actually achieving the selected goal, it thus forms an important part in personal development planning. It consists of two major functionalities. The first is targeted at determining a suitable learning plan for the user based on the available learning paths and the identified competence gaps. The second is targeted at following the learning plan by directing the user to the appropriate learning opportunities.

Assessment portlet: The Assessment portlet helps a user to perform a self assessment for the competences required to achieve the selected goal. After performing this self assessment a competence gap can be determined.

Evidence portlet. The Evidence portlet provides the user with the opportunity to add evidence to the portfolio that provides proof for the mastery of a competence, e.g. linked to the self-assessment carried out through the Assessment portlet. At the moment this portlet is only available as an integrated functionality in the Evidence portlet.

SLeD in a portlet: This is a version of the SLeD IMS-LD and IMS-QTI player, which is running in a portlet. It plays content provided by the Coppercore and newAPIS runtime engine. The application is designed to be re-used and integrated with other systems to provide plug-in learning design functionality.

Social Help portlet: Provides an interface to communicate with other individuals, mainly experts, that can provide answers to the given questions and doubts. At the moment of writing this report, this portlet is still in the testing phase.

LD Admin Tool: The IMS Learning Design Admin Tool handles the administration of IMS Units or Learning created with the ReCourse tool. This comprises creating new ‘runs’ for online delivery of the Unit of Learning through the SLeD player, and assigning users to roles (e.g. learner, peer, assessor, coach, etc.) in those runs.

Apart from the portlets, TENCompetence provides the following main tools:

LearnWeb: LearnWeb2.0 is a tool for the management and sharing of knowledge resources. It provides users with the convenience of a single environment from which to access Web 2.0 tools best suited to the competence development process. It enables access to a wide array of resources from all over the web which can then be exclusively tagged, rated and commented on by TENCompetence users for TENCompetence users. This is achieved by isolating competence focused feedback from that of standard Web 2.0 users. In this way, members of a TENCompetence community are better able to make informed opinions on the value of resources for the purposes of contextualized competence development.

ReCourse editor: It is a system that targets educational practitioners and instructional designers with little experience with the technical specification of IMS-LD. ReCourse supports detailed modeling and arranging of learning activities graphically and to store them in Units of Learning compliant with IMS-LD. ReCourse allows to integrate external resources (objects, links, etc.) and services (search & browse etc.) in the planning of the educational process. Moreover, it enables the creation of IMS QTI (v2.1) tests embedded in the Units of Learning. Furthermore, ReCourse allows templating of UoL, which can be reused in different settings.

Astro Learning Design player: The Astro LD Player is an alternative runtime environment to using SLeD. The SLeD player, used in previous pilots, is reaching the end of its useful life as it is built using out-of-date Web technologies which preclude the use of modern graphical user interfaces. Astro can deliver UoLs that embody complex pedagogical models.

NewAPIS QTI server and runtime system: The NewAPIS server for delivering QTI assessment activities has been enhanced and adapted to support the most recent version of IMS QTI (v2.1). On the runtime side, the NewAPIS runtime engine was extended to provide good rendering of all TENCompetence QTI question types, its performance and reliability were enhanced, and its architecture adapted so that it provides web services for consumption by PCM portlets. It is also integrated in SLeD and the SLeD portlet.

Wookie Widget server: The Wookie Widget server, developed by TENCompetence as a solution to the provision of flexible services for IMS LD runtime, was further developed in year 4. It is integrated in SLeD and Astro. This attracted significant interest from outside the project, to the extent that it was invited to submit to the Apache Foundation Incubator. The necessary improvements to the code base and documentation were made, and Wookie was accepted into the Apache Incubator in September. A community of developers is forming around the server in that context.

TENTube: TENTube is a video-based connection tool which supports competence development. It aims at fostering connection creation among community members and content. It is based on the latest web trends and makes extensive use of video, user profiling, game dynamics, agents and network visualizations in order to capture the attention and involvement of the learning community members. It consists of four coupled environments: a video exchange channel, a network visualization and navigation tool, and profiles space and a connection games space.

1.5 Structure of this document

The remainder of the deliverable is organized as follows.

Chapter 2 provides a set of sample real scenarios implemented with previous versions of the TENCompetence components (pilots and business demonstrators). These scenarios are focused on one of the three domains or on combinations of them and offer readers some examples of good practices drawn from real experiences that can be followed when implementing their own solutions.

Chapter 3 includes methodological indications for implementing competence development situations in the three domains (or combinations of them) based on the TENCompetence outcomes. The methodological indications compiles results from WP3 (integrated infrastructure, installation and configuration manuals), WP4 (lessons learned from pilots and business demonstrators), WP9 (user manuals, videos) and WP10 (business models).

Chapter 4 concludes this deliverable and a final References section lists the main sources used in the writing of this deliverable.

2. TENCompetence pilots and business demonstrators and their relationship with the three domains

This chapter relates the pilots and business demonstrators carried out in cycle 3 with the TENCompetence software components available at the time of implementing those experiences (mostly beginning of Year 4) with the three domains considered in the project: eLearning, Personal Competence Development and Knowledge Management. Each of the scenarios implemented in pilots and demonstrators are focused on one of the three domains or combinations of them.

These scenarios provide real-life situations which show how the three aspects can be used together or separately in an integrated system configured depending on individual or institutional needs. *Extended descriptions of the scenarios, their context, implementation and evaluation can be found in the appendices of D4.6* (Hernández-Leo et al, 2010).

2.1 E-learning

The TENCompetence pilots and most of the business demonstrators implemented with preliminary versions of the TENCompetence infrastructure represent mainly combined versions of the three domains. Table 1 includes the pilots and demonstrators with eLearning aspects with a brief description and some indicative weights of their foci in the three domains. Figures 1 and 2 show the main TENCompetence tooling specifically centred in the eLearning perspective, both figures belong to the Agora pilot implementation.

Table 1 Overview of Cycle 3 pilots and demonstrators with an eLearning perspective component and weights of their global foci in the three domains

Pilot / demons.	Brief description	eLearning	Personal Competence Development	Knowledge Management
AGORA	<p>The Spanish Àgora pilot used the TENCompetence infrastructure to support the competence development of adults in languages (English and Spanish) and information and communication technologies (ICT). In this sense, Àgora intends to facilitate the inclusion of adults with low educational profiles into the active fabric of current society, in which ICT and languages are of the utmost importance in order not to be left out.</p> <p><i>Extended description in Appendix 2 of D4.6.</i></p>	<p>++</p> <p>Some of the learning actions available in the PDP (see next column) were Units of Learning (UoLs) proposing structured learning processes with a sequence of activities (similar to a course). Some of the UoLs contained formative self-assessment tests. These UoLs were created by experts (authors) using ReCourse (see Figure 1) and enacted using the SLeD player and the integrated newAPIS engine (see Figure 2). <i>(Note that in the latest release the</i></p>	<p>+++</p> <p>The self-organized training supported by the Personal Development Planner (PDP) tool (<i>a collection of portlets –Goal selector, assessment, activity navigator, progress - in the latest PCM realise</i>) aims at allowing the learners to create and control their own learning plans based on their interests and educational background including informal and non-formal experiences. The use of the PDP functionalities, such as the self-assessment, the planning and the self-regulating elements allowed the participants to develop reflective skills.</p>	<p>++</p> <p>A group of Agora participants were interested in sharing (register, comment/discuss, tag and share) knowledge resources in order to solve common tasks of their personal interests. They use the <i>LearnWeb</i> tool.</p>

<i>SLED player and an LD admin tool are also available as Liferay portlets)²</i>				
UNESCO-IHE DSS	<p>In this pilot participants develop competences related to the process of designing and developing Decision Support Systems for River Basin management, and particularly to the formulation of decision making problems as well as understanding the appropriate usage of various tools and techniques such as simulation, optimization and multi-criteria analyses.</p> <p><i>Extended description available in Appendix 3 of D4.6.</i></p>	<p style="text-align: center;">++</p> <p>The scenario is basically a formal learning setting with an institutional education provider and final certification. However, learners have some flexibility in the creation of their personal development plans (see next column). Once learners have created their plans, they have available learning actions with links to resources already that UNESCO-IHE already had available for their existing (content-oriented) courses.</p>	<p style="text-align: center;">+++</p> <p>The participants used the Web PDP as the central tool for planning their learning process and accessing the different activities available in the pilot.</p>	<p style="text-align: center;">+</p> <p>LearnWeb was available but its use for knowledge sharing purposes was limited.</p>
UNESCO-IHE FMM	<p>The overall goal of the “Flood Modelling for Management” competence development program is to support water professionals in the development of the competences that make them capable of maximizing economic and social well-being in an equitable manner (without compromising the sustainability of their ecosystem) by using catchment, river basin and urban flooding models.</p> <p><i>Extended description available in Appendix 4 of D4.6.</i></p>	<p style="text-align: center;">++</p> <p>Similar to previous row. The result of this pilot showed that in this context participants prefer to be guided by an expert rather than to decide by themselves their learning path.</p>	<p style="text-align: center;">+++</p> <p>Similar to previous row.</p>	<p style="text-align: center;">+</p> <p>Similar to previous row.</p>
ICT Teacher Training	<p>This pilot shows how the TENCompetence framework and approach can be used by teachers with different profiles (from all subjects and levels) to develop ICT competences.</p> <p><i>Extended description available in Appendix 5 of D4.6.</i></p>	<p style="text-align: center;">+</p> <p>The scenario is framed in a formal learning setting with an institutional education provider and final certification. However the approach followed</p>	<p style="text-align: center;">+++</p> <p>Participants selected a competence profile (among a set of profiles available), assess their competences and according to their competence gap created their profile. A blog (also available in the PDP) was used for sharing progress and experience. Learners</p>	<p style="text-align: center;">+</p> <p>LearnWeb was used to search relevant multimedia resources, to evaluate and comment resources, as well as to publish learners’ own materials. Its use was essential for all the tasks proposed.</p>

² To see these portlets, please check the TENCompetence reference implementations at <http://pcm.tencompetence.org/>

		was quite flexible for the participants and included informal activities.	appreciated significantly the Goal Orientation Tool (<i>Goal Orientation portlet- in the latest PCM realise</i>) with which participants could find communities and profiles, and see which competences develop individuals with similar interests.
Digital Cinema	<p>This pilot is focused on supporting competence development of professionals in the area of Digital Cinema. In particular, the competences addressed are related to effectively using the new NINOS infrastructure for automatic audiovisual production</p> <p><i>Extended description available in Appendix 6 of D4.6.</i></p>	<p>++</p> <p>The development of some specific and complex competences requires of structured sequences of guided activities.</p>	<p>+++</p> <p>This scenario could be typically framed in the context of a larger professional community where participants are interested in a continuous professional development which is self-directed.</p> <p>+</p> <p>Sharing of knowledge resources within the professional community complements the previous facilities for this type of lifelong learning scenarios.</p>
MIZAR	<p>MIZAR is a content provider SME devoted to educational purposes. Their aim of their implementation was to explore the possibility of extending their business model by also delivering (using TENCompetence) competence development programs. The experience they carried out involved tutors (as learners) and learners in the area of “speaking Spanish in professional contexts” using their content. The learners come from an external (client) organization in the USA.</p> <p><i>Extended description available in Appendix 7 of D4.6.</i></p>	<p>+++</p> <p>MIZAR offers its educational content to learners in client organizations to develop “specific competences” structured in the form of learning paths. Tutors can be available to support learners.</p>	<p>++</p> <p>The learning paths were available from the PDP, which was used by learners to create their personal competence development plans.</p> <p>-</p>
ELSA	<p>ELSA is part of the ZEW, the Competence Center for Continuous Education of the University of Hannover. They provide support for the deployment of technology and media in the learning practice. ELSA conceptualises a learning environment including LearnWeb 2.0.</p> <p><i>Extended description available in Appendix 13 of D4.6.</i></p>	<p>++</p> <p>LearnWeb was used by the learners for self-directed learning during a semester with students.</p>	<p>++</p> <p>The scenario was mainly around sharing (register, comment/discuss, tag and share) knowledge resources.</p> <p>-</p>

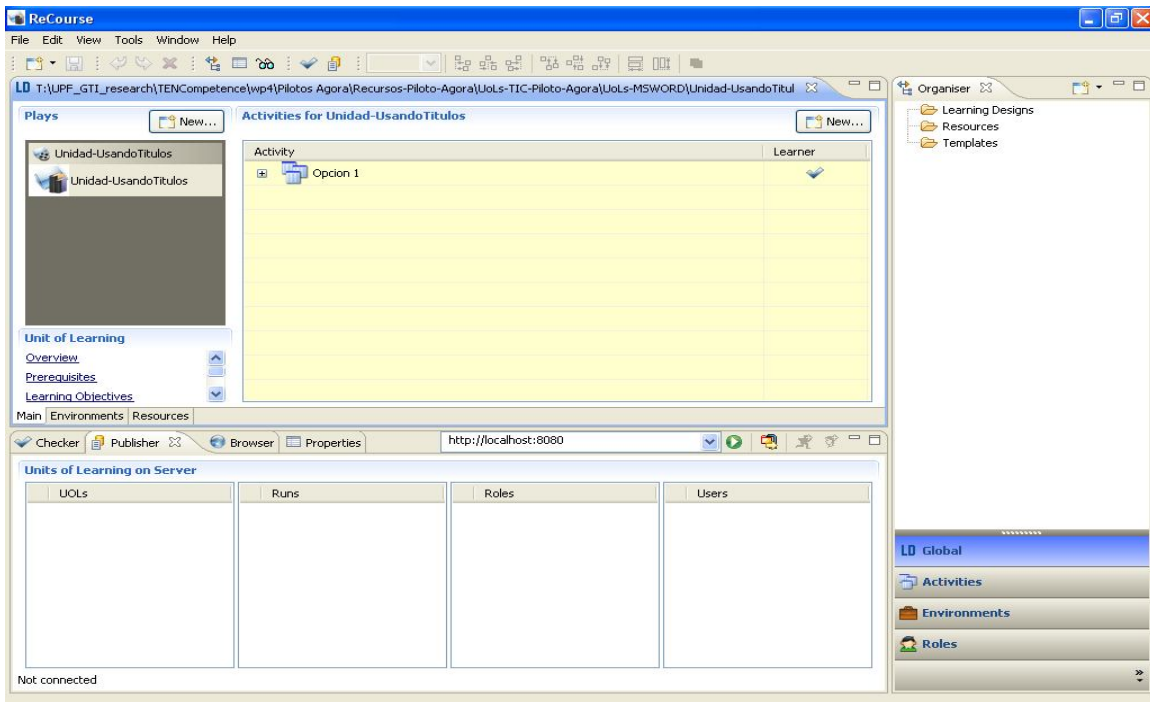


Figure 1 Screenshot of the *ReCourse* tool for the creation of IMS-LD Units of Learning with IMS-QTI tests

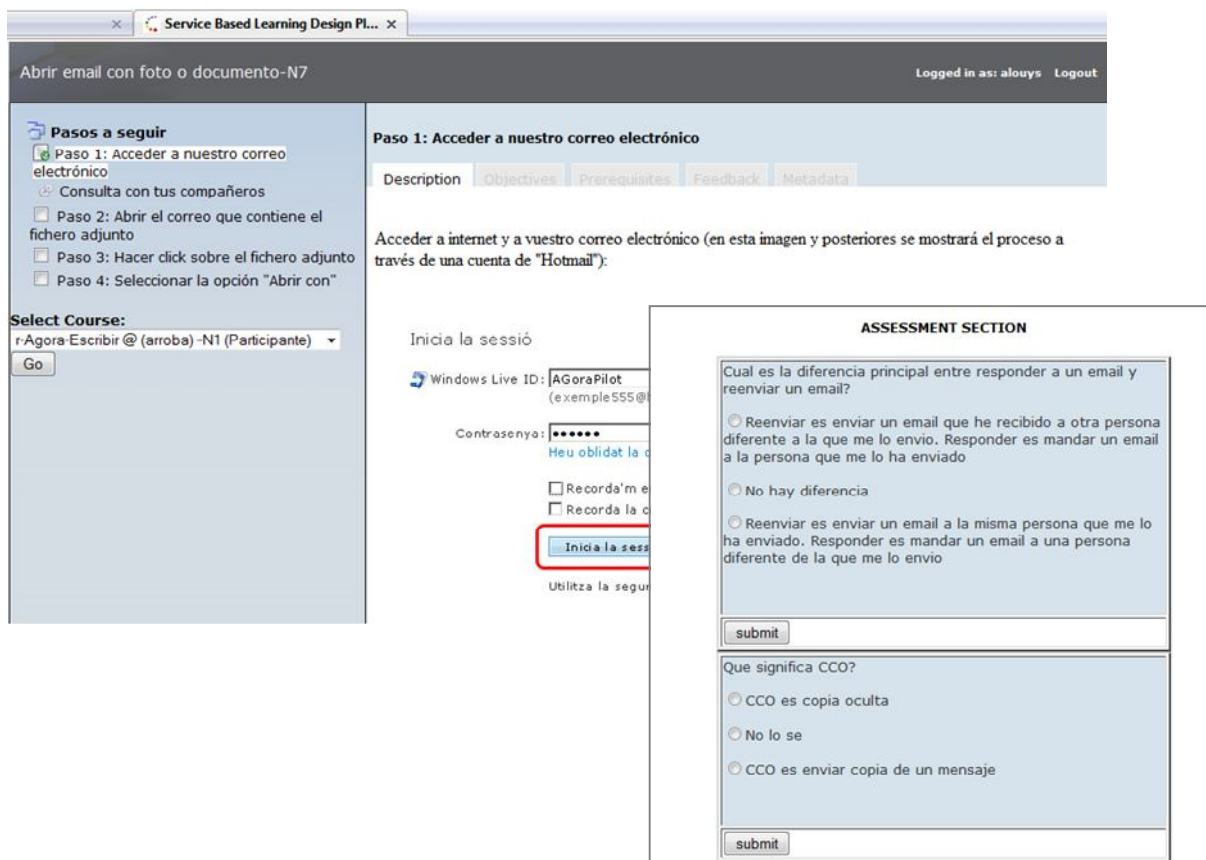


Figure 2 Screenshot of the *SLED* player running an IMS-LD UoL with an embedded IMS-QTI test³ (in Spanish, Agora pilot)

³ See (Santos et al., 2009)

2.2 Personal Competence Development

Table 2 includes the pilots and demonstrators with Personal Competence Development aspects with indicative weights of their foci in the three domains. The table shows how personal competence development, which is the main centre of the project, is central in the majority of the scenarios. Figure 3 shows a screenshot of the PDP tool available at the time of implementing the Empower Limburg Business Demonstrator.

Table 2 Overview of Cycle 3 pilots and demonstrators with a Personal Competence Development perspective component and weights of their global foci in the three domains

Pilot / demons.	Brief description	eLearning	Personal Competence Development	Knowledge Management
AGORA	<p>The Spanish Àgora pilot used the TENCompetence infrastructure to support the competence development of adults in languages (English and Spanish) and information and communication technologies (ICT). In this sense, Àgora intends to facilitate the inclusion of adults with low educational profiles into the active fabric of current society, in which ICT and languages are of the utmost importance in order not to be left out.</p> <p><i>Extended description in Appendix 2 of D4.6.</i></p>	<p>++</p> <p>Some of the learning actions available in the PDP (see next column) were Units of Learning (UoLs) proposing structured learning processes with a sequence of activities (similar to a course). Some of the UoLs contained formative self-assessment tests. These UoLs were created by experts (authors) using ReCourse (see Figure 1) and enacted using the SLeD player and the integrated newAPIS engine (see Figure 2). <i>(Note that in the latest release the SLED player and an LD admin tool are also available as Liferay portlets)</i></p>	<p>+++</p> <p>The self-organized training supported by the Personal Development Planner (PDP) tool (<i>a collection of portlets – Goal selector, assessment, activity navigator, progress - in the latest PCM realise</i>)⁴ aims at allowing the learners to create and control their own learning plans based on their interests and educational background including informal and non-formal experiences. The use of the PDP functionalities, such as the self-assessment, the planning and the self-regulating elements allowed the participants to develop reflective skills.</p>	<p>++</p> <p>A group of Agora participants were interested in sharing (register, comment/discuss, tag and share) knowledge resources in order to solve common tasks of their personal interests. They use the <i>LearnWeb</i> tool.</p>
UNESCO-IHE DSS	<p>In this pilot participants develop competences related to the process of designing and developing Decision Support Systems for River Basin management, and particularly to the formulation of decision making problems as well as understanding the appropriate usage of</p>	<p>++</p> <p>The scenario is basically a formal learning setting with an institutional education provider and final certification. However, learners have some flexibility in the creation of their personal development plans (see next column). Once learners have created their plans, they have available learning</p>	<p>+++</p> <p>The participants used the Web PDP as the central tool for planning their learning process and accessing the different activities available in the pilot.</p>	<p>+</p> <p>LearnWeb was available but its use for knowledge sharing purposes was limited.</p>

⁴ To see these portlets, please check the TENCompetence reference implementations at <http://pcm.tencompetence.org/>

	<p>various tools and techniques such as simulation, optimization and multi-criteria analyses.</p> <p><i>Extended description available in Appendix 3 of D4.6.</i></p>	<p>actions with links to resources already that UNESCO-IHE already had available for their existing (content-oriented) courses.</p>		
UNESCO-IHE FMM	<p>The overall goal of the “Flood Modelling for Management” competence development program is to support water professionals in the development of the competences that make them capable of maximizing economic and social well-being in an equitable manner (without compromising the sustainability of their ecosystem) by using catchment, river basin and urban flooding models.</p> <p><i>Extended description available in Appendix 4 of D4.6.</i></p>	<p>++</p> <p>Similar to previous row. The result of this pilot showed that in this context participants prefer to be guided by an expert rather than to decide by themselves their learning path.</p>	<p>+++</p> <p>Similar to previous row.</p>	<p>+</p> <p>Similar to previous row.</p>
ICT Teacher Training	<p>This pilot shows how the TENCompetence framework and approach can be used by teachers with different profiles (from all subjects and levels) to develop ICT competences.</p> <p><i>Extended description available in Appendix 5 of D4.6.</i></p>	<p>+</p> <p>The scenario is framed in a formal learning setting with an institutional education provider and final certification. However the approach followed was quite flexible for the participants and included informal activities.</p>	<p>+++</p> <p>Participants selected a competence profile (among a set of profiles available), assess their competences and according to their competence gap created their profile. A blog (also available in the PDP) was used for sharing progress and experience. Learners appreciated significantly the Goal Orientation Tool (Goal Orientation portlet- in the latest PCM realise)⁵ with which participants could find communities and profiles, and see which competences develop individuals with similar interests.</p>	<p>+</p> <p>LearnWeb was used to search relevant multimedia resources, to evaluate and comment resources, as well as to publish learners’ own materials. Its use was essential for all the tasks proposed.</p>
Digital Cinema	<p>This pilot is focused on supporting competence development of professionals in the area</p>	<p>++</p> <p>The development of some specific and complex competences requires of structured</p>	<p>+++</p> <p>This scenario could be typically framed in the context of a larger</p>	<p>+</p> <p>Sharing of knowledge resources within the professional</p>

⁵ To see this portlets, please check the TENCompetence reference implementations at <http://pcm.tencompetence.org/>

	<p>of Digital Cinema. In particular, the competences addressed are related to effectively using the new NINOS infrastructure for automatic audiovisual production</p> <p><i>Extended description available in Appendix 6 of D4.6.</i></p>	<p>sequences of guided activities.</p>	<p>professional community where participants are interested in a continuous professional development which is self-directed.</p>	<p>community complements the previous facilities for this type of lifelong learning scenarios.</p>
<p>MIZAR</p>	<p>MIZAR is a content provider SME devoted to educational purposes. Their aim of their implementation was to explore the possibility of extending their business model by also delivering (using TENCompetence) competence development programs. The experience they carried out involved tutors (as learners) and learners in the area of “speaking Spanish in professional contexts” using their content. The learners come from an external (client) organization in the USA.</p> <p><i>Extended description available in Appendix 7 of D4.6.</i></p>	<p>+++ MIZAR offers its educational content to learners in client organizations to develop “specific competences” structured in the form of learning paths. Tutors can be available to support learners.</p>	<p>++ The learning paths were available from the PDP, which was used by learners to create their personal competence development plans.</p>	<p>-</p>
<p>DobleVia</p>	<p>DobleVia, an SME offering educational, social and cultural services, uses the TENCompetence tools to complement their HRM infrastructure and offer training opportunities for competence development to their employees, who typically have changing job requirements.</p> <p><i>Extended description available in Appendix 8 of D4.6.</i></p>	<p>-</p>	<p>+++ In this case, the PCM (PDP tool) was used to support continuous professional development, self-directed, within a Human Resource Management / organizational perspective. DobleVia employees needed to keep-up-to-date with their profession and develop competences to master new functions within their field.</p>	<p>+ Though a knowledge management system such as LearnWeb was not used, DobleVia considered that the formalization of their knowledge in the form of learning actions associated to competences represents for them a way to manage knowledge.</p>

CEME of Altran	<p>The Centre of Excellence for Mechanical Engineering of the Altran company is changing its knowledge and human resources strategies. TENCompetence is an important trigger for this change.</p>	-	<p style="text-align: center;">+++</p> <p>The main effort in the Altran experience has been focused on exploring how to offer the learning plans more appropriate to their engineers/ consultants depending on their previously mastered competences and goals. Eventually they are also interested in matching their staff competence profiles with their (upcoming) projects.</p>	-
Empower Limburg	<p>Public- and private sector partners from the Limburg region - the Empower Limburg consortium – implemented a TENCompetence business demonstrator to improve mobility of middle managers between its partner organizations.</p>	-	<p style="text-align: center;">+++</p> <p>The TENCompetence tools have been used together with experimental procedures on how to define shared competence profiles between organizations.</p>	-
CEDEP	<p>INSEAD and CEDEP – the European Centre for Executive Development –applied the TENC Tube in an inter-organizational context composed of a learning network of peers from CEDEP member companies (e.g. L’Oréal, HSBC, Sanofi Aventis, etc.)</p>	-	<p style="text-align: center;">+++</p> <p>The focus is on the social network dimension of competence development and management systems and in particular, on how to facilitate more informal ways of knowledge exchange, linking the collective competence-related knowledge and expertise of the community of users</p>	<p style="text-align: center;">++</p> <p>The knowledge exchange (see previous column) included tacit knowledge, know-how and actual experiences. <i>TENC Tube</i> tool was used in this demonstrator.</p>
EPIQ ELEC	<p>The EPIQ Electronic Assembly Business Unit EPIQ-2 is a high technology company that needs to get more out of their engineers and specialists.</p>	-	<p style="text-align: center;">+++</p> <p>The EPIQ business demonstrator applies TENCompetence to support top and middle management, as well as various professional communities and individuals in improving the processes of</p>	<p style="text-align: center;">+</p> <p>See previous column.</p>

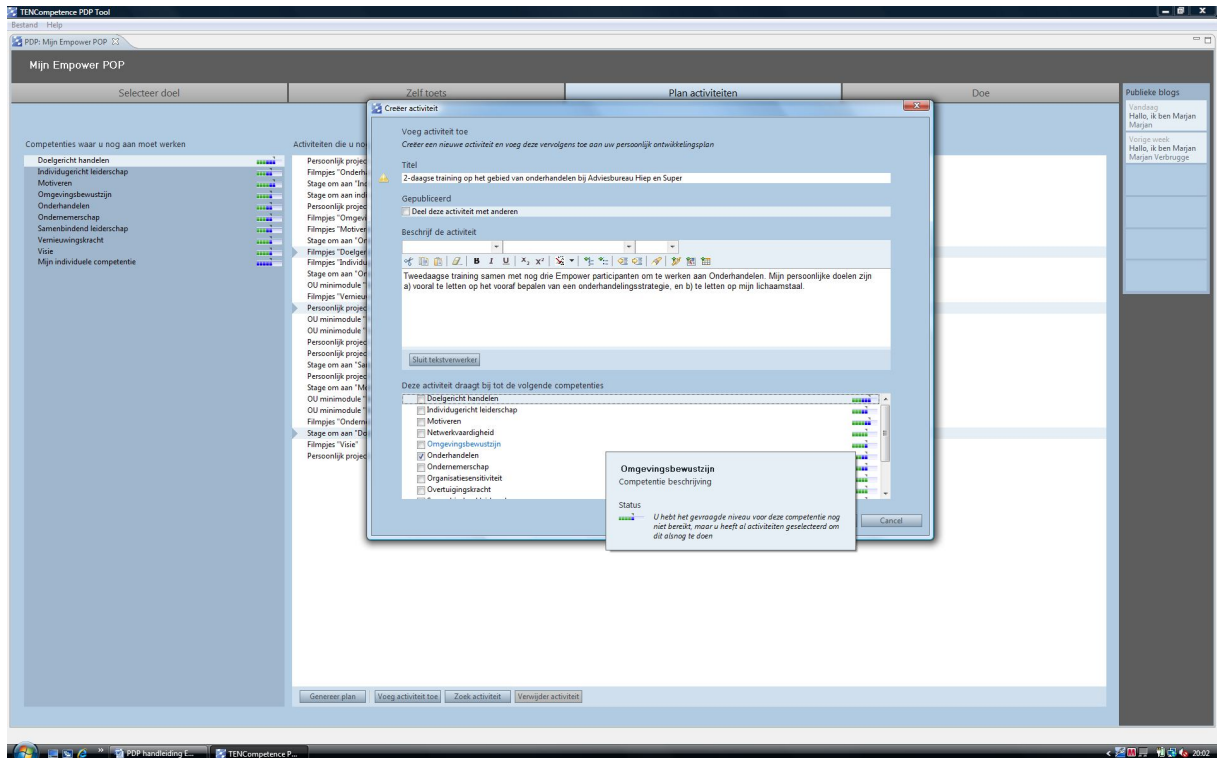
competence profiling,
performance
management and
organizational learning
enhancement and
knowledge
management in an
enterprise context.

Macmillan
Cancer
Support

The charity Macmillan
Cancer Support needed
to develop a tool for
guiding volunteers who
wished to support the
charity.

*Extended description
available in Appendix 15 of
D4.6.*

+++
The guidance included
initial alignment with
roles and subsequent
analysis of competency
to fulfil selected roles
with a view to
recommending courses
of learning to
supplement the
volunteers existing
potential.



**Figure 3 PDP tool, creating the personal development plan
(in Dutch, Empower Limburg Business Demonstrator)**

2.3 Knowledge Management

Table 3 includes the pilots and demonstrators with Knowledge Management aspects with a brief description and some indicative weights of their foci in the three domains. Figure 4 is a screenshot of LearnWeb as used in the ELSA demonstrator. The figure shows how rating, tagging and commenting to a media resource can be done using LearnWeb.

Table 3 Overview of Cycle 3 pilots and demonstrators with a Knowledge Management perspective component and weights of their global foci in the three domains

Pilot / demons.	Brief description	eLearning	Personal Competence Development	Knowledge Management
AGORA	<p>The Spanish Àgora pilot used the TENCompetence infrastructure to support the competence development of adults in languages (English and Spanish) and information and communication technologies (ICT). In this sense, Àgora intends to facilitate the inclusion of adults with low educational profiles into the active fabric of current society, in which ICT and languages are of the utmost importance in order not to be left out.</p> <p><i>Extended description in Appendix 2 of D4.6.</i></p>	<p>++</p> <p>Some of the learning actions available in the PDP (see next column) were Units of Learning (UoLs) proposing structured learning processes with a sequence of activities (similar to a course). Some of the UoLs contained formative self-assessment tests. These UoLs were created by experts (authors) using ReCourse (see Figure 1) and enacted using the SLeD player and the integrated newAPIS engine (see Figure 2). <i>(Note that in the latest release the SLED player and an LD admin tool are also available as Liferay portlets)</i></p>	<p>+++</p> <p>The self-organized training supported by the Personal Development Planner (PDP) tool (<i>a collection of portlets – Goal selector, assessment, activity navigator, progress - in the latest PCM realise</i>) aims at allowing the learners to create and control their own learning plans based on their interests and educational background including informal and non-formal experiences. The use of the PDP functionalities, such as the self-assessment, the planning and the self-regulating elements allowed the participants to develop reflective skills.</p>	<p>++</p> <p>A group of Àgora participants were interested in sharing (register, comment/discuss, tag and share) knowledge resources in order to solve common tasks of their personal interests. They use the <i>LearnWeb</i> tool.</p>
UNESCO-IHE DSS	<p>In this pilot participants develop competences related to the process of designing and developing Decision Support Systems for River Basin management, and particularly to the formulation of decision making problems as well as understanding the appropriate usage of various tools and techniques such as simulation, optimization and multi-criteria analyses.</p> <p><i>Extended description available in Appendix 3 of D4.6.</i></p>	<p>++</p> <p>The scenario is basically a formal learning setting with an institutional education provider and final certification. However, learners have some flexibility in the creation of their personal development plans (see next column). Once learners have created their plans, they have available learning actions with links to resources already that UNESCO-IHE already had available for their existing (content-oriented) courses.</p>	<p>+++</p> <p>The participants used the Web PDP as the central tool for planning their learning process and accessing the different activities available in the pilot.</p>	<p>+</p> <p>LearnWeb was available but its use for knowledge sharing purposes was limited.</p>

UNESCO-IHE FMM	<p>The overall goal of the “Flood Modelling for Management” competence development program is to support water professionals in the development of the competences that make them capable of maximizing economic and social well-being in an equitable manner (without compromising the sustainability of their ecosystem) by using catchment, river basin and urban flooding models.</p> <p><i>Extended description available in Appendix 4 of D4.6.</i></p>	<p>++</p> <p>Similar to previous row. The result of this pilot showed that in this context participants prefer to be guided by an expert rather than to decide by themselves their learning path.</p>	<p>+++</p> <p>Similar to previous row.</p>	<p>+</p> <p>Similar to previous row.</p>
ICT Teacher Training	<p>This pilot shows how the TENCompetence framework and approach can be used by teachers with different profiles (from all subjects and levels) to develop ICT competences.</p> <p><i>Extended description available in Appendix 5 of D4.6.</i></p>	<p>+</p> <p>The scenario is framed in a formal learning setting with an institutional education provider and final certification. However the approach followed was quite flexible for the participants and included informal activities.</p>	<p>+++</p> <p>Participants selected a competence profile (among a set of profiles available), assess their competences and according to their competence gap created their profile. A blog (also available in the PDP) was used for sharing progress and experience. Learners appreciated significantly the Goal Orientation Tool (<i>Goal Orientation portlet- in the latest PCM realise</i>) with which participants could find communities and profiles, and see which competences develop individuals with similar interests.</p>	<p>+</p> <p>LearnWeb was used to search relevant multimedia resources, to evaluate and comment resources, as well as to publish learners’ own materials. Its use was essential for all the tasks proposed.</p>
Digital Cinema	<p>This pilot is focused on supporting competence development of professionals in the area of Digital Cinema. In particular, the competences addressed are related to effectively using the new NINOS infrastructure for automatic audiovisual production</p> <p><i>Extended description available in Appendix 6 of D4.6.</i></p>	<p>++</p> <p>The development of some specific and complex competences requires of structured sequences of guided activities.</p>	<p>+++</p> <p>This scenario could be typically framed in the context of a larger professional community where participants are interested in a continuous professional development which is self-directed.</p>	<p>+</p> <p>Sharing of knowledge resources within the professional community complements the previous facilities for this type of lifelong learning scenarios.</p>
DobleVia	<p>DobleVia, an SME offering educational, social and cultural services, uses the TENCompetence tools to complement their</p>	<p>-</p>	<p>+++</p> <p>In this case, the PCM (PDP tool) was used to support continuous professional development, self-</p>	<p>+</p> <p>Though a knowledge management system such as LearnWeb</p>

	<p>HRM infrastructure and offer training opportunities for competence development to their employees, who typically have changing job requirements.</p> <p><i>Extended description available in Appendix 8 of D4.6.</i></p>		<p>directed, within a Human Resource Management / organizational perspective. DobleVia employees needed to keep-up-to-date with their profession and develop competences to master new functions within their field.</p>	<p>was not used, DobleVia considered that the formalization of their knowledge in the form of learning actions associated to competences represents for them a way to manage knowledge.</p>
CEDEP	<p>INSEAD and CEDEP – the European Centre for Executive Development –applied the TENC Tube in an inter-organizational context composed of a learning network of peers from CEDEP member companies (e.g. L’Oréal, HSBC, Sanofi Aventis, etc.)</p> <p><i>Extended description available in Appendix 11 of D4.6.</i></p>	-	<p>+++ The focus is on the social network dimension of competence development and management systems and in particular, on how to facilitate more informal ways of knowledge exchange, linking the collective competence-related knowledge and expertise of the community of users</p>	<p>++ The knowledge exchange (see previous column) included tacit knowledge, know-how and actual experiences. <i>TENTube</i> tool was used in this demonstrator.</p>
EPIQ ELEC	<p>The EPIQ Electronic Assembly Business Unit EPIQ-2 is a high technology company that needs to get more out of their engineers and specialists.</p> <p><i>Extended description available in Appendix 12 of D4.6.</i></p>	-	<p>+++ The EPIQ business demonstrator applies TENCompetence to support top and middle management, as well as various professional communities and individuals in improving the processes of competence profiling, performance management and organizational learning enhancement and knowledge management in an enterprise context.</p>	<p>+ See previous column.</p>
ELSA	<p>ELSA is part of the ZEW, the Competence Center for Continuous Education of the University of Hannover. They provide support for the deployment of technology and media in the learning practice. ELSA conceptualises a learning environment including LearnWeb 2.0.</p> <p><i>Extended description available in Appendix 13 of D4.6.</i></p>	<p>++ LearnWeb was used by the learners for self-directed learning during a semester with students.</p>	-	<p>++ The scenario was mainly around sharing (register, comment/discuss, tag and share) knowledge resources.</p>

<p>UniGe</p>	<p>The Laboratory on “Web Design” at the University of Genoa has the aim of teaching basic principles in web design from the point of view of both programmers and designers. In this demonstrator LearnWeb was used as a knowledge management tool for teachers.</p> <p><i>Extended description available in Appendix 14 of D4.6.</i></p>	<p>-</p>	<p>+++</p> <p>The demonstrator showed that LearnWeb can support teachers in sharing learning materials, finding and publishing the right contents.</p>
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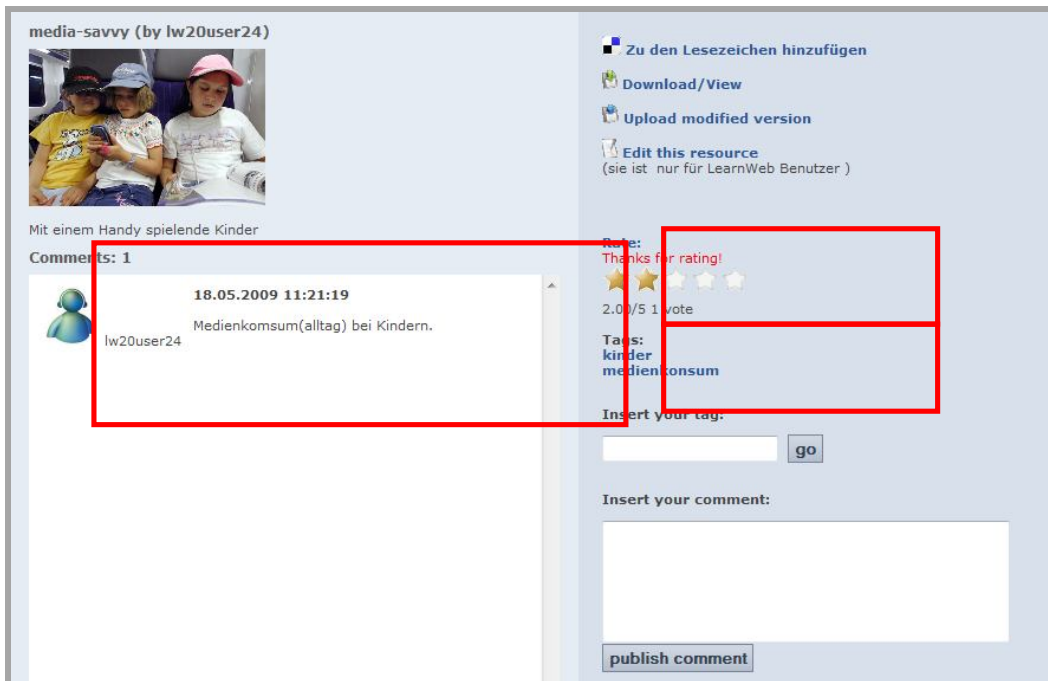


Figure 4 Media resource and additional rating, tagging or commenting in LearnWeb (in German, ELSA Business Demonstrator)

3. Implementation methodology

This chapter includes synthesized methodological indications that are suggested to be considered when adopting TENCompetence. It points to related references developed in the project for further reading. Readers are also recommended to check the main TENCompetence terms, tooling descriptions and reference implementations mentioned in Chapter 1.

3.1 Areas of TENCompetence application

The main areas for TENCompetence application can be seen from different perspectives:

A. Domains

- eLearning
- Personal Competence Development
- Knowledge Management.

Check section 1.3 for a description of the domains and D2.4 (Mendez et al., 2009) for its relation with the main TENCompetence usage profiles (Create Course, Follow Course, ePortfolio, Social Help, Competence Assessment, Personal Development Plan, Overview).

See also Chapter 2 of this document for real-life scenarios implemented with TENCompetence and their relationship with the three domains.

B. Core use cases and user groups

- Want to improve a specific competence
- Want to study for a new job
- Want to keep up-to-date
- Want to explore, select & connect to the learning resources, units of learning, people, etc. in a certain field
- Want to assess my competences
- Want to reflect on my competences
- Want support for some non-trivial learning problem.

See Table 4 for a description of the main TENCompetence user groups.

Table 4 User groups

Individual people	<ul style="list-style-type: none"> · People with a need to develop some general or specific competences to perform their job better, to solve any type of problems or to learn to cope with specific situations. Also those with a need to improve their career, or a desire to change their jobs. · People who want to share knowledge, skills, perspectives and views with others, e.g. in order to develop new knowledge. · People who need a formal degree, diploma or certificate at any time in their life. · People who want to develop competences due to the intrinsic motivation to learn something in a certain area. This includes people who want to develop competences to improve their quality of life (hobbies, family life, social environment, etc.), or to get support in something which is difficult for them. - People who want to increase their proficiency levels
Groups or Teams	<ul style="list-style-type: none"> · Groups who have to solve complex problems and tasks or have to cope with difficult situations in which group collaboration will increase the chance of successful performance. · Groups who want to support new/novice members in their teams.

	<ul style="list-style-type: none"> · Groups who want to share knowledge, skills and points of view to develop their insights and competences in the field (e.g. research teams). · Groups in companies who want to (or must) develop competences in order to perform better.
Organisations	<ul style="list-style-type: none"> · Organisations that want to disseminate and manage new and expert knowledge within the organisation / workplace. · Organisations that have to train personnel to learn or fulfil specific (new, complex or changing) job requirements. · Organisations that produce knowledge and want to manage the exploitation, management and dissemination of knowledge. · Organisations that want to develop the competences of groups/teams/departments within the organisation to cope with a new situation, e.g., new product, new competitors, new market challenges.

C. Business models

- See the potential business model outlines written in ID10.2 (Krekels, 2008) and the updated business models in D10.3 (Kew et al., 2010)
- The business models shown in pilots and demonstrators can be checked in chapter 5 of D4.6 (Hernández-Leo et al.).

3.2 *Formulating competences*

Competences are modelled in the TENCompetence project as follows: each learning network or community can a competence map which contains a series of competence profiles for roles, functions and jobs (see section 1.2). A competence profile contains one or more competences, which must be attained, in order to meet the demand of the profile. Moreover, each profile can have several levels. A competence is defined as the ability (‘disposition’) of an actor to act effectively and efficiently upon the events in an ecological niche (an occupation, a hobby, a market, a sport, etc.).

The option adopted in TENCompetence for the formulation of competences follows the concepts introduced by Cheetham & Chivers (1996, 1998). The model is generic, and it can be applied to diverse areas, see Figure 5. However for each situation there are specific characteristics, contextual and subject matter requirements, which influence the formulation of a competence-based learning scenario.

It is also important to note that along with the transformation from a topic-based to competence-based learning, new roles appear in the learning process, such as competence provider or competence assessment provider.

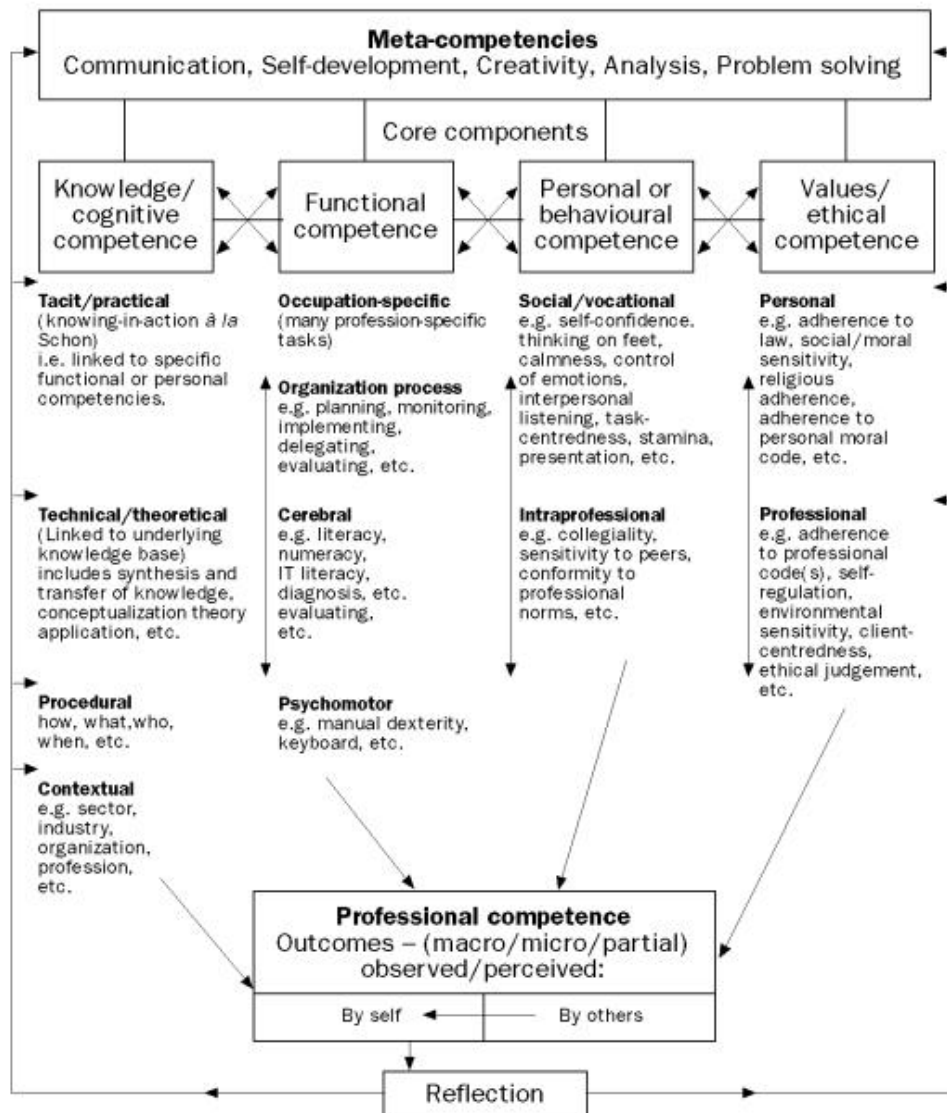


Figure 5 The Cheetham and Chivers competence model (extracted from Cheetham & Chivers 1996)

3.3 Select the tooling

The main tooling part of the PCM is described in section 1.4. These tools to manage competence development are complemented with the community based applications available in the Liferay portal, on top of which the PCM has been built.

Table 5 compiles a list with the main tooling that can be used to configure solutions for competence development, including communication and social interaction aspects. Some Liferay portlets are listed, but more portlets are available and could be of interest for your implementations. An indication of the recommended usage of the tooling depending on the domain is also included in order to provide guidance, however readers should consider these indications only as recommendations and can of course decide themselves which combinations of tools are appropriate for them according to the requirements of their own situations.

Table 5 Portlets and tools of the PCM, including some Liferay applications (in *italics*), and main indicative uses (in terms of domains)

Portlet, tool	eLearning	Personal Competence Development	Knowledge Management
Goal orientation		+	
Test		+	
Learning Path Editor <i>(authoring)</i>		+	
Competence Model Editor <i>(authoring)</i>		+	
QTI Editor <i>(authoring)</i>		+	
Goal Selector		+	
Progress		+	
Activity Navigator		+	
Assessment		+	
Evidence		+	
SLeD portlet	+		
Social Help		+	
LD Admin tool	+		
LearnWeb			+
ReCourse <i>(authoring)</i>	+		
Astro	+		
TENTube		+	+
<i>Community portlets (set of portlets)</i>	+	+	+
<i>Edit/View Profile</i>	+	+	+
<i>Wiki</i>	+		+
<i>Forum</i>	+	+	+
<i>Chat</i>	+	+	+
<i>Message board</i>	+	+	+
<i>Blog</i>		+	+
<i>Document library</i>	+	+	+
<i>Calendar</i>	+		
<i>News/Alerts</i>	+	+	+
<i>WebForms</i>	+	+	+
<i>Web2.0 integrator</i>			+

3.4 Design the workflow

As mentioned before, the design of the PCM has been accomplished so that the three domains can be used in an integrated infrastructure, but it also allows the configuration of any of them separately. Depending on the individuals or institutional needs and motivations, the integrated toolset may be configured in such a way that each role can access the system in his/her particular domain/goal (again, see D2.4). The resulting configuration defines a proposed (flexible) workflow in which the portlets/ tools should be used by the different roles.

For inclusive examples, please check the TENCompetence reference implementations for the three domains (<http://pcm.tencompetence.org/>). A schematic example that illustrate a possible workflow is the following (portlets and tools used in the workflow are in *italics*):

Example

A company X, provides the workers with a set of activities to improve their competence levels in different areas:

- A Worker/Learner (W/L) changes position in the company and s/he is asked to acquire some new competences related to this position. S/he decides to use the activities provided by the company through the TENCompetence services. S/he accesses the *Goal orientation* to identify the competence profile of his/her interest and chooses it with the *Goal selector*.
- Once selected the competence profile the W/L accesses the *Activity Navigator* portlet where s/he can determine a suitable learning plan for their user based on the available learning paths. Before determining the plans, the W/L may perform an *assessment* to indicate her/his proficiency level in each of the competences involved in the competence profile. In this case, the suitable learning plan proposed by the *Activity Navigator* also considers the identified competence gaps. When doing the *Assessment*, the W/L can decide to assess her/his competence level taking a *QTI Test*.
- Via the *Activity Navigator* the W/L is directed to the appropriate learning opportunities. Some of them are courses played in *SLeD* which contain a set of learning and assessment activities.
- The W/L can ask questions and share problems regarding the plan o the learning opportunities to his/her colleagues using the *Forum*.
- Progress information about competences is shown in the *Progress* portlet.

An expert is asked by the company X to develop a new competence profile and associated learning path for accomplishing the competences needed to act efficiently and effectively in a new position in the company.

- The expert uses the *Competence Model Editor* for authoring (creating) the competence profile, competences and levels that a worker should acquire for accessing to such as position.
- In terms of planning, a learning path describes a set of actions which lead to the attainment of a competence profile; in this sense the experts use the *Learning Path Editor* to create a suggested learning path that will enable learners to acquire the competence profile previously defined.
- The expert populates the path creating different types of activities: self-assessment activities, practices... S/he can also include courses represented as Units of Learning in IMS-LD using *Recourse* and, in this case s/he should also use the *LD Admin tool* to publish the UoL. In the creation of the activities s/he uses LearnWeb to store and manage the learning resources to be used in the activities.
- The expert may also inform about the new competence profile and activities available as well as the important dates regarding the activities through the *Calendar* or *News/Alerts* LifeRay portlets.

3.5 Set-up the implementation

Once you have selected the tooling, designed the workflow and formulated the competence profiles, competences, levels, activities, and resources the main steps that should be followed in order to set-up the implementation of a TENCompetence solution are:

1. Install and configure the system (including Liferay portal configuration issues and the aspects required for the evaluation, see 3.6)
 - Guidelines describing installation, configuration, maintenance and monitoring of the TENCompetence infrastructure can be found in ID3.27, (Alberts et al., 2009).
2. Populate the system with the competence profiles, competences, activities, resources, etc. (*author / expert* role)
 - To populate the system you should use mainly the *Model Editor*, the *Learning Path Editor*, *LearnWeb*, the *QTI Editor* and the *LD Admin tool* (previously you should also use ReCourse). You can find links to the user manuals of these tools in ID9.22 (Kalz, 2009).
 - Test the installation with the data populated to the system.
3. Design the training plan (if the training is also for experts, this step may be carried out before)
 - In the design of the training, checking the summary of the training performed in the Cycle 3 pilots may be helpful, see ID9.19 (Krekels, 2009).
 - The quick start guides and user manuals developed in WP9 for the set of tools can be also very helpful as a starting point in the creation of customized guides adapted to the need of the implementation, see ID9.22 (Kalz, 2009).
4. Make a help-desk available to the users
 - A mixed team involving in the TENCompetence approach and tooling (including Liferay) as well as system administrators should be involved.

3.6 Evaluate the implementation

In evaluating an implementation, three steps are distinguished (see D4.5):

1. Set up evaluation plan
 - What do you want to know?
 - How are you going to measure what you want to know?
 - How are you going to analyse your data?
2. Execute evaluation plan
3. Discuss and report results.

The kind of evaluation activities that you will perform are most strongly influenced by what you want to know. We distinguish five things you might want to know, corresponding to five goals of evaluation:

- *What happened in the implemented experience?*

This is the most basic question, but it is often an important one. To answer this question, a detailed description of the experience should set up. This can be done by asking coordinators, but an analysis of relevant documents and interviews with learners can also be part of the strategy of data collection. It will often be handy to use a template for data collection, such as those used in D4.6. The task of the describer is to make a detailed, informative and useful summary of the information. To enhance the accuracy of the description it is advisable that one asks the coordinator and others involved in the implementation for their feedback.

- Is the experience successful?
To answer this question, success criteria must be set up before the experience start, by which the outcomes of the experience are judged. In this evaluation data collection is typically done using questionnaires and sometimes analysis of log files for data on effort spent, possible supplemented by interviews with participants. A few criteria require comparison between the situation before and after the experience, e.g. a gain in level of competence development.
- Does the experience have an effect?
The effects concerned are often changes in a construct that involves a state, cognition, attitudes or behaviour of participants, for example participants have acquired knowledge and skills by following the experience, or the unemployment among participants decreases. This type of evaluation involves both measuring what changes occurred in the construct involved during the experience, and what changes would have occurred if the experience had not been there. The construct involved is always defined beforehand. For measuring the changes during the experience, the construct (e.g. level of competence development) is measured both before and after the experience. Measuring what would have happened if the experience had not been there is not easy, and requires hard thinking of the evaluator. In this evaluation data collection is typically done using questionnaires, sometimes supplemented by interviews with participants. Data analysis consists of comparing the results of what happened during the experience to the results of what would have happened if the experience would not have been there, and see whether the results differ considerably ('statistically significant').
- How can the experience be improved?
The information on what went well and what went wrong can be used in further improving the implementation. The focus in this evaluation is on the process of the experience ('what happened'), in combination with a judgement of aspects of this process as good or bad. For this type of evaluation, the experiences of participants are very informative, thus interviews with participants, but also with coordinators and developers, are of high value.
- How does the experience work?
The final evaluation type aims at understanding how the experience works. What are the 'active ingredients' of the experience, and how do they work together to produce the experience effects? This evaluation is the most 'scientific' type, and it is also called 'theory-driven' evaluation. In this evaluation, the evaluator makes explicit beforehand how s/he thinks that the experience works and, from that, predictions, hypotheses, are derived, and tested. For example, one might assume that using the TENCompetence infrastructure will increase the feeling that people control their own learning, and this may lead to better and more competence development. In this type of evaluation, both questionnaires, log file analysis and interview data may be used. Using more than one data collection method, e.g. questionnaires combined with interviews will typically increase the validity of the evaluation results.

Note that this document aims only at providing some initial guidance to implementers of lifelong learning situation based on TENCompetence, but it is not a comprehensive introduction to evaluating experiences such as those using TENCompetence. For further reading, readers may want to check (Griffiths, et al. 2007). In cycle 3 pilots three areas of impact have been analyzed. The instrument used for the collection of impact indicators results is provided in Appendix 1 of D4.6 (Hernández-Leo et al., 2010). The appendix provides also some indications of what data collection instruments can be used in the different phases of implementation (before, during and after an experience) to gather information related to each impact aspect.

4. Conclusion

This document has provided information useful to people who want to start using TENCompetence and are looking for examples, TENCompetence main concepts, initial guidance on the steps to follow when implementing lifelong competence development solutions, and links to further readings. The examples provided are drawn from real-life experiences carried out in a series of 14 pilots and business demonstrators along the duration of the TENCompetence project. Each of them combines different aspects of eLearning, Personal Competence Development and Knowledge Management perspectives, since these different aspects have been integrated in the TENCompetence infrastructure. People who want to implement a lifelong learning solution using TENCompetence should understand the possibilities of TENCompetence for these main areas of application and take into account the methodological indications exposed in this document. The indications include: formulating competences, selecting the tooling, designing the workflow, setting-up the implementation and evaluating of the implementation.

The TENCompetence reference implementations developed with the final version of the infrastructure, achieved during the project, are of special interest to understand the full potential of the TENCompetence achievements, and therefore they are strongly recommended to be checked together with this document. Further improvements to the infrastructure and new experiences and scenarios of real use of TENCompetence can be consulted in the future via the TENCompetence Foundation.

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