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## D2.1 - An EA Active, Problem Based Learning Methodology - EU deliverable - EAtrain2

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Innovative Enterprise Architecture Education and Training Based on Web2.0  
Technologies (EATrain2)

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## **D2.1 EA Active, Problem Based Learning Methodology**

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**Abstract:**

This deliverable reports on the work undertaken in work package 2 with the key objective to develop a learning methodology for web 2.0 mediated Enterprise Architecture (EA) learning building on a problem based learning (PBL) approach. The deliverable reports not only on the methodology but also on the activities leading to its development (literature review, workshops, etc.) and on further outcomes of this work relevant to the platform specification and pilot courses preparation.

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# 1 Executive Summary

This deliverable reports on the work undertaken in Work Package 2 (WP2) in the EATrain2 project during 2009. The key objective of WP2 has been to develop a learning methodology for web 2.0 mediated Enterprise Architecture (EA) learning building on a problem based learning (PBL) approach. The methodology in question is based on a user oriented design-tradition which attaches great importance to cultural and contextual issues in relation to teaching and educational activities. Therefore, it builds on a collaborative, iterative design oriented approach, where the partners have been actively involved in the development of concrete practices and learning designs. Consequently, in the work of WP2, and in this deliverable, attention has been paid to the following issues in particular:

- The notion of a learning methodology and the alignment between PBL and the ontology developed in WP1.
- Active problem based learning approaches. What does active and problem based learning entail; and how is problem based learning implemented into existing educational models?
- Web 2.0 technologies and practices - which questions do we need to address in order to design for web 2.0 learning?

This work has resulted in a number of specific results and/or products:

**Learning Methodology, Design workshop, and Design Framework:** The main outcomes of the work in WP2 are a learning methodology and a design framework which can guide and support practitioners in developing courses adopting an active, problem based learning approach capitalising on web 2.0 technologies. The learning methodology and design framework therefore encompass a number of design activities and resources.

One key activity has been the planning and running of a design workshop during a project meeting in Vienna based on the CoED method (Collaborative E-learning Design Method). The CoED method has successfully been used a number of times in relation to helping practitioners develop online or blended learning courses (Georgsen & Nyvang 2007).

Based on knowledge derived from an extensive literature review of web 2.0 mediated learning and active, problem based learning approaches the CoED-method was further developed to fit the specific objectives of the EATrain2-project. The planning and running of the workshop thus resulted in three substantial inputs to the further process of developing courses/learning designs building on a PBL approach and capitalising on web 2.0 practices:

1. A workshop methodology and design tool tailored specifically to the needs of the project
2. A number of preliminary course designs based on case descriptions and other inputs from partners which were further developed as a result of the workshop and subsequent inputs from the partners based on the design framework developed.
3. Conceptual and methodological discussions in relation to the workshop, based on which partners identified a range of important issues for the further design and development work.

Another central outcome of WP2 has been the production of the more concrete design framework aimed at guiding the continued development of the courses based on a collaborative, iterative design approach. The design framework is a mediating design artefact consisting of a number of conceptual models and templates, which can help practitioners design for PBL and web 2.0 mediated learning, while addressing pertinent questions and tensions which arise when adopting innovative pedagogies and tools. The design framework has been used to further develop and specify the initial learning designs produced in the workshop, which have also fed into the initial requirement specifications for the platform developed as part of the EATrain2 project.

**Collection of examples of teaching and learning practices:** In relation to the EAtain2-project, a number of teaching and learning practices related to active, problem based learning, web 2.0 and EA-training been developed, described and presented within the framework of Methopedia (<http://methopedia.eu>). Methopedia is a wiki-based community which has been developed as part of another LLP-project called COMBLE (<http://comble-project.eu/>)

**Literature review:** In order to identify relevant literature within the area of active problem based learning supported by web 2.0 technologies, we started by specifying the key terms *Problem Based Learning* and *web 2.0 technologies*. To bridge the gap between papers concerning the theoretical learning inputs and the use of web 2.0 technologies in practice, we have performed the literature search combining these two. The extensive literature search has resulted in a large database of references to papers, reports and journals. Using an open source extension for Firefox, Zotero, we have created a public, freely accessible database at this address: <http://www.zotero.org/groups/eatrain2/items>

**A Conference Symposium:** As the work of WP2 is firmly grounded in an extensive review of existing literature concerning web 2.0 mediated learning, PBL and innovative pedagogies there are some more detailed theoretical and methodological considerations behind our approach. These have been further explored and developed as three academic papers forming a symposium, which have been submitted to the Networked Learning Conference 2010 - these papers underpin and describe in more detail the approach of WP2 and the tools, resources and models developed.

In summary, the learning methodology, design activities and resources developed in WP2 have been instrumental in identifying some pertinent questions and issues, which can inform the continued work in the project. The work has led to the development of a number of concrete learning designs or teaching/learning practices that have fed into the initial requirement specifications for the *technical platform* and provided a foundation for the *course models*, which are both to be further developed in WP3.

## 2 Introduction

This deliverable reports on work undertaken in work package 2 (WP2) in the EAtain2 project. In the following we have collected the key parts of the work, for the project partners to study and for the continued work in the project. The deliverable is divided into a main part (chapters 1 – 7) followed by a number of appendices. The main part of this report presents the approach taken in work package 2, and discusses a range of critical issues in relation to this. Furthermore, results and conclusions in relation to our work in WP2 are presented in the main part. In the appendices reports, papers and documents are presented, each of them describing or otherwise documenting the work and results of WP2. The final appendix, however, (Appendix G Preliminary Platform Specification) represents shared work between WP2 and WP3, and describes preliminary user requirements for a teaching and learning platform to be used in the project in WP4.

In the following we outline the goals, objectives and tasks of work package 2, as they are stated in the project application. This is followed by a more detailed account of the approach taken.

### 2.1 Goals, Objectives and Tasks of Work Package 2

The aim of this work package is to identify new practices and methods to combine the training and teaching of the required technical skills, knowledge attitudes, and the development of innovation skills within enterprise architecture, as described in WP 1. These practices will be based on:

- ICTs and mainly on web 2.0 related technologies
- Active, problem based learning approaches.

#### 2.1.1 Objectives of WP2

As described in the work plan of the project, the objectives of WP2 are as follows:

- To examine the use of active, problem based learning approaches in the training and teaching of EA.
- To identify means in order to electronically support training and learning of the skills, knowledge and abilities that emerged from WP1.
- To identify how web 2.0 related technologies could enhance the training and learning of skills, knowledge and abilities emerged from WP1.
- To consolidate the derived knowledge from this WP with the development of a training and learning methodology which will capitalize on the EA learning ontology to identify and address learning needs.

#### 2.1.2 Description of tasks

*Task 2.1 (Months 1-3). Active learning in EA:* This task identifies what active, problem-based learning approaches could be incorporated in university-level education and VET in order for trainees to acquire the required technical skills, knowledge and attitudes and to develop the innovation skills emerged from WP1. From these approaches specific practices will be developed.

*Task 2.2 (Months 3-6). EA Training and Teaching based on ICT:* This task identifies how the methods and practices that emerged from task 2.1 could be enhanced through the use of web 2.0 technologies.

## 2.2 Major outcomes of WP2

Initially, we will briefly outline the main outputs of WP2, along with an explanation of the background material (reports, theoretical discussions etc.):

1. A learning methodology, based on an iterative design oriented approach, which can guide and support practitioners in the development of courses adopting an Active, Problem Based Learning approach capitalising on web 2.0 technologies. The learning methodology and design framework encompass:
  - a. A design workshop hosted by WP2 during a project meeting in Vienna (fully reported in Appendix A).
  - b. A design framework aimed at guiding the pedagogical development of the courses based on a collaborative, iterative design approach (the design framework is presented in Appendix B).
2. Another major output is three papers forming a symposium, which have been submitted to the Networked Learning Conference 2010. These papers underpin and describe in more detail the theoretical and methodological considerations behind our approach (the papers are presented in Appendix C, papers I-III) – the papers are part of a symposium which is entitled “Web 2.0 and Problem Based Learning in Enterprise Architecture Training”
  - a. Paper 1: “Developing a Design Methodology for Web 2.0 Mediated Learning” (Glud et al. 2010)
  - b. Paper 2: “Identifying Differences in Understandings of PBL, Theory and Interactional Interdependencies” (Ryberg, Glud et al. 2010)
  - c. Paper 3: “Developing a Design Methodology for Web 2.0 Mediated Learning” (Buus et al. 2010)
3. We have strived to make available as many resources, tools and tips as we can on Methopedia (<http://methopedia.eu>). Methopedia is a wiki-based community or social network which has been developed as part of another LLP-project called COMBLE (<http://comble-project.eu>). It is a dynamic platform where practitioners and experts can share and create learning activities, tips, descriptions of pedagogical approaches and more. In relation to the EATrain2-project, we have uploaded a number of teaching and learning practices related to active, problem based learning, web 2.0 and EA-training (these are presented in Appendix D)
4. Another outcome of our work is a publically available online bibliography representing the outcomes of the literature review conducted and other resources, which have been the foundation of and output of the work in WP2. A discussion of the literature review process and reference management can be found in (Appendix E). The public online bibliography is available from:  
<http://www.zotero.org/groups/eatrain2/items> .
5. Finally, the activities undertaken in the duration of WP2 have fed into preliminary requirement specifications for the *technical platform*. In close collaboration with partners from WP3 (and all other partners) work have commenced on specifying requirements for the technical platform. Initially, requirements were discussed during a project meeting (Appendix F) and subsequently further specified by WP3 (DERI) partners based on the preliminary learning designs and use-cases provided by partners from UKL, UOM, BOC and COI. These requirement specifications will be further developed in WP3.



## 2.3 The approach adopted by WP2

In relation to developing a learning methodology that supports active, problem based learning capitalising on web 2.0 technologies, we have prioritised to create a product which can act as a guide in supporting practitioners' pedagogical design of courses. This we have chosen, rather than developing a strongly prescriptive learning methodology outlining in detail how courses should be designed. There are several reasons for choosing a more collaborative, iterative design oriented approach, which we will briefly touch upon in the following.

Adopting an approach based on active, problem based learning, web 2.0 practices and parts of the associated pedagogical mindset is riddled with a lot of tensions, questions, opportunities, difficulties and problems, in relation to which teachers, institutions or course developers need to develop their own locally sustainable response (W. Clark et al. 2009; Crook et al. 2008; Crook & Harrison 2008; Ravenscroft 2009). The aim of our work package has therefore been to develop and collect resources and design tools which can help practitioners dealing with these issues. Another part of our strategy has been to give the partners hands on-experience with the issues, which we have done by hosting a design workshop (during the partner meeting in Vienna, Nov. 09) where we engaged in the practical design of courses.

In addition to developing a theoretical and conceptual framework for the development of a learning methodology, we have developed two specific products to support developers and designers in their work. One activity was to make resources, tools and tips available on Methopedia (<http://methopedia.eu>). A second major activity was to work on further developing a design game/design tool which has successfully been used a number of times in relation to helping practitioners develop online or blended learning courses (the Collaborative E-learning Design Method or in short CoED) (Georgsen & Nyvang 2007). More specifically, we have been working on incorporating some of the pertinent questions, problems and issues identified as critical to this project into this design game. These are issues which teachers (and institutions) need to take into account and reflect upon when designing for web 2.0 practices and active, problem based learning.

In the following, we will outline some pertinent observations relating to the objectives of WP2, as these observations have shaped our overall approach and interpretation of the needs of a learning methodology. These observations concern:

- The notion of a learning methodology
- Web 2.0 technologies and practices
- Active, problem based learning approaches. What does active, problem based learning entail and what are the possibilities and challenges related to implementing PBL approaches?

In the following, we will discuss these issues, and through the discussion we aim at pointing out the defining factors in developing a sustainable learning methodology and design framework, namely an approach where the designer/developer stays in control of defining the learning outcomes, the pedagogical approach and the roles and activities of both the teacher and the learners.

### 3 The Learning Methodology and Design Framework

In this section, we present the basis on which the learning methodology and design framework has been constructed. It was a key requirement that the learning methodology builds on or is helpful in operationalising the ontology developed by WP1. Secondly, the learning methodology needs to be based on an active, problem based approach. Thirdly, it should build on web 2.0 related technologies and approaches. In relation to the latter, we hold the view that web 2.0 approaches within education are not merely a matter of choosing a number of technological solutions or tools, but equally a matter of supporting more social, participatory and conversational modes of learning.

First of all, it might be worth outlining how we understand a learning methodology. We view a learning methodology as something which can describe, prescribe or guide the design of e.g. particular courses or broader educational units (e.g. outlining an approach for a programme, a semester or a field of research and education, such as Enterprise Architecture). However, within this broad definition we can identify a number of different approaches, which we briefly touch upon below before outlining our own perspective.

#### 3.1 Different perspectives on learning methodologies and learning design

A learning methodology can be very prescriptive, or can serve a more guiding role. In case of the former, the ideal (or dream) can be to formalise the model to a degree where it can be implemented as a software solution which obliterates the teacher. This is referred to as “programmed teaching” in some contexts.

Another perspective on learning methodologies is that they should guide teachers, trainers and others in designing courses or other educational units. In terms of software solutions one can mention for instance CompendiumLD<sup>1</sup>, which is a software solution designed to assist the teacher in creating learning designs (Conole 2008; Conole et al. 2008). Rather than replacing or obliterating the teacher, the idea is to empower and improve the teachers’ reflections on how they can design for learning.

Finally, a learning methodology can be guiding in the sense that it can function as a broader description of the relations between various learning theories, pedagogical models and then a range of learning activities, tools and assessment methods (Mayes & de Freitas 2004; Fowler & Mayes 2005). This could also be in the form of online repositories for sharing and discussing different learning designs, as is the case with Methopedia.eu and similar initiatives<sup>2</sup>.

To sum up, the difference between these approaches can be described in terms of the autonomy of the teacher/planner. Particularly, this refers to the freedom of choice in teaching methods, definition of the roles of students and teachers, and the specific use of technologies.

#### 3.2 Our perspective on a learning methodology

In our view a learning methodology should not be a strictly formalized, prescriptive model presenting a fixed model of how an EA course building on web 2.0 and active, problem based

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<sup>1</sup> Please refer to: <http://kn.open.ac.uk/public/workspace.cfm?wpid=8690> for an elaborate description of CompendiumLD

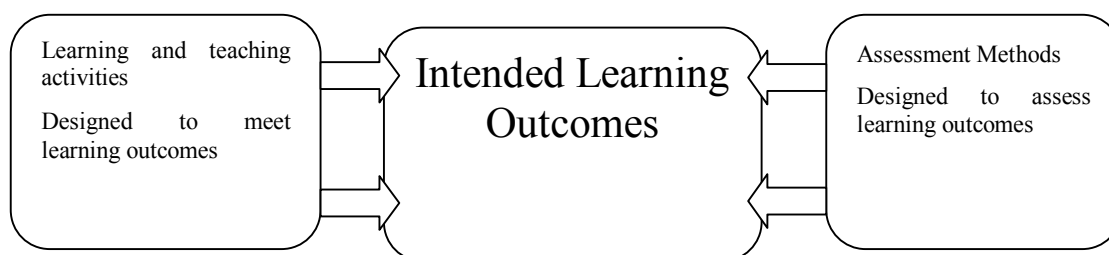
<sup>2</sup> See for instance Cloudworks: <http://cloudworks.ac.uk/>

learning approaches should be designed. Rather, our view is that a learning methodology should facilitate practitioners in creating concrete learning design, e.g. by engaging in collaborative design activities, which promote continued reflection and discussion. This approach reflects and supports insights from similar projects where results indicate that imposing fixed models and frameworks onto practitioners can alienate teachers, but also that such frameworks can conflict with teachers' values or institutional realities (de Freitas et al. 2008). Therefore, our approach is that a learning methodology should actively involve and support practitioners in creating locally sustainable learning designs. Concretely, this is what we have done:

- Hosting a Collaborative E-learning Design (CoED) workshop based on initial case-descriptions produced by the partners, where the design of the CoED workshop incorporated tensions and challenges identified through the literature review.
- Creating a design framework aimed at guiding the pedagogical development of the courses based on a collaborative, iterative design approach.
- Making relevant resources, tools and learning activities related to web 2.0 and problem based learning available to partners on the wiki-based community site Methopedia (<http://methopedia.eu>)

Thus, our method represents a guiding approach, as well as creating and making available practical guides and examples of design. The methodology and associated design resources are meant to empower teachers in designing and establishing learning designs building on active problem based learning and web 2.0 approaches. In the following we describe the components and activities included in our learning methodology.

A learning methodology can guide teachers and educational designers in the processes of achieving constructive alignment between the various elements in a course. Constructive alignment is the pedagogical principle that there should be a 'constructive alignment' between the Intended Learning Outcomes (ILO's), the teaching and learning activities and the assessment methods. In its most simple form Constructive Alignment can be illustrated as below - adapted from (Biggs & Tang 2007, p.59):



The illustration is, however, deceitfully simple, and in practice it is quite difficult to ensure constructive alignment in actual courses. The notion of Intended Learning Outcomes (ILOs) is closely connected to identifying different levels of skills, knowledge and competences, which is important in order to suggest or design appropriate learning and teaching activities, appropriate tools to employ, and appropriate ways of assessing the learning outcomes. The notion of constructive alignment has been actively embedded in the learning methodology and the design framework, where partners have been asked to reflect on learning outcomes, assessment methods and activities. To initiate discussions and work on these aspects we hosted the design workshop, utilising the CoED method. Before the workshop we asked partners for preliminary course descriptions as to have some common examples to work from during the workshop. The workshop resulted in a number of preliminary designs and pertinent questions, which then acted as the basis for further work in terms of the partners' elaborated descriptions of the courses in the project (See appendix B.3 – Contribution from partners).

<p><b>Motivation for Change/design:</b></p> <ul style="list-style-type: none"> <li>- What is the motivation for using Web 2.0 technologies as part of the design of a EA course?</li> <li>- Is Web 2.0 technologies used to fundamentally change the learning approach?</li> <li>- Is Web 2.0 technologies used as part of an all ready established learning approach?</li> </ul> <p><b>Intended Learning Outcome (ILO):</b></p> <ul style="list-style-type: none"> <li>- Make considerations related to the tensions listed in the PBL and Web 2.0 frameworks.</li> <li>- Explain what intended learning outcome expected in the learning process?</li> <li>- Consider how to get from the goal (ILO) to the assessment method(s)?</li> </ul>		
<p><b>Pedagogical Values:</b></p> <ul style="list-style-type: none"> <li>- Consider and list your pedagogical values (might be the one listed at the CoED-workshop in Vienna – but also related to the tensions)</li> </ul>		
<p><b>Unit 1:</b></p> <p><b>Learning activities</b></p> <p><b>Tools and Resources</b></p> <p><b>Type of Communication</b></p> <p><b>Interaktion duration (Assessment)</b></p>	<p><b>Unit Y:</b></p> <p><b>Ongoing activity/process</b></p> <p>E.g. the students are intended to blog about reflections on their learning process or building a portfolie etc.</p>	<p><b>Unit Y2:</b></p> <p><b>Ongoing activity/process</b></p> <p>E.g. the students are intended to establish a glosseri in a wiki collecting concepts</p>
<p><b>Unit 2:</b></p> <p><b>Learning activities</b></p> <p><b>Tools and Resources</b></p> <p><b>Type of Communication</b></p> <p><b>Interaktion duration (Assessment)</b></p>		
<p><b>Unit X:</b></p> <p><b>Learning activities</b></p> <p><b>Tools and Resources</b></p> <p><b>Type of Communication</b></p> <p><b>Interaktion duration (Assessment)</b></p>		
<p><b>Assessment</b></p> <ul style="list-style-type: none"> <li>- What kind of assessment method(s) is used to achive the ILO</li> <li>- What are they assessed upon? (the process or the solution?)</li> </ul>		
<p><b>Consider the tensions from the PBL and Web 2.0 frameworks in your course design</b></p>		

**Figure 1: Template developed as part of the design framework.**

Summing up, the methodology aims at supporting practitioners' collaborative, iterative development of a learning design for a particular course. Thus, the components and activities in learning methodology aim at supporting practitioners in developing such concrete learning designs. Because the development of learning designs capitalising on PBL and web 2.0 practices entails certain challenges and tension, we have furthermore crystallised central questions into conceptual models, which can guide practitioners' reflections on these. In the following, we present a number of important questions and tensions, which may arise from adopting a problem based approach to learning and incorporating web 2.0 technologies into the learning design. We shortly discuss how these issues have influenced the proposed learning methodology and design framework. These issues are dealt with in greater detail in the papers presented in Appendix C ((Glud et al. 2010; Buus et al. 2010; Ryberg, Glud et al. 2010)).

## 4 Web 2.0 technologies and educational practices

While evidently web 2.0 technologies and practices have attracted much attention within education and other domains within the past few years, it is still an area of experimental and incremental progress in terms of the educational potential. Within higher education (and other levels of education), it seems clear that experiences with web 2.0 learning mainly build on experimental cases and grass-root initiatives, whereas there are relatively few large-scale implementations (W. Clark et al. 2009; Crook et al. 2008; Fischer et al. 2008; Ravenscroft 2009; Redecker 2009). This also means that there are yet no stable models or frameworks for how to embed web 2.0 within higher education. Even though the actual uptake and concrete experiments (and successes) might be relatively few, there is a potential, and considerable interest in adopting web 2.0 technologies can be detected among teachers, students and institutions at large (Crook et al. 2008; Redecker 2009). However, while there are certainly potentials for educational institutions and teachers in relation to adopting web 2.0 technologies, there are also a number of barriers, tensions and difficulties associated with educational uptake of web 2.0 technologies, which must be taken into account (Boon & Sinclair 2009; Crook et al. 2008; Dohn 2009; Hemmi et al. 2009; Jones 2008; Jones & Dirckinck-Holmfeld 2009; Ryberg 2008; Ryberg, Dirckinck-Holmfeld et al. 2010).

These difficulties are for one thing rooted in the fact that part of the great interest in adopting web 2.0 learning seems to be driven by the success this range of technologies and practices have gained within more informal arenas of use. The mainstream adoption and huge success of services such as Facebook, Flickr, YouTube, and the popularisation of terms such as collaboration, sharing and 'user generated content' seem to be one of the drivers for the desire of experimenting with educational uptake of web 2.0. However, as mentioned, there are also a number of difficulties and tensions associated with web 2.0 in education, which are increasingly becoming visible from the experiments and grass-root initiatives initiated by educational pioneers. This suggests that web 2.0 technologies are not just neutral tools that can easily be embedded in educational practices, but rather they come with sets of associated practices and understandings, which have often developed in non-formal practices outside the educational system. Therefore, as explored in Appendix C, Paper I we should not consider web 2.0 merely a range of technologies, but rather view web 2.0 as an array of activities, practices or values.

Following from this, it is important to distinguish between web 2.0 *technologies* or resources as e.g. blogs, microblog-services, podcast-tools and social network sites, and then web 2.0 *activities* or *practices* such as blogging, podcasting, micro-blogging. This is because the latter embody certain concepts and values, such as collaboration, open-access, "bottom-up" participation, continuous production and openness of content (Dohn 2009). With this distinction we also want to emphasise that merely using e.g. a blog as a *technology or resource* in teaching does not necessarily make it a web 2.0 *learning activity*. Therefore, in reality, we should not uncritically use terms such as web 2.0 learning, as this really covers: *'the degree to which a certain technology supported learning situation adopts what is commonly designated as web 2.0 technologies along with a set of practices which are more learner-centred, collaborative, interactive, production-oriented and open ended than traditional largely teacher-centred and content focused approaches'*. For brevity and clarity we do, however, use terms such as web 2.0 learning or web 2.0 oriented learning to cover the wide spectrum of possible practices.

When designing 'web 2.0 learning', we argue that one needs to ask the critical question of motive: *"What is the motive for using web 2.0 technologies as part of the design of a course?"* Will the web 2.0 technologies be used as part of an already established learning approach in a particular course, or are they used as part of a design with the aim of *changing* the learning approach and the course? (These questions are part of the design framework as can be seen in Figure 1). If the motive for design is that web 2.0 technologies should become part of an already established learning approach or course one danger can be that expectations might be that the sheer use of web 2.0 *technologies* will automatically entail pedagogical changes. Likewise, if the motive for

adopting web 2.0 learning is to change existing approaches one needs to consider carefully a number of questions before designing web 2.0 learning; because this might entail ruptures and fundamental tensions between the open, more anarchistic mindset of web 2.0 and then traditional academic practices.

In the course of preparing the design framework, we have discussed and distilled some of these potential tensions into a conceptual model (Figure 2) and argued that it is crucial to consider at least four aspects when planning web 2.0 learning: *The learning process, the motivation, the infrastructure (e.g. the system) and the resources/content*. Please refer to **Appendix C, Paper I** for further details on this issue.



**Figure 2: Continua between teacher and learner control in web 2.0 learning**

Subsequently, as part of the design framework we developed a series of more concrete questions intended to provoke reflection and awareness of the tensions and questions emerging when designing web 2.0 learning (Table 1).

- **The learning process: Who controls the learning process?**
  - Who defines what is to be investigated?
  - Who decides how this should be investigated?
  - Who will perform the activity?
  - Who decides the flow and structure of the learning processes?
  - How are the learning processes organized?
  - Who controls the collaboration?
  - How is the collaboration organized? Is it e.g. formal and/or informal?
- **The motivation: Who controls the motivation?**
  - Is the motivation externally or internally driven?
  - To what extent should/can the students be self-motivated?
  - To what extent is learning in itself motivating?
- **The infrastructure: Who controls the infrastructure?**
  - Who provides the infrastructure?
  - Who provides the tools?
  - Who owns the tools for production?
  - Who organizes the tools?
- **The resources/content: Who controls the content/resources?**

- |   |
|---|
| <ul style="list-style-type: none"> <li>○ Who makes the resources/content available?</li> <li>○ What strategies (copy-paste or rip-mix-burn) for creating resources/content are supported?</li> <li>○ What resources/content is it possible for learners to create?</li> <li>○ Who defines the different roles related to competence, expertise, authority, accountability and copyright?</li> <li>○ Who has the competences/expertise?</li> <li>○ Who has the authority?</li> <li>○ Who is accountable for the resources/content?</li> <li>○ Who has the copyright of the resources/content?</li> </ul> |
|---|

**Table 1: Questions for exploring tension in web 2.0 learning**

Many of these discussions of power distribution between teacher/institution and learners do not only apply to the adoption of new technologies, but equally when implementing PBL-practices, to which we will turn our attention in the following sections. Initially, we describe the relations between the work packages in relation to PBL, where after we discuss some general characteristics of PBL, and how it has affected the learning methodology and design framework.

#### 4.1 PBL and the ontology from WP1

As a result of the work in WP1, an elaborate ontology was developed, outlining the necessary knowledge, skills and competences for Enterprise Architects within various sectors of the educational system, institutionalised and liberal market alike (university programs, private courses, and public initiatives outside institutionalized education). In the following we will describe the relations between the work produced in WP1 and the continued work of WP2 and WP3.

Initially, we have incorporated what was stated in Deliverable 1.1 about the relations between WP1, WP2 and WP3:

*“Work reported in this deliverable will be used as the solid foundation for further work in the EATrain2 project. Work package 2 on web 2.0 and active problem-based learning will build upon the competences lists and study ways of enhancing these competences through innovative pedagogies and technological advances. Furthermore, the course models to be developed in the project will provide specific ways of enhancing some of these competences.”* (Eleftheriou et al. 2009, p.7)

To very briefly re-iterate some of the outcomes of WP1 we list below a citation from WP1 and also a very broad overview of the competences listed as being important, to various degrees, for EA-training.

*“[...] the building blocks describing the competences of an Enterprise Architect are skills and knowledge while in the e-Competence Framework attitudes are included as well. In eCF attitudes are defined as “cognitive and relational capacities” such as analysis capacity, synthesis capacity, flexibility, pragmatism etc. In addition attitudes are not described explicitly in the competence template. In our report we use the term personal skills for describing eCF’s attitudes and we incorporate these in the skills category.”*(Eleftheriou et al. 2009, p.25)

Below is a rough overview of how this has been further worked into an overview or categories of competences each under the heading of skills or knowledge and related to target groups (adopted from deliverable 1.1) For a more elaborate and expanded overview of these we refer in particular to Table II in (Eleftheriou et al. 2009, pp.8-11):

<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>- <b>business</b></li> <li>- <b>technical</b></li> <li>- <b>personal</b></li> <li>- <b>ea specific</b></li> </ul> <p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>- <b>business</b></li> <li>- <b>technical</b></li> <li>- <b>personal</b></li> <li>- <b>ea specific</b></li> </ul> <p><b>Target groups:</b></p> <ul style="list-style-type: none"> <li>- <b>Private employees</b></li> <li>- <b>Public Sector Employees</b></li> <li>- <b>University students</b></li> </ul>
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**Table 2: Categories of competences - adopted from D1.1. Pages 8-11**

Furthermore, for convenience, we have added the definitions of knowledge, skills and competence from the EQF/e-CF (European Communities 2008), which are also explored further in Deliverable 1.1.

- *“knowledge” means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European Qualifications Framework, knowledge is described as theoretical and/or factual;*
- *“skills” means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments);*
- *“competence” means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy. (European Communities 2008, p.11)*

We assume that the competences, skills and knowledge must reflect EQF-levels (6-7) (e-CF 3-4) at least for the university courses, but this is something to be further explored in WP3. The level and the associated learning outcomes are, however, important to take into account when discussing assessment and pedagogical design. In a more condensed version the three concepts above can also be expressed as: Know-what, know-how and knowing-why or knowing-how-in-a-particular-practice.

While traditionally universities have been very successful in providing students with ‘knowledge’, the aspect of ‘skills’ (or combining skills and knowledge in a competence perspective) has not



been equally prioritized. As reported by (Müller 2006) this can result in discrepancies between what is taught at university, and what is needed as a professional.

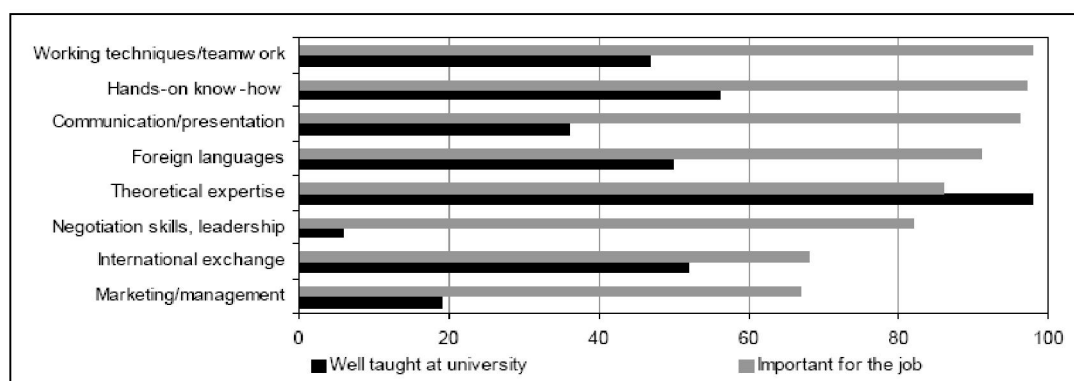


Figure 4 Comparison of capabilities taught at universities and required in professional life by young professionals [7]

### Figure 3: Comparison of capabilities taught at universities and required in professional life by young professionals

As can be seen from this figure, there are some discrepancies, in particular when it comes to what is encompassed by the concept 'personal skills', as many of the concept listed in the figure are similar to what is identified in D1.1 as 'personal skills'. These are presented in Table 3 below, based on (Eleftheriou et al. 2009):

- **Problem solving skills: To identify problems and break them down into manageable pieces**
- **Creativity: To be able to generate creative ideas and solutions, invent new ways of doing business and be open to new information**
- **Communication skills**
- **Self development: Reflect on his performance and goals, identify learning needs and development options, and develop knowledge and skills.**
- **Teamwork: working with others towards shared goals and creating group synergy in pursuing these goals**
- **Team building**
- **Leadership: inspiring and guiding groups and people**
- **Networking (social) ability**
- **Entrepreneurial**
- **Negotiation: To be able to maintain a position in conversation with others and improve this position**
- **Persuasiveness: To be able to convince others of a certain opinion**
- **Visionary**

Table 3: Selected Personal Skills from D1.1

Quite obviously 'problem solving skills' seems well aligned with problem based learning, but as we shall further explore PBL is a pedagogical approach which potentially supports the wide variety of knowledge and skills as proposed by D1.1.

The discrepancies between what is taught at university, and what is needed in professional life (as reported by Müller (2006)) should not only be understood in terms of *what* is taught, but rather

*how* it is taught. Therefore the solutions to these problems are not to create traditional courses on each of the relevant skills/personal skills, but rather to adopt pedagogies in which these skills are inherent or naturally embedded and this is one of the many reasons for choosing PBL as a teaching and learning strategy. PBL is a teaching methodology which not only embeds some of the personal skills, but furthermore a strategy which can be used in teaching and learning in relation to all the knowledge aspects and skills identified in WP1.

## 5 Active, Problem Based Learning approaches

In discussing problem based learning, we find it important to point out that there are a variety of interpretations of what constitutes problem based learning. As established we do not intend the learning methodology to be strictly prescriptive, neither do we feel comfortable outlining one particular interpretation of problem based learning. Therefore, we will start by briefly outlining our own institutional adoption of PBL, as for the reader to know the primary inspiration for the approach developed here.

### 5.1 The PBL-approach at Aalborg University

The approach at Aalborg University AAU is rooted in what has been termed the “Aalborg PBL model” (Kolmos et al. 2004) and Problem Oriented Project Pedagogy (POPP) (Dirckinck-Holmfeld 2002). This approach has been the pedagogical foundation for Aalborg University and Roskilde University Center (both situated in Denmark). The fundamental idea behind the model is a critical, experientially based perspective favouring learning as knowledge construction through collaboration, rather than focussing on delivery of information and knowledge. Today, this approach can be likened to other interpretations of problem based learning, project based or case-based learning (Dirckinck-Holmfeld 2002; Graaff & Kolmos 2007; Kolmos et al. 2004). However, there have been some differences between the Aalborg model and other approaches. Some interpretations of PBL take their point of departure in the solution of pre-defined tasks or problems set by the teacher, whereas the Aalborg model and other interpretations of PBL differ from this e.g. as noted by McConnell (2002):

*The focus is not on the usual PBL approach [...] where a problem is defined by the tutor and given to the learner as their starting point for PBL. In this traditional model, students acquire knowledge and skills through staged sequences of problems presented in context, together with associated learning materials and support from teachers [...]. The kind of PBL examined in this paper occurs in an open, adult learning context where learners, who are already professional people, work in small distributed e-learning groups and negotiate amongst themselves the focus of the problem (McConnell, 2002)*

To distinguish between different pedagogical interpretations of PBL and also the distinction mentioned above it can be useful to highlight two different tensions: teacher vs. participant control and curriculum orientation vs. problem orientation. Graphically, this can be represented as below:

	Curriculum Oriented	Problem Oriented
Participant controlled	Self-study, portfolio Study groups	Projects, case work , Field work, PBL, POPP
Teacher controlled	Lectures, courses, semi- nars, tests	Laboratory, experiments Problem solving, assign- ments, (PBL)

Figure 4: Teacher control vs participant control

These approaches are not mutually exclusive; on the contrary they are often mixed in practice. In different interpretations of PBL variations are found in the degree to which e.g. the teacher defines a problem for the students to work with, or whether this is decided by students themselves (which is usually the case in the Aalborg Model). Of importance is the fact that the PBL models adopted in the EA-courses should be aligned with the intended learning outcomes, assessment methods, preferred teaching style, etc. Thus arriving at a PBL model which is suitable for a particular course, in a particular context (e.g. private sector, public sector or undergraduate course) is intimately connected with the learning methodology and design framework developed in this work package. Before returning to the issue of design we briefly outline some of the reasons for adopting a PBL approach in this project, and some of the challenges related to this choice.

## 5.2 PBL as a pedagogical methodology for achieving higher-order skills and knowledge

Many of the skills identified in WP1 are so-called higher-order skills. For example, objectives such as heightening students' problem solving abilities, innovation and creativity skills are examples of what Biggs & Tang (2007) term functional knowledge (knowing how and why – or competence according to the EQF). This they distinguish from declarative knowledge (knowing about/knowing-what - knowledge) (Biggs & Tang 2007, p.72). However, as the authors point out much of the existing university curricula and assessment methods are predominantly aimed at teaching and assessing declarative knowledge.

Biggs & Tang (2007), however, explicitly mention problem-based learning approaches as an exception to this, and point out that assessment methods and learning activities to support functional knowledge need to be different from those aimed at declarative knowledge – but also, as we shall return to, that such strategies require teachers (institutions) to think differently about how they design learning activities and assess their students. This has to do with the changes in the relationship between teachers and students, which is a role shift that needs to be acknowledged and understood by both parties. Furthermore, assessment methods which are most effective for functional knowledge or competences might sit uncomfortably within some institutional infrastructures. Hence, processes of adopting a PBL perspective are not necessarily straightforward processes where one can easily translate certain learning requirements (or learning outcomes) into mutually recognised practices, learning activities and assessment methods (Busk Kofoed & Hansen 2004; Graaff & Kolmos 2007; Kolmos 2009; Kolmos 1996). Rather these are processes of mutual learning and negotiation of meaning.

## 5.3 What are PBLs?

The intention of using PBLs (understood as PBL methods) is that they constitute a broad, diverse and complex landscape of PBL-practices. Even so, one can also find some general traits. For example several authors argue that problems are the starting point for the learning process (Dirckinck-Holmfeld 2002; Kolmos & Graaff 2003; Savery 2006; Savin-Baden 2007). Furthermore, they highlight the importance of experience learning, where students build on their own experiences, and the notion of learning through active engagement in *actual practices or real-world problems* which involve research activities, decision-making and writing. In addition, these authors stress the principle of *inter-disciplinary*, which is related to the principles of *problem orientation*, and *participant directed* processes because the solution of problems can exceed traditional subject-related methods and boundaries (and thus the knowledge of the teachers and the limits of the particular subject). They equally argue that *group work* and *collaboration* is an important principle (though some argue that PBL can be more individualised), but they also point to differences in the understanding of collaboration, and the way in which students are mutually interdependent (see Appendix C, Paper II). Many of these points are also reflected in the summary of pertinent PBL-characteristics below (Savery 2006, pp.12-14):

- Students must have the responsibility for their own learning
- The problem simulations used in problem-based learning must be ill-structured and allow for free inquiry
- Learning should be integrated from a wide range of disciplines or subjects
- Collaboration is essential
- What students learn during their self-directed learning must be applied back to the problem with reanalysis and resolution
- A closing analysis of what has been learned from work with the problem and a discussion of what concepts and principles have been learned are essential
- Self and peer assessment should be carried out at the completion of each problem and at the end of every curricular unit
- The activities carried out in problem-based learning must be those valued in the real world
- Student examinations must measure student progress towards the goals of problem-based learning
- Problem-based learning must be the pedagogical base in the curriculum and not part of a didactic curriculum

Stated more briefly PBL is student-centred learning, where motivating and activating students are the prime concerns. Furthermore, the point of departure for the learning processes is ill-structured real life problems and an inter-disciplinary approach. These points are also explored by Barrows (1986) who identifies different PBL-practices such as, *lecture-based cases*, *case-based lectures*, *case method*, *modified case-based*, *problem based and closed-loop problem based* approaches and discuss their ability to support:

1. The structuring of knowledge in relation to actual practices (practice learning, learning in the context of a practice)
2. Development of effective reasoning skills
3. Development of effective self-directed learning skills
4. Increased motivation for learning

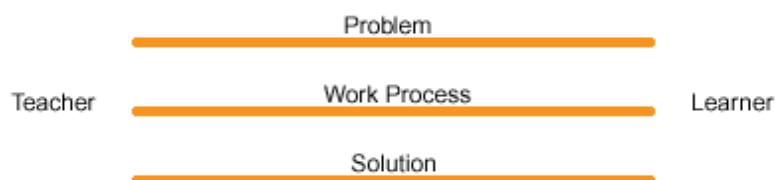
Barrows (1986) argues that higher degrees of student/learner ownership and control, lead to higher motivation for learning, development of more effective reasoning skills, self-directed learning skills and knowledge structures related to actual practice.

Summing up, there are many good reasons for adopting PBL as an overall innovative pedagogy as it addresses and supports development and improvement of *skills*, while also supporting the acquisition of *knowledge*. Furthermore, because a PBL approach suggests that students engage in the resolution of real-world problems this further supports the development of competence. In this sense, PBL supports that students get the know-what, the know-how, but also the knowing why or knowing how in a particular practice. Furthermore, as group work and collaboration is very often a central feature for PBL, many of the personal skills (see Table 3), or what Kolmos (2009, 2004) calls 'process skills' are an embedded part of the pedagogy.

Thus, it should seem to be relatively straightforward and that the way to progress within the project would be to encourage project partners to initiate PBL-practices building on the highest level of student control. There are, however, good reasons for not doing so. One concern is the change of roles for both teachers and students, and another is a concern revolving around knowledge acquirement of the students.

As we have implied, a transition to PBL-methods may not be easy, and we have therefore prioritised that the partners should be actively engaged in choosing a PBL approach which suit their own needs, values and possible institutional requirements. This is also what is reflected in

the learning methodology and design framework we have developed. In the framework we have identified some of the most central characteristics of PBL, and developed a model where either teacher or learner can be in control of central dimensions – or the ownership can be distributed between them (for a more detailed theoretical account we refer to Appendix C, Paper II (Ryberg, Glud et al. 2010) and (Ryberg et al. 2006)):



**Figure 5: Three continua for problem-based learning**

By discussing who controls the dimensions above (teachers, students, tutors or others), practitioners can use the model to discuss and elicit different theoretical and practical constructions of PBL. The dimensions most important in relation to PBL are: *The problem, the work process, the solution*, and they are further elaborated in Table 4 and incorporated into the design framework. The intention of the model is also to emphasise the fact that there are numerous ways of designing for and working with PBL.

- **The Problem: Who controls the problem?**
  - Who controls or owns the definition or framing of the problem?
- **Work Process: Who controls the process?**
  - How are the working processes organized?
  - Who controls the working processes?
  - Who decides how the problem should be investigated?
  - Who controls the collaboration?
- **The solution: Who controls the solution?**
  - Who owns it? Is the solution open-ended or closed?

**Table 4: List of questions to address in relation to PBL**

Therefore, we do not propose one PBL-model or approach to be implemented in the courses, but rather stress that a particular model of how to adopt PBL in the EA courses should be decided in collaboration with the partners.

The particular PBL-models adopted by the partners may also differ in terms of how students can or will be expected to collaborate. As already stated, there are different ways of organizing for PBL in terms of how students work together and how strongly they are mutually interdependent, as we shall briefly explore in the following.

## 5.4 PBL, web 2.0 and interactional interdependencies

By interactional dependencies we mean the type of collaborative relations students will be expected to engage in during a course e.g. group work, online discussions, sharing of resources and so on. For example, at Aalborg University the students work closely together in groups for an extended period of time (up to four months at a time). Within this period, they formulate and identify their problem, do research (collect data, find theories and methods) and write a project report. This is a very strong collaborative dependency. In contrast, students at Maastricht University follow a PBL model where they are less dependent on each other. They work individually on a problem they have chosen and meet in larger study groups (8-12 people), which they can use as an inspiration and backdrop for their own work.

In the CoED workshop and the design framework we have therefore highlighted relations between collaborative interdependencies and associated technologies, which are suited for particular purposes e.g. more collaborative modes or cooperative modes of work. In doing so, we have drawn on models and distinctions proposed by Dron & Andersson (2007). They suggest distinguishing between three levels of social aggregations which they term: the *group*, the *network* and the *collective* (Dron & Anderson 2007). *Groups* are more tightly knit social constellations often mutually engaged in working with a common problem, project or task, whereas *networks* entails more fleeting membership structures and boundaries, are emergent rather than designed, and do not necessarily revolve around a particular task. Finally, the *collective* has an even looser and more emergent structure with no sense of conscious membership or belonging. Collectives are aggregations of individuals' uncoordinated actions from which e.g. tag-clouds, recommendation systems or page-ranking systems emerge. Following from this, we can differ between *individualised*, *cooperative* and *collaborative* strategies for learning and interaction, and relate these to the different levels of social aggregation (groups (collaborative), networks (cooperative) and collectives (Dalsgaard & Paulsen 2009)).

In the design framework (and the design of the particular CoED workshop) we have therefore incorporated various conceptual models and resources which make it possible to reflect on different types of web 2.0 activities (Dalsgaard & Korsgaard Sørensen 2008), different modes of communication (Dron & Anderson 2007) and learning environments adopting different strategies in terms of interactional dependencies (Dalsgaard & Paulsen 2009).

To sum up, the aim of our developed learning methodology is not to suggest particular interactional dependencies, technological tools or promote a particular PBL-model or approach. Rather, our aim is to stress that a particular model of how to adopt PBL and web 2.0 in the EA courses should be decided in collaboration with the partners. This collaborative, iterative design approach is what is reflected in CoED workshop, the design framework, the resources and tools uploaded to Methopedia, and reflected in the continued dialogue on the design of the courses and development of the technical platform.

## 6 Conclusions

The aim of this work package has been to initiate an iterative, collaborative design process, and develop a learning methodology enabling partners to construct more concrete learning designs based on a PBL approach and capitalising on web 2.0 technologies. The reason for adopting a collaborative, design-oriented approach is due to the fact that employing active, problem based learning and web 2.0 practices in educational settings is associated with some challenges and tensions (as also reflected in the results from the workshop – see below and Appendix A). As we have argued, it is important that teachers and institutions develop their own local and institutionally sustainable response to such challenges, rather than having fixed, potentially conflicting, designs imposed upon them. Therefore, the learning methodology developed in WP2 aimed at actively involving and supporting the partners in creating locally sustainable learning designs. The learning methodology thus consists of:

- The CoED-workshop and its results (Appendix A).
- The design framework developed for the continued design and dialogue on the concrete course development, and the subsequent preliminary course or learning designs produced by the partners (Appendix B)
- The resources, tools and learning activities related to PBL and web 2.0, which have been made available in the wiki-based online community Methopedia (<http://methopedia.eu>) (Appendix D).

The activities undertaken in the duration of WP2 have also fed into the WP3 partner's process of creating preliminary requirement specifications for the *technical platform* involving input by partners from UKL, UOM, BOC, COI and NUIG (Appendix F & G).

Furthermore, the more detailed theoretical and methodological underpinnings of the learning methodology and our approach have been submitted as a symposium (consisting of three papers) for the Networked Learning Conference 2010 (Appendix C) and have been made available for the partners as part of this deliverable. In addition, we have created a publically available bibliography representing the literature and resources, which have acted as the foundation for the work in WP2 (Appendix E). These can act as valuable resources and reference material throughout the project.

The learning methodology thus comprises a range of *mediating design artefacts and resources* (Conole 2007), which can enable and support the continued development of concrete learning designs. The design work has already commenced, and in the following we discuss some of the preliminary results of the workshop and the learning design (the learning designs produced by the partners can be seen in Appendix B).

As we view the design process as a continued, dialogical process, we see the following as preliminary results. The design interactions can continue even after the official end of WP2 (January 1<sup>st</sup> 2010). However, in the following we present the preliminary results and discuss what they might mean in relation to the continued work in the EATrain2 project.

### 6.1 The CoED workshop and use of the design framework – preliminary results

The workshop resulted for one thing in the development of preliminary designs for two courses and identification of underlying pedagogical values and approach for these (see Appendix A for more detail). The designs and values formulated in the workshop have then, based on the templates and conceptual models in the design framework, been carried forward to the more detailed design proposals produced by the partners (see Appendix B for more detail). These design and use-cases produced by the partners have also fed into the preliminary platform



specifications developed by WP3 partners (DERI) with input from UKL, UOM, BOC and COI. Apart from these concrete results the workshop also prompted identification of a number of pertinent questions and issues relevant for the future work of the project.

**Issues around assessment:** In one of the cases an approach focusing on students' collaboration and participation was outlined. However, due to institutional requirements individual assessment of the students is necessary, which can potentially lessen students' willingness to engage in collaborative work e.g. due to completion between students, who might be less inclined to share and contribute to a common product, or engage in cooperative activities inspiring and helping others. These are issues which can be mitigated, but need to be carefully considered in terms of assessment practices, facilitation of activities, the framing of the purpose, and the role of the collaboration. For example, at Aalborg University students submit a collaboratively written report, but are assessed individually based on their overall understanding of the project report and their own contribution (½ hour oral exam). Furthermore, another design was envisioned as a fully online course without a facilitator/teacher. This for one thing means that it becomes more difficult to initiate and sustain learning activities and collaborative/cooperative work, but also raises issues around assessment. A question which surfaced was how to assess higher level skills (the ability to apply knowledge and use know-how to complete tasks and solve problems) in a purely online course without an examiner, facilitator or course instructor? Finally, issues around, whether assessment should focus on process or products emerged. This concerns questions of how to assess not only the product completed by the students, but how to assess their 'personal skills' or what is also referred to as 'process skills' (Busk Kofoed & Hansen 2004; Kolmos & Kofoed 2002), such as creativity, communication skills, teamwork, and the ability to reflect on own performance and goals (see Table 3).

**Issues around motivation:** From the workshop, another concern emerged; namely issues about the course delivered purely on line, and the need of a facilitator. The question is, as just mentioned, whether it is feasible to design purely online courses with no facilitator or course instructor – at least if the course should employ a problem based learning approach and capitalise on web 2.0 technologies? How can purely online courses be monitored, and who will organise activities, deadlines and outline the structure of the course? Can students for example be encouraged to engage in cooperative/collaborative activities and form self-driven community of learners? These considerations are very important when taking into account the use of web 2.0 technologies, as they are often argued to be able to support e.g. more loosely-connected communities of learners and enable collaboration or cooperation between learners. However, the motivational structure for engaging with others and the course needs to be more carefully considered. Motivational issues also arose from discussions of other design ideas. For instance it was suggested that students used social bookmarking tools (e.g. delicious.com) to share relevant material with each other for mutual inspiration or as part of collaborative tasks. In relation to these suggestions questions of what, or who, could motivate the learners to do social bookmarking, or whether teachers would be able to motivate learners to use a wiki for collaboration? What would encourage students to share with each other, and not keep their knowledge and findings to themselves, as previously mentioned? Within formal education learners' motivation and assessment are often tightly interwoven, and students often orient towards figuring out 'what counts'. Thus, it seems obvious that behaviour such as producing wiki-text, blog or share social bookmarks can be driven by extrinsic motivational structures (summative assessment such as grades or marks), and this can often be a necessary initial driver. However, there are some caveats or tensions associated with pure reliance on extrinsic motivational factors. The educational motive for engaging with social bookmarking or collaborative editing in a wiki is not only about students testing and trying a new technology, but equally about promoting and supporting students' development of team-work skills (collaboration, communication, team-building, networking) and to accustom them to a culture of knowledge sharing (which will be necessary in their professional life). While extrinsic motivational structures like grades or other types of summative evaluation can provoke certain behaviour the pedagogical challenge is to make students realise the value and necessity of these activities and skills, rather than merely being a means to attain a good grade.

These issues cannot be immediately or easily resolved, but highlights the need for a continued dialogue between the WP2 team, the course designers and course models developed in WP3. It, however, emphasises the usefulness of the workshop and design framework, as these activities and resources have provoked the questions and also include reflective tools which highlight the need to carefully consider assessment as a crucial part of the learning design – both for the overall design of a course and for the individual modules, as reflected in the design framework (see Figure 1 and Appendix B).

In summary the learning methodology, design workshop and the design framework have been instrumental in identifying some pertinent questions and issues, which can inform the continued work in the project, and are important to take into consideration when designing the course models. Secondly, the learning designs which have been outcomes of the workshop and the use of the design framework can provide the foundation for the continued, iterative production of course models and even more detailed learning designs. In addition, they have been instrumental in feeding into the preliminary requirement specifications of the EAtain2 technical platform. Although, the further development of course models and the technical platform extends beyond the duration of WP2, we believe that the design process should be a continued, dialogical process where the interactions between the partners can continue even after the official end of WP2.

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## A. Workshop report

The CoED method aims to support domain, qualification level and subject experts in designing targeted e-learning and web based and networked learning. Drawing on knowledge and theoretical concepts within the fields of design, systems development and collaborative learning, emphasis is on bringing focus and structure to the early stages of the design process. The method aims to develop design specifications and/or early prototypes within few hours of work, and furthermore to support the collaboration between different types of experts and practitioners. The status and usability of early prototypes of course designs depends on several factors, which we will return to later in this section. The CoED method is developed partly in the Learn@Work project and partly in other projects by researchers from *e-learning lab – center for user driven innovation, learning and design, Aalborg University* ([www.ell.aau.dk](http://www.ell.aau.dk)). In the following, the theoretical and conceptual basis for this tool is presented, followed by a detailed walk-through of how it has been used in the specific context of the EATrain2-project.

### A.1 Theoretical and methodological background for CoED

CoED is a common methodological framework developed with input from research on:

- Systems development – because we design (for) information and communication technology
- Collaborative learning – because we design for learning and learn in the design process
- Facilitating creative processes – because the aim is to develop something new

In the following we will go into greater detail with the contributions from these domains. Further description and discussion of the workshop methodology can be found in (Nyvang & Georgsen, 2007) Symposium paper 2 and in general in the Symposium papers for the NLC 2010 found in appendix C).

#### A.1.1 Systems development and design

Within systems development and design we can identify several development paradigms of which only a few offer relevant contributions to the design of learning activities today. The focus of systems development has traditionally been on management of development projects by means of linear processes organising system engineering from idea and system requirements to system design, programming and technical test (the so-called waterfall model) (Vliet, 2000). This approach is often criticised because of its' straight-line linear process focusing on designing a technical system, thus producing tangible designs only at the very end of the project (Beyer & Holtzblatt, 1997; Dahlbom & Mathiassen, 1993; Larman, 2003). The same sources also stress that development of ICT normally involves more than a technical system; namely social systems which influence and are influenced by the technical system. This leads to the assumption that a systems development method must in fact facilitate a learning process, which involves both designers and future users in a short cycle iterative development, which continuously produces designs that can be tested with users. Some sources stress that possible future practices with a new system can be subjected to discussion involving designers and users even before the very first prototype. This is done by the use of scenario-based narratives, forecasting the future with a new system (Carroll, 1995).

#### A.1.2 Collaborative learning in design teams

The systems development domain has already drawn our attention to the fact that specification and design can be regarded as a learning process in a community of learners learning together.

According to Wenger, a social theory of learning must include community, practice, meaning and identity (Wenger, 1998). Learning in a community of practice thus involves negotiation of meaning which is a process of participation and reification. Von Krogh, Ichijo and Nonaka stress a similar complex understanding. They, however, talk about *knowledge creation* rather than learning. They define knowledge as *justified true belief, individual and social, tacit and explicit* (Krogh, Ichijo, & Nonaka, 2000, p. 30). As a consequence, knowledge creation cannot be managed, only enabled: “*Instil a knowledge vision, manage conversations, mobilize knowledge activists, create the right context and globalize local knowledge*” (*ibid.*). Within a team of designers, which perhaps includes users, it is reasonable to expect participants to bring different knowledge and thus different *justified true beliefs* to the process, which subsequently calls for a negation of meaning within the design team. In addition to this, one of the lessons from systems development is that it is important that beliefs *do get* challenged and subjected to both negotiations and test. We thus draw on methods and techniques for challenging and negotiating beliefs.

### A.1.3 Facilitation of creative processes

This source of inspiration is of a more practical nature than systems development and learning theory. Card sorting and future workshops, which are both mentioned here, are, however, powerful ways of organising and facilitating a targeted negotiation of meaning within systems development projects.

Card sorting is a widely known technique for exploring differences and negotiating areas of agreement within systems development, and specifically within information architecture. This technique can help individuals explain to the designer how they think about a domain. With groups of card sorters the designer can facilitate discussion and negotiation of priorities – for example by giving some values priority over others. In the case of value identification, the participants in the card sorting-process start off with a stack of cards with one value sentence or phrase printed on each card. Participants negotiate which cards to keep and which to dispose of. Through a series of steps, which are described in greater detail later in this paper, a group can arrive at a limited number of values all can agree on. The future workshop is another method with a slightly different aim. It leads a group of designer-practitioners through a collaborative process composed of three phases: Critique, fantasy, and realisation. It builds on three basic assumptions:

1. Personally experienced contradictions and problems in practice are drivers for solutions and change, hence the critique phase.
2. If suggestions for solutions are constrained by feasibility and sustainability concerns too early in the process, valuable ideas and design solutions will be lost, hence the fantasy phase, and
3. Reality poses constraints that must be taken into account, hence the realisation and distinction between fantasy and reality (Jungk, 1987; Kensing & Madsen, 1991).

## A.2 User guide and detailed description of CoED

### A.2.1 Overview

#### Phases:

1. Focus the e-learning design process
2. Identify overarching values and design principles
3. Specify design



## **A.3 Phase 1 – Focus**

### **A.3.1 Goal**

The goal of phase 1 is to focus the design activity in terms of the overall approach to and understanding of learning, domain and technology.

### **A.3.2 Process**

The workshop coordinator or other expert presents foci that are already chosen or are possible choices. Based on research, literature reviews and expert knowledge, a presentation is given to introduce the participants to key issues in pedagogical design of ICT-based learning and teaching. The idea of the presentation is to focus attention on three issues related to identifying the *philosophy of the design*:

- the understanding of learning (and subsequently teaching)
- the understanding of the domain for induction
- the understanding of technology and the role it plays in both the design and the learning processes

The formulation of values and orientation within these three issues is crucial to the design process. The objective of giving this presentation, however, is not to “sell” specific ideas or solutions, but to bring these issues to the attention of the participant. A design philosophy (or set of values) is something each partner needs to negotiate in relation to their cases; however, a general philosophy is useful as a shared frame of reference for the project.

### **A.3.3 Product**

The workshop participants arrive at a shared understanding of some of the basics of the overall approach to and understanding of learning, domain and technology.

## **A.4 Phase 2: Identification of overarching values and principles**

### **A.4.1 Goal**

The goal of phase 2 is to identify the overarching values and principles that guide the design.

### **A.4.2 Process**

The workshop participants identify overarching values and principles by card sorting. Card sorting is a method that forces the participants to prioritize different concepts related to web based EA-training. The card sorting is done collaboratively starting in smaller groups and ends up with the joint priority of the full group of workshop participants. In the case of the EATrain2-workshop 8 participants were split into 4 pairs, and were given a number of cards to lay out in a specific order to show which ones they find most important. After round one, the pairs meet in groups of four and go through the process again. As the two groups were focussed on different areas (university teaching and courses for the public sector, respectively), they only merged once. Thus, the final result of each group was produced after one iteration, and in groups of 4.

Categories for sorting the cards:

- 1: The most important
- 2: The important
- 3: The less important
- 4: The un-important

Round one (in pairs): All cards are placed within the four categories, with a max of 15 cards in one category and a minimum of 5. After completion, cards from categories 1 and 2 are brought into round two.

Round two (groups of four): Cards brought forward from round one are placed on the board, with a maximum of 5 cards in category 1. The priorities of each group are displayed, and the task is now to agree on what the most important values should be.

### A.4.3 Materials

- Cards with statements about good teaching/learning or pedagogical “buzzwords” (positive ones, 40-50 cards).
- Boards to place the cards on.
- Board or paper to display the final result.

The cards used in the Vienna workshop can be seen in sections A.6.1 and A.6.2.



**Figure 6: The EATrain2 partners at work at the CoED workshop in Vienna. Here they are working in the card sorting process of identifying the overarching design values and principles.**

### A.4.4 Product

Output: Value statement regarding web 2.0 mediated EA-training. In the EATrain2-CoED workshop, the final set of cards contained the following cards prioritised with the most important first.

**The group (Public sector):**

- Competence development
- Collaboration
- Active participation
- Working with real world problems
- Process oriented learning

### The group (University):

- Assessment
- Resource based learning
- Active participation
- Learning independency
- Cooperation

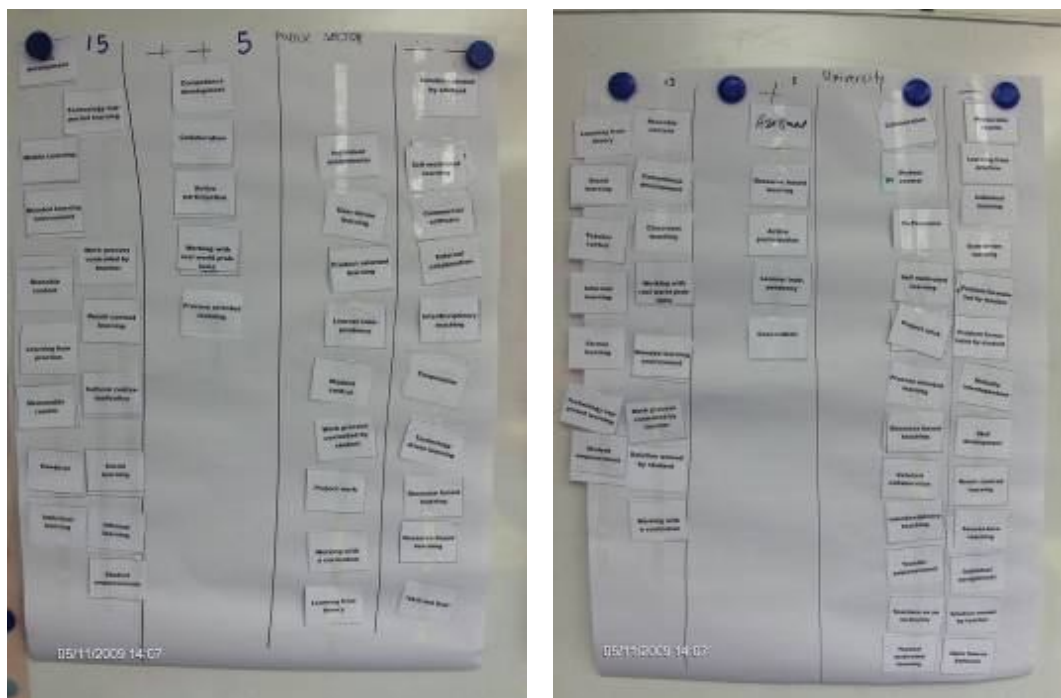


Figure 7: The results from the final iteration in the second phase of the EATrain2 workshop.

## A.5 Phase 3 Detailed design

### A.5.1 Goal

The goal of phase 3 is to focus on developing a detailed learning design based on phases 1 and 2.

### A.5.2 Process

The specific design of EA-training modules is based on the output from step two (pedagogic values) AND on the specific case the design is to be used in. Design of the specific training course or module thus requires knowledge of the cases that the design aims at. In the EAtrain2-workshop two cases (see Appendix A.5.8) were described for the participants in as much details as possible using the EAtrain2 case study-template for inspiration (see Appendix F), and participants worked in two groups. Each group has a facilitator, whose responsibility it is to support the participants in formulating a consistent design true to the values of the design philosophy. This is done by asking critical questions, pointing out “holes” in the design, etc.. For articulating the design, participants work with a set of cards illustrating factors relevant for pedagogical, technical and domain-related issues (see Appendix A.5.6 for the list of cards).

In the design the participants tried to outline the more general and overall story line of the course taking into consideration which activities, resources and infrastructure would support the pedagogical values and the case design.

The group working with the public sector case started out by defining the goals and the target of the course they were designing, but found out that they had a lack of content. In their discussion they agreed upon an assumption that content would be delivered, and they then moved on to addressing critical issues related to the project frame and logics in the project framework.

Sorting out the cards they had a long discussion starting with the infrastructure and divided it into different kinds of ‘categories’ of tool, e.g. some support user-generation other simulations/games etc.. The next point was to identify activities trying to address the real world problems, collaboration and project work. They state that the learning has to be assessed and finally certificated.

The other group working with a university case started out clarifying their value-related goals, but found in their discussion that there was a lack in their knowledge about what the content should be, and also what the purpose of the course was. In the sorting of cards, they started with the activities, dividing these into different ‘groups’ of activities e.g. Collaboration and different activities supporting collaboration. They had a discussion about different aspects of assessment. After dealing with activities they sorted the resources divided these into collaboration tools and materials like books etc. They found that the infrastructure is more relevant to the e-learning structure. For outlining their design the group started to draw what they saw as a process on a flipchart. A process could e.g. start with lectures; then move on to exercises; then assessment (e.g. students peer reviewing assignments). These activities were combined with illustrations of where and how collaboration and participation should take place. (See illustrations below for further outline about the design of activities, resources and infrastructure in the two groups)

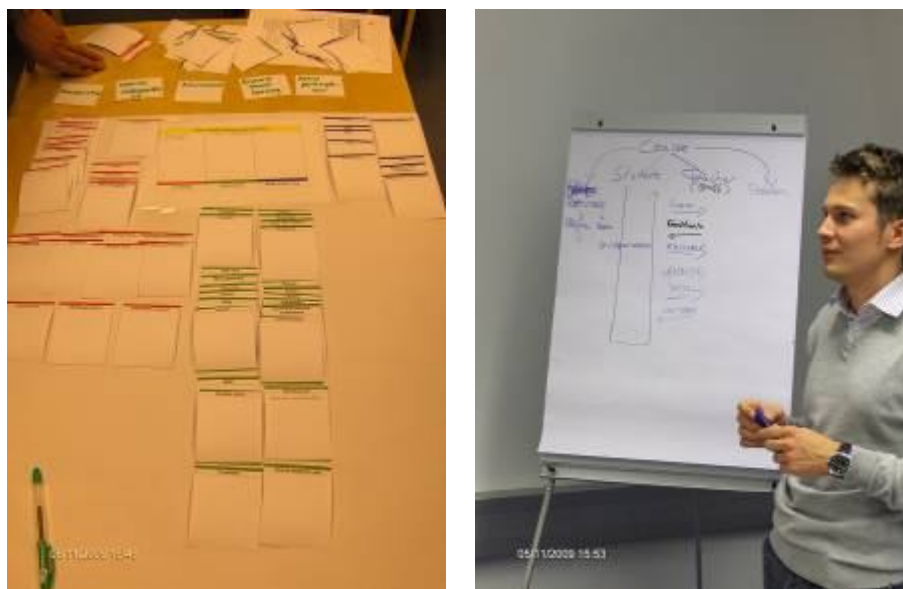
From the workshop, a number of different issues were identified, e.g. about assessment and the relevant type of assessment. On one hand, an approach with collaboration and participation in focus was presented, and at the same time individual assessment would be suggested or even be the case in the institutional framework for the case in question. An important question is how to get from the described learning goals to the appropriate assessment method(s), and what to take into account when designing the learning process? In other words, what is the purpose for each specific activity in the design? Another tension is the limitations in assessment to be aware of, e.g.

how are the online course assessed? In relation to this issue it became clear that it would be difficult to address higher level skills in a purely online assessment without an examiner, facilitator or course instructor taking part in it. Another issue related to assessment concerns whether the learner should be assessed upon the solution or the process.

From the workshop, another concern emerged namely issues about courses delivered purely on line, and the need of a facilitator. Is it being possible to design purely online courses with no facilitator or course instructor or some other role? How are purely online courses to be monitored, and who will organise deadlines and outline the structure of the course? These considerations are very important when taking into consideration the use of web 2.0 technologies, and there are some tensions related to e.g. the process and motivation for learning, which are important to consider when designing for web 2.0 mediated learning. What or who is motivating the learner to do social bookmarking? Is the teacher able to motivate the learner to use a wiki for collaboration? What makes students want to share among each other and not keep their knowledge and findings to themselves? Yet another issue relates to assessment, and whether the student is going to be measured on his or her active use of the blog, wiki, etc., related to the specific course activity? (Further elaborated in the Symposium papers for the NLC conference 2010)

### A.5.3 Materials

- Cards for story line construction
- Board or paper to add cards to.
- Pens to add commentary to story line.



**Figure 8: To the left you see the paper with the cards and as illustrated to the right one group also used a flip-over for illustrating their design.**

### A.5.4 Product

The product of the workshop is an outline of the cases sketched on a board using the cards in the three categories. Illustrations below show results of the ETrain2 CoED workshop.

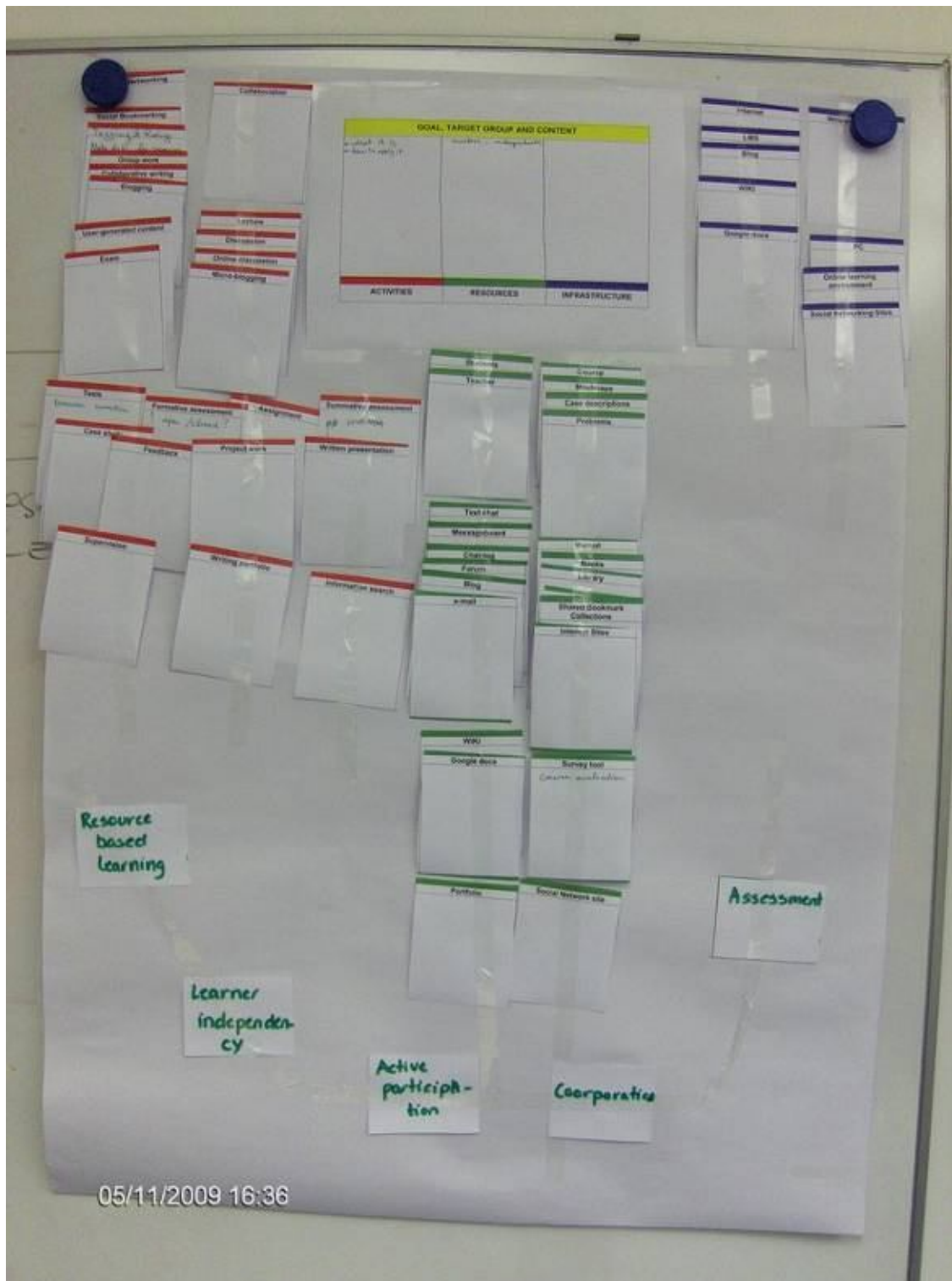


Figure 9: The product from the group working with cases within university.

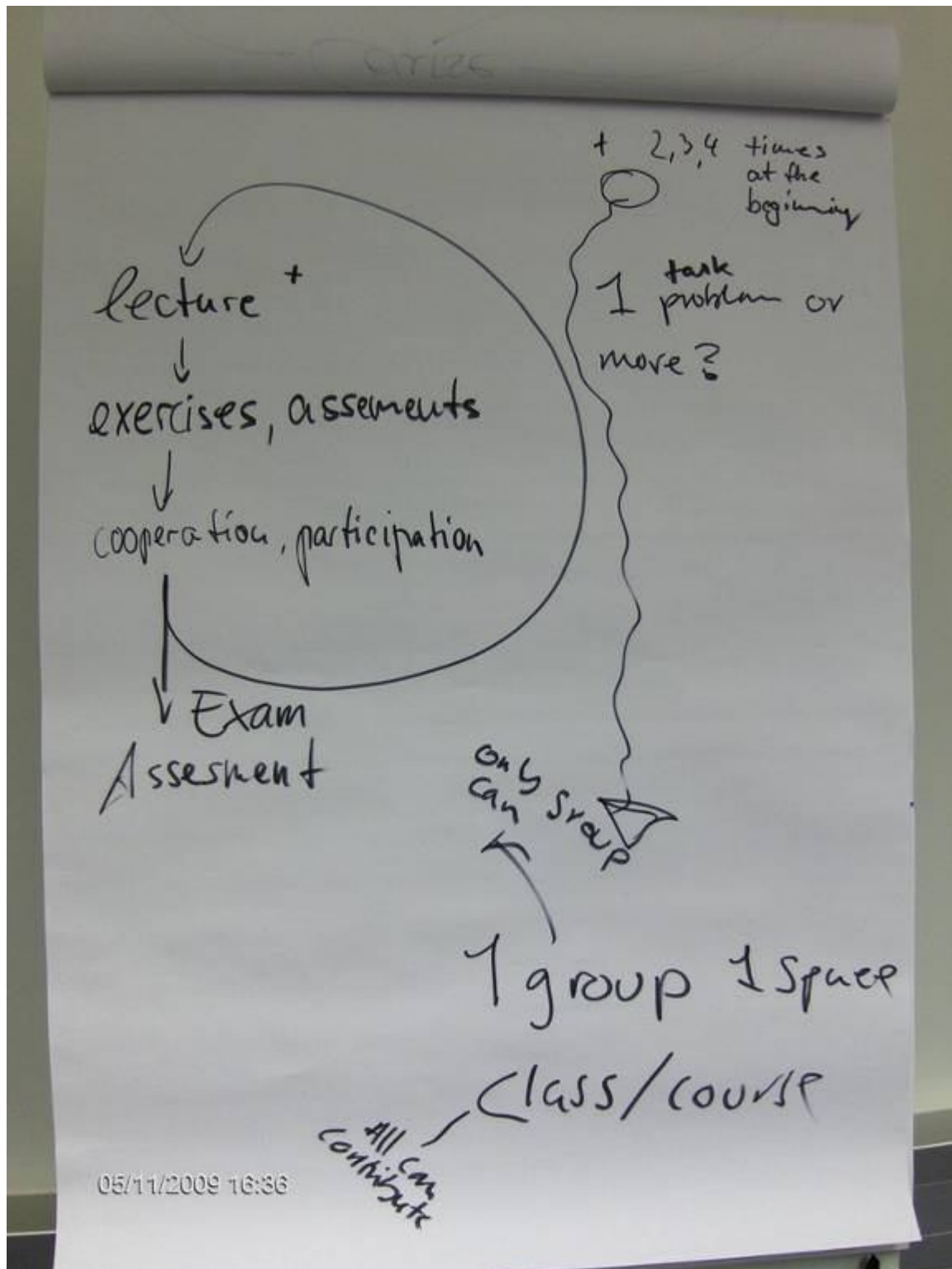


Figure 10: The product from the group working with cases within university.

The group designing for public sector had this product outlined from their design.

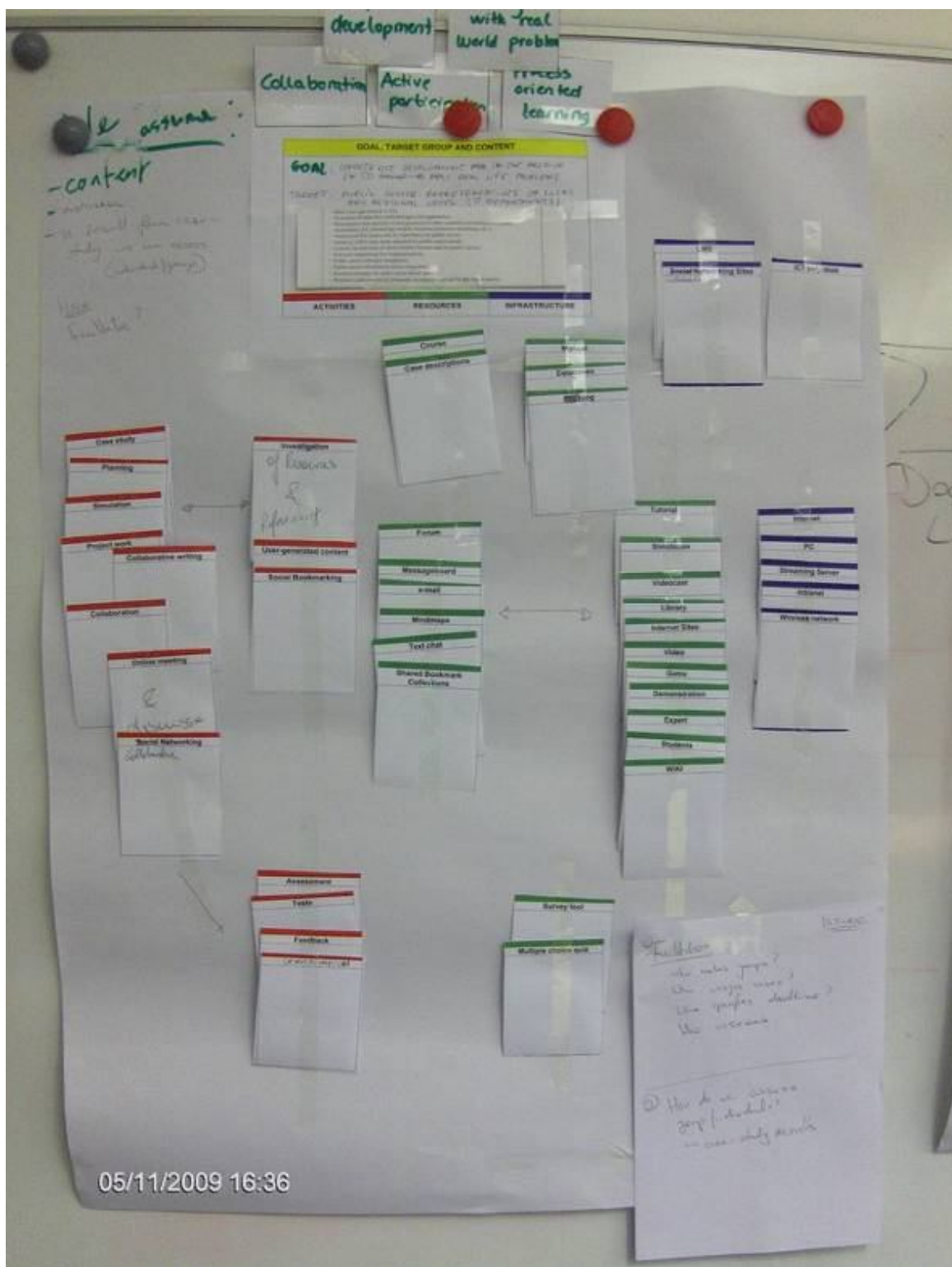


Figure 11: The product from the group working with cases from Public sector.

For enlarged pictures go to this website:

<http://www.dropbox.com/gallery/272540/1/Pictures%20from%20EATrain2%20Workshop%202009?h=2e1b6c>



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- and the Symposium Papers in appendix C.

## A.6.1 List of cards used in phase 2

### Cards for Identification of Overarching Design Values and Principles:

Working with real world problems  
Working with a curriculum  
Student control  
Teacher control  
Problem formulated by student  
Problem formulated by teacher  
Work process controlled by student  
Work process controlled by teacher  
Solution owned by student  
Solution owned by teacher  
Project work  
Result centred learning  
Active participation  
Mutually interdependent  
Learner independency  
Collaboration  
Cooperation  
Technology supported learning  
Blended learning environment  
Face-to-face teaching  
Cultural contextualisation  
Resource based teaching  
Resource based learning  
Informal learning  
Formal learning  
Process oriented learning  
Product oriented learning  
Competence development  
Skill development  
Measurable results  
Hands-on  
Interdisciplinary teaching  
Open source software  
Commercial software  
User-driven learning  
Technology driven learning  
Self motivated learning  
Teacher motivated learning  
Teacher empowerment  
Student empowerment  
Social learning  
Individual learning  
Learning from theory  
Learning from practice  
Teachers as an instructor  
Classroom teaching  
Co-Presence  
Individual assignments  
“Skill and Drill”

Mobile Learning  
Reusable content  
Copyright protection  
External collaboration

## A.6.2 List of cards used in phase 3

### Cards for Design phase – Activities (green), Resources (red) and Infrastructure (blue)

#### Activities:

Lecture  
 Assignment  
 Discussion  
 Feedback  
 Project work  
 Collaboration  
 Information search  
 Multiple choice quiz  
 Design  
 Planning  
 Assessment  
 Investigation  
 Simulation  
 Case study  
 Supervision  
 Written presentation  
 Oral/audio presentation  
 Video presentation  
 Group work  
 Face-to-face meeting  
 Blogging  
 Podcasting  
 User-generated content  
 Social Networking  
 Micro-blogging  
 Online discussion  
 Writing portfolio  
 Collaborative writing  
 Online meeting  
 Exam  
 Tests  
 Summative assessment  
 Formative assessment  
 Mobile Learning  
 GEO-tagging  
 Social Bookmarking

#### Resources:


Portfolio  
 WIKI  
 Teacher  
 Students  
 Books  
 Library  
 Case descriptions  
 Chat-log  
 Messageboard  
 Course  
 Multiple choice quiz  
 Video  
 Camera  
 e-mail  
 Forum  
 Databases  
 Survey tool  
 Internet Sites  
 Tutorial  
 Manual  
 Simulation  
 Demonstration  
 Facilitator  
 Expert  
 Video chat  
 Text chat  
 Text editor  
 Spreadsheet  
 Game  
 Google docs  
 Blog  
 Podcast  
 PDA  
 Touchscreen  
 Game console  
 Google Apps  
 Videocast  
 Shared Bookmark Collections  
 Social Network site  
 Micro-blogging site  
 Problems  
 External partners  
 Mindmaps

#### Infrastructure:

Intranet  
 Internet  
 PC  
 Portable media  
 LMS  
 Wireless network  
 Google docs  
 WIKI  
 Blog  
 Social Networking Sites  
 Online learning environment  
 Location-based mobile services  
 Virtual Worlds  
 Streaming Server  
 Camera  
 ICT help desk  
 Microphone  
 Recording equipment  
 PDA  
 Mobile Phone  
 Smart-phone  
 GPS  
 Internet

The Card generator for the method is to be found at <http://www.ell.aau.dk/coed/>

### A.6.3 Template for Case Descriptions

 <span style="float: right;"> <b>Innovative Enterprise Architecture</b>  <b>Education and Training Based on Web 2.0. Technologies</b> </span>	
<p><b>WP 2: Background information on courses/course modules on EAtraining</b></p> <p>To prepare for the workshop in Vienna on Nov. 5th, we kindly ask all of you to describe possible cases to work with in the design phase.</p> <p>Please describe in as much detail as possible a case for EA training by filling in the template. If your institution is not directly involved in developing training activities, please describe what you see as a relevant and interesting case.</p> <p><b>Please return the template to <a href="mailto:eatrain2@hum.aau.dk">eatrain2@hum.aau.dk</a>. Deadline: October 30, 2009.</b></p>	
Title or name of the course	
Provider of the course (e.g. general description, type of organization)	
Goals and content for the course/module – if possible, please refer to the ontology developed in WP1	
Participants/target group (who and how many, age range, level of prior education/training, prerequisites, etc.)	
Place (in the workplace, university, etc.)	
Duration (course hours/days, distribution of hours/days, etc.)	

Mode(s) of teaching and delivery (on line; mixed mode; lecturing; case based teaching; etc.). Consider: what will the teacher do? What will the student/learner do?
Learning activities and organization of the learning process (e.g. assignments, reading, project work, etc.).
The role of e-learning/ICT in the course (solely online, mixed mode, etc.)
Status of the course/activity (planned (to take place when), in progress, already in operation, etc.)

If you have any questions or comments on the template, please contact us by email [etrain2@hum.aau.dk](mailto:etrain2@hum.aau.dk) Thank you.

EATrain2 Aalborg team: Thomas ([ryberg@hum.aau.dk](mailto:ryberg@hum.aau.dk)), Lillian ([lillian@hum.aau.dk](mailto:lillian@hum.aau.dk)), Jacob ([jackd@hum.aau.dk](mailto:jackd@hum.aau.dk)), Louise ([lulleng@hum.aau.dk](mailto:lulleng@hum.aau.dk)), Marianne ([marianne@hum.aau.dk](mailto:marianne@hum.aau.dk)).

### A.6.4 Case descriptions from partners

<p><b>WP 2: Background information on courses/course modules on EA training</b></p> <p>To prepare for the workshop in Vienna on Nov. 5th, we kindly ask all of you to describe possible cases to work with in the design phase.</p> <p>Please describe in as much detail as possible a case for EA training by filling in the template. If your institution is not directly involved in developing training activities, please describe what you see as a relevant and interesting case.</p> <p><b>Please return the template to <a href="mailto:eatrain2@hum.aau.dk">eatrain2@hum.aau.dk</a>. Deadline: October 30, 2009.</b></p>
<p>Title or name of the course</p> <p><a href="#">Enterprise Architecture oriented approach in public sector</a></p>
<p>Provider of the course (e.g. general description, type of organization)</p> <p><a href="#">“Cities on Internet” Association</a></p> <p><a href="#">NGO being actively involved in development of Polish public sector.</a></p>
<p>Goals and content for the course/module – if possible, please refer to the ontology developed in WP1</p> <p><a href="#">Goal of that course is to give the general overview of Enterprise Architecture, stressing its possibilities and enhancement in the public sector. The course will be targeted at decision makers and shall depict advantages of EA and encourage introducing EA in the public sector.</a></p> <p><a href="#">Content general proposition (will be detailed in the future):</a></p> <ul style="list-style-type: none"> <li>– <a href="#">Basic concepts related to EA;</a></li> <li>– <a href="#">Overview of main EA methodologies and approaches;</a></li> <li>– <a href="#">Presentation and analysis of best practices in other countries (including documents, taxonomies, EA referencing models, business processes modelling, etc.);</a></li> <li>– <a href="#">Analysis of EA layers and its importance for public sector;</a></li> <li>– <a href="#">Advantages of introducing specific strategy of public sector development;</a></li> </ul> <p>...</p>
<p>Participants/target group (who and how many, age range, level of prior education/training, prerequisites, etc.)</p> <p><a href="#">Public sector decision makers (central and regional level), people which might be responsible for introducing EA approach in the sector.</a></p> <p><a href="#">5 persons for EA Train2 case study.</a></p> <p><a href="#">Prior education – general knowledge of IT systems.</a></p>
<p>Place (in the workplace, university, etc.)</p> <p><a href="#">In the workplace or home – where participants wish.</a></p>
<p>Duration (course hours/days, distribution of hours/days, etc.)</p>

10 hours of the course divided into several sessions, attended by participants in the most suitable time for them.
Mode(s) of teaching and delivery (on line; mixed mode; lecturing; case based teaching; etc.). Consider: what will the teacher do? What will the student/learner do? The whole course will be provided online, no lecturing or practical experience classes are planned. Case based teaching will be included, e.g. presenting best practices of EA implementation. No teacher involved.
Learning activities and organization of the learning process (e.g. assignments, reading, project work, etc.). Reading, presentations, exercises, etc. But the most suitable learning activities shall be the result of the Vienna workshop. Only direct interaction between participants and tutor will not be included.
The role of e-learning/ICT in the course (solely online, mixed mode, etc.) Solely online course which enables to take advantage of innovative ICT solutions in order to encourage participants to do some interactive tasks, try some practical activities in the area of EA.
Status of the course/activity (planned (to take place when), in progress, already in operation, etc.) The course will take place within the WP4 period, namely within M17 – M21 organised as “summer schools”, exact time of doing “lessons” will be chosen by participants.

## WP 2: Background information on courses/course modules on EA training

To prepare for the workshop in Vienna on Nov. 5th, we kindly ask all of you to describe possible cases to work with in the design phase.

Please describe in as much detail as possible a case for EA training by filling in the template. If your institution is not directly involved in developing training activities, please describe what you see as a relevant and interesting case.

**Please return the template to [eatrain2@hum.aau.dk](mailto:eatrain2@hum.aau.dk). Deadline: October 30, 2009.**

Title or name of the course

Public administration enhancement through Enterprise Architecture approach implementation.

Provider of the course (e.g. general description, type of organization)

“Cities on Internet” Association

NGO being actively involved in development of Polish public sector.

Goals and content for the course/module – if possible, please refer to the ontology developed in WP1

The goal of the course is to prepare public sector representatives of regional and local level for planning IT systems development according to EA rules.

Content general proposition (will be detailed in the future):

- Basic concepts related to EA;

<ul style="list-style-type: none"> <li>– Overview of main EA methodologies and approaches;</li> <li>– Presentation and analysis of best practices in other countries (including documents, taxonomies, EA referencing models, business processes modelling, etc.);</li> <li>– Analysis of EA layers and its importance for public sector;</li> <li>– Analysis of EA case study adjusted for public sector needs;</li> <li>– Criteria for selection of most suitable frameworks for public sector;</li> <li>– Software supporting EA implementation;</li> <li>– Public sector software integration;</li> <li>– Public sector information (data) integration;</li> <li>– Business strategy for public sector development;</li> <li>– Business (administrative) processes description unified for the whole sector;</li> </ul>
<p>Participants/target group (who and how many, age range, level of prior education/training, prerequisites, etc.)</p> <p>Public sector representatives, mainly working in IT departments or responsible for making decisions in the area of EA approach implementation in particular institutions.</p> <p>2 groups of 8 persons for EATrain2 case study.</p> <p>Prior education: IT departments representatives – good knowledge of IT systems in public sector, most of all participants – very weak knowledge of EA, no details.</p>
<p>Place (in the workplace, university, etc.)</p> <p>In the workplace.</p>
<p>Duration (course hours/days, distribution of hours/days, etc.)</p> <p>30 hours of the course, attended by participants in the most suitable time for them.</p>
<p>Mode(s) of teaching and delivery (on line; mixed mode; lecturing; case based teaching; etc.). Consider: what will the teacher do? What will the student/learner do?</p> <p>The whole course will be provided online, no lecturing or practical experience classes are expected.</p> <p>Case based teaching will be included, preferably at least one practical case for each section of the course.</p> <p>No teacher involved.</p>
<p>Learning activities and organization of the learning process (e.g. assignments, reading, project work, etc.).</p> <p>Reading, presentations, practical exercises, real world cases, questions, checking tests, at least one “practical case” to be solved.</p> <p>But the most suitable learning activities shall be the result of the Vienna workshop. Because of the online form of the course, different possibilities for interaction with participants (via platform) shall be implemented.</p>
<p>The role of e-learning/ICT in the course (solely online, mixed mode, etc.)</p> <p>Solely online course which enables to take advantage of innovative ICT solutions in order to encourage participants to do some interactive tasks, try some practical activities in the area of EA.</p>
<p>Status of the course/activity (planned (to take place when), in progress, already in operation, etc.)</p> <p>The course will take place within the WP4 period, namely within M17 – M21 organised as “summer schools”, exact time of doing “lessons” will be chosen by participants.</p>



**WP 2: Background information on courses/course modules on EA training**

To prepare for the workshop in Vienna on Nov. 5th, we kindly ask all of you to describe possible cases to work with in the design phase.

Please describe in as much detail as possible a case for EA training by filling in the template. If your institution is not directly involved in developing training activities, please describe what you see as a relevant and interesting case.

**Please return the template to [eatrain2@hum.aau.dk](mailto:eatrain2@hum.aau.dk). Deadline: October 30, 2009.**

Title or name of the course

Enterprise Architectures

Provider of the course (e.g. general description, type of organization)

University of Koblenz. Institute for Information Systems Research, Research group E-Government. Professor Dr. Maria A. Wimmer, Dipl.-Inform. Christoph Neuroth (for exercises)

Goals and content for the course/module – if possible, please refer to the ontology developed in WP1

To provide an overview about:

- The landscape of Enterprise Architecture
- Enterprise Architecture Frameworks
- Introduction to context and conditions of complex information systems
  - multi-disciplinary understanding of socio-technical systems
  - comprehensive methods for holistic systems analysis and design
- Methods for
  - Analysis of information systems
  - Requirements elicitation and specifications
  - Modelling/Conceptual design socio-technical systems
  - Evaluation of results
  - Performance measurement / Key performance Indicators
- Contents of Enterprise Architectures
  - Overall pictures of information systems landscapes
  - Organisational structures, Business domains, Actors
  - Processes and Services
  - Business Interactions
  - Data and information
  - Networks and Software architectures
  - Cross-organisational interactions
- Tools for
  - Systems analysis
  - Requirements specification
  - Conceptual design / Modelling
  - Evaluation of conceptual designs
  - Performance Management / KPI
- Enterprise Architectures in the context of Systems development lifecycles

The course will consist of a combination of lectures and practical exercises.
<p>Participants/target group (who and how many, age range, level of prior education/training, prerequisites, etc.)</p> <p>The target group consists of about 30 graduate students from computer science, information management and information systems. Students will be about 23 -24 years and will be in their first till third semester of their master studies. Most of them will not have working experience in this domain.</p>
<p>Place (in the workplace, university, etc.)</p> <p>University</p>
<p>Duration (course hours/days, distribution of hours/days, etc.)</p> <p>Course is taught in 2 hours per week in the semester lecture plus 1 hour per week in the semester exercise (both presence).</p> <p>In total this makes up approx. 12 lectures and 12 exercises per semester</p> <p>This course model corresponds to 5 ECTS</p> <p>Study hours: presence 45 hours, homework 105 hours</p>
<p>Mode(s) of teaching and delivery (on line; mixed mode; lecturing; case based teaching; etc.). Consider: what will the teacher do? What will the student/learner do?</p> <p>mixed mode:</p> <p>presence study: teaching the main concepts (teacher), presenting the exercises (by teachers and students), examining exercises (teachers),</p> <p>online: exercises and homework (students), examining exercises (teachers)</p> <p>offline: homework and exercises (students)</p>
<p>Learning activities and organization of the learning process (e.g. assignments, reading, project work, etc.).</p> <p>Presence teaching, online study, homework through assignments, exercises, readings</p>
<p>The role of e-learning/ICT in the course (solely online, mixed mode, etc.)</p> <p>Mixed mode. Blended Learning. Presence study with professor and supported own study with WBT.</p>
<p>Status of the course/activity (planned (to take place when), in progress, already in operation, etc.)</p> <p>To take place in summer academy 2010, course is regularly offered every second semester (so far in a traditional format of teaching)</p>

**WP 2: Background information on courses/course modules on EA training**

To prepare for the workshop in Vienna on Nov. 5th, we kindly ask all of you to describe possible cases to work with in the design phase.

Please describe in as much detail as possible a case for EA training by filling in the template. If your institution is not directly involved in developing training activities, please describe what you see as a relevant and interesting case.

**Please return the template to eatrain2@hum.aau.dk. Deadline: October 30, 2009.**

Title or name of the course

Enterprise Architecture

Provider of the course (e.g. general description, type of organization)

Department of Technology Management

University of Macedonia

Naousa, Greece

Goals and content for the course/module – if possible, please refer to the ontology developed in WP1

This course presents a holistic framework of managerial analysis and modeling, which unifies the technological with the managerial. It is an essential methodological tool for the analysis and design of multi-complex information systems. Within the course scope CASE tools are demonstrated, which automate the formulation procedure of an overall managerial model.

The course thematic includes the following:

- basic concepts of Enterprise Architecture (EA);
- historical background, benefits and drawbacks of EA application;
- Zachman framework;
- analysis of an EA case study;
- other EA frameworks, criteria for selecting suitable frameworks;
- software for supporting EA implementation projects;
- exemplar of using Telelogic's System Architect tool for supporting EA projects.

Participants/target group (who and how many, age range, level of prior education/training, prerequisites, etc.)

- Undergraduate students of the Technology management department.
- Taught at the 5<sup>th</sup> semester of a 4-year study program.
- Around 30-40 are expected to follow the course on a regular basis, around 50-60 are expected to take the final exams.
- 20-22 years old, without working experience
- Computer literate
- The curriculum of the Technology Management Department is arranged in eight semesters and encompasses six courses per semester. Before the EA course, students have completed courses at:
  - Mathematics I, Information Technology and Applications, Business Management and Technology, Accounting and Finance for Managerial Decisions, Digital Systems and Applications, Telecommunication Systems and Applications (1<sup>st</sup> semester)
  - Mathematics II, Computer Programming, Products and Services Marketing,

<p>Managerial Economics and Business Decision-making, Micro-processors and micro-computers, Digital Telecommunications (2<sup>nd</sup> semester)</p> <ul style="list-style-type: none"> <li>○ Statistics – Probability, Object-oriented Design and Programming, Human Resources Management, Management Information Systems, Operational Systems, Computer Networks (3<sup>rd</sup> semester)</li> <li>○ Operational Research, Data Organization and Management, Production and Operations Management, Information Systems Analysis and Design, Internet Technology, Web Technology (4<sup>th</sup> semester)</li> </ul>
<p>Place (in the workplace, university, etc.)</p> <p>Courses will take place at the university and/or online. Tutors are obliged to be at the university for the three pre-defined hours per week. Students are not obliged to be there; participation at the courses is optional. However, participation at the exams is compulsory for getting a pass score at the course.</p>
<p>Duration (course hours/days, distribution of hours/days, etc.)</p> <p>3-hour courses per week; 12-13 weeks of lessons. In total about 35-40 hours duration for the whole course.</p>
<p>Mode(s) of teaching and delivery (on line; mixed mode; lecturing; case based teaching; etc.). Consider: what will the teacher do? What will the student/learner do?</p> <p>Current situation:</p> <p>The courses are provided in the format of lectures from the tutor towards the students. Students may be engaged in group assignments that usually award part of the final course grade.</p> <p>Potential future situation:</p> <p>This should be the result of our workshop. However, in terms of course prerequisites and limitations the following are to taken under consideration:</p> <ul style="list-style-type: none"> <li>➤ There has to be physical presence. Tutor has to attend every week for 3 hours, students not. This means that group or project based work is also possible.</li> <li>➤ On line learning and sharing would be welcome to the degree that helps the EA course.</li> <li>➤ Students' assignments/projects are also welcome either individually or in teams. In the latter case an efficient means of evaluating the result would be desired.</li> <li>➤ A written examination at the end of the semester has to be given and be allocated a considerable part of the course's final grade.</li> </ul>
<p>Learning activities and organization of the learning process (e.g. assignments, reading, project work, etc.).</p> <p>The course can be adjusted to whatever the results of the workshop show as long as the aforementioned limitations are followed.</p>
<p>The role of e-learning/ICT in the course (solely online, mixed mode, etc.)</p> <p>It is in general desirable to follow a mixed mode of physical presence and online learning.</p>
<p>Status of the course/activity (planned (to take place when), in progress, already in operation, etc.)</p> <p>I am not sure I understand this question. The pilot should start around March 2010 and end around June 2010, engulfing the whole course for 2010, from start to end.</p>

## B. Introduction to Design Framework

The following design framework was used as a way to recapitalize the results from a workshop in the EATrain2 project. In the workshop practitioners made preliminary choices in relation to designing web 2.0 mediated learning building on a problem-based approach to learning. Their primary task, building on the CoED (collaborative e-learning design) method was to identify the pedagogical values they agree on.

The design framework below was used to discuss the pedagogical values found in the workshop. It can be used to see what questions you still need to consider and the consequences of the chosen pedagogical values. In the following we will elaborate on the design framework, which consists of six parts

1. PBL framework
2. Web 2.0 framework
3. Typology for web 2.0
4. Communication model
5. Learning environment model
6. Templates for course design and unit descriptions
7. Example of template with content

By drawing on your own answers to the questions in the frameworks for web 2.0 and PBL (parts 1 and 2), and subsequently reflecting on the web 2.0 typology, the communication situation and the learning environment (parts 3, 4 and 5), a detailed course design can be outlined. For this purpose we suggest a scheme, which relates the intended learning outcome, pedagogical values, and motivation for change to the specific modules or units in the course and choices in relation to e.g. duration, technology, and communication type (part 5).

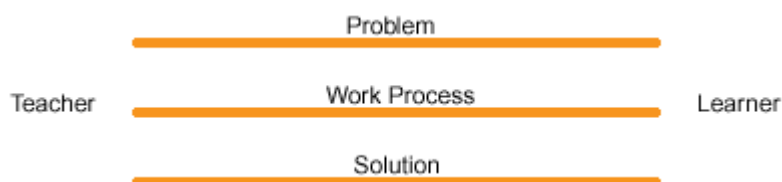
The overarching themes in the scheme are: Intended learning outcome, motivation for change and pedagogical values. Using the answers to the questions in the frameworks can help identify these. In the EATrain2 project the pedagogical values was found by rethinking the pedagogical values from the CoED workshop in relation to the questions from the web 2.0 and PBL framework and other resources given.

### B.1 Models

The following models can help initiate discussions about different dimensions related to PBL and web 2.0. Thus they can be used to identify what approaches to use when designing problem-based learning mediated by web 2.0. The value cards found in the CoED workshop can be understood as ways of taking a stand in relation to the dimensions or continua.

#### B.1.1 PBL Model

In relation to problem-based learning we need to ask questions in relation to at least three dimensions: *the problem*, *the work process*, and *the solution*. The teacher or the learner can exercise the control over these or it can be distributed between them to various degrees.



**Figure 12: Three continua for problem-based learning. (Ryberg, Koottatep, Pengchai, & Dirckinck-Holmfeld, 2006)**

The problem: *Who controls the problem?*

- Who controls or owns the definition or the framing of the problem?

Work process: *Who controls the process?*

- How are the working processes organized?
- Who controls the working processes?
- Who decides how the problem should be investigated?
- Who controls the collaboration?

The solution: *Who controls the solution?*

- Who owns it? Is the solution open-ended or closed?

### **B.1.2 Web 2.0 Model**

A crucial question one needs to ask when thinking of designing web 2.0 mediated learning is:

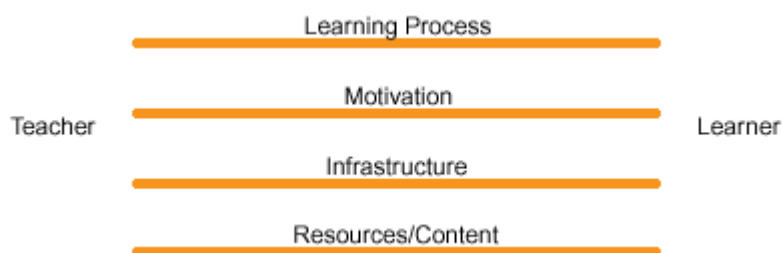
*What is the motivation for using web 2.0 technologies as part of the design of a course?*

*Are web 2.0 technologies used to fundamentally change the learning approach?*

or

*Are web 2.0 technologies used as part of an all ready established learning approach?*

If the web 2.0 technology is used to change the learning approach we need to discuss different questions before we design web 2.0 mediated learning. In relation to this, at least four dimensions or continua can be addressed: The learning process, the motivation, the infrastructure, and the resources/content. At one end of the continua the *teacher/institution* is in control and at the other end the *learner* is in control.



**Figure 13: Four continua between teacher and participant control in web 2.0 mediated learning. (Glud, Buus, Ryberg, Georgsen, & Davidsen, 2010)**

**The learning process: *Who controls the learning process?***

- Who defines the problem to be investigated?
- Who decides how the problem should be investigated?
- Is it possible to change the problem to be investigated in the process?
- Who will perform the activity?
- Who decides the flow and structure of the learning processes?
- How are the learning processes organized?
- Who controls the collaboration?
- How is collaboration organized? Is it e.g. formal and/or informal?

**The motivation: *Is the motivation controlled by the teacher or the learner?***

- Is the motivation externally (extrinsic) or internally (intrinsic) driven?
- To what extend should the students be self-motivated?
- To what extend can the students be self-motivated?
- To what extend is learning in itself motivating?

**The infrastructure: *Who controls the infrastructure?***

- Who provides the infrastructure?
- Who provides the tools?
- Who owns the tools for production?
- Who organizes the tools and orchestrates the use of the tools?

**The resources/content: *Who controls the content/resources?***

- Who makes the resources/content available?
- What strategies (copy-paste or rip-mix-burn) for creating content should be supported?
- What resources/content is it possible for learners to create?
- Who defines competence, expertise, authority and copyright?
- Who is accountable for the resources/content?
- Who has the copyright of the resources/content?

## B.2 Resources

The following resources can be used to reflect on the choices in relation to what functions of web 2.0 technologies and types of communication to support when designing the learning environment.

### B.2.1 Typology for web 2.0

This model illustrates functions of web 2.0 technologies related to a use context central to learning. This is useful as inspiration for the case descriptions partners are expected to produce as part of their design process.

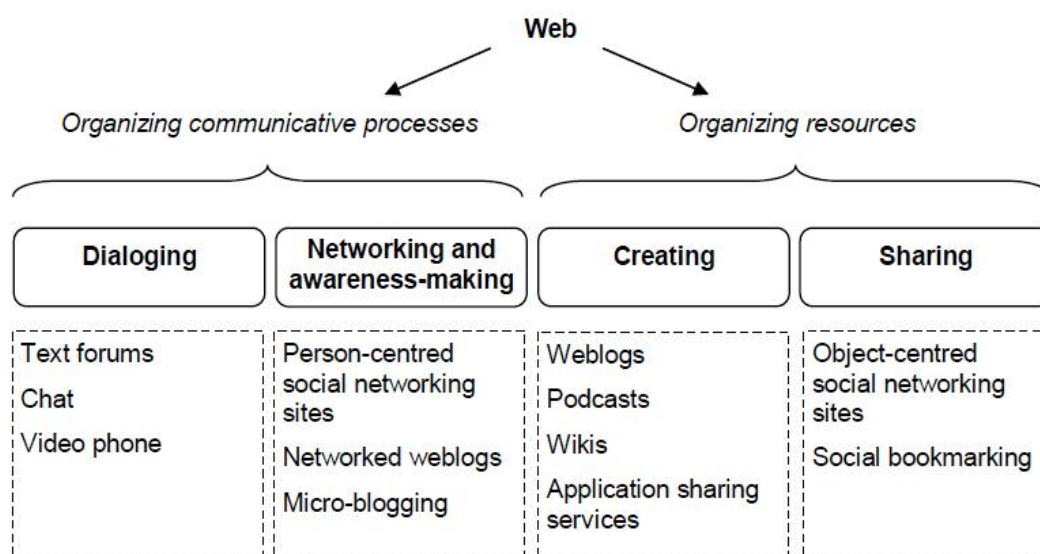


Figure 14: Typology for Web 2.0. (Dalsgaard & Korsgaard Sørensen, 2008)

### B.2.2 Communication model

The following model can be used to discuss what type(s) of communication to support. Moreover it shows how different types of communication can be supported by different ways of using the technology.

Mode of communication	Main group mode	Examples of use
One to many	Group	E.g. public forums, personal blogs
One to some	Group	E.g. restricted forums, mailing lists, video conferences
One to one	Group	E.g. email, chat, instant messaging
Some to many	Group	E.g. public group blogs
Some to some	Group, network, collective	E.g. syndicated group blogs, specific-purpose wikis such as 5 Wikibooks



<b>Some to one</b>	Group, collective, network	E.g. internally-focussed tagging systems, organisational social networking, RSS aggregators
<b>Many to many</b>	Collective	E.g. wikis such as Wikipedia
<b>Many to some</b>	Collective	E.g. organisation-level RSS aggregators
<b>Many to one</b>	Collective, network	E.g. recommendations of collaborative filters, social networking, RSS aggregators

**Table 5: Types of communication in social software. (Dron, 2007)**

### B.2.3 Individual, cooperative, and collaborative learning environments

The following model is inspired by (Dalsgaard & Paulsen, 2009) and can be used to define different types of connections between actors.

*Individual learning* gives the individual flexibility but small affinity to a learning community. It is often practiced in relation to distance education.

*Collaborative learning* requires participation in a learning community. However there is not as much flexibility for the individual. Collaborative learning is common in online education provided by face-to-face institutions.

*Cooperative learning* supports both individual flexibility and affinity to a learning community. It thrives in virtual learning environments that emphasize individual freedom in online communities.

Collaborative learning environment	Cooperative Learning Environment
Rigid Individual Learning Environment	Flexible Individual Learning Environment

**Figure 15: Collaborative, cooperative and individual learning environments.**

The three terms: individual learning, cooperative learning and collaborative learning can be distinguished in other ways. Individual learning can be conducted alone, collaborative learning is done in groups and cooperative learning takes place in networks (Dalsgaard & Paulsen, 2009).

*Groups* are more tightly knit social constellations. Often the group members are mutually engaged in working with the same problem, project or task.

*Networks* on the other hand as more fleeting membership structures and boundaries are emergent rather than designed and the members are not occupied in solving the same problem, project or task.

To this we add the term *collectives*, which is to be understood as a looser and more emergent structure with no sense of membership or belonging. In relation to the other terms collective should be understood as some sort of learning pool whereto the individual, the group and the collaboration can add and change content. An example of this could be a tag cloud.

<b>The Collective</b>		
Individual (Alone)	Learning	Cooperative (Networks)
	Learning	Collaborative learning (groups)

**Figure 16: Alone, network, group and collective.**

## B.2.4 Model for course design

<p><b>Motivation for Change/design:</b></p> <ul style="list-style-type: none"> <li>- What is the motivation for using Web 2.0 technologies as part of the design of a EA course?</li> <li>- Is Web 2.0 technologies used to fundamentally change the learning approach?</li> <li>- Is Web 2.0 technologies used as part of an all ready established learning approach?</li> </ul> <p><b>Intended Learning Outcome (ILO):</b></p> <ul style="list-style-type: none"> <li>- Make considerations related to the tensions listed in the PBL and Web 2.0 frameworks.</li> <li>- Explain what intended learning outcome expected in the learning process?</li> <li>- Consider how to get from the goal (ILO) to the assessment method(s)?</li> </ul>		
<p><b>Pedagogical Values:</b></p> <ul style="list-style-type: none"> <li>- Consider and list your pedagogical values (might be the one listed at the CoED-workshop in Vienna - but also related to the tensions)</li> </ul>		
<p><b>Unit 1:</b> Learning activities Tools and Resources Type of Communication Interaktion duration (Assessment)</p>	<p><b>Unit Y:</b> <b>Ongoing activity/process</b> E.g. the students are intended to blog about reflections on their learning process or building a portfolie etc.</p>	<p><b>Unit Y2:</b> <b>Ongoing activity/process</b> E.g. the students are intended to establish a glosseri in a wiki collecting concepts</p>
<p><b>Unit 2:</b> Learning activities Tools and Resources Type of Communication Interaktion duration (Assessment)</p>		
<p><b>Unit X:</b> Learning activities Tools and Resources Type of Communication Interaktion duration (Assessment)</p>		
<p><b>Assessment</b></p> <ul style="list-style-type: none"> <li>- What kind of assessment method(s) is used to achive the ILO</li> <li>- What are they assessed upon? (the process or the solution?)</li> </ul>		
<p><b>Consider the tensions from the PBL and Web 2.0 frameworks in your course design</b></p>		

Figure 17: Course design model.

**B.2.5 Course unit:**

<p><b>Unit X:</b></p> <p><b>Learning activities</b></p> <ul style="list-style-type: none"> <li>- for planning you might use the Workshop Activity Cards</li> </ul> <p><b>Tools and Resources</b></p> <ul style="list-style-type: none"> <li>- for planning you might use the Workshop Resource Cards</li> </ul> <p><b>Type of Communication</b></p> <ul style="list-style-type: none"> <li>- channel &amp; collaboration / cooperation / individual (the matrix from Dron &amp; Anderson)</li> </ul> <p><b>Interaction duration</b></p> <ul style="list-style-type: none"> <li>- the estimated time-effort for the lecturer and for the student</li> </ul> <p><b>(Assessment)</b></p> <ul style="list-style-type: none"> <li>- considerations about assessments during the learning process</li> </ul> <p style="text-align: center;"><b>Consider the tensions in PBL and Web 2.0</b></p>	<p>For type of communication you can also use the tools card from the CoED workshop</p>
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Figure 18: Course unit illustration

**B.2.6 Template for describing Unit X or Y:**

Information	Content
Unit Name	
Type of activity	
Brief description of the activity	
Who will perform the activity	
Type of Communication	

Duration	
How is it assessed	
Relation to the Intended Learning Outcome (ILO)	

### B.2.7 Example

The example below illustrates the explanations given in this document on how to describe Unit X or Y.

Information	Content	Example(s)	
Unit Name	Brief Descriptive Name of the Unit	<i>Portfolio</i>	<i>"Group presentation on EA tensions"</i>
Type of activity	Describe the type of activity - use activities from the CoED cards	<i>Writing</i> <i>Make reflection</i>	<i>Do a presentation</i>
Brief description of the activity	A couple of sentences to describe the activity	<i>Make reflection on the learning process considering different questions</i>	<i>Prepare a 20 min presentation</i>
Who will perform the activity	Individual student / student group / teacher / course instructor/ facilitator	<i>Individual student</i>	<i>Group of 3-6 students</i>
Type of communication	Which resources are used in the interaction or communication - use resources//infrastructure from the CoED cards	<i>Wiki or Blog</i> <i>One-to-one</i>	<i>Presentation program</i> <i>Many-to-many</i>
Duration	Ongoing process or restricted to a part of the unit only  Student effort hours (required)	<i>Ongoing process</i>  <i>Student – 10</i> <i>Teacher - 3</i>	<i>Only Unit</i>  <i>Student - 20</i>

	by an "average" student)  And the teacher effort hours (eg. dialogue etc.)		
How is the activity assessed	Describe the kind of assessment  And in what context  Eg. by itself - as part of the assessment of other activity – at the end of the course	<i>Produce a wiki/blog</i>  <i>At the end of the course</i>  <i>By itself</i>	<i>Live performance</i>  <i>At the end of the Course</i>
Relation to the Intended Learning Outcome (ILO)	Describe how and to what degree this related to the ILO	<i>Fully related to...</i>  <i>Partly related to...</i>	<i>Partly related to....</i>

## B.3 Contribution from partners

In the following sections you will find three contributions submitted from UOM, UKL and BOC, respectively. The contributions are based on the models and templates above. The following is thus an example of how the schemas were filled out in practice.

### B.3.1 Example I from OUM

#### **Motivation for Change/design:**

The motivation for using Web 2.0 technologies and PBL as part of the design of the UOM EA course is related to the need for students' enhanced participation and their involvement with actual EA cases.

Web 2.0 technologies and PBL are not intended to fundamentally change the learning approach, rather to be used as part of an already established learning approach. Courses in UOM are taught through weekly lectures and the intention is to keep these lectures. However, the target is to enhance the lectures with active participation after the lecture ends (i.e. collectively browsing and gathering online resources, exchanging opinions, discussing questions and ideas) and to introduce PBL for students' assignments. Another long-term goal is to build a collective database of online resources which will complement the lecture slides and notes. It is envisioned that this database will be maintained after the course ends and be in the disposal of future students.

#### **Intended Learning Outcomes (ILO):**

To elaborate on the PBL tensions, we have to distinguish between the lecture part and the assignment part of the course.

For the lecture part, the problem, work process and solution will be controlled almost entirely by the teacher, as students' knowledge and skills are not mature enough to effectively engage in this activity.

For the assignment part, students may acquire more control. The problem can be fully decided the students although the teacher will be available to provide assistance in this. The work process will be controlled by both; students will be allowed to form groups by themselves and to arrange their own way of collaboration. However, the teacher will decide upon the deadlines and the meetings between teacher and groups.

Examining the Web 2.0 tensions, it could be argued that the motivation is controlled by the teacher as EA is a mandatory course and students have to be successful in it in order to graduate. However, it is expected that students will have some intrinsic motivation due to the innovativeness of the learning approach we are planning. The infrastructure and tools will also be controlled by the teacher as they will be provided by this project. The content and resources are controlled by both teacher and students. Teacher fully controls the resources for the lectures, while students have absolute control over the online resources. Students may add online any resources they regard as relevant, and they will be free to comment, tag and rate all resources (either provided by themselves or by their classmates).

The learning process refers mainly to outcomes relevant to personal skills development. Linking to the list of personal skills needed by EA students (as developed within WP1) we intend to enhance the following skills in the UOM pilot:

- Assignment work according to the PBL approach will enhance students' problem solving skills, creativity and abstractionism.
- Group work and collaboration as part of assignments work will enhance students' skills in teamwork, diplomacy, listening and negotiating.
- Assignments' presentation to the teacher and class will contribute to the development

of persuasiveness, verbal communication and didactical skills. Visualisation skills could also be enhanced in this process.

- The online social platform will contribute to the development of students' networking skills.

Our learning approach will not contribute to the development of leadership, visionary and change management skills. We believe that these skills cannot be easily addressed within a university course.

It is not anticipated that all aforementioned skills will be assessed; for some of them we can only trust that they will be developed during the course. However, there are skills that can be assessed to a certain degree, as for example verbal communication and persuasiveness skills, the ability to work with teams and negotiate with them, creativity and problem-solving. All these skills will be assessed through the students' performance in the group assignment work.

#### **Pedagogical Values:**

- Resource based learning, in the sense that knowledge should not only rely on teacher's slides and note but be enhanced with online resources.
- Active participation, in the sense that students should not merely be receivers of knowledge but get engaged in fruitful interactions between them and with the teacher.
- Cooperation, in the sense that students are required to efficiently work in teams in order to solve problems.
- Individual assessment, in the sense that at the end of the semester each student has to be appointed one individual grade, so each student's individual work must somehow get assessed even through collaborative online work and group assignment.
- Reusable content, in the sense that online resources and students' assignments will be available for reference to future students.

<b>Unit 1: Lecture</b>	<b>Unit 2:</b>  <b>Online collaboration platform</b>	<b>Unit 3:</b>
<b>Unit 4: Assignment meetings with teacher</b>		<b>Group assignment</b>
<b>Unit 5: Presentation of assignments</b>		

#### **Assessment**

In overall we envision three assessment methods for the UOM pilot as follows:

- There will be a written exam at the end of the semester. This is required for every University subject and it is something we can not change for the pilot.
- Students will also be assessed for the group assignments they deliver. Students will have a long period to work on their assignments and they will have to deliver a written assignment as a group in the end of the semester. However, students will also present their assignments in the classroom, discuss them with teacher and classmates and defend the decisions taken. This feature has a twofold objective; first to assess each student's contribution to the group work and second to allow the whole class to learn through other students' experiences.
- The teacher will also assess student's activity in the online platform, i.e. reviewing the resources posted and commented, participation in discussions, etc.

At the written exam students are mainly assessed on the solution, and it is a purely a summative assessment. At the group assignments and their online activity students are mainly assessed on the process as no specific correct answers are sought for. Both are formative assessments as their main target is for the student to learn through them.



<b>Information</b>	<b>Content</b>
Unit Name	Unit 1: Weekly lectures
Type of activity	Lecture
Brief description of the activity	The teacher gives a lecture to the classroom using PowerPoint slides. Students may interrupt to address questions and short discussion may follow at the end.
Who will perform the activity	The teacher is the main actor in this activity.
Type of Communication	Mostly one to many: from the teacher to the whole class. The questions section is many to one and the discussion section many to many.
Duration	Three consecutive hours per week. It is expected that most weekly meetings will be in the form of lectures.
How assessed	The weekly lectures will offer students the knowledge and professional skills needed in EA. Students have to apply these skills in the group assignment and prove their knowledge in the final written exam.
Relation to the Intended Learning Outcome (ILO)	This unit mainly refers to ILOs relevant to knowledge and professional skills which will be defined further in WP3. As far as personal skills are concerned, listening skills and verbal communication skills may also be enhanced through this unit.

<b>Information</b>	<b>Content</b>
Unit Name	Unit 2: Online collaboration platform
Type of activity	Social networking; micro-blogging; taking courses and tests; resources sharing, tagging and rating
Brief description of the activity	<p>Between the weekly lectures and throughout the semester students go online for actively sharing and learning. This activity may be related to a specific course given previously in class or to EA in general.</p> <p>Detailed description of online activities (EA platform requirements):</p> <p>Relevant to specific courses: After the lecture ends the teacher uploads the course slides (as a SCORM package with tests, etc.) on the platform. Students may view the online course while they are studying at home and take the tests associated with it. Students also have the possibility to add comments and links relevant to the course and to place questions and answers on it. The teacher may interfere with answers if needed (if students cannot clarify issues by each other's input).</p> <p>Relevant to EA in general: Students are expected to start networking on EA by sharing relevant links and other resources with their classmates. Students can comment, bookmark, tag and rate any online resource either posted by themselves or by their classmates. Each student should have an online profile which apart from the usual user information should also include information on the user's activity (posts, ratings, etc.). This will help the student gather his own resources and bookmarks in one place. Finally, an online messaging service (similar to an internal email solution) would be needed for the students to communicate directly with the teacher.</p>
Who will perform the activity	Students will be the main actors, although the teacher will also be able to perform these actions online.
Type of Communication	Many to many
Duration	This unit begins after the first lecture and ends at the end of the semester just before the written exams.
How assessed	Teacher reviews online activity in regular intervals and also participates in it to clarify comments and contribute to the discussion. At the end of the semester, the teacher has an idea of each student's contribution and participation. Quality should matter more than quantity.
Relation to the Intended Learning Outcome (ILO)	Through this unit students are mostly expected to develop their networking skills, to appreciate different opinions and to learn gaining knowledge from different sources and perspectives.

<b>Information</b>	<b>Content</b>
Unit Name	Unit 3: Group assignment
Type of activity	Assignment
Brief description of the activity	<p>Students are divided into groups (4-5 students per group). Each group undertakes an assignment for the rest of the semester. Students are relative independent in the assignment process. They can identify the case they want to address and they can fully control the process of applying EA to it. Students are expected to cooperate both offline and online for the assignment.</p> <p>Detailed description of online activities (EA platform requirements):  Students will be able to form online groups closed to the members of the specific assignment. In these groups they will have the same functionalities as the rest of the platform (posting comments, links, bookmarks, tagging, rating) but all activity will be hidden from the rest classmates although open to the teacher. Moreover, students will be able to bring bookmark resources from the general EA space to their own group. Groups should also have an online space for uploading and sharing files with each other. Ideally, collaborative online editing of such files would also be needed, however we recognise that to provide an online office solution (such as Google docs) is without the scope of the current project.</p>
Who will perform the activity	Students perform this activity with the assistance and guidance of the teacher whenever needed.
Type of Communication	Some to some
Duration	A few weeks
How assessed	The group delivers one written report of the assignment. Moreover, the group presents the assignment in class to teacher and the rest groups (unit 5).
Relation to the Intended Learning Outcome (ILO)	Apart from professional skills and knowledge, through the group assignment students are expected to develop their problem solving skills, creativity, abstractionism, teamwork, diplomacy, negotiation, and listening.

<b>Information</b>	<b>Content</b>
Unit Name	Unit 4: Assignment meetings with teacher
Type of activity	Face-to-face meeting
Brief description of the activity	Each group meets with the teacher to review the progress of the assignment, and to clarify issues and difficulties. The meeting could be open to the other groups as audience or not.
Who will perform the activity	Students divided in groups, teacher
Type of Communication	Some to one
Duration	Depends on the frequency of the meetings. For example, half an hour every 1 or 2 weeks.
How assessed	Teacher understands the progress and capabilities of the group as a team but also individually for each group member.
Relation to the Intended Learning Outcome (ILO)	Students have the opportunity to develop their verbal communication skills as well as listening and persuasiveness skills.

<b>Information</b>	<b>Content</b>
Unit Name	Unit 5: Presentation of assignments
Type of activity	Presentation
Brief description of the activity	Students present their group's assignment to the teacher and the class, who are invited to provide feedback and comments. This activity is performed at the end of the semester after the assignments are completed and before the written exam.
Who will perform the activity	Students as group members  Detailed description of online activities (EA platform requirements): Each group uploads the final report of their presentation in their group's closed online space. Whether the assignments will also be uploaded to the open space depends on the teacher (and whether they want these to be available for future students or not).
Type of Communication	Some to many
Duration	Three hours for all groups. We envision that all presentations will be performed during the final programmed class meeting.
How assessed	Teacher will assess the oral presentation of the group's assignment and place questions to any of the group members. All group members are expected to actively participate.
Relation to the Intended Learning Outcome (ILO)	Students will be able to display their verbal communication skills, as well as didactical, persuasiveness, and visualisation skills.

### **B.3.2 Example II from UKL**

#### **Motivation for Change/design:**

What is the motivation for using Web 2.0 technologies and PBL as part of the design of an EA course?

The motivation for using Web 2.0 technologies and PBL as part of the design of the course is, that we want to offer our students new and methodical up-to-date courses about actual and interesting topics. Therefore we will use Web 2.0 technologies for a better student - student and student - teacher communication. Further we will use PBL as a learning method that offers the possibility to reduce presence study and strengthen individual study. We consider that not as a fundamental change of our learning approach, rather as an enhancement of an already established learning approach. The content of an existing course will be enhanced slightly with the results of the project and we will change our traditional learning methods using PBL to teach the students in a modern way that strengthen students individual skills, knowledge in EA related aspects and soft skills.

#### **Intended Learning Outcomes (ILO):**

Using PBL in an eLearning course at the university offers pros and cons:

On the one hand, students will learn how to solve problems without getting instructed in every step they take. On the other hand we have to find a method of assignment to have a basis to grade the students individually.

Who will have control on what? This is another question mentioned during the Vienna meeting. The cases will be created and/or chosen by the teacher. Further, the lessons will be controlled by the teacher, also exercises and assignment will be given and controlled by university staff. So the individual part, controlled by the students, will consist of solving the problems and learning ways to find resources, to use them and to write an assignment about the problem they are confronted with. The results, lessons learned and methods used should be presented in a presentation and will also be the basis for the assignment. Regarding the platform students should use, the class workspace will be controlled by teacher but with a good possibility for students to make changes and post ideas in WEB 2.0 features as forums, chat etc. The individual group spaces are fully controlled by the students.

#### **Pedagogical Values:**

- Collaboration,
- Active participation,
- learner independency,
- learning from real world cases

#### **Assignment:**

Parallel to the lessons, exercises the students will have to complete will be assessed. At least 50% of the maximum points are necessary to gain the certificate. The grade will consist of two parts: oral cooperation during lessons and the assignment that have to be written after the course.

**Units:**

Information	Content
Unit Name	Introduction
Type of activity	Presence study
Brief description of the activity	The teacher will reflect about the aims of the whole course and describes organisational things. Further a first overview about terms methods and frameworks will be given.
Who will perform the activity	Teacher
Type of Communication	Face-to-face teaching
Duration	1,5 hours
How assessed	Exercise
Relation to the Intended Learning Outcome (ILO)	Enterprise Architects should be firm with the specific language they use and should have a first overview about the whole topic

Information	Content
Unit Name	Data Mining
Type of activity	Presence study
Brief description of the activity	The teacher will reflect about methods of data mining. Desk research, interview, survey, observation, think aloud, workshops, scenario building, mock-ups and soft system method.
Who will perform the activity	Teacher
Type of Communication	Face-to-face teaching
Duration	1,5 hours
How assessed	Exercise
Relation to the Intended Learning Outcome (ILO)	It is important that an Enterprise Architect know how to collect the data he needs to produce detailed models of the enterprise's environment, processes, workflows etc.

Information	Content
Unit Name	Modelling exercise
Type of activity	Model some content in a specific modelling language
Brief description of the activity	The students should develop models from a specific content provided by the exercise leader. The modelling language will be predetermined.
Who will perform the activity	Student
Type of Communication	asynchronous (in the group or with exercise leader), synchronous (chat in group workspace, ICQ or Skype)
Duration	About 2 hours
How assessed	By itself.
Relation to the Intended Learning Outcome (ILO)	Practical exercises improve the knowledge and skills about the production of detailed models of the enterprise's environment, structure, processes and workflows. Further the student gathers experience about the usage of several modelling languages.

Information	Content
Unit Name	Modelling languages
Type of activity	Presence study
Brief description of the activity	The teacher will reflect about methods of system modelling and ways to describe systems in standard notations (concepts for modelling data/information/knowledge, processes, organizations/actors, security, architectures and other system resources)
Who will perform the activity	Teacher
Type of Communication	Face-to-face teaching
Duration	1,5 hours
How assessed	Exercise
Relation to the Intended Learning Outcome (ILO)	It is important that an Enterprise Architect know how to produce detailed models of the enterprise's environment and structure, processes, workflows etc. Therefore the student should know the different modelling languages and the cases to use them.



Information	Content
Unit Name	Assignment
Type of activity	Research, Development, Writing
Brief description of the activity	The students should create groups and will be confronted with a problem (PBL) they should solve during the course. The result should be an assignment that has to be presented. Lessons and exercises will show them possible methods they can use.
Who will perform the activity	Student
Type of Communication	Face-to-face (during lesson), asynchronous (in the group or with exercise leader), synchronous (chat in group workspace, ICQ or Skype)
Duration	1 month
How assessed	
Relation to the Intended Learning Outcome (ILO)	It is important that an Enterprise Architect know how to produce detailed models of the enterprise's environment and structure, processes, workflows etc. Therefore the student should know the different modelling languages and the cases to use them.

### B.3.3 Example III from BOC

#### Motivation for Change/Design:

- What is the motivation for using Web 2.0 technologies and PBL as part of the design of a EA course?

The motivation for design of the EATRAN2 course within the industry context and more specifically within BOC is related to the upcoming challenge to provide services and solutions to customers in the area of Enterprise Architecture. As a wide-spread field it involved expertise from different areas (business, technology, regulation dimensions/perspectives). Specifically designing a course for the EA on one side structures the training approach internally (how do we train new employees? What is their focus and direction?) but also builds up the basis for offerings in the area of training services to BOC's customer base. Web 2.0 in this area is regarded as a possible to exchange with experts and stakeholders from other domains (see above) as well as allow the student to become the teacher and vice-versa. Problem based learning allows to focus on real-life issues to be covered in consulting and development projects. The skills and competences in WP1 needed to handle these issues have been described and defined by the responsible people within the company.

- Are Web 2.0 technologies and PBL used to fundamentally change the learning approach?

Compared to the current situation the technology as well as PBL will transform the learning approach currently applied from a direct/mentor based system to a group-wide (BOC works on 9 different locations) including expertise from various branches and backgrounds. The expectation related to PBL is that the students will be able to be included directly into customer projects. The learning curve is supposed to be faster than before. Nevertheless the new course designed is not seen as a replacement, rather as an additional option.

- Are Web 2.0 technologies and PBL used as part of an already established learning approach?

Depending on the definition of Web2.0, such technologies are in use for sharing of information and knowledge through groupware systems, etc.

#### Intended Learning Outcomes (ILO):

Enterprise architecture experts for consulting projects in accordance with the skills and competences defined that can be certified based on an international standard (see ITSMF, ITIL™ as examples) and is applicable (meaning it can be used in REAL-LIFE problems).

Steering/Strategic alignment of learning goals to group strategy -> mentoring and leadership of course

#### *Intended Project Outcomes:*

Learning course for new employees of BOC

Learning course (platform independent) as a service offering for BOC customer

Repository of best practices of individual students

Repository of best practice models on Web2.0/PBL approaches in the field

Methodology on Web2.0/PBL course design

- Consider the tensions listed in the PBL and Web 2.0 frameworks.

- Explain what intended learning outcomes are expected in the learning process?

**Pedagogical Values:**

- Consider and list your pedagogical values

Competence development/Career planning

Working with real-life problems

Collaboration among colleges on a specific topic

**Process-oriented learning** (not the result is the goal to learn but the HOWTO)

(might be the one listed at the CoED-workshop in Vienna – but also related to the tensions)

**Unit Design****Ongoing activity/process**

The students are intended to communicate about reflections on their learning process. Students are intended to establish to collect concepts, ideas in a kind of repository.

Students are intended to use Web 2.0 features to coordinate themselves. Students should write an essay and present their methods, experiences and results.

<b>Information</b>	<b>Content</b>
Unit Name	Unit 1: Introduction
Type of activity	Lecture
Brief description of the activity	Within this first session an alignment between the expertise of participants and their expectations, as well the defined learning goal/strategy is performed.
Who will perform the activity	Course instructors (facilitators, mentors), students
Type of Communication	Offline: Presentation and Discussion Online: Video/Screensharing conference and telephone communication
Duration	2 hours
How assessed	No assessment is necessary, the main objective is to provide the instructors with the necessary background and provide students with organisational information as well make them aware of the goal to be achieved.
Relation to the Intended Learning Outcome (ILO)	Group separation for practical work, acquisition of the status-quo in the area of EA, formulizing the learning objective.

Information	Content
Unit Name	Unit 2: Conceptual Background
Type of activity	Lecture
Brief description of the activity	<p>Presentation of the conceptual background that needs to be taken into consideration with respect to EA focusing on the product and service strategy of the group:</p> <ul style="list-style-type: none"> <li>• Strategy management</li> <li>• Business process management</li> <li>• Supply chain management</li> <li>• IT-Service and architecture management</li> </ul> <p>by focusing on topics such as application scenarios, existing frameworks and methodologies, best practices, market situation, etc.</p> <p>Conceptually the main issues to tackle are modelling methods and how such methods are made available and adapted through meta-modelling concepts</p>
Who will perform the activity	Students
Type of Communication	<p>Online repository of material</p> <p>Q&amp;A with expert team</p>
Duration	<p>Undefined</p> <p>Weekly Q&amp;A session</p>
How assessed	<p>Continuous assessment of understanding of the basic and conceptual concepts through session related questionnaires and personal feedback to expert</p>
Relation to the Intended Learning Outcome (ILO)	<p>Creation of conceptual background for EAs, provision of SOTA and trends</p>

<b>Information</b>	<b>Content</b>
Unit Name	Unit 3: Practical Background
Type of activity	Lecture
Brief description of the activity	Presentation of the background related to EA projects such as project management skills, escalation procedures, expert system, organisational structure of group, group standards on appearance and look and feel
Who will perform the activity	Course instructors (facilitators, mentors), students
Type of Communication	Online or Offline presentation (F2F)
Duration	2 x 2h
How assessed	No assessment
Relation to the Intended Learning Outcome (ILO)	Practical background for EA architect

<b>Information</b>	<b>Content</b>
Unit Name	Unit 4: Real World Example/Project
Type of activity	Project work
Brief description of the activity	<p>Being equipped with conceptual and practical skills the participants are involved in EA related projects and case studies (internal vs. external focus).</p> <p>Internally means that specific cases are developed for presentation and application scenarios. These cases build up the knowledge base for consulting and acquisition tasks.</p> <p>Externally means that the student is directly involved in customer projects for specific and defined tasks.</p>
Who will perform the activity	Students
Type of Communication	Direct communication with facilitator or mentor
Duration	Depending on project size and duration
How assessed	Through external or internal project owner
Relation to the Intended Learning Outcome (ILO)	Practical experience is created in applying the concepts learned.

<b>Information</b>	<b>Content</b>
Unit Name	Unit 5: Experience Reporting and Assessment
Type of activity	Project work
Brief description of the activity	This unit is closely related to unit 4 and unit 7. The students report their experiences and provide feedback from their practical work. This builds up the basis for assessment by the facilitators and mentors and provide important feedback for future involvements.
Who will perform the activity	Course instructors (facilitators, mentors), students
Type of Communication	Direct communication with facilitator or mentor Group presentation Feedback circles through virtual teams
Duration	Depending on project size and duration
How assessed	Through course instructor and facilitators
Relation to the Intended Learning Outcome (ILO)	Through continuous feedback the ILO is reached stepwise. By breaking down the ILO defined into more specific competences and skills a development plan defined in unit 1 is evaluated.

Information	Content
Unit Name	Unit 6 and Unit 7: Collaboration platform and project collaboration
Type of activity	Social networking; micro-blogging; taking courses and tests; resources sharing, tagging and rating
Brief description of the activity	Unit 6 and 7 handle the collaboration between stakeholders of the programme during different phases. Unit 6 represents the platform for exchange on a high level (conceptual, product and service strategy, etc.) whereas unit 7 handles all project related collaboration mechanism, mainly between the participant and the facilitator/mentor.
Who will perform the activity	Student and Course instructors but according to Web2.0 definition are regarded as on the same level
Type of Communication	Collaboration
Duration	Continuous for employment (unit 6) or project duration (unit 7)
How assessed	No assessment necessary, rather gardening of information and knowledge provided.
Relation to the Intended Learning Outcome (ILO)	Both platforms are regarded as information and knowledge bases.

### Assessment

- What kind of assessment method(s) is used to achieve the ILO
- What are they assessed upon? (the process or the solution? Formative and/or Summative)

Assessment of the process is regarded as a success factor based upon a developed plan for developing competences and skills in the domain. Assessment is done by the project leaders based on the results delivered in internal and external projects.



### B.3.4 Example IV from COI

#### **Motivation for Change/design:**

Generally the motivation of EA course for public administration is to provide civil servants with general overview of EA, stressing its possibilities and enhancement in the public sector, as well as prepare public sector representatives of regional and local level for planning IT systems development according to EA rules (to develop relevant competences to start becoming Enterprise Architects in their organisations in the future).

Currently the offer of similar EA courses is quite poor and not adjusted to civil servants requirements who need real life examples (case-based learning). The existing courses are not addressed to so strictly selected target and are based on “normal” teaching and learning methods, not including active participation, collaboration and cases solving.

- What is the motivation for using Web 2.0 technologies and PBL as part of the design of a EA course?

The motivation for using Web 2.0 technologies and PBL within the public sector is to enhance “normal” learning and teaching methods and to provide the target with:

- possibility of exchanging opinions and news (ones related to the course area), combining the theoretic approaches with state projects being currently developed, etc;

- tools of communication among the course receivers;

- active involvement in the course (better perception);

- real world examples to be solved (simulation);

- group work (if possible) and possibility of cooperation in the area of EA (project work, collaborative writing);

- possibility of exchanging knowledge with domain experts

- possibility of focusing on real-life issues

- Are Web 2.0 technologies and PBL used to fundamentally change the learning approach?

Considering the current situation (described above) Web 2.0 and PBL are intended to change the approach to learning EA – from the traditional course to an active experience based on real cases and group cooperation of course participants. Participants will be directly involved in solving problems and they will learn in this way. The new course is going to be a new, more interesting possibility of learning and teaching EA issues and encouragement for civil servants to participate in active, modern courses.

- Are Web 2.0 technologies and PBL used as part of an already established learning approach?

They are used as part of already established learning processes provided by COI, e.g. portals for the public sector using Web 2.0 technologies for active sharing information and users’ opinions and giving real examples (life cases) to be examined.

#### **Intended Learning Outcomes (ILO):**

- Consider the tensions listed in the PBL and Web 2.0 frameworks.

- Explain what intended learning outcomes are expected in the learning process?

- Consider how to get from the goal (ILO) to the assessment method(s)?

Learning process will refer to knowledge and expertise gaining and through that, based on real life cases developing relevant EA competences, namely:

- EA knowledge widening: understanding general idea of EA, reading and understanding EA relevant documents, understanding EA methodologies and different approaches (mainly course 1 for decision makers).

- Personal Enterprise Architect skills and competences development in order to be prepared to implement EA approach in the own institution: business strategy alignment, information systems alignment, software integration, data integration, business processes description and unification, etc. (course 2 for public sector IT departments representatives).

Since the learning outcome is to develop practical competences it is necessary to design the course on the basis of PBL and provide course participants with real life problems using mainly lecture-based cases and case-based lectures in such a way that participants receive an overview of real life cases and relevant methods to solve them, and then they may simulate similar problems solving.

#### **Pedagogical Values:**

- Consider and list your pedagogical values

(might be the one listed at the CoED-workshop in Vienna – but also related to the tensions)

- Competences and skills development (in order to be able to implement EA approach)
- Real life problems to be solved (simulation) and project work to provide participants with real situations which they may meet when implementing EA approach.
- Collaboration (collaboration among course participants, joint solving problems, sharing opinions, collaborative writing, online discussions, etc.) in order to encourage people to active participation in the course and then to use gained experience in real life situations.
- Process oriented learning in the sense that the course is a learning process planned in detail and containing all relevant steps required to achieve planned results (knowledge and competences).
- Individual learning as a supplement to collaboration – each course participant shall gain its own knowledge and competences on the basis of his/her own learning process including also collaboration with other course participants.

<b>Unit 1:</b> Methodological background (theory)		
<b>Unit 2:</b> Practical background (use cases)	<b>Unit 4:</b> Online collaboration platform	
<b>Unit 3:</b> Real world problems		<b>Unit 5:</b> Active (collaborative) problems solving
<b>Unit 6:</b> Summary and assessment		

### Assessment

- What kind of assessment method(s) is used to achieve the ILO
- tests (including multiple choice tests) – checking knowledge
- case-based tests in the sense that course participants may answer questions in the writing form and solve test cases – checking practical skills and competences.

The above mentioned methods require the platform includes survey tool, multiple choice quiz tool and modelling tool (the last one in order to enable users to solve real cases, model something, simulate, etc.)

- What are they assessed upon? (the process or the solution? Formative and/or Summative)

Assessment of the course will be rather summative than formative, it will always take place after some piece of work (e.g. unit) and will summarise feedback from course participants and include different types of tests.

**Consider the tensions from the PBL and Web 2.0 frameworks in your course design**

Information	Content
Unit Name	<b>Unit 1:</b> Methodological background (theory)
Type of activity	Presentation (written, audio, video ones)
Brief description of the activity	Course participants are given several online introductory presentations. They may watch / read presentations whenever they want in their own speed. Within this unit course participants will mostly work individually.
Who will perform the activity	Course participants individually will follow presentations in the defined order.

Type of Communication	-
Duration	5 hours
How assessed	Short test after the unit 1 - main goal of this test is to check understanding of key EA issues among participants, what is essential to understand next parts of the course and actively participate in further tasks.
Relation to the Intended Learning Outcome (ILO)	<ul style="list-style-type: none"> <li>- Understanding general idea of EA</li> <li>- Understanding EA methodologies</li> </ul>

Information	Content
Unit Name	<b>Unit 2:</b> Practical background (use cases)
Type of activity	Presentations (written, audio, video ones), case studies, information search, investigation, (online) discussion (e.g. forum), blogging, test, Google docs.
Brief description of the activity	<p>Presentation of practical aspects of EA, e.g. real approaches to EA, use cases, real implementation, project management, etc.</p> <p>This unit includes presentations given to the participants, describing some practical issues related to EA. Course participants will also read some documents but they also may start discussing and working together, they may search for information on their own, they will combine theoretical approaches with presented implementations and projects being currently developed in Poland, etc. Case studies analysis will include moderated discussions among participants which enable to conclude reasons, process, results, internal and external circumstances, etc.</p> <p><i>Content remark:</i>  <i>Selection of case studies is a key element when preparing content of the unit 2. On the one hand case studies shall reflect theoretical approaches presented during the unit 1 and on the other hand they shall be adjusted to planned ILO, particularly working with these use cases shall start to develop first EA competences among the participants.</i></p> <p>This unit will involve a facilitator who will moderate discussions and help to summarise results of use cases.</p>
Who will perform the activity	Course participants individually or in groups with help of facilitator (moderator).
Type of Communication	Some to some, one to many, one to some.
Duration	10 hours
How assessed	After this unit multiple choice test will be done by participants in order to assess their general knowledge in the area of EA.
Relation to the Intended Learning Outcome (ILO)	<ul style="list-style-type: none"> <li>- understanding different approaches</li> <li>- reading and understanding EA relevant documents</li> <li>- development of some preliminary skills and competences, e.g. defining and developing business strategy, describing business processes, data integration, understanding technical documents (publications), relationship management, etc.</li> </ul>

Information	Content
Unit Name	<b>Unit 3:</b> Real world problems
Type of activity	Project (group) work, collaboration (including collaborative writing and preparing reports), simulation (including elements of design and planning)
Brief description of the activity	<p>This unit will be focused on collaborative work on simulated problems related to the area of EA. Participants will solve provided problems (e.g. design or plan something) on the basis of knowledge gained during the first two units and information which might be searched for or investigated on the Internet or shared among participants.</p> <p>Participants working in small groups will simulate solving problems similar to real ones.</p> <p>This unit will enable them to use previously gained pieces of information in practice.</p> <p>After successful (or not) solving the problem course participants must be able to report the results and achievements and to summarise their own experience.</p> <p>Feedback provided by participants will be used to summarise work results and give them some feedback (comments, guidelines) on it.</p> <p><i>Content remark:</i> Problems shall be related to the previously discussed case studies. All these elements (case studies and real life problems) shall be selected in such a way that they will develop just several chosen EA competences and skills.</p>
Who will perform the activity	Course participants, facilitator.
Type of Communication	Some to some, many to many, one to many, one to some.
Duration	15 hours
How assessed	Online activity of course participants shall be monitored. This unit will be summarised by multiple choice test and case-based test which will enable to check practical skills of course participants.
Relation to the Intended Learning Outcome (ILO)	<ul style="list-style-type: none"> <li>- Enterprise Architect competences development: business strategy alignment, information systems alignment, software integration, data integration, business processes description and unification, selecting most suitable frameworks for public sector, etc.</li> <li>- group work (collaboration) skills development.</li> </ul>

Information	Content
Unit Name	<p><b>Unit 4:</b> Online collaboration platform</p> <p><b>Unit 5:</b> Active (collaborative) problems solving</p>
Type of activity	Collaboration, (online) discussions (e.g. forum), blogging, design and planning, micro-blogging, online meeting, tagging and (social) bookmarking, wiki, chat, information search, investigation, user-generated content.
Brief description of the activity	These units include all elements of course participants collaboration supported by the platform functionalities.

	<p>Unit 4 includes all platform functionalities required to exchange and share information as well as to enable group work and collaboration.</p> <p>Unit 5 includes activities of course participants supported by the platform.</p>
Who will perform the activity	Course participants whose activities will be supported by Web 2.0 technologies. Facilitator will be involved.
Type of Communication	Some to some, many to many, one to many, one to some.
Duration	Collaboration starts after the Unit 1 (theory) and lasts till the end of the course.
How assessed	No particular assessment of these units. Unit 5 have the same assessment as unit 3.
Relation to the Intended Learning Outcome (ILO)	<ul style="list-style-type: none"> <li>- Enterprise Architect competences development: business strategy alignment, information systems alignment, software integration, data integration, business processes description and unification, selecting most suitable frameworks for public sector, etc.</li> <li>- group work (collaboration) skills development.</li> </ul>

## B.4 References

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## **C. Symposium for the Networked Learning Conference 2010**

### **C.1 Introduction – rationale for papers and information about the conference**

The following three papers plus the initial symposium description have been a major part of the theoretical and conceptual work underlying the learning methodology, the design framework and the contributions to Methopedia. The symposium addresses pertinent tasks in Work Package 2, in particular the symposium addresses issues around web 2.0 tools and practices (Paper 1), Problem Based Learning approaches (Paper 2) and the creation of a learning methodology and design framework (Paper 3).

The Networked Learning Conference is an international, research-based conference. Since its inception in 1998 the conference has developed a strong following by international researchers. In addition it is well supported by practitioners, managers and learning technologists interested in contributing to and hearing about research in this area. The conference is considered a major event in the international 'technology enhanced learning' conference circuit.

The conference will be held in Aalborg, Denmark, 3rd & 4th May 2010 and the expected attendance will be between 100-130 people. The website of the conference is: <http://www.networkedlearningconference.org.uk/>



## C.2 Web 2.0 and Problem Based Learning in Enterprise Architecture Training

### Introduction

This symposium is brought together by research and development carried out in relation to the EU-funded research project “Innovative Enterprise Architecture Education and Training Based on Web 2.0 Technologies” (EATrain2). The overarching aims of EATrain2 project are:

*“[...] to identify the training and educational needs of employees in both public and private sector and university students regarding EA and to fulfil these using innovative pedagogies and practices based on Web 2.0 technologies and active, problem-based learning approaches.”*

The EATrain2 project consortium comprises partners from six European countries and stakeholders from both business, the public sector and academia: [University of Macedonia](#) (Project Leaders - Greece), [Euroconsultants SA](#) (Greece), [University of Koblenz-Landau](#) (Germany), [Aalborg University](#) (Denmark), [BOC Asset Management GmbH](#) (Austria), ["Cities on Internet" Association](#) (Poland), [National University of Ireland](#) (Ireland).

The EATrain2 project is composed of four main work packages (WPs) which run consecutively from January 2009 to December 2010 with half a year allocated for each work package. The task of WP1 was to identify stakeholders' needs regarding Enterprise Architecture Training, and this work package was concluded in summer 2009. The objective of WP 2 is further the work from WP1 by developing a Problem Based Learning methodology, which capitalises on web 2.0 technologies. This will provide the background for work of WP3, which consists in the development of course models and a platform for carrying out three pilot courses. Finally, the objective of WP4 is to evaluate the three pilot courses designed for business, the public sector and academia respectively.

This symposium addresses work and research carried out in relation to Work Package 2, which is headed by researchers from Aalborg University (Denmark). The main objectives for this work package are:

- To examine the use of active, problem-based learning approaches in the training and teaching of EA.
- To identify means in order to electronically support training and learning of the skills, knowledge and abilities that emerged from WP1.
- To identify how Web 2.0 related technologies could enhance the training and learning of skills, knowledge and abilities that have emerged from WP1
- To consolidate the derived knowledge from this WP with the development of an training and learning methodology which will capitalize on the EA learning ontology to identify and address learning needs

In this symposium we report the research and work carried in relation to these objectives. In particular, we focus on the development of a learning methodology, which capitalises on PBL and web 2.0 technologies. The three papers in this symposium each address important aspects and corner-stones of this work, by discussing theoretical and methodological questions associated

with the development of such a learning methodology and will outline the contours of the final outcomes of the work package.

In the first paper, (Symposium Paper 1) review, synthesise and discuss notions such as web 2.0 and learning 2.0, which have been prominent concepts within Networked Learning and educational research within the last few years. (Symposium Paper 1) outline the potentials that are being associated with web 2.0 technologies and practices, but also critically discuss gaps between hypothesised or assumed potentials and then the actual experiences and evidence available in relation to educational uptake of web 2.0 technologies and practices. This is done by highlighting a number of tensions which emerge from educational use of web 2.0, but which (Symposium Paper 1) argue can be used as resources for design and as an input for the overall learning methodology discussed in (Symposium Paper 3). This is accomplished by identifying four central aspects (learning process, motivation, infrastructure and resources/content), which the authors argue can be more or less controlled by either teachers or learners (or distributed between them). From these the authors distils a number questions which can be used by practitioners to critically reflect on their values and priorities in relation to actual design of networked learning courses, capitalising on web 2.0 oriented learning.

In the second paper (Symposium Paper 2) argue for the potential connections between Problem Based Learning and web 2.0 technologies and practices. The authors draw on the insights of the preceding papers, but also argue how our current understandings and PBL-practices might be expanded through discussing various interpretations and understandings within theories such as networked learning and connectivism and their different views of terms such as ‘social’ and ‘collaborative’ – some of which have arisen with the emergence of web 2.0. The authors argue that these more complex discussions and subtle differences between various theories and pedagogies can in turn be translated into more concrete models or concepts that are relevant for practitioners in designing for networked learning. This feeds into and contributes to the overall learning methodology which is the focus of the third and final paper of the symposium.

In the final paper (Symposium Paper 3) the authors discuss the notion of a learning methodology, and situate this within the wider frame of learning design or “Designing for Learning”. They discuss existing work within this broad area and different approaches and interpretations of learning design. As a part of developing the learning methodology the authors introduce a particular method for learning design: Collaborative E-learning Design method (CoED) and how this method has been developed. Furthermore, the authors outline how the learning methodology will be applied in the EATrain2project as a way of enabling teachers and practitioners to design courses capitalizing on a problem based learning approach and web 2.0 practices, which builds heavily on the questions, models and concepts introduced in (Symposium Paper 1 & 2). As part of the collaborative e-learning design (CoED) method and the broader learning methodology the authors held a workshop for the project partners, and the results and input from this workshop will be briefly discussed in the paper. Finally, the authors discuss how this work has and will be furthered through development of design artefacts and templates and use of the wiki-based community ‘Methodpedia’, which has been developed as part of the EU project COMBLE.

## **C.3 Contributing to a Learning Methodology for Web 2.0 Learning – Identifying Central Tensions in Educational Use of web 2.0 Technologies**

### **C.3.1 Abstract**

This paper aims at developing a methodology for designing Web 2.0 mediated learning building on a PBL approach to learning and by identifying tensions in the cross field between learning and Web 2.0. To establish an overview we begin by defining the intersections between learning and Web 2.0. In relation to this, and building on (Symposium paper 2), we argue that a problem-based approach to learning fits well with the characteristics of Web 2.0 activities. Moreover, we argue that the connection between Web 2.0 and learning gives rise to an overarching tension between who controls the learning environment: the teacher or the learner. We argue that this tension can be understood as expressible across at least four dimensions: *the learning process*, *the motivation*, *the infrastructure* and *the resources/content*. We find that crucial questions need to be considered in relation to each of these dimensions to be able to design web 2.0 mediated learning and these questions and tensions are what we explore in this paper. These in turn contribute to the development of a learning methodology, which we discuss in detail in (Symposium Paper 3). Discussing the questions relating to the four dimensions of Web 2.0 learning makes it possible to identify the consequences of our learning values in relation to different dimensions of web 2.0 oriented learning. In this way the model and the corresponding questions can help practitioners reflect on their course designs. Furthermore, we discuss some additional mediating design artefacts, which we are developing as a support to practitioners' design of web 2.0 oriented learning. These are descriptions of existing practices which will be uploaded in the wiki-based social community Methopedia.

#### **Keywords**

Web 2.0 mediated learning, Problem-based learning, VLE, PLE, tensions, learning values, CoED

### **C.3.2 Web 2.0 Mediated Learning**

As our point of departure we begin by defining Web 2.0 and learning in order to identify the cross field between the two. In a recent BECTA report Crook et al. (2008) mention different reasons why Web 2.0 technologies could potentially benefit current teaching practices. Firstly, young people are already using Web 2.0 technologies. Secondly, Web 2.0 activities are understood to be important from a learning theoretical perspective (Crook et al., 2008, p. 29). Particularly qualities such as the centrality of participation, production, dialogue, and collaboration makes them ideal to actively engage learners individually as well as collaboratively. Thirdly, there is a match between current policy and curriculum goals where terms such as enterprise 2.0 reflects that Web 2.0 technologies are also important in the modern economy (Crook et al., 2008, p. 72). Finally the user-centered focus of Web 2.0 activities supports the users in creating and maintaining connections between formal as well as informal learning arenas (Dohn, 2009, p. 344).

While there exists a multitude of partly overlapping definitions of web 2.0 we have identified two more overarching perspectives or ways of understanding web 2.0, and the way it has been practiced e.g. Anderson defines Web 2.0 as:

*"(...) a group of technologies which have become deeply associated with the term: blogs, wikis, podcasts, RSS feeds etc., which facilitate a more socially connected Web where everyone is able to add to and edit the information space."* (Anderson, 2007, p. 5)

From this definition Web 2.0 is understood as a type of technology, but also as a range of activities with certain characteristics. Following from this we differ between Web 2.0 *technologies* or resources as e.g. blogs, microblogs and podcasts and then Web 2.0 *activities* or practices such as blogging, podcasting, and micro-blogging. With this distinction we also want to emphasise that using e.g. a blog as a *technology or resource* in teaching does not necessarily make it a web 2.0 *activity*, as this would entail more than merely employing a particular technology. This distinction has been further explored by Web 2.0 Dohn (2009) who has defined web 2.0 as a range of activities or practices, rather than technologies, and which she characterises in the following way (Dohn, 2009, p. 345):

- collaboration and/or distributed authorship
- active, open-access, "bottom-up" participation and interactive multi-way communication
- continuous production, reproduction, and transformation of material in use and reuse across contexts
- openness of content, renunciation of copyright, distributed ownership
- lack of finality, "awareness in practice" of the "open-endedness" of the activity
- taking place on WWW, or to a large extent utilizing Web-mediated resources and activities

From these characteristics Dohn argues that web 2.0 is a matter of degree, meaning that an activity does not have to be characterized by all of the bullet-points on the list above (except the last one which Dohn argues is a necessary condition (Dohn, 2009, p. 345)). Overall one might say that the shift from Web 1.0 to Web 2.0 can be characterized as a shift in participant control in relation to different aspects of the learning activities. Within learning research there seems to have been a gradual move from what we could call learning 1.0 seen as a more traditional curriculum-based approach towards learning 2.0 as a more problem-based approach to learning – although it should be noted that actual pedagogical practice or institutionalised education has not necessarily changed to the same degree. Conole (2007) identifies this transition as part of three broader shifts, which are related to an emerging interest in the social potentials of technologies, partly due to the emergence of web 2.0 technologies:

*"In essence, this suggests that there are three fundamental shifts: a shift from a focus on information to communication, a shift from a passive to more interactive engagement, and a shift from a focus on individual learners to more socially situative learning."* (Conole, 2007, p. 82)

While curriculum based strategies, normally designated as *teaching*, aim at providing the student with a relatively fixed amount of agreed upon knowledge, and with a focus on content, teacher control and instruction. Problem-based strategies, normally designated as *learning*, on the other hand aim at providing the student with abilities to acquire knowledge appropriate to problemsolving. Using Problem-Based Learning (PBL) the focus is on participant control (Bygholm & Buus, 2009). This also means that a transition from curriculum-based teaching to PBL entails a movement from a teacher-centered approach to a learner-centered approach (Jones & Dirckinck-Holmfeld, 2009; Ryberg, Koottatep, Pengchai, & Dirckinck-Holmfeld, 2006). This move can in many ways be compared to the move from web 1.0 to web 2.0 which by some is seen as a move from 'users/learners as consumers' towards 'users/learners as producers'. Consequently it makes good sense to connect Web 2.0 with a problem-based approach to learning as (Symposium paper 2) also argues.

### C.3.3 Identifying Tensions in Educational Adoption of Web 2.0

Looking at web 2.0 from a learning perspective, we find that there is a tension between who controls the learning environment: the teacher or the learner. This tension is often expressed as a question of whether to design or use a *Virtual Learning Environment* (VLE) (often managed by the teacher/institution) or adopting a more personal or individualized approach to learning in the shape of a *Personal Learning Environment* (PLE) where the learner customizes his or her own learning environment (Conole, de Laat, Dillon, & Darby, 2008). In the Becta rapport Crook et al. (2008) sum up this tension in the questions: who controls the learning experience? And how is this control managed? (Crook et al., 2008, pp. 34-46). Focusing on learning management the discussion also concerns whether the different technologies used for the learning activity should be integrated in a Virtual Learning Environment (VLE), or if they should form a more loosely coupled Personal Learning Environment. In a VLE the teacher organizes the tools and structures the dialogue (Crook et al., 2008, p. 36), whereas a PLE is argued to support the ideas that 1) learning is ongoing, 2) learning takes place in many different contexts and situations, and 3) the individual plays a role in organizing and producing their own learning materials. Moreover in a PLE the management and personalization of the technologies is also part of the learning process (Attwell, 2007, p. 1). Consequently, we would claim that the difference between a VLE and a PLE lies in the fact that learning in the VLE is managed or controlled by a teacher; while in the PLE it is self-directed. We shall, however, return with some more critical notes on these distinctions, which we feel over-emphasises a technological perspective.

The tension between learner and teacher control is also reflected in learning theories with a behaviorist approach at one pole and the social constructivist at the other. Here Dalsgaard (2006) argues that the question of whether to use a VLE/LMS or a PLE, depends on the pedagogy we build on. As a result he suggests we begin by choosing our learning theoretical foundation. Moreover he suggests a separation of the managerial-administrative systems from the learning processes. This, he argues, would leave more room for social software which supports self-governed, problem-based and collaborative activities supporting a social constructivist pedagogy (Dalsgaard, 2006, p. 2). However, when users are encouraged to manage their own learning environment, at least three types of disadvantages or difficulties emerge:

- it has been questioned whether learners have the sufficient skills to manage their own learning
- privacy becomes an issue since not everyone wants to learn in public or share their projects
- not everyone can or should teach in a "YouTubey" and "Twitterly" blogosphere (Notess, 2009)

Moreover, since the consequences of using web 2.0 technologies and more learner-centred pedagogies have not yet been thoroughly documented, many prefer to let the teacher manage or control the learning processes in a VLE (Crook et al., 2008, p. 37). In relation to these discussions of VLEs vs. PLEs it should be noted that the sharp distinctions between PLEs and VLEs can be quite problematic. As previously argued there are good reasons for distinguishing between web 2.0 as range of technologies/resources and then web 2.0 practices or activities. As argued by Dohn (2009) it is possible to use web 2.0 tools in a very conservative, teacher-centred way. Therefore rather than equating PLEs or VLEs with particular teaching strategies and ideals we need to ask ourselves: what aspects of VLEs and PLEs support problem-based learning mediated by Web 2.0? Since this question is universal it would result in a universal answer. However, to design we need to ask questions in relation to specific learning situations. Here we suggest that we add further nuance to this debate by not differentiating between particular technological solutions, but instead focus on questions of who *controls* the learning environment. Furthermore, as we shall explore in more details in the coming sections, we should be careful in dichotomous distinctions such as web

1.0 vs. web 2.0 or learning 1.0 vs. 2.0, but rather keep in mind as also argued by Dohn (2009) and in (Symposium Paper 2) that web 2.0 is a matter of degree to which one adopts, not only a range of technologies, but moreso a set of practices or activities. In reality, therefore, we should not talk about web 2.0 learning, but rather ‘the degree to which a certain technology supported learning situation adopts what is commonly designated as web 2.0 technologies along with a set of practices which are more learner-centred, collaborative, interactive, production-oriented, open ended than traditional largely teacher-centred and content focused approaches’ – however, for brevity and clarity we shall use terms such as web 2.0 learning or web 2.0 oriented learning to cover this wide spectrum of possible practices. The matter of degree we explore through proposing some central dimensions or continuums of web 2.0 learning which can be seen as stretched out between teacher or learner control. This is inspired by the model for PBL developed in (Symposium Paper 2). (Symposium Paper 2), who focus on PBL, argue that control can be exercised across three dimensions of PBL: *the problem, the work process, and the solution*. Each of these axes represents central aspects of PBL that can be controlled by either the teacher or the learner. As further argued in (Symposium Paper 2) it makes good sense to connect PBL and web 2.0, which means that the more general questions debated in relation to PBL and learning are also relevant in relation to web 2.0, even though new nuances and challenges emerge as well.

When designing web 2.0 learning, we argue that first of all one needs to ask the crucial question of motive: "*What is the motive for using web 2.0 technologies as part of the design of a course?*" Are web 2.0 technologies used as part of an already established learning approach in a particular course? Or are they used as part of a design with the aim of *changing* the learning approach? If the motive for design is that web 2.0 technologies should become part of an already established learning approach or course one danger or common misconception is that using web 2.0 *technologies* will automatically entail web 2.0 *activities*. On the other hand, if the motive for using web 2.0 is a change in the learning approach one needs to discuss different questions before designing web 2.0 learning. In relation to the scope of this paper we therefore suggest that we rethink the model presented in (Symposium Paper 2) in relation to web 2.0. We argue that it is crucial to address at least four aspects when planning web 2.0 learning: *The learning process, the motivation, the infrastructure (e.g. the system) and the resources/content*.



**Figure 19: Continua between teacher and learner control in web 2.0 learning.**

For each of these axes or continua the teacher or the learner can be more or less in control, or the ownership can be distributed equally between them. The axis of the *learning process* concerns who controls the flow of the learning process, the collaboration or interactional dependencies, and how this control is managed. This axis is very similar to the problem and process axes explained in (Symposium 2) and it concerns not only who orchestrates the learning process, but also the very object of the learning process e.g. who controls what ‘the problem’ i.e. what should be investigated and how. In this way this concerns questions of to which degree the learning process

is self-managed and self-driven and whether the learner decide what should be learned (learner defines the curriculum) – a full scale learner-managed and learner-driven learning process would probably not fit within existing formal education, though single courses or parts of the full learning process (e.g. attaining a degree) might be more learner-centred than others.

The *motivation* continua concerns questions like: Is the current project or course driven or fuelled by the learner's own motivation or is the motivation of a more external nature i.e. teachers' or institutional demands? The tension here also concerns conflicting learning goals in the educational system and web 2.0 practices (Dohn, 2009, pp. 344-345). As pointed out by Dohn, the engagement with web 2.0 activities and technologies in non-institutionalised settings seldom happens with the explicit intention of achieving well-defined learning outcomes; rather than being the main goal of the activity, learning is more often than not a secondary outcome. The main goal is often participation in itself, and while often being an intimate part and outcome of the activity, learning may not be the explicit goal of the activity. This obviously is in stark contrast to learning taking place within institutional settings, where the expected learning outcomes are more or less explicitly stated and necessary to adhere to in order to successfully pass a course, attain a degree etc. Although educational institutions and courses might differ in their approach and be more or less open-ended in terms of curricular demands (e.g. some institutions promoting a more problem based learning approach, like Aalborg University, may have a thematic framework for a semester shaping the courses and the students self-chosen project, rather than a fixed curriculum) institutionalized learning will usually pose some demands on learning outcomes, structure and process. Thus, the fundamental motivational structure might be different, and we should be careful in assuming that the 'tools' in themselves are the motivation e.g. "many students have their own personal blog, therefore they will suddenly find algebra III a feast when handing in assignments in a blog, rather than the usual way". Even if variation and experimentation within a learning context can certainly be motivating, we should be careful in assuming that we can easily transfer the 'funniness' or motivational structure from informal to the formal. Such discussions obviously also pose challenging questions concerning whether an activity is really web 2.0 learning if it is entirely based on extrinsic motivation/demands, or whether activities must include a certain level of intrinsic motivation to be "genuine" web 2.0 learning activities. From another point of view this also touches upon issues of to which degree teachers and institutions can rely on learners being or becoming motivated, self-directed, which might differ significantly depending on age, subject, level of education and so on. As previously stated our intention is not to argue for how these tensions can be overcome, but rather to shed light on them, as for practitioners to reflect upon when engaging in practical course designs.

The *infrastructure* continua concerns questions of who controls or manages the infrastructure and how. By infrastructure we primarily mean the organisation of tools, although it can be difficult to separate the orchestration of tools from the axis of the learning process. However, concerns and questions do arise around the ownership and control of the tools of production and the content. For example, Dalsgaard (2006) suggests that students should choose and own the tools that are used as part of the learning processes (in order to separate management tools from the learning processes), however, as previously mentioned, some students might lack skills in identifying and using relevant tools for learning. Furthermore, while concerns can arise around data safety, e.g. if a certain service siege to function and students' work is lost (which would speak for an institutionalised system), another side of the coin might be whether students are able to or will have the right to export content produced within an institutional system for other purposes (and what kind of content the students will be allowed to publish).

Finally, and related to the former, the resources/content continua concerns questions regarding the creation of and ownership over content, but also what kind of resources are deemed acceptable within an institutional setting. As argued by Dohn (2009) there are some tensions between

common, informal web 2.0 practices and the demands and rules of e.g. academia. While a perfectly sensible and meaningful response to a question in an informal forum for educational technologist of ‘what web 2.0 is’ could be to copy/paste some definitions lifted off from Wikipedia, blogs and garnished with a reference to an article, this might not fulfill institutional demands within an academic context. Potentially, such a response could be deemed to lack originality, be insufficiently researched and argued or be considered pure plagiarism if not properly cited. This also reflects and overlaps with the other dimensions mentioned, but highlight that there might be certain tensions in terms of what constitutes relevant content production within different practices, as there are different ground rules for what is produced, but also the rationale for producing the content. In a non-institutional setting the ‘task’ might be formulated as identifying a fast and effective solution to a particular problem raised, and the solution is in itself a satisfactory product. However, within an institutional setting the task is not only to respond to a particular question with a quick solution, rather the process, active production and construction of the response is part of the learning process, and thus also part of a satisfactory outcome. As such the tension is not only related to ownership of content, but also to who defines these logics and rationales, as well as who decide on issues of what constitute relevant expertise, authority and accountability.

Although many of the dimensions overlap, we also believe there is a value in upholding the four aspects. By distinguishing between learning process and infrastructure we stress that a system in itself does not necessarily have an integrated pedagogy, which cannot be changed in the enactment of the system. Moreover by distinguishing between tools and the organization of these in an infrastructure we stress that using a web 2.0 technology in itself does not constitute web 2.0 learning. Rather, it is the organization or orchestration of the learning environment as a whole, which can be more or less web 2.0 learning-oriented. Consequently, the model stresses that whether a learning design is an instance of web 2.0 learning depends on how the power is distributed and managed across the different dimensions (and it would be questionable to which degree something could be considered web 2.0 learning if the teacher fully exercises control over all four dimensions). One aspect of designing web 2.0 learning can therefore be considered as a reflection on and negation of the control in a course across these four dimensions. We have therefore developed a series of more concrete questions (see Table 1) intended to provoke reflection, as to support practitioners in designing web 2.0 learning and to become aware of the tensions and potential pitfalls when designing web 2.0 oriented learning. These concepts, models and questions, will contribute to the development of our overall learning methodology and the design of a workshop, as explained in (Symposium Paper 3). Also, the questions referenced below have become part of templates or ‘toolkits’ which are intended to act as ‘mediating design artefacts’ (Conole, 2007) (Symposium Paper 3)

**The learning process: Who controls the learning process?**

- Who defines what is to be investigated?
- Who decides how this should be investigated?
- Who will perform the activity?
  
- Who decides the flow and structure of the learning processes?
- How are the learning processes organized?
  
- Who controls the collaboration?
- How is the collaboration organized? Is it e.g. formal and/or informal?

**The motivation: Who controls the motivation?**

- Is the motivation externally or internally driven?
- To what extent should/can the students be self-motivated?
- To what extent is learning in itself motivating?



**The infrastructure: Who controls the infrastructure?**

- Who provides the infrastructure?
- Who provides the tools?
- Who owns the tools for production?
- Who organizes the tools?

**The resources/content: Who controls the content/resources?**

- Who makes the resources/content available?
- What strategies (copy-paste or rip-mix-burn) for creating resources/content are supported?
- What resources/content is it possible for learners to create?
- Who defines the different roles related to competence, expertise, authority, accountability and copyright?
- Who has the competences/expertise?
- Who has the authority?
- Who is accountable for the resources/content?
- Who has the copyright of the resources/content?

**Table 6: Questions for exploring tension in web 2.0 learning**

One aspect of our research team's approach and work is to provide practitioners with sets of concepts, questions and models. However, another aim is to supply practitioners with existing learning designs, patterns or other resources which can help them make sense of how web 2.0 oriented learning practices might be designed. We have therefore collected a number of both practically and theoretically oriented articles with examples of concrete implementation of web 2.0 practices and technologies, which we aim to translate into practice description and make available in Methopedia, which is an online wiki-based community for sharing learning activities and methods (Ryberg et al., 2008; Ryberg, Niemczik, & Brenstein, 2009). Methopedia, is a wiki-based network for educators and trainers that has been developed within the COMBLE project which is funded by the EACEA Lifelong Learning ICT Programme. The goal of the COMBLE project is to improve the quality of Blended Learning in higher, continuing and business education, and Methopedia (methopedia.eu) is a wiki and social community aimed at facilitating knowledge transfer between trainers/educators from different institutions or countries through interactive peer-to-peer support, and sharing of learning practices.

### C.3.4 Bridging the Gap between Practices in an Iterative Design Process

Building on a practice perspective on web 2.0, Dohn stresses that it is not technology in itself, which is important but the skill-relative affordances it poses for the agent. In relation to this it is important to note that skills and affordances develop from the skills the agent has and the practices s/he is already engaged in, and the understandings of which s/he agrees with (Dohn, 2009, p. 347). Consequently, to design web 2.0 mediated learning Dohn argues that we should build on existing practices and skills and make them more web 2.0 oriented (Dohn, 2009, p. 348). Here we, however, also agree with Crook et al. (2008) who argue we should build our research on documented exchanges in learning situations (Crook et al., 2008, p. 47). However, case studies in relation adopting web 2.0 resources or technologies are seldom evaluated in relation to their impact on learning (Ibid.). In a review of existing research Conole et al. (2008) conclude that students are actively involved in co-designing their e-learning environment (Conole et al., 2008, p. 513), but also state that little in-depth research has been done on how students use technologies to support their learning (Conole et al., 2008, p. 512) – this might also be related to the fact that actual adoption of web 2.0 learning practices are relatively scarce, at least within secondary education (Crook & Harrison, 2008) . Therefore, to find more consistent and well-established patterns in the use of and experience with web 2.0 oriented learning more analyses are needed.

Crook et al. (2008), however, speaks in favour of adopting web 2.0 technologies, mostly used in informal settings, in teaching, and one of the ways web 2.0 activities are used within education, according to Crook et al. (2008), is in communities of teachers. Examples of this could be teachertube.com, lemill.net, slideshare.com (Crook et al., 2008, p. 48) and Methopedia.eu. Common to these communities is the intention to share different kinds of learning resources like e.g. instructional videos, slides, learning tools and learning activities. However, from the literature it is also possible to identify a range of activities, and from literature we have identified a number of different practical approaches to the use of web 2.0 in learning situations. In relation to blogs there is a lot of interest in the area but not that big an actual uptake. This might be caused by the understanding that blogging is often seen as carrying an internal motivation. Wikis such as Wikipedia have been integrated in courses to a further extend. However this practice has not been formally evaluated (Crook et al., 2008, p. 52). Podcasting has been used in higher education in particular for the purpose of language learning. However, this has mainly been in support of more traditional ways of teaching such as recording lectures (Crook et al., 2008, p. 53). Such examples we aim at collecting and translating into descriptions of learning activities in Methopedia. The templates that are used in Methopedia are very basic, and encompass only a 'short description', 'process description', 'required resources', 'examples' and 'comments', which however have proven to be effective in quickly describing smaller learning activities (Ryberg et al., 2009). Once again we should be critical in regards to what constitute web 2.0 learning activities. As we have emphasised using a web 2.0 technology adopted from informal settings in an educational context does not automatically make the teaching more web 2.0 oriented learning. Because as previously mentioned web 2.0 technologies can equally be used to support curriculum-based and content-focused teaching.

### C.3.5 Conclusion

The objective of this paper has been to develop a theoretical foundation for establishing a methodology for designing web 2.0 learning, and identifying tensions in the cross field between web 2.0 and learning, which we hope can provoke necessary reflections in relation to practitioners' design of courses. We have argued that these tensions can be mapped as continua or axes stretched out between learner and teacher control, and we have argued that these four aspects concern: who controls the flow of the learning process, where the motivational structures are grounded (extrinsically or intrinsically), who controls and exercises ownership over the infrastructure. This has further lead to a series of questions, which will be incorporated as part of the CoED method, which we explain in more detail in (Symposium Paper 3) and be transformed into a number of mediating design artefacts. To take into account the tensions in the field we suggest that practitioners address questions in relation to the four continua of learner and teacher control: the learning process, the motivation, the infrastructure (e.g. the system) and the resources/content. We suggest to use the questions identified in relation to each of these dimensions to discuss the consequences of our learning values in relation to incorporating different dimensions of web 2.0 in actual learning designs. In this way the continua and the questions derived from these can be used as a way to bridge the gap between pedagogical values and designing for practice. Consequently answering the questions in relation to the four continua is a way of making the choices in the preliminary phases of the design process tangible, and thus useful in relation to designing Web 2.0 mediated learning. Finally, another type of mediating design artefacts are the practices and examples that we aim to upload and share in Methopedia, which will be based on practices derived from publication of both a more theoretical and practical nature.

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## **C.4 Identifying Differences in Understandings of PBL, Theory and Interactional Interdependencies**

### **C.4.1 Abstract**

In this paper we discuss the potential linkages between networked Problem Based Learning (PBL) and web 2.0 technologies. Some of the core concepts associated with web 2.0 technologies and practices, such as collaboration, active participation, creation and sharing are well aligned with common interpretations of PBL as a more student-centred pedagogy focusing on students' active (collaborative) production of knowledge through engaging with problems. While there are some obvious connections between PBL and web 2.0 technologies, many of the thoughts and ideas that have arisen in relation to web 2.0, such as Personal Learning Environments (PLEs), also challenge notions of PBL, but equally hold opportunities to expand our understandings of this pedagogical approach. Moreover, we discuss how certain interpretations of networked learning (Jones & Dirckinck-Holmfeld, 2009; Jones, Ferreday, & Hodgson, 2008) and ideas articulated around the notion of connectivism (Siemens, 2005) might challenge and expand our understandings of PBL. While these discussions are more theoretically oriented our aims in this symposium are to translate these more complex discussions and subtle differences between various theories and pedagogies into more concrete models or concepts that are relevant for practitioners in designing for networked learning. However, the more intimate relations between models and concepts and practical design, will be discussed in the third paper of this symposium.

### **C.4.2 Introduction**

With the popularisation of web 2.0 practices and technologies, we have also witnessed a revitalisation or renaissance of terms such as collaboration, sharing, dialogue, student centred learning, active learning, and the need to position students as producers, rather than consumers of knowledge. These are, however, pedagogical ideals which have been prominent within research areas such as Networked Learning, CSCL and CMC-research well before the emergence of web 2.0. They even pre-date the Internet and World Wide Web (Jones & Dirckinck-Holmfeld, 2009; Ryberg, 2008), as we shall also return to when discussing PBL-practices. This dialogical, collaborative perspective, which Weller (2007) characterises as the 'discussion view', has existed and thrived, but it also seems fair to say that the mainstream and institutional uptake of learning technologies (fuelled in particular by the popularisation of VLEs/LMSs) have been primarily oriented towards the 'broadcast view' (delivering content or resources globally, flexibly and on demand to the individual users) (Weller, 2007).

While many of the pedagogical ideals often associated with web 2.0 may not be entirely new, the mainstream adoption of services such as Facebook, Flickr, YouTube and the popularisation of ideas such as collaboration, sharing and 'user generated content' seem to have created a stronger platform for these ideals. Possibly, also because the ideas of creation and production resonate well with political discourses on the knowledge society, and the competitiveness (or survival) of nations being dependent on their ability to continuously creating new knowledge, ideas, products and services. Thus, it seems that ideas around web 2.0, learning 2.0 (Redecker, 2009) or e-learning 2.0 (Downes, 2005) have had a broad(er) educational impact and stimulated more debate and greater interest than earlier discourses on educational technology. Even though the actual uptake and concrete experiments (and successes) might be relatively few it seems that there is a general educational interest in adopting web 2.0 technologies in schools from both teachers and students, and also a number of pioneers are profoundly interested in changing the orientation of educational practices from a broadcast-centered to a discussion-centered view (or from a more teacher-centered to a more learner centered and collaborative perspective) (Crook & Harrison, 2008).

Following from this there has also been an increased interest in ideas of Personal Learning Environments (PLEs) which have been argued to embody a more learner-centered perspective (Attwell, 2007; Dalsgaard, 2006). Conversely, as explored by (Symposium Paper 1) the VLE has become synonymous with or a symbol of the 'broadcast' or 'teacher-centred' view, and as pointed out by Jones & Dirckinck-Holmfeld (2009), many online learning pioneers view the VLE as a retrograde step; although evidently VLEs can be used to design dialogical, collaborative or 'discussion oriented' courses or programmes. In relation to this, and also the apparently broad interest in adopting web 2.0 technologies, we should like to raise the point that we must be careful in ascribing too much power to perceived inert affordances of particular technologies, and focus equally on how the technologies are enacted or taken into use by practitioners. As argued by Dohn (2009) and (Symposium Paper 1) we should distinguish between web 2.0 'technologies' and 'practices/activities' by which we mean that a particular web 2.0 technology or sets of technologies e.g. wikis, blogs, podcasts do not automatically entail a web 2.0 learning practice, such as a more collaborative or learner centred pedagogy. While it is possible to create highly collaborative and student oriented courses in a VLE, it is equally possible to use web 2.0 technologies, such as blogs, podcasts or wikis in a very conservative, 'broadcast oriented' way (Dohn, 2009). In addition, the reasons for adopting new web 2.0 technologies might be more oriented towards engaging and motivating students, than changing the existing pedagogical approach. Therefore we would argue - in line with Dohn (2009) - that web 2.0 learning is a matter of the degree to which one adopts, not only a range of technologies, but more so a set of practices or activities. Currently, and very broadly speaking, ideas seem to cluster around general concepts such as collaboration, learner-centered pedagogies and personal learning environments, but as we shall argue there are significantly different interpretations of these terms and the pedagogies and practices emerging from these diverse understandings. This becomes particularly visible when querying further into different conceptual frameworks, such as networked learning, connectivism or problem based learning, and from a theoretical point of view the subtle differences and varied interpretations are important to identify and discuss further. However, our aim is also to make these differences and interpretations available to practitioners who might not have a deeper interest in learning theories or find discussions of subtle variations between different PBL-models exhilarating. Therefore, our objective is to identify ways in which we can help practitioners and designers navigate this complex field. In this endeavour we find inspiration within the field of learning design, and as described in (Symposium Paper 3) our research group have adopted the CoED method (Nyvang & Georgsen, 2007) as a practical tool to support practitioners in designing networked learning. However, some of the fundamental tensions which underpin these more practically oriented questions, concepts and models are the focus of the present paper. In this paper we therefore discuss and analyse concepts such as PBL, Networked Learning, connectivism and ideas on Personal Learning Environments in order to identify some pertinent questions and important characteristics which can be used by practitioners to navigate within this complex landscape.

### **C.4.3 Characterising PBL – Differences and Similarities**

Our purpose in this article is not to give a thorough review or discuss in detail various interpretations of PBL. Rather our aim is to identify some defining characteristics of PBL, which can help practitioners situate themselves within the broad and diverse landscape of PBL-practices, which is quite complex:

*“As even superficial inspection of a few of the available sources can reveal, the label 'PBL' is used to cover an amazing diversity of educational practices, ranging from problem-oriented lectures to completely open experiential learning environments aimed at improving interpersonal relations.” (Kolmos & Graaff, 2003, p. 657)*

*“The term problem-based learning must be considered a genus for which there are many species and subspecies. Each addresses different objectives to varying degrees. All description and evaluation of any PBL method must be analysed in terms of the type of problem used, the teaching learning sequences, the responsibility given to students for learning and the student assessment method used.”* (Barrows, 1986, p. 485)

Barrows (1986) proposes three variables that can be used to differ between various PBL-practices. The first is about the design and format of the problem and concerns if the problem is given to the students or self-chosen, and the openness of the problem e.g. whether students are given very detailed description of the problem along with rich references to how they might approach or solve the problem, or whether the problem is more ill-defined, thus requiring more free enquiry. Secondly, he differs between whether the learning process is teacher directed or learner directed e.g. whether the *teacher determines the amount of information and the sequence of information to be learned in the domain of a course* (Barrows, 1986, p. 482) or whether this responsibility is delegated to students and tutors. The third variable concerns, the sequence in which problems are given and information acquired e.g. are cases/problems provided before or after further information is presented. Based on these dimensions, Barrows (1986) identifies different PBL-practices such as, lecture-based cases, case-based lectures, problem based and closed-loop problem based approaches and discuss their ability to support: 1. The structuring of knowledge in relation to actual practices (practice learning, learning in the context of a practice) 2. Development of effective reasoning skills 3. Development of effective self-directed learning skills 4. Increased motivation for learning (in relation to which Barrows argue that higher degrees of freedom and self-control also entail higher motivation). Both the intended learning outcomes of PBL and the ideas of students as more active, productive and engaged in real practices seem, as also highlighted by Dohn (2009), to correspond well with the ideas and ideals often associated with web 2.0 such as those identified by Crook & Harrison (2008) where students gain more control and engage in enquiry, collaboration and publication, which support more diverse literacies (Crook & Harrison, 2008, p. 11)

While Barrows is particularly interested in discussing different PBL approaches within clinical, medical practice the variables and the four outcomes or learning objectives of PBL are more broadly applicable, and are also highlighted by others. Although there are differences and various interpretation of PBL, one can also find some general traits, for example several authors argue that problems are the starting point for the learning process (Dirckinck-Holmfeld, 2002; Kolmos & Graaff, 2003; Savery, 2006; Savin-Baden, 2007). In line with Barrows they argue that important aspects are the design of the problem, who formulates the problem and who is responsible for the major decisions in relation to the problem solving process (teacher or participant directed). Also they highlight the importance of experience learning, where students build on their own experiences, and the notion of learning through active engagement in actual practices or real-world problems which involve research activities, decision-making and writing. In addition, they stress the principle of inter-disciplinarity, which is related to the principles of problem orientation, and participant directed processes because the solution of problems can exceed traditional subject-related methods and boundaries; and thus the knowledge of the teachers and the limits of the particular subject. They equally argue that group work and collaboration is an important principle (though some argue that PBL can be more self-directed understood as more individualised), but they also point to differences in the understanding of collaboration, and the way in which students are mutually interdependent. At Aalborg University the students work closely together for an extended period of time, within which they have to formulate and identify the problem, and write a project report, whereas students at Maastricht University follow a model where they are less dependent on each other. They work individually on the case they have chosen (which are open ended but suggested and formulated by the teachers) and meet in larger study

groups (8-12 people) they can use as an inspiration and backdrop for their own work. In this sense one could say that the Maastricht model is more of a *cooperative* organisation of the work whereas the Aalborg model is a *collaborative* organisation. McConnell (2002) distinguishes between distributed *collaborative* and distributed *cooperative* learning. Roughly, the distinction here is whether the work on the problem itself and the outcome is shared (collaborative) or whether individuals engage in discussions and reflection on their own, individual assignments with others (cooperation). We do not mean to limit ourselves to discussing particular instances or interpretations such as either the Aalborg or Maastricht model of PBL, but we do find that the distinction between cooperative and collaborative modes of group work/collaboration is important as a more generalised trait of PBL. Moreover, as we shall return to, distinctions similar to those of collaboration and cooperation are also demarcation lines along which we can discuss variations between particular theories or perspectives on learning.

On basis of this brief discussion of PBL and building on Ryberg et al. (2006) we can extract three important characteristics of PBL, which we can use to distinguish between various theoretical and practical constructions of PBL –in the first place regardless of whether it is collaborative or cooperative. We propose that we can distinguish between: *The problem, the work process, and the solution*. “The problem” opens questions about who controls or owns the formulation and design of the problem: teacher, student or others? “The work process” is concerned with how working processes are organized and who controls them. Who chooses in which way to investigate the problem (theories, methods, empirical investigations etc.) and is the sequencing of task controlled and designed by a teacher, or do the students organise the work? Finally, one can query into who owns “the solution”, meaning to which degree the students are expected to come up with a pre-defined solution or to which degree this is a process of exploration and knowledge production. The three dimensions can then be thought of as stretched out between two ends of continua between teacher and participant control (Ryberg, Koottatep, Pengchai, & Dirckinck-Holmfeld, 2006):



**Figure 20: Central dimensions of problem based learning.**

As further explored in (Symposium Paper 1) these fundamental questions of ownership and control seem also to be more generally applicable in relation to wider debates about web 2.0 and learning. For example, as highlighted by (Symposium Paper 1) and Dalsgaard (2006) questions of ownership refer to discussions of who controls and chooses the tools of production, and who directs and orchestrate the learning processes; but also whether the learning processes are directed towards *acquiring* particular predefined institutional learning outcomes and competences, or whether the processes are directed towards addressing open-ended, real-life problems by *participating* in identifying and 'solving' such problems, thus making the very process of participation and enquiry the curriculum. As pointed out by Dohn (2009), who draws on the distinction between the acquisition and participation metaphor (Sfard, 1998), this fundamentally concerns whether web 2.0 tools and practices should be 'tamed' to meet existing educational goals, or whether they should be adopted as a means to change existing educational models towards a more *participationist* approach (which also aligns well with a common distinction of whether PBL is adopted as a 'teaching method' or as 'the curriculum' (Savin-Baden, 2007)). As Dohn (2009) points out educational change has been the aim of many theorist and practitioners working with educational technologies. Once again it is important to stress that we do not argue for one or the other approach, but merely want to point out that being aware of and reflecting on the

overarching motives for adopting PBL or web 2.0 practices is an important and very fundamental question for practitioners to address. In essence, this concerns whether the tools, practices and methodologies are seen as (potentially) more motivating or effective ways of 'doing the same', or whether these are vehicles for more or less radical ways of changing existing practices, if we should place them at two ends of a spectrum.

#### **C.4.4 Networked learning, social learning and different understandings of collaboration**

As mentioned web 2.0 seems to have popularised ideas of sharing, collaboration and social learning, but as also indicated by distinctions between cooperation and collaboration there are different ideas about how 'learning interactions' can and should be organised. This concerns different modes of interaction, but also, as we shall return to, interactions at different levels of scale. These complexities are captured in one of the definitions that have become central within networked learning:

*“Networked learning is learning in which information and communications (ICT) is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources”* (Goodyear, Banks, Hodgson, & McConnell, 2004)

Firstly, this definition of networked learning goes beyond merely denoting 'online learning' or 'e-learning', as it encompasses theoretical assumptions about learning and how to design for learning. The definition stresses the connections *between* people and *between* people and resources, but also points to a certain level of social organisation between learners, tutors and resources i.e. a learning community. However, the notion of a learning community and the strength of the ties or connections between people can differ in various interpretations. Some have criticised notions such as Communities of Practice (CoP) (Lave & Wenger, 1991; Wenger, 1998) and the strong focus on 'collaborative learning' within the area of CSCL, and have voiced a concern that these perspective focus too much on networks composed of strong ties, thus overlooking the value of weak ties between learners (Jones et al., 2008; Jones & Esnault, 2004; Ryberg & Larsen, 2008). Simultaneously, proponents of networked learning also argue for learning and collaborative knowledge construction processes organised around focused and intensive negotiations of problems (McConnell, 2002; Zenios & Goodyear, 2008). As argued by Jones et al. (2008) networked learning theory does not privilege a particular pedagogical model or ideal; at least not in terms of uniformly favouring collaboration or unity of purpose in a community of learners. However, the ideas of relations and connections also suggest that learning is not confined to the individual mind or the individual learner. Rather, learning and knowledge construction is located in the connections and interactions between learners, teachers and resources, and seen as emerging from critical dialogues and enquiries. As such, networked learning theory seems to encompass an understanding of learning as a social, relational phenomenon, and a view of knowledge and identity as constructed through interaction and dialogue. Furthermore, as argued by Jones (2008) this aligns well with social practice, socio-cultural or social learning theories who also situate and analyse learning as located in social practice and interaction, rather than a phenomenon of the individual mind (Jones, 2008). Returning to the discussions of types of connections (weak or strong) and modes of interaction, such as collaboration or cooperation (which can be said to be strongly tied or more weakly tied respectively) we believe there are some important aspects in these distinctions, which can be important for practitioners to reflect upon. In a recently published book on networked learning (Dirckinck-Holmfeld, Jones, & Lindström, 2009) Jones & Dirckinck-Holmfeld (2009) discuss the ideas and tensions between strongly-tied collaborations vs. more loosely tied cooperative modes of learning asking whether the internet and broader sociological trends have resulted in a



social shift from more cohesive, communal towards more dispersed, personalized relations. This they relate to the notion of networked individualism coined by Wellman and explored by Castells and they pose the questions:

*“Networked individualism might suggest that we need to take a more critical approach to the theories of education and learning that are based on community and collaboration. The term also suggests that we can do this without ruling out the central place of communication and dialogue in education and learning. [...] We argue that a key question for research is whether the Internet will help foster more densely knit communities or alternatively whether it will encourage more sparse, loose knit formations. [...] a significant question is whether designs for networked learning environments should reflect the trend towards networked individualism or serve as a counter balance to this trend, offering opportunities for the development of collaborative dependencies.” (Jones & Dirckinck-Holmfeld, 2009, pp. 6-7)*

Clearly, these ideas challenge (some) of the models of PBL formerly introduced (in particular the Aalborg model for PBL), but also as we shall return to, hold developmental potential and can act as a window of opportunity.

Another perspective that seems to align well with networked learning theory and also seem to challenge ideas around collaboration and tightly knitted communities is the notion of connectivism (Siemens, 2005) which has attracted some attention in the recent years. Connectivism has been presented as a learning theory for the 21<sup>st</sup> century, and has been closely aligned with recent technological changes – in particular the pervasiveness of various ‘networked technologies’ such as email, the web and more recently social networking, blogs, RSS and various mechanisms for aggregating and filtering information:

*“Over the last twenty years, technology has reorganized how we live, how we communicate, and how we learn. Learning needs and theories that describe learning principles and processes, should be reflective of underlying social environments” (Siemens, 2005, Introduction section, para 1)*

The argument proposed by Siemens (2005) is that existing theories or paradigms of learning (behaviourism, cognitivism and constructivism) cannot sufficiently explain or account for the fundamentally changed conditions for learning brought about by the changes in the technological landscape e.g. abundance of information, the increasingly shorter half-life of knowledge, the need to continuously stay updated with the newest information and resources, and that many information processing tasks can be delegated to technology (or social filtering through networks at different levels of scale). Siemens (2005) argue that learning rests in the capabilities of forming connections to other people, networks and sources of information and that the capacity to recognize or create useful information patterns are crucial:

*“The starting point of connectivism is the individual. Personal knowledge is comprised of a network, which feeds into organizations and institutions, which in turn feed back into the network, and then continue to provide learning to individual. This cycle of knowledge development (personal to network to organization) allows learners to remain current in their field through the connections they have formed.” (Siemens, 2005, Connectivism section, para 7)*

Although, this seems to be very similar to some of the ideas expressed in networked learning theory, it also seems to have a much stronger focus on the individual, and the individual's capacity to sift through, filter, find and utilize various networks to retrieve resources and ideas which can enhance the individuals' capacity (and thus the whole network). In this sense other persons (who are in themselves personal networks) and networks at different levels of scale seem to become instruments or hubs through which the individual can retrieve these. In our interpretation, it seems that the most fundamental relations are those between an individual and a resource or idea, possibly acquired and filtered through a complex socio-technical network. Although, Siemens argue that knowledge and thinking reside outside the head, it does seem to be a very different perspective when compared to social or socio-cultural theories of learning (also because Siemens relate patterns in external networks with neural networks, thus making a reference to neuroscience). Even though the filtering mechanisms are moved outside the individual's head, it is not entirely clear to us, whether this represents a re-location of a basic 'cognitivist information processing' metaphor dispersed into a socio-technical network, or whether concepts such as 'communities', 'networks' and 'collaboration' have a more significant role. We believe that these differences can be fruitfully discussed by highlighting distinctions made between a socio-cultural and socio-constructivist perspective (Dillenbourg, Baker, Blaye, & O'Malley, 1996). Whereas the socio-constructivist approach understand groups (or collaboration) as consisting of individual and relatively independent cognitive systems, which exchange messages, the socio-cultural perspective suggests that groups or collaboration can be understood as a single cognitive system with its own properties. Thus, in a socio-constructivist view (primarily inspired by Piaget) individual cognition is strengthened, matured or catalysed by social interaction, but the cognitive development remains tied to the mental operations of the individual, and has its own logic relative to the existing mental apparatus of the individual. In a socio-cultural view (inspired by Vygotsky) the focus is on social practice, artefacts and how individual cognition and cognitive structures are seen as formed by/forming the social, cultural world.

In our interpretation of Siemens' ideas it seems that the individual nodes in the network grow by their 'own logic' (aka their unique social network or constellation of connections), thus acting as relatively independent nodes, who however affect others and the network as a whole. Although, Siemens highlight communities and connections between people it is not clear to us, what is the role of dialogues, collaboration or mutual construction of knowledge or how well connectivism can account for (or is interested in) such patterns of learning. It seems to be a more individualized or personalized perspective on learning than e.g. networked learning theory, and although there are many authors who challenge notions of strongly tied communities, communication, dialogue and mutual construction of knowledge seem to play a more central role. This difference is also reflected in online postings where Siemens expresses a discomfort with the term 'collective intelligence', and argues instead for the term 'connective intelligence':

*"For reasons of motivation, self-confidence, and satisfaction, it is critical that we can retain ourselves and our ideas in our collaboration with others. Connective intelligences permits this. Collective intelligence results in an over-writing of individual identity"*  
(Siemens, 2008, Collective Intelligence? Nah. Connective Intelligence section, para 3)

This highlights critical questions, which have also been raised by others in relation to socio-cultural theories of learning; namely whether individuals are 'puppets and marionettes of the culturally given' and become mere reflections of socio-cultural forces where cognition is uniformly structured or *determined* by the social. However, socio-cultural theorists strongly emphasise how individuals and collectives continuously produce new, surprising behaviour, knowledge and artifacts (Engeström, 1987, 1999). Our purpose, however, is not to argue for one

of these theoretical perspectives, but rather to point out the underlying differences between more individualized and more social views of learning and cognition, as these may have an impact in terms of designing for learning, in relation to modes of interaction, roles, tools and types of activities preferred.

Related to these debates on tensions between individuals, the social and more networked views on social interaction and learning, we find the ideas and distinctions proposed by Dron & Anderson (2007) valuable. They suggest that we can distinguish between three levels of social aggregations which they term: the *group*, the *network* and the *collective* (Dron & Anderson, 2007). *Groups* are more tightly knit social constellations often mutually engaged in working with a common problem, project or task, whereas *networks* entails more fleeting membership structures and boundaries, are emergent rather than designed, and do not necessarily revolve around a particular task. Finally, the *collective* has an even looser and more emergent structure with no sense of conscious membership or belonging. Collectives are aggregations of individuals' uncoordinated actions from which e.g. tag-clouds, recommendation systems or page-ranking systems emerge. In particular, web 2.0 technologies have amplified and rendered the latter two levels of social aggregation visible, and these are also interesting challenges to tightly knitted constellations such as group work in PBL. The main idea is that the learner should be placed squarely in the middle of these overlapping aggregations and be able to draw on all three in their (self-directed or more collaborative) learning processes.

Following from this, PLEs (or VLEs) can thus be designed and shaped in different ways depending on the underlying view of cognition, learning and the types of interactional dependencies preferred. These can be designed as constellations of technologies where the individual freely forms and controls their own learning processes by connecting to others for inspiration or resources across the various levels of aggregation. However, they can equally be designed as platforms for strongly tied collaborative work and dependencies, where there is a greater level of transparency between the groups and between the groups and external resources and materials (Dalsgaard & Paulsen, 2009). In the latter sense, groups and not only the individuals, become the social filtering mechanism or 'interpretative communities'. As suggested by Dalsgaard & Paulsen (2009), we can differ between *individual*, *cooperative* and *collaborative* strategies for learning and interaction, and relate these to the different levels of social aggregation (groups (collaborative), networks (cooperative) and collectives – although they do not discuss collectives in detail). Furthermore, as previously discussed, various PBL-strategies can also be mapped along the lines of more individualised, cooperative or collaborative approaches, as e.g. reflected in the differences between the Aalborg and Maastricht models of PBL. Consequently, the approach chosen by practitioners in terms of interactional dependencies and the variety of PBL models also impacts how the learning environment should be designed and what tools and practices should be made available or encouraged (for further discussions of this issue see (Symposium Paper 3)).

#### **C.4.5 Concluding remarks**

The intention of this paper is not to argue for particular interpretations or models of PBL, or to promote certain interactional dependencies. Our aim has been to discuss and distil some pertinent characteristics and differences between different ways of designing for networked PBL and adopting web 2.0 tools and practices. While the mainstream interpretations of web 2.0, highlighting more social, student centred, collaborative and production oriented pedagogical strategies, align well with most interpretations of PBL, our purpose has been to identify and make visible the subtle differences glossed over by generic terms such as 'social' and 'collaborative'. While the theoretical differences might be difficult for practitioners to make immediate sense of, they make quite a difference when it comes to practical design of networked PBL courses, but

also in deciding which web 2.0 technologies and practices to incorporate for a particular course. In terms of PBL approaches we have argued that these constitute a very diverse and complex landscape, but also that some of the pertinent characteristics which one can use to conceptually differ between diverse PBL strategies, relate to the distribution of power between teachers and students along three axis which we have termed: the problem, the process and the solution. It is our hope that practitioners can use these distinctions and questions as practical guidelines and support in creating institutionally and locally sound responses to implementing PBL in particular courses (see Symposium Paper 3). Furthermore, we have argued that there are some underlying theoretical differences in how various perspectives perceive relations between the individual and the social, and how they view cognition and learning. This can lead to different preferences in terms of interactional dependencies (e.g. collaborative, cooperative or more individualised learning strategies), but also in terms of how various levels of social aggregation (groups, networks and collectives) might be promoted, valued or enacted in particular course designs. While for instance many designs for networked PBL seem to have favoured more tightly knit types of interaction (collaboration and dialogues in groups or more cohesive networks) (McConnell, 2002; Dirckinck-Holmfeld, 2002), the emergence of more dispersed networked technologies and 'collective' patterns of aggregating individual uncoordinated action hold interesting opportunities for expanding existing designs for PBL and collaborative learning (without excluding the value of more tightly knitted interactional dependencies). Finally, we have pointed to a crucial question in adopting PBL and web 2.0 practices concerning the motivation for doing so; namely whether they are seen as (potentially) more motivating or effective ways of 'doing the same', or whether they are envisioned as vehicles for changing existing practices. Though, this might seem an odd question, we believe, as also suggested by Dohn (2009), that a 'full package subscription' to web 2.0 practices and PBL (or a participationist perspective) might encompass more radical changes and tensions (e.g. in terms of responsibilities and power delegated to students), which are important to reflect upon. The questions, models and concepts identified in this paper will be more intimately connected to issues of practical design in (Symposium Paper 3)

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## **C.5 Developing a Design Methodology for Web 2.0 Mediated Learning**

### **C.5.1 Abstract**

In this paper we discuss the notion of a learning methodology and situate this within the wider frame of learning design or “Designing for Learning”. We discuss existing work within this broad area by trying to categorize different approaches and interpretations. Specifically targeting what can be viewed as a lack of attention paid to integrating the preferred teaching styles and learning philosophies of practitioners into design tools, we present a particular method for learning design; the Collaborative E-learning Design method (CoEd). In the paper we describe how this method has been adopted as part of a learning methodology building on concepts and models presented in the other symposium papers, in particular those of active, problem based learning and web 2.0-technologies. The challenge of designing on the basis of an explicit learning philosophy, and still trying to develop a design method or tool with a certain general applicability is discussed at the end of the paper. Experiences from a recent design workshop are described and discussed, with a focus on what specific steps have been taken in order to apply the method successfully within the EAtain2 project as a way of enabling teachers and practitioners to design courses in collaboration. As part of the collaborative e-learning design (CoED) method and the broader learning methodology the authors gave a workshop for the project partners, and the results and inputs from this workshop will be briefly discussed in this paper and in the symposium presentation.

### **C.5.2 Introduction**

As part of one the work packages in the EAtain2 project our research team are working on creating a learning methodology, which addresses how to adopt active problem based learning approaches and web 2.0 technologies in a range of courses on 'Enterprise Architecture'. In this final paper of the symposium on "Web 2.0 and Problem Based Learning in Enterprise Architecture Training" we therefore turn our attention towards more practical methods and methodologies for design, which will be discussed in their own right, but also draw heavily on the concepts, models and questions which have emerged from (Symposium Papers 1 & 2). In this paper we present the rationale and theoretical underpinnings of our proposed learning methodology which combines insights from the area of learning design with a particular method called CoED (Collaborative E-learning Design) method (Nyvang & Georgsen, 2007). Initially we discuss the area of 'learning design' where after we locate CoED within this theoretical landscape. Then we describe how we have applied the CoED method in practice as part of an EAtain2 workshop. We discuss how we designed the workshop, what the outcomes and insights were, and how these have then led into a more specific methodology for the continued course design within the project. In relation to this we discuss the design artefacts and templates, which are being developed and finally we briefly connect this to the wiki-based community Methopedia (Ryberg et al., 2008; Ryberg, Niemczik, & Brenstein, 2009), which is further explained in (Symposium Paper 1).

### **C.5.3 Learning Design**

Learning design is an area of research that has gained increased attention within the recent years, and very broadly stated the area is concerned with enabling educators to create, design and share pedagogically sound, high-quality learning designs or effective practices. One common notion within this area is the importance of learners' activity or learning activities, as summed up by (Britain, 2004):

- *The first general idea behind learning design is that people learn better when actively involved in doing something (i.e. are engaged in a learning activity).*
- *The second idea is that learning activities may be sequenced or otherwise structured carefully and deliberately in a learning workflow to promote more effective learning.*
- *The third idea is that it would be useful to be able to record 'learning designs' for sharing and re-use in the future. (Britain, 2004, p. 2)*

Even though there are many different interpretation of what constitutes a 'learning design' or a 'learning activity', there seems to be a general understanding that a learning design has a certain learning objective, has a sequential structure or flow, consists of multiple learning activities, and that there are a number of resources and/or learning supports related to the design or the activities. The relations between learning designs and learning activities are therefore often thought of as expressible in terms of nested hierarchies, where a learning design consists of several learning activities. Learning activities, however, can also encompass multiple smaller learning activities (which for example in the IMS-LD specification are referred to as an activity structure).

More generally, while the area of learning design signals a move away from an exclusive focus on delivering (digital) packaged content to students, early e-learning research tended to focus on the development and sharing of content (Conole, 2007). In particular discussions of digital content have revolved around the granularity of 'learning objects, and whether these should be understood as free-floating 'digital assets' (single files such as images, videos or audio clips) or embody learning outcomes and activities. Littlejohn et al. (2008) proposes the following classification scheme to distinguish between different levels or understanding of learning objects/activities (Littlejohn, Falconer, & McGill, 2008, p. 759):

- Digital assets – normally a single file (e.g. an image, video or audio clip), sometimes called a 'raw media asset'.
- Information objects – a structured aggregation of digital assets, designed purely to present information.
- Learning activities – tasks involving interactions with information to attain a specific learning outcome.
- Learning design – structured sequences of information and activities to promote learning.

Furthermore, they stress that the first two levels are primarily 'information content', and therefore have no learning or teaching effect in isolation, but require that the 'information content' is placed within learning activities or designs (ibid.). This also reflects a broader concern with more content oriented approaches, because an overly exclusive focus on content can easily lead to very instructivist learning models (Conole, 2007). Therefore, rather than focusing on content in isolation, the idea of learning design is to understand content as part of a flow of learning activities that students engage with, and how these flows can be represented and shared in various ways. Such representations range from purely textual descriptions to embedded elements in software systems and packages, which can represent and run pre-designed sequences of activities. The ladders are the intentions behind standards and software systems such as LAMS (Learning Activity Management System) and IMS-LD.

Within the area of learning design there are many ways of distinguishing between different levels of granularity, and also many interesting attempts of mapping the relations between learning designs, learning activities, learning theory/pedagogical approaches – and the particular contexts they are enacted in (other detailed mappings can be found in (Fowler & Mayes, 2005; Conole, Dyke, Oliver, & Seale, 2004)). In particular, the relations between learning theories or pedagogical approaches and then more concrete learning activities or learning designs are



interesting, but also, as we shall return to, quite complicated. These relations are interesting because one of the points of learning designs is to make teachers more reflective about their teaching practice, and how to design for effective learning by providing them with ‘frameworks’ for creating and describing learning designs. This also encompasses providing teachers with theoretically informed models of ‘best practice learning designs’ to promote better fits between ‘theory’ and ‘practice’ (Conole et al., 2004). In this vein many theorists have worked on creating impressive mappings of the differences and similarities between various learning theoretical perspectives (Conole et al., 2004), but also more detailed schemes of how particular theories would entail different pedagogical approaches and variations in more concrete learning activities (Fowler & Mayes, 2005; Mayes & de Freitas, 2004). For a simple, but also broad way of understanding and visualising these relations, we have found inspiration in a model by (Berge, 2006), where we have added alternative descriptions (the grey column).

Pedagogy, Learning Theory	Pedagogical Approach			
Course templates, descriptions, sequences of activities, learning designs	Course Design			
Activity structures, activities, mini-activities	Course design components			
Materials and resources	Own Material	External material	Repurposed external material	Reification of practice

**Table 6: Model adapted from Berge. (2006)**

The model was originally designed to describe different ideas for reusing learning resources coupled with different standards. For example the SCORM-standard provides a strong platform for supporting reuse of materials, whereas IMS-LD and LAMS are more optimal for representing ‘course design components’ and ‘course designs’. What is interesting is that, according to Berge (2006), the level of ‘Pedagogical approach’ is beyond the level of standardisation. Instead, he suggests that reuse at this level is supported by the body of pedagogical literature (of which some parts are more prescriptive in terms of how certain theories can be applied in actual pedagogical practice, and other parts are of a more general theoretical nature). Although this argument seems to be in opposition to the attempts of mapping these relations, the intention of such mappings is not to arrive at standards for design. This should rather be seen as a way providing an overview of a highly complex theoretical landscape and thus trying to reduce complexity for practitioners. Nevertheless, it does highlight some tensions which also become visible in practice. While it might be a practitioner’s or theorist’s dream to have prescriptive models embedded in software, which at the click of a button could generate a course and a range of learning activities congruent with a particular pedagogical perspective and aligned with a subject area, the actual practice of designing for learning is more complex, contingent and situated. As explored by de Freitas et al. (2008) more generalised frameworks and models can be useful tools in supporting practitioners’ design of networked learning, but at the same time practitioners need to remodel these to make them useful, meaningful and relevant for their own contexts (de Freitas, Oliver, Mee, & Mayes, 2008, p. 38). Alternatively, such standardised frameworks run the risk of alienating and marginalising practitioners:

*“Perhaps most importantly, however, this analysis calls into questioning the whole project of standardized approaches. In this specific context, the role of research-*

*generated models in influencing teachers' practice has been shown to be problematic. What this study indicates is that there is a stark choice for such models: either they will marginalize teachers by being imposed on practices in a way that practitioners fail to understand, or else they will be adapted, becoming meaningful but nonstandard. The ideal of a universal approach to representing teaching practice becomes either undesirable or impossible.” (de Freitas et al., 2008, p. 38)*

Furthermore, ‘pure’ theoretical models promoting a particular pedagogy or learning theoretical perspective also run the risk of being difficult to align with actual design practice, which is (for good reasons) often more pragmatic and dynamic, and employ a variety or blend of approaches, rather than adhering to one particular approach. These insights obviously shed a critical light on and problematise the very notion of developing a ‘learning methodology’ intended to support a problem based learning approach capitalising on web 2.0 practices. While our research could have created a range of more prescriptive ‘innovative’ learning designs based on particular interpretations of PBL and web 2.0 practices we risk marginalising the experiences and expertise of the domain experts (the partner researchers teaching Enterprise Architecture). Also, as we have suggested in (Symposium Paper 1 & 2) the adoption of (some) web 2.0 practices and PBL approaches might entail more fundamental pedagogical shifts or changes (e.g. radical learner centred pedagogies), which might be incompatible with practitioners’ values or desires for change, but could potentially also be in conflict with institutional requirements or national policies (de Freitas et al., 2008). In the context of the EATrain2project, we have therefore adopted a more collaborative and iterative design approach, which requires mutual engagement and negotiation between educational technologists, domain experts and technical developers. Rather than further developing or drawing directly on extensive frameworks and mappings of relations between a learning theoretical approach and particular activities, we have tried to extract and distil some central tensions concerning web 2.0 and PBL, which we have translated into a number of questions, models and conceptual distinctions (Symposium Paper 1 & 2). These have, as we shall return to, been incorporated into the CoED-framework and the particular design of the workshop, but also in a range of mediating design artefacts and templates, which we hope can act as ‘boundary objects’ for mutual negotiation between the different partners in the continual, iterative process of designing the Enterprise Architecture courses. In this sense, our aim has been to provide what Conole (2007) terms ‘mediating design artefacts’ in the shape of ‘toolkits’ (*a structured resource that can be used to plan, scope and cost an activity* (Conole, 2007, p. 87)) and ‘models and patterns’ which are:

*“[...] a model is an abstract representation that helps us understand something we cannot see or experience directly. Patterns [...] are more flexible descriptions of problems that practitioners will not directly reuse, but that provide guidance and illustration of an approach to the problem” (ibid.)*

In the following we outline the CoED-method and then discuss in more detail how we designed the workshop, what the outcomes were, and the subsequent development of additional design artefacts.

### **C.5.4 Developing design tools for practitioners**

As stated above, the development of learning design models must be placed within a span between at one end of the spectre a content oriented “digital asset”-approach, and at the other end a process oriented, situated design process drawing on the inputs and priorities of local pedagogical and domain experts. At eLearningLab, Aalborg University, a method for supporting the design work of practitioners has been developed and tried out in a number of different settings. The CoED method aims to support domain, qualification level and subject experts in

designing targeted e-learning and webbased and networked learning. Drawing on knowledge and theoretical concepts within the fields of design, systems development and collaborative learning, emphasis is on bringing focus and structure to the early stages of the design process. The method aims to develop design specifications and/or early prototypes within few hours of work, and furthermore to support the collaboration between different types of experts and practitioners. The status and usability of early prototypes of course designs depends on several factors which we will return to later in this section. The CoED method is developed partly in the Learn@Work project and partly in other projects by researchers from *e-learning lab – center for user driven innovation, learning and design, Aalborg University* ([www.ell.aau.dk](http://www.ell.aau.dk)). In the following, the theoretical and conceptual basis for this tool is presented, followed by a detailed walk-through of how it has been used in the specific context of the EAtrain2-project.

As indicated in the definitions by (Britain 2004) the focus in learning design within networked learning builds on explicit pedagogical values or preferences (here problem based learning); however, the process of connecting the consequences of a specific set of pedagogical values or a specific learning philosophy is more often than not overlooked when talking about ways of designing. In the CoED method the point of departure has been a desire to let the preferences of the teaching practitioners play a pivotal role in the design process. In previous work attempts have been made to incorporate well-known pedagogical planning tools into conceptual models for design of networked teaching and learning (Georgsen, 2005), and a number of critical issues have been identified as part of this work. In the Flexnet project (<http://www.ell.aau.dk/Flexnet.54.0.html>), design work was focused on the three elements pedagogy, technology and study/learning materials, and as illustrated below, the careful consideration of the interplay, tensions and mutual dependencies of these three elements constitute a crude outline of a design methodology in itself. The considerations can be summed up as follows:

**Pedagogy:** Through use of technology and use of changed study materials new possibilities are offered to the students. Pedagogy is all about facilitating learning. Thus, in order to take advantage of the potential added value of the technology, the planner/teacher must carefully consider the consequences of his or her pedagogic values. If e.g. the planner/teacher aims at constructivist learning, then study materials and communication technology used on the course must be selected and designed to facilitate and support this. As such, a flexible design tool should be “value-free” and allow for the implementation of various pedagogic perspectives. By including a process of defining core values in the teaching philosophy in the design work, CoED allows for this.

**Technology:** Technology is always used within a specific context, and the interplay between design and use of technology is an important one, especially in relation to educational practices where this situated perspective becomes even more critical. Therefore, design, test and evaluation of technology/tools for educational purposes must be carried out in authentic settings in order to ensure that the tools and use thereof are adjusted to the settings and needs of the specific culture and subject matter. By engaging both teaching experts and future users in the design process, CoED aims at bringing authenticity into the heart of the design process.

**Study materials:** The characteristics of online materials are different from traditional paper based materials in more ways than one, and as such they, at the same time, hold new pedagogic potential and pose a challenge to teachers. In order to develop materials and ways of working/teaching which support the overall teaching philosophy and learning style of the specific design, the process of matching student activity and technology design is an important one in the CoED method.

In order to progress beyond “black box-thinking” where notions of learning and teaching are embedded into tools, technologies and materials prior to the engagement of teaching professionals or domain experts (cf. the waterfall approach described above), we need to acknowledge the interrelatedness between pedagogy, technology and study materials. This is the case whether we concern ourselves with designing complete courses or just elements thereof. Development of the CoED method should be seen as an attempt to further the involvement of all relevant parties in the design process, in order to enhance the influence of learning models and teaching philosophy in the designs.

### **C.5.5 History and introduction - Theoretical and methodological background for CoED**

CoED is a common methodological framework developed with input from research on:

- Systems development – because we design (for) information and communication technology
- Collaborative learning – because we design for learning and learn in the design process
- Facilitating creative processes – because the aim is to develop something new

In the following we will go into greater detail with the contributions from these domains.

### **C.5.6 Systems development and design**

Within systems development and design we can identify several development paradigms of which only a few offer relevant contributions to the design of learning activities today. The focus of systems development has traditionally been on management of development projects by means of linear processes organising system engineering from idea and system requirements to system design, programming and technical test (the so-called waterfall model) (Vliet, 1993). This approach is often criticised because of its’ straight-line linear process focusing on designing a technical system, thus producing tangible designs only at the very end of the project (Beyer & Holzblatt, 1997; Dahlbom & Mathiassen, 1993; Larman, 2003). The same sources also stress that development of ICT normally involves more than a technical system; namely social systems which influence and are influenced by the technical system. This leads to the assumption that a systems development method must in fact facilitate a learning process which involves both designers and future users in a short cycle iterative development which continuously produces designs that can be tested with users. Some sources stress that possible future practices with a new system can be subjected to discussion involving designers and users even before the very first prototype. This is done by the use of scenario based narratives, forecasting the future with a new system (Carrol, 1995).

### **C.5.7 Collaborative learning in design teams**

The systems development domain has already drawn our attention to the fact that specification and design can be regarded as a learning process in a community of learners learning together. According to Wenger, a social theory of learning must include community, practice, meaning and identity (Wenger, 1998). Learning in a community of practice thus involves negotiation of meaning which is a process of participation and reification. Von Krogh, Ichijo and Nonaka stress a similar complex understanding. They, however, talk about *knowledge creation* rather than learning. They define knowledge as *justified true belief, individual and social, tacit and explicit* (Von Krogh, Ichijo et al. 2000, p. 30). As a consequence, knowledge creation cannot be managed, only enabled: “*Instil a knowledge vision, manage conversations, mobilize knowledge activists, create the right context and globalize local knowledge*” (*ibid.*). Within a team of designers, which

perhaps includes users, it is reasonable to expect participants to bring different knowledge and thus different *justified true beliefs* to the process, which subsequently calls for a negation of meaning within the design team. In addition to this, one of the lessons from systems development is that it is important that beliefs *do get* challenged and subjected to both negations and test. We thus draw on methods and techniques for challenging and negotiating beliefs.

### C.5.8 Facilitation of creative processes

This source of inspiration is of a more practical nature than systems development and learning theory. Card sorting and future workshops, which are both mentioned here, are, however, powerful ways of organising and facilitating a targeted negotiation of meaning within systems development projects.

Card sorting is a widely known technique for exploring differences and negotiating areas of agreement within systems development, and specifically within information architecture. This technique can help individuals explain to the designer how they think about a domain. With groups of card sorters the designer can facilitate discussion and negation of priorities – for example by giving some values priority over others. In the case of value identification, the participants in the card sorting-process start off with a stack of cards with one value sentence or phrase printed on each card. Participants negotiate which cards to keep and which to dispose of. Through a series of steps, which are described in greater detail later in this paper, a group can arrive at a limited number of values all can agree on. The future workshop is another method with a slightly different aim. It leads a group of designer-practitioners through a collaborative process composed of three phases: Critique, fantasy, and realisation. It builds on three basic assumptions:

1. Personally experienced contradictions and problems in practice are drivers for solutions and change, hence the critique phase.
2. If suggestions for solutions are constrained by feasibility and sustainability concerns too early in the process, valuable ideas and design solutions will be lost, hence the fantasy phase, and
3. Reality poses constraints that must be taken into account, hence the realisation and distinction between fantasy and reality (Kensing & Madsen, 1991; Jungk & Müllert 1984).

### C.5.9 CoED phases and principles

The CoED method facilitates the design process by following five principles and splitting the early design into three phases.

Principles - the CoED method:

1. Facilitates conversations about e-learning design
2. Structures conversations about e-learning design
3. Produces design specifications and/or actual designs rapidly
4. Involves e-learning experts, domain specialists and future users of the e-learning design
5. Involves at least two people in the design process

Phases

1. Focus the e-learning design process
2. Identify overarching values and design principles
3. Specify design

Following principle number four, the design process ideally involves learning experts, domain specialists and future users of the learning design. We are aware, however, that this is not always the case, and not always possible either. By mapping the range and degrees of the different areas of knowledge involved in the design process, it becomes possible to predict a number of actions and procedures in the design process. In the matrix below we predict four possible outcomes and procedures following the CoED workshop.

	Low degree of domain knowledge	High degree of domain knowledge
Low degree of pedagogical/didactical knowledge	Situation 1: The CoED product should be reviewed and tested by domain specialists, future users and learning designers.	Situation 2: The CoED product should be reviewed by experienced learning designers.
High degree of pedagogical/didactical knowledge	Situation 3: The CoED product should be reviewed by domain experts and/or tested by domain experts and end users.	Situation 4: The CoED product can be implemented without further research or test.

**Table 7: Matrix of dependencies and expected outcomes in the CoED method.**

In the EU project ETrain2 we used the CoED method as our foundation and customized it in relation to the web 2.0 and the PBL models presented in (Symposium Paper 1 & 2). The methodology arising from this was used in a workshop aimed at helping teaching practitioners within the field of enterprise architecture design courses building on PBL and web 2.0 learning. As mentioned in the earlier section above, the CoED method works by splitting the design process into three phases. In the following we will describe how we customized this method in relation to the specific workshop with ETrain.

In *phase I* of the design process the idea is to focus the design activity in relation to the overall approach to and understanding of learning, domain, and technology. In the workshop the coordinator presented the participants to key issues in pedagogical design of web 2.0 mediated learning. This was done to focus the attention on the philosophy of the design which concerns:

- 1) the understanding of learning (and subsequently teaching)
- 2) the understanding of the domain of enterprise architecture, and
- 3) the understanding of PBL and web 2.0 technologies and the role they play in both the design and the learning process (Nyvang and Georgsen 2007: 8).

As described in symposium paper 2, the characteristics of a web 2.0 activity fit well with a learning approach based on PBL. Therefore the focus in this first phase related to the aim of designing for web 2.0 mediated learning should lead the participants to an understanding of PBL and web 2.0 for them to further exploit these in the actual design.

In *phase II* the goal is to identify the overall values and principles to guide the design. Inspired by the CoED method the participants in the workshop conducted a card sorting exercise, using cards with different positive statements about teaching and/or learning values or pedagogical concepts (further details can be found in Nyvang & Georgsen 2007; and Buus et al. 2009). The participants prioritized the cards into groups of: 1) the most important, 2) the important, 3) the less important, and 4) the unimportant. During the two rounds of card sorting, participants discussed the chosen teaching/learning values by reflecting on questions related to the four continua: *the learning*

*process, the motivation, the infrastructure (e.g. the system) and the resources/content.* The continua or questions were not presented directly to the participants, but were built into the design of the particular cards used. Through these discussions the participants discovered the consequences of the learning approaches presented in phase I, while at the same time making it possible to see what dimensions in relation to web 2.0 they still needed to consider. Moreover, the phase helped the participants sort out contradicting cards. In this way answering the questions helped focus the process towards choosing the final learning values.

In *phase III* the focus is to develop a detailed learning design using the values and principles prioritized in phase II (Nyvang & Georgsen 2007: 9). In this phase the participants worked in two groups or design teams, as the EATrain2project aims at both the public and private sector with its' training courses. Each group had a facilitator asking critical questions supporting the group in formulating a design, which was true to the chosen values and the preliminary design choices made from answering questions relating to the four dimensions presented in (Symposium Paper 1). To guide the dialogue about the more detailed design, participants worked with a set of cards illustrating three factors relevant for pedagogical, technical and domain-related issues: *Resources, activities* and *infrastructure* (Nyvang & Georgsen 2007: 11) – also some of these cards represented the tensions, concepts and models identified in (Symposium Paper 1 & 2) e.g. some were named 'student owns problem' or 'teacher owns solution'. As mentioned in Symposium Paper 1 we suggested to bridge the gap between formal and informal practices by finding patterns in web 2.0 mediated learning in a recreational context and exemplify these as cases. Based on these descriptions, designers could work with transforming experience with domestic and recreational use patterns and user practices into future educational practices.

### **C.5.10 Observations from the Workshop and preliminary analysis of outcomes**

In the following we will evaluate the results and observations from the EATrain2workshop where we used the CoED method as described above. This will also serve as the concluding discussion in this paper.

The workshop was organised with the partners, primarily project leaders from the EATrain2 project with one or two representatives from each partner. There were 7 representatives from the partner organisations and 3 facilitators from AAU. The point of departure for the workshop was presentations of web 2.0 and problem based learning to tighten focus. In the second phase the participants were divided into four groups in pairs of two, dealing with two different cases/target groups: public sector and university. The private sector was merged into the public sector, as the number of participants was not enough to deal with three groups. This phase had two steps and in the second step the four groups was merged into two. As part of the second step in this phase the two groups dealing with the public sector had defined values and they merged the cards from the categories *most important* and *important* and started the process all over again. Merging the values in the public sector group, showed that the groups in their first step had identified almost the same values, and they reached as negotiated values as limited 5 value cards: *Competence development, Collaboration, Active participation, Working with real world problems, Process oriented learning*

The group dealing with university identified in their second step that the values from the first step in general had similar values, but they differed in which of the two categories *most important* and *important* the values were placed. They had a process negotiating about the values in the different categories and arguing their statements to weather the values should be placed in one or the other category. The group ended up with five value cards: *Assessment, Resource based learning, Active participation, Learning independency, Cooperation.*

During the third phase of the workshop, the public sector group started out by defining the goals and the target, but found out that they had a lack of content. In their discussion they had to agree upon an assumption that content is delivered. They were addressing critical issues related to the project frame and logics in the project framework. The other group (university) started with making the goals more clearly related to their values, but found that there was a lack in terms of not knowing more about the content and the purpose of the course. They draw what they saw as a process on a flipchart. A process could be to start with lectures → then exercises, assessment (e.g. student peer reviewed) → together with cooperation and participation, and this was to be seen as a recurring pattern throughout the process.

Emerging from the workshop different issues were identified e.g. about assessment and kinds of assessment. On one hand one could have an approach where collaboration and participation is in focus, or/and one could have an approach where individual assessment is conducted. An important question is how to get from the goal to the assessment method(s), and what to take into account when designing the learning process – what are the purpose for doing ‘this’ activity? Another tension is the limitations in assessment to be aware of, e.g. how are the online course assessed? Emerging from this issue and related to the ontology in the project it will be difficult to address higher level skills with pure online assessments without examiner, facilitator or course instructor taking part in it. Another issue related to assessment is concerning whether the learner should be assessed with reference to the solution or the process.

Another concern emerging from the workshop was issues about pure online courses, and the need of a facilitator. Could it be possible to design purely online courses with no facilitator or course instructor or some other role? How are purely online courses to be managed and who will be organising deadlines for the course? These considerations are very important when taking into consideration to use web 2.0 technologies, and as we also stress in the symposium paper 1 and 2 there are some tensions related to e.g. the process and motivation important to consider when designing for web 2.0 mediated learning. What or who is motivating the learner to do social bookmarking? Is the teacher able to motivate the learner to use a wiki for collaboration? What makes students want to share among each other and not keep it to oneself, and another issue related to assessment is whether the student is going to be measured on this? Some of the issues raised during the workshop and the dialogue after the workshop have opened for further discussion and development of a practical framework for design and reflection in learning design taking web 2.0 and PBL into consideration in the design for web 2.0 mediated learning. The theoretical foundation for this design framework is based on the web 2.0 and PBL frameworks described further in the symposium papers 1 and 2. Building on the answers to the questions in the frameworks for web 2.0 and PBL (Symposium paper 1 and 2) and reflections on types of communication (interactional dependencies) in social software (Dron og Anderson 2007), and a web 2.0 typology described by Dalsgaard & Sorenson (2008), it is possible to design the course in more detail. As a design framework we developed a template which relates the intended learning outcome, pedagogical values, and motivation for change to the concrete modules or units in the course, and choices in relation to e.g. duration, technology, and communication type. These can be identified by using the answers to the questions in the other frameworks.

### **C.5.11 Concluding remarks**

In this paper we have tried to develop a learning methodology for the particular purpose of designing courses capitalising on PBL and web 2.0 learning. This we have done by building on the theoretical foundation developed in (symposium paper 1 and 2) and combined these with a practical approach by integrating the collaborative e-learning design (CoED) method in the EATrain2 learning methodology. This reflects also our aim of creating a more collaborative and iterative design methodology, as existing experiences show that very prescriptive methodologies



might alienate or marginalise practitioners. Therefore, the CoED method seems particularly well suited for this purpose, as it stresses giving a voice to preferred teaching styles and learning philosophies of practitioners, as this is integrated in the very design tools. In addition to this, we have also explored how the insights of (Symposium Paper 1 & 2) were built into the cards and phases of the CoED method. The outcome from the workshop has therefore also been used to broaden the CoED method as a tool for design and to develop a framework for “design for learning” or a ‘learning methodology. The templates and frameworks evolved in this process will from our point of view be beneficial for further development of courses within Enterprise Architecture (EA) building on a PBL approaches and web 2.0 mediated learning.

## C.5.12 References

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- Ryberg, T., Niemczik, C., & Brenstein, E. (2009). Methopedia - Pedagogical Design Community for European Educators. In D. Remenyi (Ed.), *The Proceedings of the 8th European Conference on e-Learning* (pp. 503-511). Academic Publishing Limited.

## D. Methopedia – Rationale of and Examples of the Learning Activities Created and Collected by WP2 Team

One aspect of our research team's approach and work has been to provide the project partners (and other practitioners) with sets of concepts, questions and models. However, another aim is to supply partners with existing learning activities or learning examples which can help them make sense of how web 2.0 oriented learning practices might be designed. We have therefore created and collected a number of practically, as well as theoretically oriented resources/articles with examples of concrete implementations of web 2.0 practices and technologies (in relation to this we refer to the Zotero-group directory/collection of references, where we have placed a number of articles in the Zotero collection "Articles about web 2.0/social software technologies in practice" (<http://www.zotero.org/groups/eatrain2/items/collection/890199>)).

Our aim is to translate such accounts and articles into practice descriptions/learning activities and make them available in Methopedia (<http://methopedia.eu>). Methopedia is an online wiki-based community for educators and trainers which enable them to share learning activities and methods (Ryberg et al., 2008; Ryberg, Niemczik, & Brenstein, 2009). Methopedia has been developed within the COMBLE project (<http://comble-project.eu>), which is also funded by the EACEA Lifelong Learning ICT Programme. The goal of the COMBLE project is to improve the quality of Blended Learning in higher, continuing and business education, and Methopedia is both a wiki and social community which aims at facilitating knowledge transfer between trainers/educators from different institutions or countries through interactive peer-to-peer support, and sharing of learning practices. Thus, the main objective of Methopedia is to enable teachers and trainers across Europe to describe and share their learning practices in a way which is intelligible to their peers, which makes it a suitable outlet for learning practices/activities developed within the EAtain2 project.

Methopedia consists of a wiki for sharing and working together on approaches and learning activities based on editable templates. The templates are very basic and encompass only a 'short description', 'process description', 'required resources', 'examples' and 'comments'. Through various workshops carried out in relation to the COMBLE project, the template has proven to be effective in quickly describing smaller learning activities. We have therefore chosen to use it within the EAtain2 project as a way to support the partners in becoming more familiar with web 2.0 exemplars and for inspiration in relation to their own designs. At the same time the descriptions and activities can benefit trainers and educators across Europe.

### D.1 References

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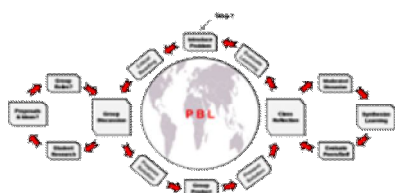
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## D.2 Activities, approaches and description uploaded to Methopedia

Here is the text of the pages uploaded to Methopedia as of today. Since Methopedia is a wiki, the uploaded text is subject to change. All these examples follow the same Methopedia template of “Short description”, “Process description”, “Required resources”, “Examples”, “Comments”, and “Reflection”.

### Problem Based Learning

#### Short description



With Problem Based Learning (PBL) the core concept is to introduce a problem to the learners and solve that as part of the learning process.

#### Process description

PBL is a label covering several learning methods that share a common idea where the learners are presented with a problem that they need to solve with the skills and knowledge gained from the course.

The problem does not have to be a problem; it can also be a posed question, a contradiction, an unexplained phenomenon, or something that makes the learners wonder.

While there are several different and unique ways of applying PBL, there are five specific approaches that show how to apply PBL to most situations.

#### 1. Lecture-based cases

The teacher presents a case to provide perspective on the lecture and show how it can be used in practice. The students do not need to reflect on the case or acquire information independently, as the teacher is going over the case for them.

#### 2. Case-based lectures

The students are presented with one or more cases that will be used to highlight the information in an upcoming lecture. The learners are to examine the cases before the lecture with the knowledge they have before the lecture, and then the teacher will go over these cases using the new information at the lecture.

#### 3. Case method

The students are given a full case, with all the relevant information ahead of the lecture and must set up their own hypotheses about the case and analyze it. This analysis of the case is then discussed in class with the teacher giving feedback on the work done by the students. Through this discussion, the students reflect on the case with the aid of the teacher using the methods and information that the teacher intended to introduce.

#### **4. Modified case-based**

This method has the students go over a case, much like the Case method, but the students are allowed and expected to choose their own approaches and methods. Usually the students work in small groups and discuss the case internally before the lecture where they discuss it with the class and teacher.

#### **5. Problem-based**

The students are presented with a problem, which they must form their own hypotheses about and use their problem solving skills to find a solution. The teacher's role is to advise the students in their information search and can try to remind the students what they've already learned and how it could be used with their current hypothesis. The major difference with this compared to the previous four is that in this approach, it is the students controlling what the hypothesis is, and how to approach it.

A variant of the problem-based approach is the closed loop/reiterative problem based approach. In addition to everything from the problem-based approach, the students are asked to reflect on how they reasoned through the problem and if they would have done it differently with what they've learned from the problem solving. The cycle of solving a problem, and reflecting on it and finding a new solution can be repeated many times, each time adding a new layer of knowledge.

#### **Required resources**

PBL mainly requires time and manpower. It requires more preparation time than classic lectures. Each approach requires more preparation time, with the lecture-based approach requiring the least and the closed loop/reiterative problem-based approach the most.

#### **Examples**

#### **Comments**

This example is developed in relation to the two EU projects COMBLE (<http://comble-project.eu/>) and EATRAN2 (<http://www.eatraining.eu/>)

#### **Reflection**

## Blogging

### Short description



[Image by ~C4Chaos \(Access: 01.10.2009\)](#)

A blog is a type of website, usually maintained by an individual almost like a diary or portfolio. In the blog the author comments or describes events or material such as videos or pictures. The posts are most often displayed in reverse-chronological order (wikipedia 2009). Writing the blog everyday learners reflect on small learning results in relation to the bigger goal of the curriculum and thus learn how to learn (O'Donnell 2006: 17).

Literature:

O'Donnell, M (2006) *Blogging as Pedagogic Practice: Artefact and Ecology* in Asia Pacific Media Educator, Issue No. 17, Dec. 2006

### Process description

To make learners reflective of their own thinking (Crook et al. 2008: 32) the following process is suggested:

1. At least 1/2 hour everyday is reserved for blogging in the classroom. The learners is asked to blog on what they learned that day, what they want to learn better and how they will reach this goal.
2. After blogging every student is asked (on class) to mention some of the things he or she wrote in the blog. It is discussed how he or she can reach the learning goal.
3. The learners is continuously encouraged to comment on each others blogs.

Literature:

Crook, C. (2008) *Web 2.0 Technologies and Learning at Key Stages 3 and 4: Summary Report* in BECTA

### Required resources

Computer and softwareprogram for blogging (find them at: [www.blogspot.com](http://www.blogspot.com) and [www.thoughts.com](http://www.thoughts.com)).

This example is developed in relation to the two EU projects COMBLE (<http://comble-project.eu/>) and EATRAN2 (<http://www.eatraining.eu/>)

**Examples**

Youtube video: <http://www.youtube.com/watch?v=NN2I1pWXjXI>

**Comments**

*Please add additional information, practical advice or limitations here.*

**Reflection**

## Podcasting

### Short description



[Image by the tartanpodcast \(Access: 01.10.2009\)](#)

Podcasting is a way of publishing audio and video content on the web as a series of episodes with a common theme. Moreover this is supported by a so called "feed" making it possible for listeners to subscribe to the series and get new episodes when they are published. Podcasting in this activity is used as an alternative way to present a research assignment (Middelton, 2009: 149).

For more activities using podcasting see Middelton, A. (2009) *Beyond podcasting: creative approaches to designing educational audio* in ALT-J Research in Learning Technology.

### Process description

1. Listen to podcasts from other students and educators to get inspired
2. Discuss in class what makes a good podcast in relation to the assignment and make bulletpoints
3. Write a manuscript for the presentation
4. Record
5. Export audiofile as an MP3 file
6. Upload file to a podcast webservice (Odeo or Podomatic)
7. Learners can subscribe to a podcast made by their group using free programmes (iTunes, Ipodder) or any RSS aggregator.
8. See more under examples.

### Required resources

Computer, basic microphone, podcaster software (windows users can use the free program: audacity, Mac users can use Garageband).

### Examples

Youtube video: <http://www.youtube.com/watch?v=y-MSL42NV3c>

### Comments

This example is developed in relation to the two EU projects COMBLE (<http://comble-project.eu/>) and EATRAN2 (<http://www.eatraining.eu/>)

### Reflection

## Twitter



[Image by Roo Reynolds \(Access: 15.12.2009\)](#)

A new way to engage students through social software – the possibilities of Twitter as a tool for communication and reflection.

### Process description

Each participant signs up on twitter.com with a username.

Depending on the purpose of using Twitter in class the facilitator should make a hashtag # to label the course. It could be #ILS09 or #coursename.

During the course you should ask the students for a number of tweets for each lecture and tag it with the hashtag.

The result of using Twitter in educational settings is a back channel for communication and reflection among students and teachers. Here discussions can be facilitated and you can follow up on different areas of interest.

It is important that you make it clear what the purpose of using Twitter is and how many tweets you expect from each student to start the process of making twitter a part of your teaching.

### Required resources

Laptops, internet connection and a Twitter account.

### Examples

Currently I am co-teacher at course called ICT, learning and collaboration where four students are participating and a remark from that experience is that it is difficult to facilitate discussion. We believe that there would be more activity on twitter - re-tweets, direct messages etc. - if the student were a bit large.

It is also difficult to assess the activity in a qualitative manner because you cannot control the structure and level of reflection on Twitter. You have to require a number of tweets and that seems like the only way to evaluate the student's activity right now.

### Comments

Twitter is also a type of informal learning.

This example is developed in relation to the two EU projects COMBLE (<http://comble-project.eu/>) and EATRAN2 (<http://www.eatraining.eu/>)

### Reflection



## Wiki

### Short description



[Image by jaaron \(Access: 01.10.2009\)](#)

Co-construction of knowledge with a wiki in order to enhance student's collaboration skills and theoretical and methodological understanding.

### Process description

You must have access to a wiki - see [http://en.wikipedia.org/wiki/List\\_of\\_wiki\\_software](http://en.wikipedia.org/wiki/List_of_wiki_software) for inspiration.

To facilitate the generation of wiki articles you must emphasise the relevance for the students - you also have to set up some specific requirements for each student.

Furthermore it is important to give the students the ownership of the wiki. They have to decide the structure, categories and design in order to give them a certain responsibility towards integrating the wiki in their lives as student's.

### Required resources

Computer, internet access and a server for the wiki installation.

### Examples

At a master level course at Aalborg University we have implemented a wiki in a Wordpress installation <http://www.blog.ell.aau.dk/wiki>. The students are asked to write to articles about a topic within the area of Human Centered Informatics and make 2 comments on their fellow student's articles.

### Comments

The wiki could be implemented in almost any educational setting to structure the students or pupils work. Choosing a wiki makes it possible for the students to access the articles anywhere and anytime.

image url: [http://farm4.static.flickr.com/3158/2728668033\\_2cd12e5757.jpg](http://farm4.static.flickr.com/3158/2728668033_2cd12e5757.jpg)

This example is developed in relation to the two EU projects COMBLE (<http://comble-project.eu/>) and EATRAN2 (<http://www.eatraining.eu/>)

### Reflection

## Social Networking



[Image by aqhong \(Access 10/12/2009\)](#)

### Short description

Social networking sites are websites where users create personal profiles and connect with each other. The idea behind the sites is to link up with your friends and see who they are friends with and their friends' friends.

### Process description

Social networking sites excel at creating and highlighting social connections. You can usually send messages to and chat with other users, and some sites allow you to create personalized webspaces. Facebook, MySpace, and LinkedIn are some of the common examples.

When used for learning, the easy communication and connectivity of such sites can be helpful in supporting and strengthening connections between both the teacher and students and between students.

One use for social networking sites is to set up collaborative problem solving. By allowing the students to discuss a problem with each other they can bounce idea off of each other and find a solution together. This use of social networking is likely already happening, with students discussing course related subjects among themselves. By participating in or directing this discussion, a teacher can influence the discussion and assist if the problems prove too difficult.

Another use is as a way to share files and news quickly. If someone has a file that the rest of the course could use, they can quickly share it with the rest. Mind the copyrights when doing this, though. This can also be used by teachers to share course material and slides. Some schools and universities are already doing this, including official Facebook and MySpace pages, Youtube channels, and official presences in online games like Second Life.

Social networking sites can also be used to allow the students to create profiles and establish their course identity with new profiles created specifically for the course, either as a part of the course, or because the students want to keep their private profile separate from their course profile.

**Required resources**

You will need an internet connection and the course participants will all need to be members of the same social networking site. With younger students, this is likely already the case. You will also need to be somewhat proficient in the chosen social networking site if you want to participate in the social networking yourself.

**Examples****Comments**

A good reason to use social networking sites in learning is that many younger students are already avid users of social networking sites, and are used to communicating like that.

This example is developed in relation to the two EU projects COMBLE (<http://comble-project.eu/>) and EATRAN2 (<http://www.eatraining.eu/>)

**Reflection**

## Social Bookmarking

### Short description



[Image by inju \(Access: 12.11.2009\)](#)

Social bookmarking is a way to share internet bookmarks with others. They work more or less like the bookmarks in a web browser, except you share them for others to see and use.

### Process description

Like standard web bookmarks, the social bookmark is only a link to the content, not the content itself. To create a social bookmark you create an account on a social bookmarking website, and start adding links to your profile. Usually, these social bookmarking sites will have a plugin for your web browser to make this easier to do.

Social bookmarking for learning can be used in a setting where all the students subscribe to the teacher's bookmarks and get all the links and references that the teacher adds. That way, everyone has the same links and online materials. Expanding on that, the students can make bookmarks of their own and share them with each other, creating a social bookmarking network. This network can be used to find many websites relating to the subject and can become a solid collection of information.

By subscribing to each other, you can share interesting sites with each other and help each other catch useful web links that you might otherwise have missed. This can also be useful in an administrative fashion where if you find something that would be useful to someone else, you can social bookmark it.

You can also add so-called "tags" to your links. With the tags, your bookmarks become easy to find both for you and the people you share it with as it's possible to search for these tags, both on your own and others' profiles. It is also possible to subscribe to other people's bookmarks, allowing you to instantly see when they add a new link to their profile.

### Required resources

You will need an internet connection and an account on at least one social bookmarking website.

### Examples

**Comments**

This example is developed in relation to the two EU projects COMBLE (<http://comble-project.eu/>) and EATRAN2 (<http://www.eatraining.eu/>)

**Reflection**

## Personal Learning Environment

### Short description



[Photo by adesigna \(Access 08.12.2009\)](#)

The concept of a Personal Learning Environment (PLE) is where you look at the learner's learning environment as a whole, including both the formal and informal learning.

### Process description

Looking at PLEs, you need to look at the environment the a person learns in, both containing the formal learning, such as school, college, or courses and the informal learning, which is what is learned outside of formal learning institutions. If a learner realises what his or her PLE looks like, it can be useful in optimizing how they learn.

The use of PLEs in education requires the learner to take a personal responsibility for what he/she learns. The idea is that the learner will use his/her own preferred learning methods for gathering information and building up qualifications. Some may prefer reading about it, some prefer trial and error, and some might choose to hunt the Internet for information. How the learner gains the information is up to him/her, the important thing is that he gets the information needed to achieving the desired knowledge.

This is the core of using a PLE that the learner is allowed to set his/her own learning style as opposed to going to a course with an evaluation at the end. The evaluation still happens, but in a way designed to test out the qualifications required to pass the evaluation. This evaluation needs to be flexible enough to let the learners show how they've gained the required skills, including going through how they got the information.

Adopting PLE use will have an effect on who is in control of what to learn, how to do it, and what tools to use. Traditionally, these things are decided by the teacher, but the PLE approach is learner-based, which means that the role of teacher becomes that of an instructor or guide that can help the learners in the right direction, but keeping in the background as the learners discover knowledge on their own.

It is not uncommon for PLE users to turn to web based searchers, or to have them engage in Web 2.0 content such as [blogs](#), [wikis](#), and [social networking](#) sites.

**Required resources**

A PLE isn't so much a thing as it's an idea and a culture. As such, it requires only goodwill and time. While you can add Web 2.0 or other tools to the mix, the core is the culture.

**Examples****Comments**

This example is developed in relation to the two EU projects COMBLE (<http://comble-project.eu/>) and EATRAN2 (<http://www.eatraining.eu/>)

**Reflection**

## RSS

### Short description



[Image by Tiago Pinhal \(Access: 15.12.2009\)](#)

RSS (Really Simple Syndication or Rich Site Summary) is an Internet tool, which allows you to send out summaries of what's new on a website in the form of headlines and summaries.

### Process description

Using this you can send out information from your website and have the recipients see it, even if they haven't visited your website today. A series of RSS publications from the same source is called an "RSS feed". RSS feeds are commonly seen on websites that update often, like news sites or blogs. To read an RSS feed, you will need an RSS reader of some kind. It can be a standalone program, or a part of an internet browser or email program.

If you use RSS for learning, it is useful to have access to a website that updates on a somewhat frequent basis and with an RSS set up. The students will need an internet connection and an RSS reader to be able to subscribe to your website. When the RSS is set up, the updates on the website can automatically be sent out to the RSS subscribers who will be able to see the updates without needing to keep an eye on your website. This is extremely useful when it comes to sudden updates, like rescheduling of classes or similar urgent administrative messages.

It is also possible to use RSS as a news collector, by setting up a subscription to several different RSS feeds and collecting information from these. This allows both teacher and student to gain an overview of the field covered by the RSS feeds. It is important to choose the relevant RSS feeds that match the course and materials that the students could want to use.

RSS can also be used to make the students into the RSS authors. By having each student create their own RSS feed and have them subscribe to each other, to form a collaborative network where both students and teacher share RSS updates about the subject at hand. This is similar to using social bookmarks, but with RSS, the students are not just finding material to share, but actively creating it. Some blogs have a built in RSS feed generator, which can help with the technical parts of it.



**Required resources**

You need computers and an internet connection. An internet server with RSS enabled is also helpful to have, or some kind of blog software with RSS built in.

**Examples****Comments**

The image on this page is provided as an illustration only, and is not an actual active RSS feed.

This example is developed in relation to the two EU projects COMBLE (<http://comble-project.eu/>) and EATRAN2 (<http://www.eatraining.eu/>)

**Reflection**

## E. Literature review and management of references

In order to search and identify relevant and useful literature within the area of active problem based learning supported by web 2.0 technologies, we started by specifying what the primary key terms for the literature search should consist of – Problem Based Learning and web 2.0 technologies. To bridge the gap between papers concerning the theoretical learning inputs and the use of web 2.0 technologies in practice, we have performed the literature search combining these two poles. In that way we have provided a foundation for the WP2 methodology within the area of an active problem based learning supported by web 2.0 technologies.

<b>Web 2.0 technologies and active problem based learning:</b>
<p>Elearning, web 2.0 technologies, teaching, learning, Web 2.0 in practice, problem based learning and social software, learning and social software, learning and blogging, learning and wikis, education and blogging, social networking and active learning, social software and pedagogy, social software and education and assessment, Active Problem Based Learning, Web 2.0 technologies for learning</p>

**Table 8: Search terms used in our literature search.**

The literature review included papers from scientific conferences and journals. Furthermore we search for European and national reports regarding our area of interest. First we performed a rough search where every item that where found was added to the project groups Zotero library. The criterion of relevance in the second iteration of our literature review was to find peer reviewed papers. Finally we conducted a literature review again from scratch to verify that we had found the items with the most relevance for our work in WP2.

Viewing the references at some of the primary articles has provided valuable insights in new directions for our continuing search for relevant literature. Furthermore these references have provided us with new relevant literature databases for further inquiry.

In order to reduce the likelihood of bias, we set some selection criteria during the initial stage of the review. So, we have used the following inclusion criteria:

- Any study describing the use of web 2.0 technologies in teaching in terms of blogs, wikis, LMS, etc
- Any study describing the bridge between learning theory and practice.

Throughout the act of searching literature we have been revising our search vocabulary over time and went back and forth reviewing the references of the articles identified during the previous process, as well as to go forward to identify articles referring to those articles.

During the primary period of the literature research the AAU team read the scientific papers and prioritized the individual article in accordance with the aim of our work package. In Zotero we individually added a note where we prioritized the articles relevance's on scale from 1 to 3. Furthermore, we wrote a notes regarding the relevance of the article and pasted in a few key quotes from the article to pinpoint the important conclusions from that article. Firstly this work made it possible for the team to get an overview of all the articles we had found during our literature search. Secondly the web of literature provided a framework for our later activities in the work packages, such as the CoeD workshop in Vienna and the templates for the partners.

### E.1.1 Where did we search

We have conducted literature searches across the following databases. Each of them specifically deals with areas within the active problem based web 2.0 technology cloud:

**Eric** – Education Resources Information Center

**ACM** – Association for Computing Machinery

**Scopus** - Contains bibliographical references and full text to articles

**SpringerLink** – Contains bibliographical references and full text articles

**Proquest** – Contains bibliographical references and full text articles

### E.1.2 Specific journals and sources with relevance to the area, which we have been monitoring throughout the period:

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#### **Journals and other sources being monitored throughout the EATrain2 project**

ALT-J Research in Learning Technology

(<http://www.informaworld.com/smpp/title~content=t713605628~link=cover>)

Assessment & Evaluation in Higher Education

(<http://www.tandf.co.uk/journals/titles/02602938.asp>)

British Journal of Educational Technology

(<http://www3.interscience.wiley.com/journal/117984068/home>)

Computers & Education

([http://www.elsevier.com/wps/find/journaldescription.cws\\_home/347/description#description](http://www.elsevier.com/wps/find/journaldescription.cws_home/347/description#description))

Distance Education

(<http://www.informaworld.com/smpp/title~content=t713412832~link=cover>)

Educational Media International

(<http://www.informaworld.com/smpp/title~content=t713698864~link=cover>)

Elearning papers EU

(<http://www.elearningpapers.eu/index.php?page=home>)

European Journal of Open, Distance and E-Learning (EURODL)

(<http://www.eurodl.org/>)

First Monday

(<http://firstmonday.org/>)

JISC-research reports

(<http://www.jisc.ac.uk/>)

Journal of Computer Assisted Learning

(<http://www3.interscience.wiley.com/journal/118532949/home>)

Læring og Medier (LOM) (Learning and Media)

(<http://www.forskningsnettet.dk/en/lom>)

MedieKultur (Media and Culture)

(<http://ojs.statsbiblioteket.dk/index.php/mediekultur/index>)

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Scandinavian Journal of Educational Research

(<http://www.informaworld.com/smpp/title~content=t713445993~link=cover> )

Studies in Continuing Education

(<http://www.informaworld.com/smpp/title~content=t713445357~link=cover> )

Technology, Pedagogy and Education

(<http://www.informaworld.com/smpp/title~content=t716100724~link=cover> )

The International Review of Research in Open and Distance Learning

(<http://www.irrodl.org/index.php/irrodl> )

QUT | Journal of Learning Design

(<http://www.jld.qut.edu.au/> )

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## E.2 Managing, sharing and making our references publically available

### E.2.1 Zotero

Zotero is an open source extension for Mozilla Firefox that enables individual and group bibliographies to be synced online across different computers. Zotero is an easy way to collect, share and manage bibliographies individually and in research teams.

### E.2.2 Zotero and EAtrian2

Each item in Zotero has been classified in accordance with the problem area we are working with in WP2. The list of folders is based on a categorisation which has evolved during the literature review. We have not worked with a set of prefixed categories, but have revised the categories that first emerged into new and more specific categories as the literature review became more and more precise and detailed. The final list of categories within Zotero is:

- Collaborative Learning Design editors
- Enterprise Architecture in general
- Journals
- Learning designs
- Learning Theory
- Problem-Based Learning
- Useful web sites
- Web 2.0 and Social Software
- Web 2.0/social software and learning
- Web 2.0/social software technologies in practice

The bibliography that has provided the foundation for our work package is public and available at the following address:

<http://www.zotero.org/groups/eatrain2/items>

Each reference can occur in more than one category as they are not mutually exclusive.

### E.2.3 EAtrain2 and Dropbox

First of all Zotero and Dropbox works together quite nicely, when both programs are installed on a computer, the user can store a local file of the Zotero library in Dropbox and all items including pdf's will be available anywhere at all times.

Besides the integration between Zotero and Dropbox WP2 team have used Dropbox as a shared folder among the members of the WP2-team. This made the writing process easier as we always had the most updated version of the documents available.

## **F. Technology discussions – summary of EATrain2 meeting October 30, 2009**

The following is a summary of a meeting between the partners October the 30th 2009. The meeting concerned the Pergamon platform developed as part of the EATrain2project.

### **F.1 Summary**

During the meeting the partners discussed present and future functionalities of the Pergamon platform (<http://pergamon.deri.ie/>).

#### **F.1.1 Present Functionalities of Pergamon**

Some of the central functionalities of the platform are:

- Micro-blogging
- Link sharing
- Upload of a file
- Save notes
- Download files
- Tagging
- Search
- Rate content
- SCORM compatible objects
- Flash documents are available to be run
- Wiki: can implement video and images

#### **F.1.2 Future Functionalities of Pergamon**

In the courses the students might be divided into groups. From this it was argued that the platform should be able to support such groups. Moreover supporting the groups in Pergamon would enable the instructor to monitor the group-work. As it is now there is no difference on different courses access in Pergamon. However during the meeting it was argued that we need to design for such differences.

In relation to this it was discussed whether there are to be courses in the Pergamon platform, if so there need to be more levels in the system. From this it was argued that the Pergamon platform in the future should have different types of domains open to different groups of actors:

- My space (personal)
- The group
- The class
- Everyone (public)

As of now the dialogue is mainly taking place through the wiki and micro-blogging. Therefore the partners agreed that a forum should be added. Dividing the platform into different domains will enable it to support group-work and mini-lectures. In relation to this, the domain could be the over category for several types of domains and it should be possible to share files, links with different levels of aggregation (only class, only group, only friends etc.). Moreover the various groups need to have a special treatment. For example the history for the 'class' needs to be different from the history of the group of friends and a class might be a mandatory-group. This means that there are different approaches to groups and different needs for each group. Consequently before designing

for different types of groups in Pergamon we need to answer the following questions:

**What are the types of groups we need to support?**

**What are these groups' requirements?**

In relation to this the developers argue that we need to develop a datamodel. Moreover it was argued that problem-based learning should be made into a datamodel along with an EA course model. In this way the course and the pedagogical model was going to be made into a datastructure.

To build on PBL the developers suggested that we should document the dataflow in PBL approaches and see what Pergamon is supporting. However there are no resources for in depth development with the system.

Moreover we might find that there are other elements/plugin-ins to be brought into/added to Pergamon if the platform itself doesn't support the PBL approach. In relation to this CSCL-scripts such as "Collage" describing collaboration could be used.

However, the team from DK argued that groups should be a flexible concept so we do not limit ourselves. Moreover when designing for PBL the DK team stress that PBL cannot easily be formalized and built into the system. Rather a learning environment is designed by combining different resources, activities and infrastructures some of which are non-technological.

Moreover we should check if it is possible to:

- Send a notification to the students about upload of files to their front page
- Up-load different types of resources it is possible to up-load in Pergamon.
- Have restricted access
- Discuss and place questions.

## G. Preliminary Platform Specification

### G.1 Executive Summary

The adoption of Web 2.0 technologies is changing the Web from a read medium to a read/write medium. This means empowering individuals to publish information to the web and hence, not only 'big publishers' can disseminate their data, ideas and point of views. This eventually aims to make the web more democratic, more useful and more social. However this also introduces new challenges in terms of required technologies to lower barrier to publishing, making collaboration easier, taking into account the "new social dimension" of the web, and dealing with the already existing but now aggravated problem of information overload.

Our main concerns while providing a "Web2.0 platform" to support an Enterprise Architecture course based on active problem-based learning methodology are:

- to provide easy-to-use tools for contribution,
- to enable and encourage collaboration, and
- to challenge the information overload by organizing information in an easy and predictable way which impose minimal cognitive load on users.

We adopt the following approaches to address these concerns:

1. The use of popular and familiar tools, e.g. blogs, wiki, forum.
2. Extending an existing eLearning platform and using existing tools.
3. Taking into account the context in which the platform will be used in i.e. EA course based on PBL approach. We incorporate specific sensible concepts into the core architecture of our platform. This will make resource finding more predictable by the user and will help her focus more on the content rather than on worrying about how/where the system organize content in order to find them.
4. Enabling user-specific resource organization. Primarily based on tags to enable the user to organize content that interest him the way that best fits her and using her own terminology.
5. To encourage collaboration, all content –even those provided as course material by the facilitator- can be commented on, rated, discussed on the forum and tagged.

### G.2 Use-Cases

#	Use Case	Actor	System Support	Additional Info
1.	Introduce course and platform	Facilitator	Manual, Glossary, FAQs, Introductory Lecture (provided by facilitator)	
2.	Divide students into groups; create own group	Facilitator/ Student	Create group, add student to group	
3.	Upload content/resources required for next	Facilitator	Upload ability  Notify students about the new resources when logging into the	



	lesson preparation		platform	
4.	Create/Edit a Wiki page as a collaborative group workspace	Student	Wiki Functionality Notify group members	
5.	Rate/ Comment/ Tag any resource	Student	Rating/ Tagging/ Commenting functionality available on all resources  Notify related members (this will depend on the visibility of the subject resource)	
6.	Post a discussion topic (or reply to a discussion topic) on the forum	Student	Forum functionality Notify relevant students	
7.	Share a resource or a link within group/ with all/ with specified other student	Student	Sharing functionality with the ability to define the scope  Notify relevant students	
8.	Filter contents based on tags, creation/update date.	Student	In both public and group space:  Tagging functionality  Filter by date  Filter by creator	To alleviate the information load and enhance the student control over influx of content and notification
9.	Check inbox	Student	View resources/messages that were sent to the student	This is the normal sharing functionality with the student as the target of sharing. This will enable not only exchanging messages but also exchanging other resources
10.	Reply to a message	Student	Enable reply to messages	
11.	Share a public resource with her group i.e. notify the group of the existence of a useful resource	Student	Enable copying resources from public space to group space	
12.	Check student activity	Facilitator	View student activity on the platform	

13.	Record Student Assessment	Facilitator	Enable data entry	
14.	Submit problem/assignment solution	Student	Sharing resource(s) with facilitator	This is the normal sharing functionality with the facilitator as its target

### G.2.1 Notes

- Each student will have three spaces: private, group, and class.
- All activities (primarily creating/filtering resources) will be doable through a consistent UI - that follows conventions used in popular available tools - in both public and group space. Hence, access rights depend on the context (the space). This reduces probability of accidentally sharing group-specific resources with public and enhances user experience (still the user can override this behaviour)
- Resources are files (content) uploaded to the system by a user (facilitator/student).
- References are static resources that may only be uploaded by a facilitator or platform manager, e.g. glossary, platform manual, etc. They are highlighted as a specific type of resource because they should be always available for students in some fixed place.
- A resource may refer to an actual file or a link to an online resource. 'Sharing resources' means sharing the internal or external link to that resource.

## G.3 Functional Requirements

### G.3.1 Overview

Communication	
FUN1_COM	Micro-blogging
FUN2_COM	Blog
FUN3_COM	Email
FUN4_COM	Direct Messaging
FUN5_COM	Instant Messaging / Chat
FUN6_COM	Forum
Collaboration	
FUN7_COLL	Wiki
FUN8_COLL	Screen Sharing
FUN9_COLL	Resource Sharing Pool
FUN10_COLL	Tagging/Bookmarking
FUN11_COLL	Rating
FUN12_COLL	Comments/Notes

<b>Resources</b>	
<b>FUN13_Res</b>	Upload File
<b>FUN14_Res</b>	Play Media File
<b>FUN15_Res</b>	SCORM package
<b>Assessment and Platform Management</b>	
<b>FUN16_Ass</b>	Facilitator Back Office
<b>FUN17_Ass</b>	Workflow Definition
<b>FUN18_Ass</b>	Student Portfolio
<b>FUN19_Ass</b>	Grades
<b>Integration with External Tools</b>	
<b>FUN20_Ext</b>	Integration of Modelling Tool
<b>FUN21_Acc</b>	Google Docs
<b>Access Control</b>	
<b>FUN22_Acc</b>	User Registration, Login & Profile
<b>FUN23_Acc</b>	Groups
<b>FUN24_Acc</b>	Resource/Post Scope
<b>FUN25_Acc</b>	Search
<b>FUN26_Tech</b>	Notification
<b>Technical</b>	
<b>FUN27_Tech</b>	High-speed Internet Connection
<b>FUN28_Tech</b>	Migratable
<b>FUN29_Tech</b>	Pilot Platforms in Pilot Language

### G.3.2 Key Terms

**User:** Facilitator or student.

**Resource:** A resource is a file (text, image, sound, video, etc.) or a link to a file.

**Reference:** A static resource uploaded by the facilitator.

**Post:** Any text created by a user on the platform, e.g. a forum post, status update, or comment. A post may contain or link to a resource.

**Pilots:** The 'pilots' field in the below requirements specifies which pilot requested that requirement. However all requirements will be provided on all pilot platforms.

### G.3.3 Requirements

#### Communication

<b>ID</b>	<b>FUN1_COM</b>
<b>Title</b>	<b>Micro-blogging</b>
<b>Status</b>	Accepted

<b>Goal</b>	To publish short (160 chars) personal status updates (similar to Twitter/Facebook updates)
<b>Actor</b>	User
<b>Pilots</b>	UoM, BOC
<b>Related use-cases</b>	4, 5
<b>Use of external tools</b>	No
<b>Scope</b>	Group, Class
<b>Comments</b>	

<b>ID</b>	<b>FUN2_COM</b>
<b>Title</b>	<b>Blog</b>
<b>Status</b>	Accepted
<b>Goal</b>	To publish longer updates. Comments may be added to posts
<b>Actor</b>	User
<b>Pilots</b>	UoM, BOC, COI, UKL
<b>Related use-cases</b>	6
<b>Use of external tools</b>	No
<b>Scope</b>	Group, Class
<b>Comments</b>	One blog per class, owned by the facilitator, but with full rights for all students, e.g. posting, tagging, commenting, etc.

<b>ID</b>	<b>FUN3_COM</b>
<b>Title</b>	<b>Email</b>
<b>Status</b>	Accepted
<b>Goal</b>	To send messages to a user's existing email address
<b>Actor</b>	User
<b>Pilots</b>	BOC, UKL
<b>Related use-cases</b>	9
<b>Use of external tools</b>	Email client
<b>Scope</b>	Individual
<b>Comments</b>	Inclusion of an email address in a user's profile would enable another user to send an email via their existing email client. Would not require further integration.  It is envisaged that tools like Direct messaging and instant messaging

	will be used instead of email.
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<b>ID</b>	<b>FUN4_COM</b>
<b>Title</b>	<b>Direct Messaging</b>
<b>Status</b>	Accepted
<b>Goal</b>	To send a message directly to another user or group of users.
<b>Actor</b>	User
<b>Pilots</b>	UKL, UoM
<b>Related use-cases</b>	9
<b>Use of external tools</b>	No
<b>Scope</b>	Individual, Group, Class
<b>Comments</b>	

<b>ID</b>	<b>FUN5_COM</b>
<b>Title</b>	<b>Instant Messaging / Chat</b>
<b>Status</b>	Accepted
<b>Goal</b>	To engage in a live chat with other user(s)
<b>Actor</b>	User
<b>Pilots</b>	BOC, UKL, COI, UoM
<b>Related use-cases</b>	
<b>Use of external tools</b>	Yes, Current IM tools, e.g. Skype, Jabber, MSN
<b>Scope</b>	Group, Class
<b>Comments</b>	

<b>ID</b>	<b>FUN6_COM</b>
<b>Title</b>	<b>Forum</b>
<b>Status</b>	Accepted
<b>Goal</b>	To post and discuss issues, not in real-time
<b>Actor</b>	User
<b>Pilots</b>	UKL, BOC, COI, UoM
<b>Related use-cases</b>	
<b>Use of external tools</b>	No
<b>Scope</b>	Individual, Group, Class

<b>Comments</b>	The forum functionality possibly subsumes the necessity of a Blog
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## Collaboration

<b>ID</b>	<b>FUN7_COLL</b>
<b>Title</b>	<b>Wiki</b>
<b>Status</b>	Accepted
<b>Goal</b>	To collaboratively edit a common online knowledge resource
<b>Actor</b>	User
<b>Pilots</b>	UoM, UKL
<b>Related use-cases</b>	4
<b>Use of external tools</b>	No
<b>Scope</b>	Individual, Group, Class
<b>Comments</b>	

<b>ID</b>	<b>FUN8_COLL</b>
<b>Title</b>	<b>Screen Sharing</b>
<b>Status</b>	Pending (dependent on implementation overhead)
<b>Goal</b>	To share a user's screen with another user(s)
<b>Actor</b>	User
<b>Pilots</b>	UKL
<b>Related use-cases</b>	
<b>Use of external tools</b>	Yes; this functionality is already provided by some IM providers (e.g. Skype) that will be integrated with the platform.
<b>Scope</b>	Individual, Group
<b>Comments</b>	

<b>ID</b>	<b>FUN9_COLL</b>
<b>Title</b>	<b>Resource Sharing Pool</b>
<b>Status</b>	Accepted
<b>Goal</b>	To share resources with other user(s)
<b>Actor</b>	User
<b>Pilots</b>	BOC, UoM, COI, UKL
<b>Related use-cases</b>	7
<b>Use of external tools</b>	No
<b>Scope</b>	Individual, Group, Class

<b>Comments</b>	
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<b>ID</b>	<b>FUN10_COLL</b>
<b>Title</b>	<b>Tagging/ Bookmarking</b>
<b>Status</b>	Accepted
<b>Goal</b>	To associate a tag with a resource, which may be used to identify or categorise this resource at a future stage.
<b>Actor</b>	User
<b>Pilots</b>	UKL, BOC, UoM
<b>Related use-cases</b>	5
<b>Use of external tools</b>	No
<b>Scope</b>	Group, Class
<b>Comments</b>	Tagging a resources subsumes bookmarking functionality

<b>ID</b>	<b>FUN11_COLL</b>
<b>Title</b>	<b>Rating</b>
<b>Status</b>	Accepted
<b>Goal</b>	To rate a resource or a post on quality and relevance
<b>Actor</b>	User
<b>Pilots</b>	BOC, UoM
<b>Related use-cases</b>	5
<b>Use of external tools</b>	No
<b>Scope</b>	Group, Class
<b>Comments</b>	

<b>ID</b>	<b>FUN12_COLL</b>
<b>Title</b>	<b>Comments/Notes</b>
<b>Status</b>	Accepted
<b>Goal</b>	To add a comment to a resource or post
<b>Actor</b>	User
<b>Pilots</b>	BOC, UoM
<b>Related use-cases</b>	5
<b>Use of external tools</b>	No
<b>Scope</b>	Group, Class
<b>Comments</b>	

## Resources

<b>ID</b>	<b>FUN13_Res</b>
<b>Title</b>	<b>Upload File</b>
<b>Status</b>	Accepted
<b>Goal</b>	To upload a file to the platform and specify its scope.
<b>Actor</b>	User
<b>Pilots</b>	UoM, UKL
<b>Related use-cases</b>	1, 3
<b>Use of external tools</b>	No
<b>Scope</b>	Individual, Group, Class
<b>Comments</b>	Maximum storage capacity thresholds should be introduced for each user to avoid server storage issues.

<b>ID</b>	<b>FUN14_Res</b>
<b>Title</b>	<b>Play Media File</b>
<b>Status</b>	Accepted
<b>Goal</b>	To play media files, e.g. videos, podcasts, in the EA Training platform
<b>Actor</b>	User
<b>Pilots</b>	UoM, UKL
<b>Related use-cases</b>	
<b>Use of external tools</b>	No
<b>Scope</b>	Individual
<b>Comments</b>	

<b>ID</b>	<b>FUN15_Res</b>
<b>Title</b>	<b>SCORM package</b>
<b>Status</b>	Accepted
<b>Goal</b>	To support handling of SCORM packages
<b>Actor</b>	User
<b>Pilots</b>	UoM, UKL, BOC, COI
<b>Related use-cases</b>	
<b>Use of external tools</b>	No
<b>Scope</b>	Individual, Group, Class
<b>Comments</b>	A SCORM package may only be uploaded by the facilitator. Exercises may be included in the SCORM package by the content provider.



## Assessment and Platform Management

<b>ID</b>	<b>FUN16_Ass</b>
<b>Title</b>	<b>Facilitator Back Office</b>
<b>Status</b>	Accepted
<b>Goal</b>	To provide a facilitator space where (s)he can: <ul style="list-style-type: none"> <li>• Create a class</li> <li>• Create groups</li> <li>• Assign students to groups</li> <li>• Track each student's activity</li> <li>• Record student grades</li> </ul>
<b>Actor</b>	Facilitator
<b>Pilots</b>	UoM, UKL
<b>Related use-cases</b>	1, 2
<b>Use of external tools</b>	No
<b>Scope</b>	Individual, Group, Class
<b>Comments</b>	

<b>ID</b>	<b>FUN17_Ass</b>
<b>Title</b>	<b>Workflow Definition</b>
<b>Status</b>	Accepted
<b>Goal</b>	To enable a facilitator to define the workflow for a particular course.
<b>Actor</b>	Facilitator
<b>Pilots</b>	BOC, UKL
<b>Related use-cases</b>	
<b>Use of external tools</b>	No
<b>Scope</b>	Class
<b>Comments</b>	The course content is provided by the facilitator, but how this content is to be used, when, and in what order is defined as the course workflow.

<b>ID</b>	<b>FUN18_Ass</b>
<b>Title</b>	<b>Student Portfolio</b>
<b>Status</b>	Accepted
<b>Goal</b>	To provide a student space, where (s)he can: <ul style="list-style-type: none"> <li>• Store resources</li> <li>• View his/her platform activity</li> </ul>

	<ul style="list-style-type: none"> <li>View his/her grades</li> </ul>
<b>Actor</b>	Student
<b>Pilots</b>	UoM, UKL
<b>Related use-cases</b>	
<b>Use of external tools</b>	No
<b>Scope</b>	Individual
<b>Comments</b>	Each student defines the access rights of their portfolio.

<b>ID</b>	<b>FUN19_Ass</b>
<b>Title</b>	<b>Grades</b>
<b>Status</b>	Accepted
<b>Goal</b>	To record and present students' grades.
<b>Actor</b>	User
<b>Pilots</b>	UoM, UKL
<b>Related use-cases</b>	
<b>Use of external tools</b>	No
<b>Scope</b>	Individual
<b>Comments</b>	Grades are visible to the facilitator and the student

### Integration with External Tools

<b>ID</b>	<b>FUN20_Ext</b>
<b>Title</b>	<b>Integration of Modelling Tool</b>
<b>Status</b>	Accepted
<b>Goal</b>	To model using a business process modelling tool (such as Adonis (BOC)) within the EATraining platform and export the models in a standard format to other areas of the platform
<b>Actor</b>	Student
<b>Pilots</b>	BOC, UKL
<b>Related use-cases</b>	
<b>Use of external tools</b>	Adonis
<b>Scope</b>	Individual, Group
<b>Comments</b>	The BOC business process management and modelling tool, Adonis, may be embedded on the platform as an iFrame.

<b>ID</b>	<b>FUN21_Ext</b>
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<b>Title</b>	<b>Google Docs</b>
<b>Status</b>	Pending (This functionality may be covered by WIKI)
<b>Goal</b>	To edit documents asynchronously.
<b>Actor</b>	Student
<b>Pilots</b>	UKL, UoM, COI
<b>Related use-cases</b>	4
<b>Use of external tools</b>	Google Docs
<b>Scope</b>	Individual, Group
<b>Comments</b>	

### Access Control

<b>ID</b>	<b>FUN22_Acc</b>
<b>Title</b>	<b>User Registration, Login &amp; Profile</b>
<b>Status</b>	Accepted
<b>Goal</b>	To register a user, provide a secure login, and store a user profile
<b>Actor</b>	User
<b>Pilots</b>	UKL, BOC, UoM
<b>Related use-cases</b>	
<b>Use of external tools</b>	No
<b>Scope</b>	Individual
<b>Comments</b>	The student may update his profile information at any time.

<b>ID</b>	<b>FUN23_Acc</b>
<b>Title</b>	<b>Groups</b>
<b>Status</b>	Accepted
<b>Goal</b>	To group students in work-groups
<b>Actor</b>	Individual
<b>Pilots</b>	UKL, BOC, UoM, COI
<b>Related use-cases</b>	2
<b>Use of external tools</b>	No
<b>Scope</b>	Individual, Group
<b>Comments</b>	The facilitator may assign groups or may allow students to form their own groups.

<b>ID</b>	<b>FUN24_Acc</b>
<b>Title</b>	<b>Resource/Post Scope</b>
<b>Status</b>	Accepted
<b>Goal</b>	To assign a certain scope (individual, group, class) to a resource or post
<b>Actor</b>	User
<b>Pilots</b>	UKL, BOC, UoM
<b>Related use-cases</b>	7
<b>Use of external tools</b>	No
<b>Scope</b>	Individual, Group, Class
<b>Comments</b>	

<b>ID</b>	<b>FUN25_Acc</b>
<b>Title</b>	<b>Search</b>
<b>Status</b>	Accepted
<b>Goal</b>	To search for a resource/post based on certain criteria, e.g. tag, creation date, creator, etc.
<b>Actor</b>	User
<b>Pilots</b>	
<b>Related use-cases</b>	
<b>Use of external tools</b>	No
<b>Scope</b>	Individual, Group, Class
<b>Comments</b>	

<b>ID</b>	<b>FUN26_Acc</b>
<b>Title</b>	<b>Notification</b>
<b>Status</b>	Accepted
<b>Goal</b>	To notify users when certain events take place, within a specified scope.
<b>Actor</b>	User
<b>Pilots</b>	
<b>Related use-cases</b>	
<b>Use of external tools</b>	No
<b>Scope</b>	Individual, Group, Class
<b>Comments</b>	

## Technical

<b>ID</b>	<b>FUN27_Tech</b>
<b>Title</b>	<b>High-speed Internet Connection</b>
<b>Status</b>	Accepted
<b>Goal</b>	To facilitate online access and collaboration
<b>Actor</b>	
<b>Pilots</b>	NUIG
<b>Related use-cases</b>	
<b>Use of external tools</b>	No
<b>Scope</b>	-
<b>Comments</b>	

<b>ID</b>	<b>FUN28_Tech</b>
<b>Title</b>	<b>Migratable</b>
<b>Status</b>	Accepted
<b>Goal</b>	To enable the deployment of the EATraining platform on local servers
<b>Actor</b>	Platform manager
<b>Pilots</b>	NUIG
<b>Related use-cases</b>	
<b>Use of external tools</b>	No
<b>Scope</b>	-
<b>Comments</b>	For the duration of the project, all instances of the EATraining platform will be hosted by NUIG. After the project, these instances should be transferable to the pilots' servers.  Also, new instances of the platform should be deployable.

<b>ID</b>	<b>FUN29_Tech</b>
<b>Title</b>	<b>Pilot Platforms in Pilot Language</b>
<b>Status</b>	Accepted
<b>Goal</b>	To provide the platform in the pilot languages, English, German, Greek, and Polish, as well as facilitating easy extensibility into another language.
<b>Actor</b>	
<b>Pilots</b>	UoM, BOC, COI, UKL, NUIG
<b>Related use-cases</b>	

<b>Use of external tools</b>	No
<b>Scope</b>	-
<b>Comments</b>	

## G.4 Platform Data Model

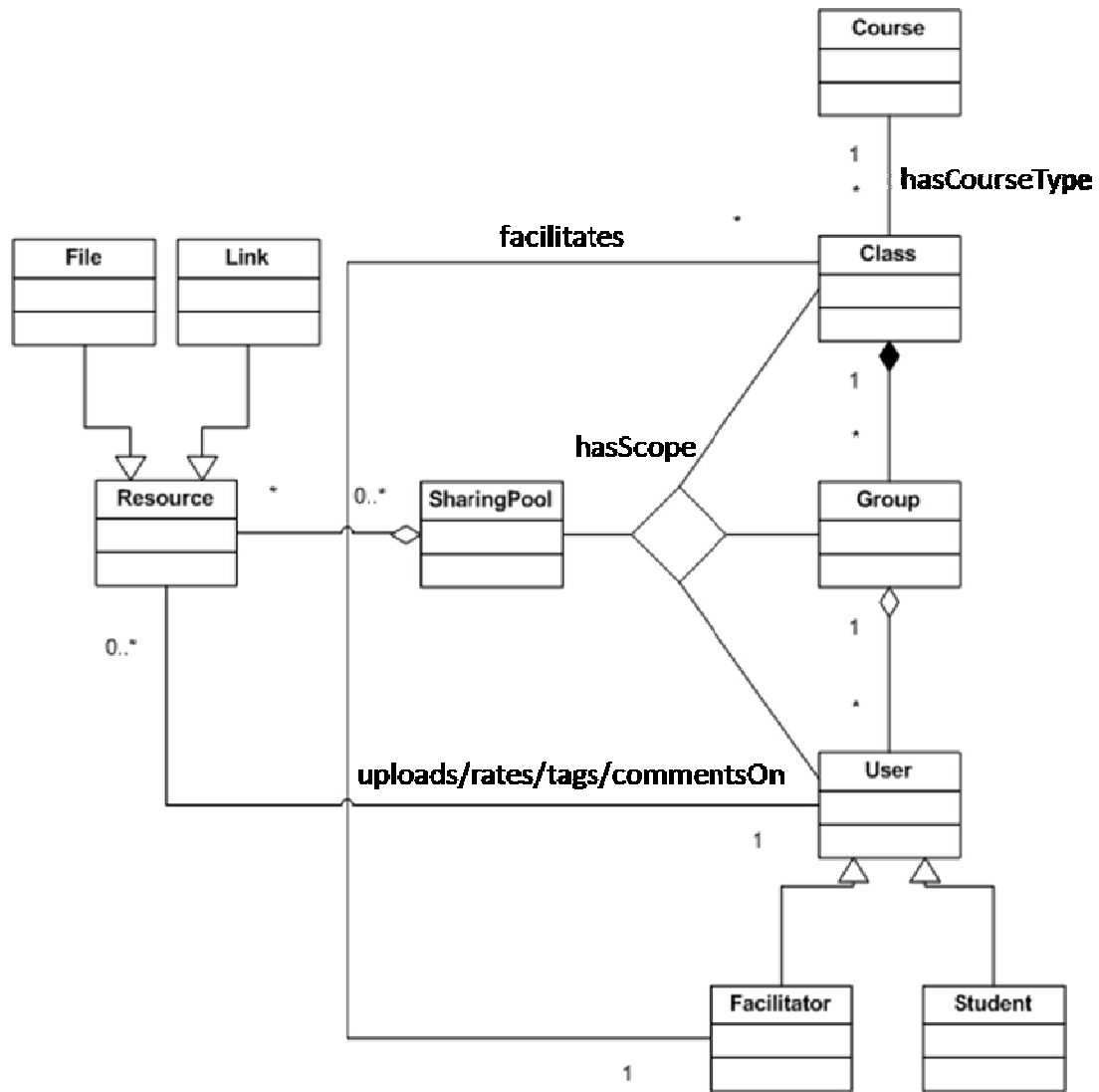


Figure 21: Resource Data Model

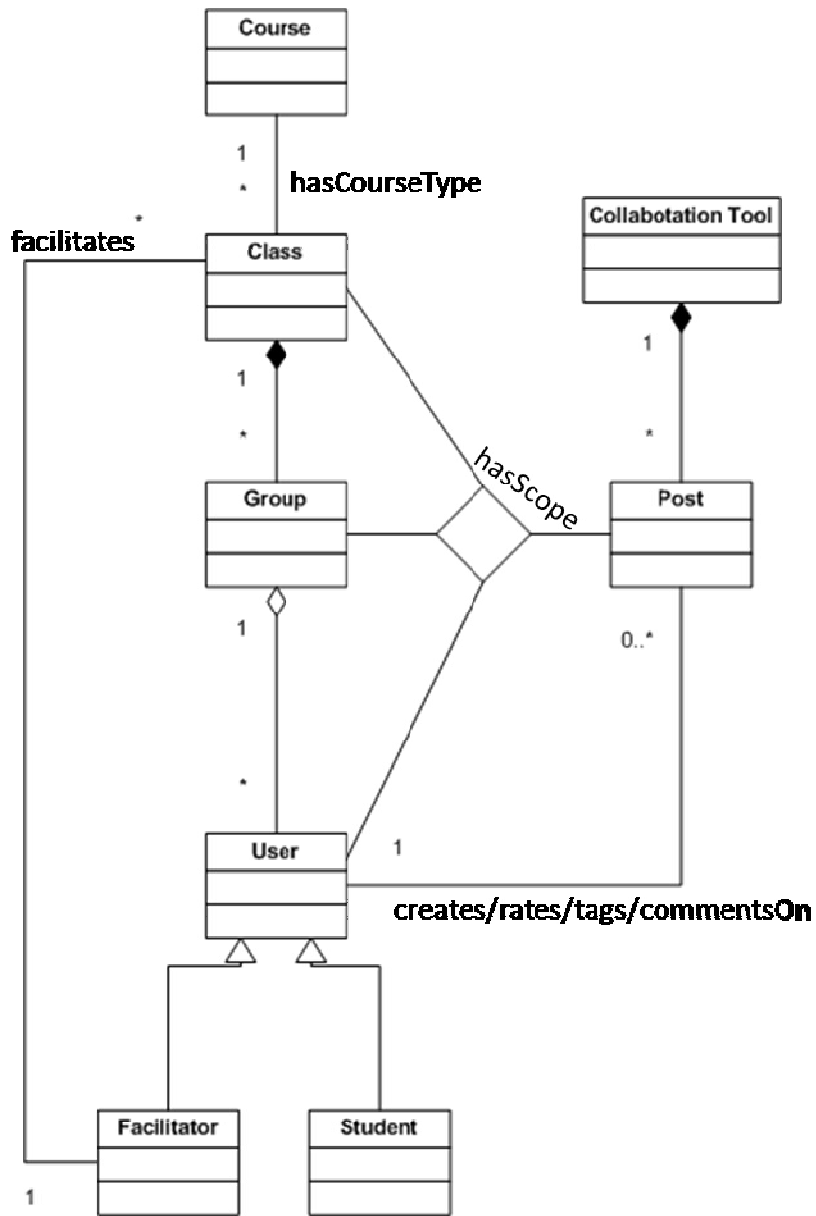


Figure 22: Post Data Model

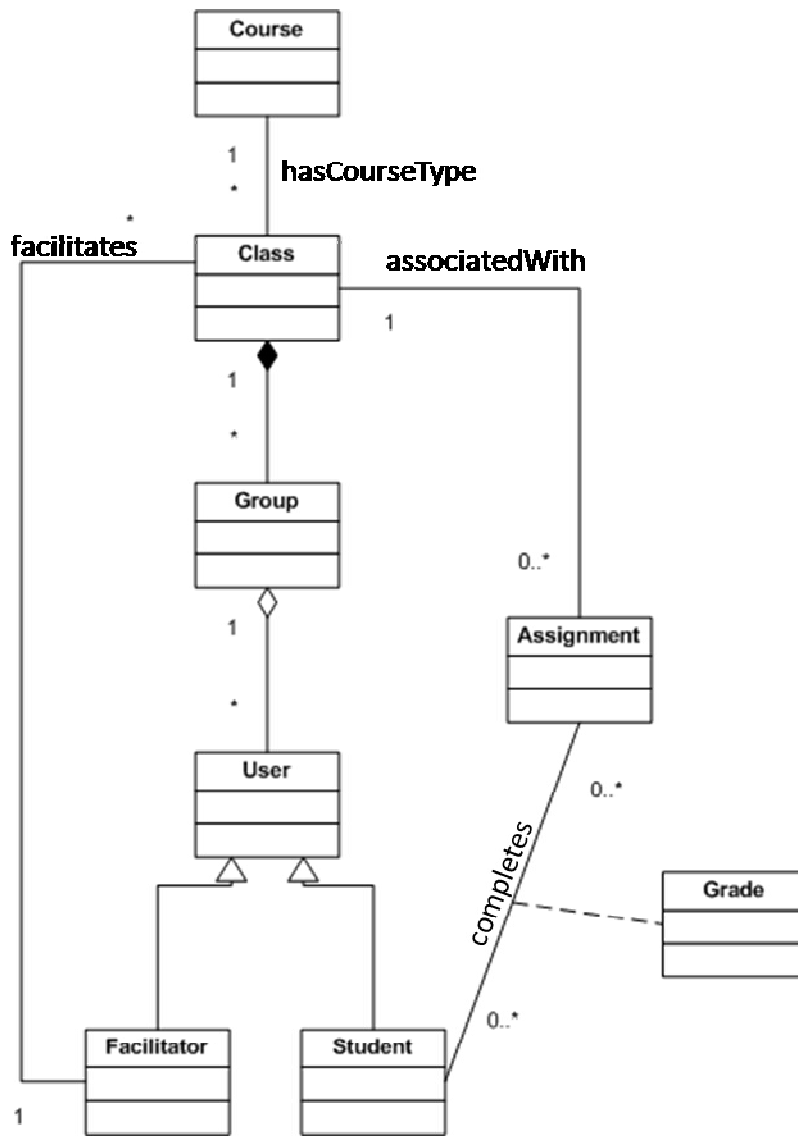


Figure 23: Assignment Data Model