Education and Culture DG Lifelong Learning Programme	Project funded by: **Framework Lifelong Learning Programme / Sectorial Programme / Erasmus (European Commission, EACEA**

OEII - “Open Educational Innovation and Incubation"

Open Educational Innovation and Incubation

Deliverable No.	**D10**
Workpackage No.	**WP4**
Workpackage Title	**Assessing the incubation of versatile advancement pilots**
Activity description	**University pilot assessments**
Authors (per company, if more than one company provide it together)	**KU Leuven: Lut Moorthamer**
Status (D: draft; RD: revised draft; F: final)	**F**
Nature	**Report**
Dissemination Level	**Restricted**
Date	**31 January 2013**

Executive Summary

This document provides the results of the assessment of a number of pilots on new educational initiatives. A total of 15 examples have been examined related to three main topics: 1° Open Education, OER, OCW and MOOCs: 2° educational innovation and knowledge circulation with companies; 3° Social Innovation and Crowdsourcing.

In the first part we present the general methodology of the OEII-project and the specific place of WP4: **Assessing the incubation of versatile advancement pilots**.

In the main part of the document, all the pilot assessments are described. For each group of examples a standardized template has been used.

The templates for assessment are presented in the annexes.

List of abbreviations

Abbreviation	Definition
ABED	Brazilian Association for Distance Education
ACQA	Academic Competences and Quality Assurance
ASM	American Society for Metals
BS	Bachelor of science
CAEL	Council for Adult and Experiential Learning
CC	Creative commons
CEASAR	Connecting All European and South American Researchers
Ctedu	Educational Technology Centre
DL	Distance learning
ECTS	European Credit Transfer System
EU	European
GPL	General Public License
HE	Higher Education
HEI	Higher Education Institution
HR	Human Resources
HTSE	Heat Treatment and Surface Engineering
ICT	Information and Communication Technology
IFHTSE	International Federation for Heat Treatment and Surface Engineering
IOM3	Institute of Materials, Minerals and Mining
KA	Khan Academy
LDAP	Lightweight Directory Access Protocol
LLL	Lifelong learning
MIT	Massachusetts Institute of Technology
MNM SafEng	Master of Science in Safety Engineering
MOOC	Massive Open Online Course
MS	Master of science
MTM	Department Materials Engineering
NASA	National Aeronautics and Space Administration
NGO	Non-Governmental Organisation

OA	Open Access
OCW	Open Course Ware
OCW-UE	Open Course Ware – University of Evora
OEII	Open Educational Innovation&Incubation
OER	Open Educational Resources
OERU	OER University
PLAR	Prior learning accreditation and recognition
POC	Permanent Education Commission
PPP	Public – private partnership
P2PU	Peer2Peer University
PUC - SP	Pontificia Universidade Catolica de Sao Paulo
QA	Quality Assurance
R&D	Research & Development
RPL	Recognition of prior learning
SJSU	San Jose State University
STEM	Science, Technology, Education and Mathematics
TIDD	Graduate Program in Technology and Design Digital Intelligence
TP	Technological poles
TU/e	Technische Universiteit Eindhoven
UK	United Kingdom
US	United States
UT	University of Texas
VUE	Virtual University Enterprise
WP	Work Package

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1. Introduction

In face of enormous socio-economic and demographic challenges, Europe requires an advanced educational system which contributes to innovation, competitiveness and economic growth. The higher education sector should be a key part of this system, leading through demonstrating and delivering innovation. Many factors contribute to universities' successes and failures, including: course offering, pricing, openness, social and professional regional embedding, market conditions, access to finance, educational R&D, constellation of the local regulatory framework, entrepreneurial capabilities and culture, intermediaries, stakeholder cooperation, and knowledge transfer mechanisms.

Educational systems & associated business models must be increasingly agile to respond to, and survive, (more versatile) changing (external) factors. Universities must search to create added value and innovate (more) systematically. They must learn to reinvent, reinforce and restructure educational programmes with requirements of the innovation-driven economy in mind. They must do this by acknowledging the centricity of the lifelong learner. As the call for highly educated, employable and entrepreneurial students with more converging market skills is loud, curricula infusion with new elements must be a part of a systematic discussion of universities and external parties. It is high time that the acceleration processes to university entrepreneurship, university interfacing, and university-market receptiveness are identified and assessed. Universities must systematically explore how higher education can better connect with the labour market opportunities, and enact a dialogue between university management, public (policy) bodies, social partners, foundations, commercial & non-commercial partners, so as to increase the strength of the links between the education, training & retraining of individuals, academics and professionals and the needs of European society as a whole. The collection of practices of (university-market) interfacing must systematically contribute to this objective, and increase capacity building in favour of more rapid educational innovation and incubation.

2. Objectives, actions, methodology

2.1. Objectives of the OEII Project

The aim of Open Educational Innovation & Incubation (OEII) is to conceptualise the design of a sustainable organisational interface which supports improved university-market receptiveness and improves (internal) university incubation and innovation. OEII intends to systematically involve university management, change agents, internal & external stakeholders, multipliers and accelerators, to promote the knowledge exchange process between different parties. It intends to seek solutions to optimise the educational innovation and incubation process, and identify any organisational structures and opportunities that can be taken advantage of. Recommendations to improve organisational interfaces are formulated, and appropriate motivation and reward mechanisms for academics and accelerators are provided.

To accumulate knowledge, OEII performs a cross-comparison of university interfacing models, and deduces flexible interface models for improving support to the (pre)incubation of new educational initiatives. It seeks more empirical insight into the process of incubation by assessing the actual strengths and weaknesses of emerging, running, and small-scale experimental pilots, which actually go through the process of (pre)incubation.

The primary objective of OEII is to formulate recommendations on the organisation of a (more) transparently organised, and sustainable, university-market interfacing, which is receptive to inside and outside developments, and the valorisation of educational innovation. This may be powered by commercial & Open Educational Resources (OER). Secondary objectives include: (a) driving the employability-dialogue with external stakeholders on curriculum innovation & student skills and competences, (b) enhancing educational attainment by establishing connective (post-academic) HE learning paths, (c) acting as a provider towards more inclusion of the population, and (d) improving the possibilities of social mobility for disadvantaged groups.

2.2. General methodology of the OEII-project

In order to keep coherency between the different workpackages (WP), this paragraph gives a brief introduction of the methodology applied by the project as a whole.

The primary objective of OEII is to formulate recommendations on the organisation of a (more) transparently organised, and sustainable, university-market interface, which is receptive to inside and outside developments, and the valorisation of *open* educational innovation. *The recommendations will include the following aspects*:

1. driving the employability-dialogue with external stakeholders on curriculum innovation & student skills and competences,

2. enhancing educational attainment by establishing connective (post-academic) HE learning paths,

3. acting as a provider towards more inclusion of the population, and

4. improving the possibilities of social mobility for disadvantaged groups.

The aim of the research-oriented WP2 is to analyse different university interfacing with external stakeholders, based on questionnaire and interviews. Main aspects which should be taken into account by universities for improving relations with external world and support new educational initiatives were identified.

WP3, titled as Flexible interface models and pre-incubation of educational initiatives aimed to offer possibilities for wide-scale dialogue – consultations, workshops, meetings with regional and professional stakeholders in order to explore opportunities for detailed pilot case assessments. Following the first, analytical review of WP2, this second run of consultation meetings with wide range of relevant stakeholders wishes to articulate the voice of practitioners and to select some appropriate fields and opportunities for further assessment in WP4. Findings of all three previous stages will be synthetized by WP5, leading to development of recommendations in WP6.

Figure 1 describes the relations between the different workpackages.

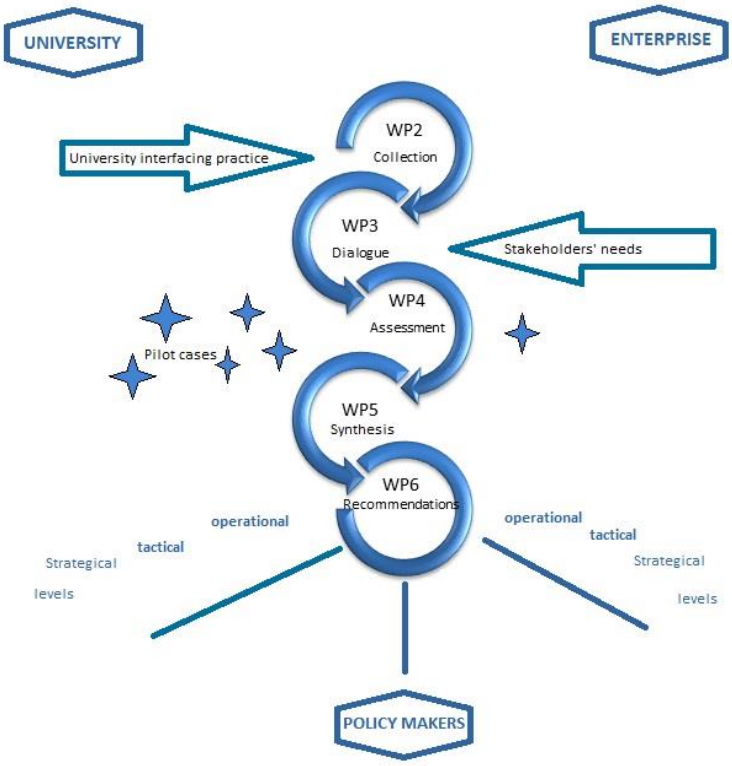

Figure 1: Workpackages and methodology

2.3. Objectives and methodology of WP4

The aim of workpackage 4 is the assessment of incubation pilots on new educational initiatives. 15 examples of educational openness and/or innovation were selected for investigation. The basis for selection was that each should contribute to our understanding of how openness and/or innovation can contribute to improvements in universities interfacing with other organisations. We recognise that we have not made a universal study, in that the example cases we have chosen to analyse are only a small proportion of those that are available. However, the cases chosen cover a variety of different types of interactions between universities and other organisations of different scales and types.
The cases investigated have been clustered in three groups:

1. Cluster 1 is related to Open Education, OER, OCW and MOOCs
2. Cluster 2 is related to educational innovation and knowledge circulation with companies
3. Cluster 3 is related to Social Innovation and Crowdsourcing

For each cluster a template for assessment of the cases has been developed: see templates in annex 1 and 2.

3. Cluster 1: Open Education, OER, OCW and MOOCs

3.1. Class2Go MOOC Platform

3.1.1. Goals and Aims

Class2Go, created by a team of eight engineers at Stanford's Computer Science Department, is the newest member of the family of platforms hosting online Stanford University courses.

It is open-source, non-profit, portable and designed not only for teaching but also for research, so Stanford professors are able to learn about learning as they teach. Its documents are already portable, videos already live outside its system on YouTube, assets can be repurposed as professors see fit and the platform's exercises and problem sets are in the Khan Academy format (meaning they're not in a proprietary database) and can be used anywhere.

3.1.2. History and Evolution

A team of eight built the first version of Class2Go platform over the summer 2012, and it is still under active development. Class2Go launched in Fall 2012 six on-campus classes and two "massive open online courses" (MOOCs). One new MOOC was launched in January 2013.

3.1.3. Roles and actors

Providers: Stanford University
Teaching providers: Stanford University
Students: anyone with an internet connection; there is no admissions process.

3.1.4. Topics

The topics available are all in the computer science domain. The courses offered via the Class2Go platform as of January 2013 are:

1. Introduction to Databases
2. Solar Cells, Fuel Cells and Batteries
3. Computer Networking

3.1.5. Size

Student population

No data available.

Teaching staff

The teaching staff are Stanford University professors.

1. Introduction to Databases: 1 person
2. Solar Cells, Fuel Cells and Batteries: 1 person
3. Computer Networking: 2 persons

Providers

The Class2Go platform is a not-for-profit enterprise of Stanford University.

3.1.6. Sector of providers

The provider (Stanford University) is in the 'First-degree level higher education' and 'Post-graduate level higher education' sectors in the Standard Industrial Classification.

3.1.7. Learning design

Pedagogical mix

Proportions of constructivism and connectivism.

Videos from Stanford professors with interactive in-video quizzes.
Formative and summative exercises.
Frame extracting allows to preview and navigate to specific parts of videos.
Discussion forums.

Courses follow a strict schedule.

Assessment type

Problem sets, tests, exams

3.1.8. Award type

Statement of Accomplishment from the instructor (all students who achieved at least 50% of the possible points).

3.1.9. Industry's skills requirements

Not available

3.1.10. Analysis

Stakeholders

1. University
2. Class2Go team
3. Students (Stanford and externals)
4. Teachers
5. External users

Finance

Project is financed by Stanford University. The platform is open, meaning that you can grab the code base for free and run it on your very own server. Class2Go is also portable, giving schools the ability to move documents and media to other platforms if they so choose. MOOC courses are for free.

Government role

There is no direct role of Government in Class2Go.

Social mission

The mission is to provide free on-line education (courses and platform) to universities, private schools, students and NGO's.

Quality aspect

Content is provided by professional educators. Regarding platform itself all users can comment on bugs and make suggestions. If they want to fix a bug, go ahead fork, fix, test, and send a pull request.

Infrastructure related interfacing

Class2Go is Stanford's internal open-source platform for on-line education. The Stanford platform is interoperable in the sense that it builds on existing software (some commercial, some open source):

- YouTube and Popcorn.js for video
- Piazza for forums
- MySQL is our database
- The massive Python Django ecosystem: e.g. South, Registration
- Amazon AWS suite for hosting (EC2, S3, RDS, Route53, IAM)
- Chef from Opscode for configuration management
- Github for source code management and issues

Unlike some other platforms, Class2Go gives educators immediate access to valuable data, allowing them to make refinements to the educational experience.

3.1.11. References

http://class.stanford.edu
http://news.stanford.edu/news/2012/september/class2go-online-platform-091212.html
http://techcrunch.com/2012/09/17/class2go-stanfords-new-open-source-platform-for-online-education/

3.2. Coursera MOOC platform

3.2.1. Goals and Aims

Coursera (https://www.coursera.org/) is an independent educational technology company which partners currently with more than 30 educational institutions and provides an online platform for open-access, non-credit classes, available at no cost to audiences around the world. Coursera is dedicated to working with high-quality university partners rather than with individual instructors. They offer courses in a wide range of topics, spanning the Humanities, Medicine, Biology, Social Sciences, Mathematics, Business, Computer Science, and many others. Coursera also offers "a system of testing, grading, student-to-student help and awarding certificates of completion of a course for under $100" (Friedman, 2012). The universities and the company also obtain valuable data on each of the students that could be used to market to them in the future (Sung, 2012).

Classes, usually about 6 to15 weeks long, offered on Coursera are designed to help students master the material; students watch video lectures taught by world-class professors, learn at their own pace, test their knowledge, and reinforce concepts through interactive exercises. When students join a Coursera course, they are also joining a global community of thousands of students learning alongside them (Schoch, 2012; http://www.coursera.org).

Coursera envisions a future where the top universities are educating not only thousands of students, but millions (http://www.coursera.org).

3.2.2. History and evolution

Coursera was developed at Stanford University in fall of 2011 by computer science professors Daphne Koller and Andrew Ng. They developed its core technologies, many of them deployed in their own computer science classes (University of Pennsylvania, 2013). Coursera, located in Mountain View, California, was launched shortly after Udacity, another for-profit online education venture by former Stanford Professor Sebastian Thrun, and shortly before edX, a not-for-profit online education initiative by MIT, Harvard, and the University of California, Berkeley (Wikipedia, 2013).

It first began offering courses from partner universities in April 2012 (Vanderbilt University, 2013). At launch, the start-up offered courses from a mere three institutions: Stanford University, the University of Michigan, Princeton, and the University of Pennsylvania (Banning, 2012). As of July 17, 2012, Coursera had partnerships with 16 universities: Stanford, Princeton, University of Michigan, University of Pennsylvania, Georgia Tech, Duke, University of Washington, Caltech, Rice, University of Edinburgh, University of Toronto, EPFL-Lausanne (Switzerland), Johns Hopkins University (School of Public Health), University of California–San Francisco, University of Illinois–Urbana-Champaign, and University of Virginia (Georgia Tech, 2012). From the Coursera webpage we can read that currently there are 33 partner institutions. However, in browsing the Coursera course catalogue we can also find courses from the Leiden University (Netherland), Indian Institute of Technology Delhi (India), Indraprastha Institute of Information Technology Delhi (India) and University of California, Berkley (US) which makes the number of participating universities as 37.

It was announced that in the fall 2013, Coursera will offer 100 or more free MOOCs that are expected to draw millions of students and adult learners globally (Lewin, 2012). However, the statistics change faster than we can even report, but at last count, more than 2.2 million students from nearly 200 countries have enrolled into its 200+ online courses (ICEF Monitor, 2013).

3.2.3. Roles and actors

Providers: Coursera is a service provider, an independent for-profit educational technology company with Stanford roots. As of December 2012, Coursera finances its operations from venture capital (Stanford partners…, 2012).

Teaching providers: The official Coursera platform announces that are currently 33 different universities, colleges and schools that offer on-line courses through Coursera:

1. Berklee College of Music (US)
2. Brown University (US)
3. California Institute of Technology (US)
4. Columbia University (US)
5. Duke University (US)
6. École Polytechnique Fédérale de Lausanne (Switzerland)
7. Emory University (US)
8. Georgia Institute of Technology (US)
9. Hebrew University of Jerusalem (Israel)
10. Icahn School of Medicine at Mount Sinai (US)
11. Johns Hopkins University (US)
12. Ohio State University (US)
13. Princeton University (US)
14. Rice University (US)
15. Stanford University (US)
16. The Hong Kong University of Science and Technology (Hong Kong)
17. The University of British Columbia (Canada)
18. University of California, Irvine (US)
19. University of California, San Francisco (US)
20. University of Edinburgh (United Kingdom)
21. University of Florida (US)
22. University of Illinois at Urbana-Champaign (US)
23. University of London International Programmes (United Kingdom)
24. University of Maryland, College Park (US)
25. University of Melbourne (Australia)
26. University of Michigan (US)
27. University of Pennsylvania (US)
28. University of Pittsburgh (US)
29. University of Toronto (Canada)
30. University of Virginia (US)
31. University of Washington (US)
32. Vanderbilt University (US)

33. Wesleyan University (US) (https://www.coursera.org/)

These universities represent 8 different nations; 25 institutions are from the United States, two institutions both from Canada and United Kingdom, and one institution from Australia, Hong Kong, Israel and Switzerland. However, in browsing the Coursera course catalogue we can also find courses from the Leiden University (Netherlands), Indian Institute of Technology Delhi (India), Indraprastha Institute of Information Technology Delhi (India) and University of California, Berkley (US).

Students: There's no admissions process; the courses are open to everyone with an internet connection, regardless of age, location or socioeconomic status (Willis, 2012).

3.2.4. Topics

Coursera offers courses in a wide range of topics, spanning the Humanities, Medicine, Biology, Social Sciences, Mathematics, Business, Computer Science, and many others. On the 21st January 2013, 213 courses were found in the Coursera Course Catalogue (https://www.coursera.org/#courses):

1. Biology & Life Sciences (25 courses)
2. Business & Management (15 courses)
3. Computer Science: Artificial Intelligence, Robotics, Vision (22 courses)
4. Computer Science: Programming & Software Engineering (19 courses)
5. Computer Science: Systems, Security, Networking (16 courses)
6. Computer Science: Theory (12 courses)
7. Economics & Finance (23 courses)
8. Education (6 courses)
9. Electrical and Materials Engineering (11 courses)
10. Food and Nutrition (9 courses)
11. Health and Society & Medical Ethics (23 courses)
12. Humanities (36 courses)
13. Information, Technology, and Design (18 courses)
14. Law (3 courses)
15. Mathematics (13 courses)
16. Medicine (23 courses)
17. Music, Film, and Audio Engineering (10 courses)
18. Physical & Earth Sciences (23 courses)
19. Social Sciences (5 courses)
20. Statistics, Data Analysis, and Scientific Computing (16 courses)

However, it seems that the same course can belong to several categories.

3.2.5. Size

Student population

Currently, there are more than 2 million students enrolled in the program. On January 21st there were 2,381,766 participants on the Coursera platform. However, Coursera founder Daphne Koller (Stanford) says about 7-9% of the students successfully finish the classes (Schoch, 2012). Regardless of how the numbers are sorted, professors and university administrators are intrigued by the chance to reach vast audiences around the globe, via the digital classroom. Many Coursera classes attract more than 10,000 enrollees; some can roar past 50,000 (Anders, 2013).

Official Coursera Meetups Channel (http://www.meetup.com/Coursera/) gives an overview of the large variety of user communities.

Teaching staff

Coursera is a service provider, but the academic content of the courses comes from the participating universities. Information about the Course Instructor(s) is provided on the Introduction page of each course. Some courses have several instructors (for example, *E-learning and Digital Cultures* by the University of Edinburgh has 5 instructors and *Introduction to Philosophy* by the University of Edinburgh has 7 instructors), others have only one instructor (for example, *Fundamentals of Online Education: Planning and Application* by Georgia Institute of Technology or *Social Psychology* by Wesleyan University). Some courses are jointly developed by several universities (for example, *Game Theory* is developed by Stanford University and the University of British Columbia).

However, Coursera has the Course Operations team that helps teachers offer their classes to tens or hundreds of thousands of students. The team started with 2 founders and now they have more than 20 people doing Engineering, Design, Course Operations, and Business Development
(https://www.coursera.org/#about/team).

Providers

The Coursera platform, which offers online classes to everyone with access to the Internet, has cost the University about $250,000 to implement. The money supports faculty and graduate student assistants who are developing the online offerings and video lectures. Professors participating in Coursera do not receive any raise in their standard University salaries; the incentive to teach online classes largely relies on their interest in providing a unique learning experience for students and bringing their content to a world audience. The $250,000 figure includes the cost of utilizing the broadcast facilities in creating the video lectures, according to Deputy Dean of the College (Santoro, 2012).

While Coursera is a for-profit company, currently they are not generating revenue (Kolowich, 2012). Coursera and participating schools each meet their own expenses, which are substantial on both sides (Wikipedia, 2013). As of December 2012, Coursera finances its operations from venture capital. In April 2012, Coursera announced that they had received

$16 million of Series A venture capital from L. John Doerr at Kleiner, Perkins, Caufield & Byers and Scott Sandell of New Enterprise Associates (Stanford partners, 2012). Young (2012) notes “Coursera is following an approach popular among Silicon Valley start-ups: Build fast and worry about money later”.

3.2.6. Sector of providers

The content providers are higher education institutions. The educational technology support is provided by the Coursera, an independent educational technology company.

3.2.7. Learning design

Pedagogical mix

When a student takes one of Coursera classes, he/she will watch lectures taught by world-class professors (Friedman, 2012). Coursera courses are delivered in 10- to 15-minute videos with embedded interactive quizzes and automatic grading to give students immediate feedback. A social networking component allows students to work together online. Students join a global community of thousands of students learning alongside themselves. Students can't, however, interact with the professors directly. Instead, for feedback, they use an online forum to ask and rank questions, with the most common ones rising to the top (Banning, 2012).). Coursera notes a median response time of 22 minutes in an online forum for student-to-student questions (Friedman, 2012). An interesting side product of Coursera's offerings has been the formation of subgroups within the huge classes where people gather together of their own accord to share their learning and take studies a bit farther. In some cases, these groups are geographical (https://www.coursera.org/#about/pedagogy).

Even within videos, there are multiple opportunities for interactions: the video frequently stops, and students are asked to answer a simple question to test whether they are tracking the material. Many of Coursera courses' homework are designed to give students multiple opportunities to learn the content and demonstrate their knowledge. In the Coursera platform, they typically get immediate feedback on that concept they did not understand. In many cases, randomized versions of the same assignment are provided, so that a student can re-study and re-attempt the homework. However, the content of each course is determined by each instructor (https://www.coursera.org/#about/pedagogy).

The courses are designed based on pedagogical foundations that help students master new concepts quickly and effectively. Key ideas include mastery learning, to make sure that students have multiple attempts to demonstrate their new knowledge; using interactivity, to ensure student engagement and to assist long-term retention; and providing frequent feedback, so that students can monitor their own progress, and know when they have really mastered the material. (https://www.coursera.org/#about/pedagogy)

Most courses have start and end dates, though it's possible to join a course after it has begun, as long as it is before the registration cut-off date. The offerings range from 4-5 weeks to 12 weeks. The length is determined by each instructor for the needs of each course (The Big Three, at a Glance, 2012).

Thus, a student can study at his/her own pace, test his/her knowledge (e.g. online quizzes), and reinforce concepts through interactive exercises (e.g. interactive discussion forums) (Friedman, 2012). However, one student who participated in the Coursera course highlights a huge pedagogical challenge the MOOC course designers have in front of them:

> When I think about how MOOCs could work, I assume that we are talking about a new mode of teaching and learning where the students take on a lot of responsibility for their own learning, setting their own goals, exploring and sharing together. For some students, though, the absence of the teacher as a determining factor in the day to day activities of the class, as someone who gives the grades, as someone who enforces the "rules," is clearly going to be a shock. In the absence of the teacher-as-rule-enforcer, some students seem ready and willing, even eager, to leap into that role themselves. The phenomenon of student-as-rule-enforcer is, I suspect, one factor contributing to the sometimes very negative and even cruel content of peer feedback in the class, along with the often hostile atmosphere at the discussion boards. It's not really something I had expected to encounter, since my own classes have a very different dynamic. So, while I did not expect or enjoy the tidal wave of vitriol when I shared my story, it was a good learning experience and made me realize even more fully what a huge challenge the MOOC course designers have in front of them (Gibbs, 2012).

Another student notes:

> ... the Coursera course I'm taking (AI) has longer videos (6-20 minutes) of the instructor mumbling as he draws over and over on ever increasingly confusing Powerpoint slides. Sometimes a video will have one multiple choice question, other times the video will not have any questions at all. The worst part is that only once has the video gone on to explain the question. So if a student has a problem understanding the question, they will have to resort to the forums. At the end of each section (about an hour's worth of videos) students can take a five question quiz. Granted, the feedback on the quizzes are a lot better -- but it's a lot to expect an hour of instruction to be reinforced by a mere five questions.
> Basically, the Coursera course is taught as if I was sitting in a class watching an instructor draw on a PowerPoint -- the fact that it's running in a web browser and can provide a different method of teaching seems to be lost on the instructor (http://news.ycombinator.com/item?id=3919354).

A more positive opinion from another student:

> I'm in the course and am enjoying it. Yes, the lectures are canned and the material is rather static but I think a critical piece missing from this conversation is that these courses provide free access to high-quality course material, lectures, syllabi, and a learning community to students from around the world who might not otherwise have exposure to this kind of learning. Perhaps Coursera and co. are getting the most attention because they are not charging for their online courses and that is a radical and progressive move in our profit-driven country and world.
> (http://www.hybridpedagogy.com/Journal/files/Broadcast_Education.html)

Tony Bates (2012) is also quite critical about the pedagogic model of the Coursera courses:

> …the teaching methods used by most of the Coursera courses so far are based on a very old and outdated behaviourist pedagogy, relying primarily on information transmission, computer marked assignments and peer assessment. Behaviourist pedagogy has its value, especially where there are right and wrong answers, facts or procedures that must be learned, or students lack higher level cognitive processing skills. In other words it works reasonably well for certain levels of training. But it is extremely difficult if not impossible to teach higher order skills of critical thinking, creative thinking, and original thinking using behaviourist pedagogy, the very skills that are needed in a knowledge-based society. (It should be noted that the 'Canadian' MOOCs of Stephen Downes, George Siemens and Dave Cormier do not suffer from this fault).
>
> Third, and this is the most enraging part of the presentation for me, Daphne Koller talks as if she invented online learning, and that nothing was known beforehand about works and doesn't work in online learning. So she has discovered that students learn better if they are active, so there are lots of tests and activities in the courses. It is better to break up monolithic one hour lectures into smaller, more digestible chunks. Both these strategies in fact date back to the UK Open University print packages forty years ago and it has been standard practice to incorporate such strategies in most online learning since it began on a serious scale 20 years ago.
>
> Her comparisons are all with the weaknesses of lecture-based teaching. For this we should perhaps be thankful but again this is not new – online educators have been making this point again for over 20 years. And now Coursera is creating local or online study groups: again standard practice in other forms of online learning.

However, there are different views and Tony Bates blog on Online learning and distance education resources. (http://www.tonybates.ca/2012/08/05/whats-right-and-whats-wrong-about-coursera-style-moocs/) is a good forum to consider different approaches and opinions.

Assessment type

The most typical assessment types are software grades quizzes, homework, problem sets; five other students grade written responses. Many instructors allow quizzes to be taken multiple times, with highest grade counting (a different quiz each time) (The Big Three, at a Glance, 2012).

Coursera has invested substantial effort in developing the technology of peer assessments, where students can evaluate and provide feedback on each other's work. They have developed a process in which students are first trained using a grading rubric to grade other assessments. This has been shown to result in accurate feedback to other students, and also provide a valuable learning experience for the students doing the grading. They have also drawn on ideas from the literature on crowd-sourcing, which studies how one can take many

ratings (of varying degrees of reliability) and combine them to obtain a highly accurate score. In addition self-assessment online quizzes have been used

(https://www.coursera.org/#about/pedagogy)

However, in spite of all these positive features some critics can be found. The student's (Gibbs, 2012) comments at the blog about grading are as follows:

> Some weeks after the course was finished, Coursera finally got around to issuing the certificates for participation and recording our grade on a sort of transcript page where the grades for all a given individual's Coursera course grades are kept. People were understandably outraged to find out that the professor's grading scheme had been discarded and replaced with a new scheme, not explained clearly anywhere, that gave a percentage grade instead of a letter, and which also seems to result in some unspecified number of people not receiving a certificate despite the fact that they passed the class according to the professor's original grading scheme.
> There is a lot to say here but since it is so incredibly depressing, I am just going to write out five thoughts and then be done with it. I won't go into the details of the grading scheme itself; instead, I will try to stick to more general comments.
>
> **1. People are very emotional about grading**. Even though the course is long over, the discussion boards have suddenly become active again. Earlier in the course, Coursera really could do no wrong; any criticism of the course was generally frowned upon by the majority of students participating in the forums. Now, though, things have changed. Grades are different. Even students who are not likely to be critical of other aspects of the course design are ready to stand up and speak out if they feel they have been wrongly graded. A sad reflection on education in general, where people are more focused on how they are being graded as opposed to the learning process itself.
>
> **2. Grading is a contract that must be respected**. I am staggered by the idea that anybody at Coursera thought they could just throw out the professor's grading scheme and replace it with a different scheme. What does that tell us about Coursera? Nothing good, in my opinion. Even if they decided that this professor's grading scheme was not sustainable over the long term, they should have asked him to change the scheme for the next offering of the class, rather than retroactively changing the scheme for the class that has already taken place.
>
> **3. But … grading really has no place in a MOOC**. Seriously, what is the point of all this? Bitterness and acrimony about the grading scheme was a drag on the class week after week, and now it is adding a new dimension of dissatisfaction to the experience… for no good reason whatsoever. Peer feedback is great, because it is sometimes useful - and if it is not useful, you can just ignore it. Grading, however, is different - grading distracts from the emphasis on giving good feedback and it is also very hard to ignore. Yet the grading is also utterly pointless, given that this course is not for credit. The grade literally does not matter.

4. Alternatives to grading. At a minimum, students should have been allowed to opt out of the grading process at the beginning of the class, receiving feedback but no grades and likewise giving feedback but no grades. That would have been a fine option for me and for many others I am sure! There could be a certification of completion based purely on participation as a combination of writing essays, giving feedback, and participating at the discussion board. I would argue that such a participation-based system would actually have been just as effective as any formal grading scheme, given the chaotic nature of peer-based grading to begin with.

5. Poor communication. Throughout the class, Coursera has had an incredibly poor communication strategy overall, and this grading debacle has shown their communication at its worst. I have received two emails from Coursera about the grading debacle, although comments at the discussion board indicate that there are other Coursera emails that I never received (an email about the availability of the end-of-course survey? never got it; an email from the professor about the grading debacle? never got it). The sheer chaos of the discussion boards makes it a very poor vehicle for class-wide communication. The staff postings to the discussion board have been limited to "no comments," so it is not possible to ask questions about what the staff has posted there. Meanwhile, there is still no announcement of any kind on the announcements page of the class; the last announcement is six weeks old and for the entire ten-week course there were a grand total of four announcements. Many of the problems in this class could have been overcome with better communication, but the communication strategy appears to be non-existent, just *ad hoc* and *ad libitum*.
I learned a lot from this course - but mostly what I learned are things NEVER to do when creating a massive open online course. And my already bad attitude about grades and grading has definitely *not* improved, that's for sure. :-)

3.2.8. Award type

Coursera offers no diplomas or degrees. However, Coursera announced in January 2013 that students will be offered the opportunity to earn “Verified Certificates” for select MOOCs for a small fee. This new option, called “Signature Track”, is available on a course-by-course basis and aims to verify the identity of the participating students. The certificate, however does not include credit toward a degree program, it simply aims to give them a more meaningful way to prove that they’ve completed the course (Empson, 2013).

3.2.9. Industry’s skills requirements

According to the specified learning outcomes of different courses many skills relevant to industry have been identified, for example, skills for data analytics at massive levels, the fundamental computing skills, technical skills needed to write software, core skills in the quantitative management of investments, strategic skills, analytical skills, and social skills.

3.2.10. Analysis

Stakeholders

Providers: Coursera is a service provider, an independent for-profit educational technology company with Stanford roots. Coursera has the Course Operations team that helps teachers offer their classes to tens or hundreds of thousands of students. The team started with 2 founders and now they have more than 20 people doing Engineering, Design, Course Operations, and Business Development (https://www.coursera.org/#about/team).

Teaching/content providers: The content providers are higher education institutions and their staff. The official Coursera platform announces that are currently 33 different universities, colleges and schools that offer on-line courses through Coursera (see section 1.3). These universities represent 8 different nations; 25 institutions are from the United States, two institutions both from Canada and United Kingdom, and one institution from Australia, Hong Kong, Israel and Switzerland. However, in browsing the Coursera course catalogue we can also find courses from the Leiden University (Netherland), Indian Institute of Technology Delhi (India), Indraprastha Institute of Information Technology Delhi (India) and University of California, Berkley (US).

Students: There's no admissions process; the courses are open to everyone with an internet connection, regardless of age, location or socioeconomic status (Willis, 2012).

Business ventures: Coursera finances its operations from venture capital. In April 2012, Coursera announced that they had received $16 million of Series A venture capital from L. John Doerr at Kleiner, Perkins, Caufield & Byers and Scott Sandell of New Enterprise Associates (Stanford partners, 2012).

Finance

Venture capital and philanthropy have funded Coursera.

Coursera provides an online platform for open-access, non-credit classes, available at no cost to audiences around the world. Coursera also offers "a system of testing, grading, student-to-student help and awarding certificates of completion of a course for under $100" (Friedman, 2012).

The Coursera platform has cost the University about $250,000 to implement. The money supports faculty and graduate student assistants who are developing the online offerings and video lectures. Professors participating in Coursera do not receive any raise in their standard University salaries; the incentive to teach online classes largely relies on their interest in providing a unique learning experience for students and bringing their content to a world audience. The $250,000 figure includes the cost of utilizing the broadcast facilities in creating the video lectures, according to Deputy Dean of the College (Santoro, 2012).

While Coursera is a for-profit company, currently they are not generating revenue (Kolowich, 2012). Coursera and participating schools each meet their own expenses, which are substantial on both sides (Wikipedia, 2013). As of December 2012, Coursera finances its

operations from venture capital. In April 2012, Coursera announced that they had received $16 million of Series A venture capital from L. John Doerr at Kleiner, Perkins, Caufield & Byers and Scott Sandell of New Enterprise Associates (Stanford partners, 2012). Young (2012) notes “Coursera is following an approach popular among Silicon Valley start-ups: Build fast and worry about money later”.

Revenue opportunities in the Coursera include:

1. **Data mining:** Sell student information to potential employers or advertisers.
2. **Cross- or up-sell:** Course materials (e.g., videos) are freely available, but ancillary services like system of testing, grading, student-to-student help and awarding certificates of completion are fee-based.
3. **Advertising model:** Courses have named sponsors.

Government role

There is no direct role of for the Government within Coursera.

Social mission

Coursera mission is to democratize education, making necessary, important, invaluable learning available to the widest number of people everywhere for the lowest cost.

Quality aspect

Quality is assured by working with high-quality university partners. Coursera courses are primarily offered by high-prestige name-brand universities in several countries.

Infrastructure related interfacing

Coursera was developed at Stanford University in fall of 2011 by computer science professors Daphne Koller and Andrew Ng. They developed its core technologies, many of them deployed in their own computer science classes (University of Pennsylvania, 2013). The Coursera platform has cost the University about $250,000 to implement. The money supports faculty and graduate student assistants who are developing the online offerings and video lectures. The $250,000 figure includes the cost of utilizing the broadcast facilities in creating the video lectures, according to Deputy Dean of the College (Santoro, 2012).

Now Coursera is operating as a service provider, an independent for-profit educational technology company. Coursera has the Course Operations team that helps teachers offer their classes to tens or hundreds of thousands of students. The team started with 2 founders and now they have more than 20 people doing Engineering, Design, Course Operations, and Business Development (https://www.coursera.org/#about/team).

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3.3. EdX MOOC platform

3.3.1. Goals and Aims

"The Future of Online Education for anyone, anywhere, anytime" (edX, 2012g). EdX is a not-for-profit enterprise, run by its founding partners Harvard University and the Massachusetts Institute of Technology. EdX has a goal to be open to all: "to reach out to students of all ages, means, and nations" (edX, 2012d). Along with this open access aim, the edX partners intend to use edX to "research how students learn and how technology can transform learning–both on-campus and worldwide" (ibid).

3.3.2. History and evolution

Edx has developed from MIT's experiments with MITx, a MOOC platform through which MIT sought to research and develop educational technologies for use within its conventional campus based face-to-face courses.

Daniel classified edX as an xMOOC (Daniel, 2012) i.e. a platform which supports mainly behaviourist approaches to learning and teaching. However, the edX platform itself does not limit course providers to behaviourist approaches. Daniel was drawing on observations and data prior to October 2012. Since then, at least one course which features connectivist (Siemens, 2004) features has started its run on the edX platform. This computer science course (CS50x) features 'Spaces' in which students can collaboratively develop and run code. However, collaboration is not necessary to complete or pass the course.

3.3.3. Roles and actors

Providers: MIT, Harvard

Teaching providers: Universities Harvard, MIT and Berkeley (to be joined by the University of Texas in summer 2013), and the company 10gen (a company which provides database software and services).

Students: anyone with an internet connection; there is no admissions process (edX, 2012h).

Resource providers: edX has formed partnerships with several organisations who provide products for free use by edX staff and students. Examples include VMware which provides software to those taking HarvardX's CS50x course (The Tech, 2012b), and Cengage, a producer of educational content and software which provides the textbook for one of Harvard's edX courses "Health in Numbers: Quantitative Methods in Clinical & Public Health Research" (The Tech, 2012a).

3.3.4. Topics

The topics currently available are all in the science domain. However in December 2012 edX announced forthcoming courses in the humanities and social sciences, to start in spring 2013 (edX, 2012f).

The courses offered via the edX platform as of November 2012 are:

1. Artificial Intelligence (CS188.1x), first run September – November 2012, 15 hours per week
2. Circuits and Electronics (6.002x), first run March – June 2012, 12 hours per week
3. Foundations of Computer Graphics (CS184.1x), first run November – December 2012, 12 hours per week.
4. Health in Numbers: Quantitative methods in clinical & public health research (PH207x), first run October 2012 – January2013, 10 hours per week
5. Introduction to Computer Science 1 (CS50x), first run October 2012 – April 2013, 160 hours total plus final project.
6. Introduction to Computer Science and Programming (6.00x), September 2012 – January 2013, 12 hours per week.
7. Introduction to Solid State Chemistry (3.091x), first run October 2012 – January 2013, 12 hours per week.
8. Software as a service (CS169.1x), first run September 2012 – October 2012, 12 hours per week.
9. Software as a service (CS169.2x), first run November 2012 – December 2012, 12 hours per week.
   (edX, 2012e)
   and 3 courses from 10gen, a company offering NoSQL database software that are run on the edX platform but not via the edX.org web site. These are instead offered via 10gen's own web site
10. MongoDB for developers (M101P), first run October 2012 – December 2012, 10 hours per week.
11. MongoDB for DBAs (M102), first run October 2012 – December 2012, 10 hours per week.
12. MongoDB for Java developers (M101J), first run scheduled for February – April 2013, 10 hours per week.
    (10gen, 2012; The Tech online edition, 2012).

3.3.5. Size

Student population

Data for the first course run on the edX platform, Circuits & Electronics 6.002x, show that just under 155,000 students registered for the course when registration opened in February 2012. However, only 23,000 earned any points on the first problem set, and 9,300 passed the midterm exam. When the course ended, 8,200 students took the final examination, of whom just over 7,000 earned a passing grade and the option of receiving an informal certificate from edX. (Kolowich, 2012). The course ran from March 5, 2012 until June 8, 2012 (edX, 2012i).

According to EdX spokeswoman Amanda Keane, by mid-October 2012 there had been over half a million course enrolments for edX's eight courses including the inaugural course in Spring 2012 and with Fall 2012 courses still actively enrolling. At this time there were over 370,000 unique learners enrolled in edX. These figures mean that the 7 courses launched since the inaugural course each have, on average, a population of 30,741 enrolled students (Boston Daily, 2012).

There were 30,000 registrations for the first two courses run by 10gen, 10,000 For M102 (MongoDB for DBAs) and 20,000 for M101 (MongoDB for Developers). (Erlichson, 2012).

Teaching staff

The teaching staff are named as 'Course staff' for the course listed on the 'About' page for each course on the edX site are as follows:

1. Artificial Intelligence (CS188.1x): 7 staff members (provider: Berkeley)
2. Circuits and Electronics (6.002x): 11 staff members (5 instructors, 4 teaching assistants, 2 edX platform support (provider: MIT)
3. Foundations of Computer Graphics (CS184.1x): 1 staff member (and "students Nicholas Estorga and Brandon Wang have developed the auto-graders used in the course, and will be assisting in its administration" (edX, 2012c) (provider: Berkeley)
4. Health in Numbers: Quantitative methods in clinical & public health research (PH207x): 2 members of staff (provider: Harvard)
5. Introduction to Computer Science 1 (CS50x): 5 staff members (provider: Harvard)
6. Introduction to Computer Science and Programming (6.00x): 3 staff members (provider: MIT)
7. Introduction to Solid State Chemistry (3.091x): 1 staff member (provider: MIT)
8. Software as a service (CS169.1x): 2 staff members (provider: Berkeley)
9. Software as a service (CS169.2x): 2 staff members (provider: Berkeley)
10. MongoDB for developers (M101P): 1 staff member "and other 10gen employees"
11. MongoDB for DBAs (M102): 1 staff member "and other 10gen employees"
12. MongoDB for Java developers (M101J): 1 staff member "and other 10gen employees" (provider: 10gen)

Providers

The edX platform is a not-for-profit enterprise of its founding partners Harvard University and the Massachusetts Institute of Technology. EdX is based in Cambridge, Massachusetts, U.S.A and is governed by MIT and Harvard (edX, 2012d).

In addition to Harvard and MIT, other partner universities and organisations provide course through the edX platform. In October 2012 there were two named partner "X Universities", University of California, Berkeley and The University of Texas (UT) System, though at this time there were not yet any UT courses available. UT "plans to offer at least four courses on edX within the next year" (edX, 2012k).

10gen, the provider of the MongoDB courses is a company founded in 2007 and funded by venture capital e.g. receiving $42 million in May 2012 (The Register, 2012).

3.3.6. Sector of providers

The providers (MIT and Harvard) are both in the 'First-degree level higher education' and 'Post-graduate level higher education' sectors in the Standard Industrial Classification (Companies House, 2007).

Most of the teaching providers are also in the First-degree level higher education and 'Post-graduate level higher education' sectors , and one (10gen) is in the 'Business and domestic software development 'sector.

3.3.7. Learning design

Pedagogical mix

Some edX course follow a strict schedule (e.g. 3.019x) during which the learner is expected to read specified sections of a textbook and/or course web pages online. Others allow students to study at their own pace, (e.g. the current run of CS50x allows starting any time after October 15, 2012 and finishing any time before April 15, 2013). For some courses (e.g. 3.019x) there are online exercises which are marked automatically. However, there is no feedback or help provided to the learner, other than to let them know that there is right or wrong.

A problem that some learners have reported with edX courses is that although the textual and multimedia material is generally of good quality, there is little support if a learner has a problem understanding it.

Assessment type

Some edX courses offer both final and mid-term exams which allow learners to test their progress. For example course 3.019x had two midterm exams and a final exam, all run online. The mid-term exams were designed to be taken in 3 hours, but were open for 72 hours (Friday to Sunday) to enable learners to cope with internet access problems and other interruptions.

3.3.8. Award type

Typically, learners who pass the final exam receive a certificate from edX. However, there are plans for proctored exams, run in conjunction with Pearson Vue who will manage the computer-based testing. This could raise the perceived value of certificates gained in this way (Coughlan, 2012).

3.3.9. Industry's skills requirements

See e.g. Skills for Jobs: Today and Tomorrow. The National Strategic Skills Audit for England 2010 (UK Commission for Employment and Skills, 2010). The UK Commission for Employment and Skills reports on recruitment problems and skills gaps by industry sector and by occupation (Shury et al., 2010). Occupations (employment type classifications) are given in appendix d, page 266.

Key future occupational skills needs (UK Commission for Employment and Skills, 2010) shows future skills gaps, e.g. by predicted future economic activity (appendix b).

3.3.10. Analysis

All the courses on the edX platform are time limited. In some, the schedule is enforced more rigorously than others for example in "Introduction to Computer Science 1" (CS50x) the only hard deadline is the end of the course, by which time the student must submit their answers to all the problems, quizzes and the final project (edX, 2012j). However in the 'Circuits and Electronics' course (6.002x) there are weekly coursework deadlines, and both mid-course and end of course exams (edX, 2012a). The requirements to gain a certificate also vary. For example, for Certificates issued will indicate that students have successfully completed the course, but will not include a specific grade (edX, 2012b). However, for in "Introduction to Computer Science 1" (CS50x) students who earn a passing grade on the problem sets, quizzes, and a final project "will receive an honor code certificate from HarvardX that can be downloaded as a PDF from edX's website" (https://x.cs50.net/2013/syllabus). Criticisms of the scheduled and exam driven courses (e.g. 6002.x) include the fact that the schedule of the exams drives some students to focus on passing the exam, rather than gaining an understanding of the subject matter (Mike, 2012)

All of the edX courses use behaviourist pedagogies, in that the main teaching strategy is for the students watch videos and read course materials. However, some also provide opportunities for problem based and collaborative learning. For example the collaborative coding spaces in CS50x provide facilities for students to write and evaluate code in an online collaborative environment. There is also much evidence of activity on third-party social media sites and tools such as Facebook, Twitter and Skype (e.g. Facebook group formed for CS50: https://www.facebook.com/groups/453432201388295/).

There are some innovatory relationships that have been established as side effects of the edX MOOC platform. One is in the relationship between publishers and the platform, and between publishers and students using the platform. For example, for the 'Circuits and Electronics' course (6.002x) Elsevier Publishing is providing a free online-only version of the course textbook "The Foundations of Analog and Digital Electronic Circuits" to enrolled

students. These students also have the opportunity to buy discounted copies of the print or electronic book (25% off cover price).

10gen's motives for using the edX platform could be as a way of driving up adoption of its database products and services.

Stakeholders

Providers: MIT, Harvard

Teaching providers: Stakeholders include the institution itself, and staff of the following organisations. Universities Harvard, MIT and Berkeley (to be joined by the University of Texas in summer 2013). The company 10gen (a company which provides database software and services).

Students: anyone with an internet connection; there is no admissions process (edX, 2012h).

Resource providers: edX has formed partnerships with several organisations who provide products for free use by edX staff and students. Examples include VMware which provides software to those taking HarvardX's CS50x course (The Tech, 2012b), and publishers e.g. Cengage, a producer of educational content and software which provides the textbook for one of Harvard's edX courses "Health in Numbers: Quantitative Methods in Clinical & Public Health Research" (The Tech, 2012a)

Finance

Overall , the edX venture is not-for-profit. A variety of companies provide services for free to individual MOOCs and/or the edX platform as a marketing strategy. Some of these partner companies are funded through Venture capital.

Government role

There is no direct role of for the Government within edX.

Social mission

EdX's social mission is to offer open access to higher education to all at all ages.

Quality aspect

The edX platform is owned and run by institutions with a reputation for quality in the Higher Education marketplace, and with high value brands. Courses are offered through the platform by a variety of providers, and many of these courses are based on existing materials used in conventional face-to-face teaching. Students and potential students perception of quality and value of these courses is influenced by the institutions reputation, and the involvement of some staff from these institutions in teaching roles on the courses. However, many of the courses offered to date have been done so with little change in the learning design from the face-to-face course on which they were based, and offer little feedback to struggling learners and have a focus on passing exams rather than transformative learning.

Infrastructure related interfacing

The edX platform has been developed from MIT's MITx MOOC platform. Edx itself has described the platform as "open source" (edX, 2012h) but it appears that the code has yet to be released (StackExchange, 2012).

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3.4. Khan Academy MOOC platform

3.4.1. Goals and Aims

Khan Academy is non-profit organization founded by Salman Khan. Their mission is "to accelerate learning for students of all ages" and spread out high level education everywhere. The goal is changing education for the better by providing a free world-class education for anyone and anywhere. Platform is prepared for students, teachers, home-schooler, principal, adult returning to education. All materials are free of charge.

3.4.2. History and evolution

Founder of Khan Academy is Salman Khan who earn three degrees from MIT: a BS in mathematics, a BS in electrical engineering and computer science, and an MS in electrical engineering and computer science. In 2004 he tutored his cousin Nadia in mathematics by Internet. When other relatives and friends need similar help he start distribute his lesson on YouTube. When YouTube canal gets huge popularity testimonials of students prompted Khan to focus on the tutorials full-time. In 2009 Salman Khan quit his job in finance as a hedge fund analyst at Connective Capital Management and release Khan Academy – non-profit organization. The project is funded by donations. In 2012 Google announced it would

give Khan Academy $2 million for creating more courses and translating core content into most widely spoken languages. Khan academy currently provides various levels of different courses (mathematics, physics, chemistry, finance, computer science etc.). Khan have a different language releases supported by volunteers.

3.4.3. Roles and actors

Providers: Khan Academy

Teaching providers: Khan Academy team - Salman Khan and co-operators, all users can be a teacher (internal system of tutoring).

Students: anyone who enter on the page (no admissions and register required).

3.4.4. Topics

Over 227 million lessons delivered. 3800 videos (January 2013). Khan Academy offered subject categories:

1. Math
   - Arithmetic and Pre-Algebra,
   - Algebra,
   - Geometry,
   - Trigonometry and pre-calculus,
   - Calculus,
   - Probability and statistics,
   - Differential Equations,
   - Linear Algebra,
   - Applied Math,
   - Brain Teasers,
   - Vi Hart
2. Science & Economics
   - Biology,
   - Chemistry,
   - Physics,
   - Cosmology and Astronomy,
   - Organic Chemistry,
   - Finance and capital markets,
   - Microeconomics,
   - Macroeconomics,
   - Computer Science,
   - Healthcare and Medicine,
   - LeBron Asks,
   - MIT+K12,
   - Projects
3. Humanities
   - History,

- American Civics,
- Art History

4. Test Prep
   - SAT Math,
   - GMAT,
   - CAHSEE,
   - California Standards Test,
   - Competition Math,
   - IIT JEE,
   - Singapore Math
5. Computer Science
   - Drawing,
   - Programming Basics,
   - Animation,
   - User Interaction

3.4.5. Size

Student population

Over 4 million unique users per month. Channel on YouTube is viewed over 82 million times. There is a problem with a strict determining exact number of students due to lack of necessary registration. Courses are not ending with certificate or any document which could be counted.

Teaching staff

Salman Khan began tutoring his cousin in Mathematics in late 2004. Videos was distributed on You Tube and formed the core of Academy. Now, Khan Academy uses micro lectures by video prepared by many people. Khan Academy invite users to be teachers or tutors by signing-in the system. Khan Academy provide translation project of KA content into other languages. The project involves volunteers from around the world.

Providers

Khan Academy is only provider. KA starts a project of implementation Khan Academy methods in traditional schools. Teachers from various schools could implement Khan Academy methodology and application in their course.

3.4.6. Sector of providers

Organization non-profit and schools.

3.4.7. Learning design

Pedagogical mix

The main idea of changing model of the education by Khan Academy is “removing the one-size-fits-all lecture from the classroom and letting them do work”. In contrast to the traditional classroom where students learn, practise etc. and on the end they have exam

which gives incomplete information about gaps of knowledge. Khan Academy focus on providing learning process as a continuing series of consistent elements where you can indicate precisely gaps of knowledge.

In addition to video tutorials Khan Academy deliver system of learning and tutoring with elements of gamification. System consist lot of interactive exercises (mathematics only) arranged from very simple to very complicated. System forces multiple make exercise the same type to pass. If student answer incorrectly system ask again but using the same class of problem. This method allows learn without gaps of knowledge.

Main goal of Khan Academy is giving opportunity to get solid foundation of the subject.

Teachers/tutors have very complex statistic tool which allows to track progress of students: which topic is difficult for given students, how long did it take to master the material. etc.

Assessment type

Every exercise is assessed immediately after learner answer. More important is to master the subject from assessment then take an evaluation. Assessment serves as an immediate response feedback. Khan Academy has a built-in system of badges.

3.4.8. Award type

1. Badges.
2. Points.
3. Map of knowledge/skills (possibility of exploring map of skills and checking path of development)

3.4.9. Industry's skills requirements

Hard to point out direct skills required on labour market. Indirectly it could be identifying analytical skills.

3.4.10. Analysis

Stakeholders

1. Khan academy team
2. Students/pupils
3. Teachers
4. Donators
5. Schools
6. Content providers
7. National partners and communities

Finance

Khan Academy itself is a non-profit organisation that is supported by donators. And the service is free for all stakeholders. All of the site's resources are available to anyone: students, teachers, home-schoolers, principals, adults returning to the classroom. Khan Academy's materials and resources are available completely free of charge.

Government role

There is no direct role of Government in Khan Academy.

Social mission

changing education for the better by providing a free world-class education for anyone anywhere.

Quality aspect

Content is provided by professionals and educators.

Infrastructure related interfacing

1. YouTube channel:
   YouTube channel include video library with over 3900 videos in various topic areas and over 225 million lessons delivered.[29][30] These videos are licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License.[31]
2. Excersise system:
   Khan Academy also provides a web-based exercise system that generates problems for students based on skill level and performance. The exercise software is available as open source under the MIT license.

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3.5. MOOC EaD - O primeiro MOOC em língua portuguesa (MOOC DL - The first MOOC in Portuguese language)

3.5.1. Goals and Aims

The MOOC we present is found in http://moocead.blogspot.pt/ and is called *MOCC EaD - O primeiro MOOC em língua Portuguesa* (MOOC DL - the first MOOC in Portuguese language). So, this MOOC has two major objectives:

- Propose as a working model the concept of distance education statement based on collaboration and interactivity;
- Experience English, the emerging concept based on the constructivist MOOCs.

3.5.2. History and evolution

The MOOC EaD has been designed and curated by João Mattar (Brazil) and Paulo Simões (Portugal) and is supported by TIDD (Graduate Program in Technology and Design Digital Intelligence) at PUC-SP (Brazil) and by ABED - Brazilian Association for Distance Education.

As far as we noticed the press coverage was not intense, mostly because this MOOC just started last October.

Any education professional can participate in this MOOC, with particular emphasis on those that are connected to the Distance Education and / or e-Learning.

The MOOC EaD is the first MOOC conducted in Portuguese. It is dedicated to Distance Education, where different models of Distance Education in Moodle are discussed incorporating blogs and YouTube videos. Also explores various tools such as Twitter and Diigo.

3.5.3. Roles and actors

The MOOC EaD presents a list of digital tools (Wikis, Twitter, Diigo, Playlist, You Tube) and each tool is workout during usually a week as a MOOC activity that is streamlined by a MOOC "teacher".

There are also experts' testimonies in the form of a YouTube video.

Teachers in the MOOC EaD have a webpage link, open to the general public.

In this MOOC the students build their own learning pathway. They choose the spaces that they find more appropriate and decide on the path that suits them.

As to the teacher, in this MOOC they believe that his role should be as a facilitator that orientates students through their learning process. So in the context of this MOOC they are called curators instead.

The roles of curators includes: planning the MOOC, post texts, videos, conduct asynchronous activities, attend various platforms, monitor and propose discussions, among other activities.

3.5.4. Topics

The topics available are all in the domain of DL models. There is a list of topics such as: Learning objects; Assessment; Learning objects; Interactivity; …

In each one of the above mentioned topics there are some learning materials such as a descriptive text a video and blogs where people may comment on the topic.

3.5.5. Size

The numbers are on permanent counting the various spaces. There is a space for formal registration. Among the various spaces some numbers can be provided (03 DEC 2012):

- Facebook Page - History of DL - 640 Likes
- Event on Facebook - 242 Go
- Twitter – 183 Followers
- Diigo Group - 49 Members
- YouTube Channel - 76 Subscribers; 3194 Views
- Central Area (Blogger) - 28,590 views

3.5.6. Sector of providers

Providers: Free association of two researchers in Science Education.

Teaching providers: The two curators of the course assume the role of teachers.

No data on students. There's no admission process; the course are open to everyone with an internet connection.

3.5.7. Learning design

It is designed as an experience-oriented and collaborative knowledge construction.

Pedagogical mix

The MOOC EaD is a cMOOC, this is, it uses a connectivist approach.
The blog is conceived as a common space for ads, suggestions and discussions.
The MOOC EaD page has a link to the MOOCfesto where the authors exposed their main directions of experimentation and concerns.

Assessment type

There is no type of evaluation.

3.5.8. Award type

There is no type of award.

3.5.9. Industry skills requirements

Not applicable

3.5.10. Analysis

The MOOC is integrated as an activity from JOVAED (Day Virtual Distance Education) promoted by ABED (Brazilian Association of Distance Education) that supports and certifies the participation of those involved. Moreover, the MOOC was supported by TIDD (Graduate Program in Technology Intelligence and Digital Design at PUC-SP).

What is relevant

1. MOOC EaD is the first MOOC in Portuguese which is indeed relevant since it opens up a space to network using the Portuguese language that has a number of 280 million speakers (the fifth most spoken language in the world. Being so it fortalices and promotes a digital Portuguese culture and give access to the Portuguese community of speakers to a virtual place of discussion about new subjects matters.

2. It is a space of experimentation and learning, where experts and people/students are close to each other, therefore a space of interaction and democratization of knowledge on very updated and new brand topics.
3. Because it is a MOOC, it strengths students autonomy and learning style.

What is a constrain

1. The credits outcomes. This is, it is not clear how people/students get credits or certification.
2. It is not clear what are the learning outcomes; this is what people/students should know at the end of the course.

Interfacing activities

Stakeholders	University teachers, researchers and experts in Distance Education (Portuguese and Brazilians) Higher Education Students Professionals in the field of education Users are Master and Doctorate students from the Graduate Program in Technology and Design Digital Intelligence University of São Paulo – PUC – Catholic private university ABED - Brazilian Association for Distance Education.
Finance	No finance model.
Role Government	No government involvement.
Social Mission	To connect and strengthen the Portuguese speaking community throughout web based environment The believe that distance education can decisively contribute to the processes of growth, democratization of education and reduce inequalities in Portuguese-speaking countries. Strengthen and promote a digital Portuguese culture and give access to the Portuguese community of speakers to a virtual place of discussion about new subjects matters.
Quality Aspect	It is provided by two higher education teachers /curators), and it is promoted by specialized researchers and experts in Distance Education. It is developed in the frame of a Graduate Program in Technology and Design of Digital Intelligence. The majority of students are from higher education, particularly post-graduate students. Institutions involved are higher education institutions and specialized institutions. Materials provided are high level materials created by specialized authors.
Infrastructure related interfacing	It is designed as an experience-oriented and collaborative knowledge construction. The MOOC advocates an alternative distance education model

	more flexible and based on design education, constructivism, connectivism, training for teaching online, games, virtual worlds, social networking, interaction & collaboration. The MOOC ead, the first MOOC in Portuguese, reflects and proposes mobilizations in defense of interactive and collaborative model. Its flows are: history (facebook), models (blog and YouTube), tools (Twitter, Diigo etc.) & future of ead (mediawiki).
Award to interfacing	Collaborative knowledge construction. Discussions about very prominent and updated subjects, matters and issues. It provides a practical knowledge on digital tools.

3.6. OCW at the University of Évora – Portugal

3.6.1. Goals and Aims

After the signing of the Protocol of accession of the University of Évora to the network OCW-Universia, a platform was installed (eduCommons) to support free access to content produced at the University of Évora, thus constituting the Open Course Ware at the University of Évora (OCW-UE).

This tool is an extension to the system Plone (www.plone.org) and is developed by the group COSL (www.cosl.usu.edu) Utah State University. It is also free software covered by the GNU GPL license.

The platform OCW is not integrated with the system of unique identification (LDAP), so the data of those who use this platform are distinct from those used in other applications at the University.

3.6.2. History and evolution

The MIT (Massachusetts Institute of Technology) is the inventor and the main promoter behind Open Course Ware (OCW): a course that does not lead to a degree and does not grant access to faculty.

The MIT set up OCW in the year 1999 as an alternative to traditional distance-learning programs. In 2001 the idea of the MIT's Open Course Ware was announced in *The New York Times.* In 2009 they published 1950 courses and one of the collections (highlights for High School) got 1 million visits. Until now MIT published 2150 courses and reached 125 million visits.

The major impact of this initiative has led, since 2001, to the participation of Universities and other organizations from all over the world, including Portugal, which, thus, in coordination with the OCW-MIT, engaged in similar projects, which sought free access to materials that teachers used in class at MIT, along with a study guide.

In Portugal, Universia as an entity that aggregates a vast network of universities, adhered to this concept from the beginning, promoting Universia-OCW Consortium, with the aim of providing free access, simple and consistent to the materials to educators in the non-profit sector, students and self-taught persons worldwide. The materials are offered with the seal

of higher education institutions guaranteeing thus the quality of content/knowledge available.
In October 2008, the University of Évora joined this consortium, with the signing of a protocol between the two institutions (University of Évora and Universia), thus becoming the first University in Portugal adhering to this project.

3.6.3. Roles and actors

According to the assumptions of the OCW initiative, only teachers of the University of Évora have the right to publish content on the site OCW-UE. These contents can be constituted by the materials used in the teaching of disciplines at the University of Évora or resulting from the reuse materials available on OCW sites, provided they meet the licensing conditions to those materials.

By providing their content on the site OCW-UE teachers are in agreement with the conditions of use, reuse, adaptation and distribution conferred by OCW initiative. The University of Évora is responsible for maintaining the site where the content produced is recorded and used by their teachers in their courses, to support the teaching-learning process (OCW – http://www.uevora.pt/).

These materials (documents, syllabus, bibliography, etc..) are a set of integrated features in one place, are offered freely and are universally accessible through the Web, without intellectual property limitation.

The very use, reuse, adaptation and distribution of this content is permitted under certain restrictions listed under licensing that covers them (Creative Commons licensing - Some Rights Reserved - http://www.ocw.uevora.pt/ue). The teacher is not to give up their copyright, but offers some of the rights to the general public, under certain specified conditions.

Users of such content also undertake to:

- use the content without commercial purposes,
- recognize the institution that originally published the content and, if appropriate, also recognize its author.

3.6.4. Topics

Contents produced by teachers from the University of Évora in several areas (Arts, Science and Technology and Social Sciences)

3.6.5. Size

No data available

3.6.6. Sector of providers

Providers: Universia-OCW Consortium (in this case, University of Evora).

Teaching providers: Only teachers of the University of Evora (we don´t know the exact number).

Students: The courses are open to everyone; there are permissions to anonymous access to the consultation of content. The OCW provides free learning opportunities (self-learners).

3.6.7. Learning design

Structure of the course modules

The structure of modules created by the teacher consists of the following elements:

- 1.Objectives
- 2.Program
- 3.Teaching methodology
- 4.Type of Evaluation
- 5.Study Materials
- 6.Bibliography

Permissions

Anonymous access to the platform eduCommons allows the consultation of content that have already been published, it is not possible any other level of intervention.

A user to access the content management tools requires prior registration, made by the Administrator of the platform.

Although eduCommons provide an initial set of user profiles, a new profile was created to enable teachers of the University of Évora all the permissions related to creating and publishing content. This profile is named UeTeacher. So, a user with the profile Ueteacher has permissions to create diverse content, associated to a course and submit them to different workflow states. The teacher is then responsible for the content it provides. On the other hand, the teacher does not have permissions to create more complex structures such as new disciplines and departments.

Products

The completion of the project Consortium OpenCourseWare Universia / University of Évora took the free and open digital publication of the book Open Course Ware (OCW): knowledge, materials production, content sharing, learning (http://repositorio.ipsantarem.pt/bitstream/10400.15/400/1/OCW_FINAL_REVISTO_print5.pdf). This high quality publication includes educational resources of university-level (courses programs, grades, assignments and exams). This material is also available around the world for students and educators who want to use and adapt it under open licenses.

Based on the guiding axes defined in the Statutes of the University of Évora, to boost the Educational Technology Center (CTedu) and crossing them with the measures that have been presented at international level (European Year for Combating Poverty and Social Exclusion (2010), Strategy for the Information Society (post-i2010), Lisbon Strategy (EU2020) and national - Trust Agreement for Higher Education, the OpenCourseWare was designed as one of the tools available online to respond to the need of support training and professional development of university teachers on ICT (Information and Communication Technologies).

The book is intended, ultimately, to contribute to enrich the knowledge concerning open content initiatives, supported by proper tools, such as OCW and to achieve the following objectives:

- Contribute to the success of the European Year against Poverty and Social Exclusion (2010) with regard to teacher training;
- Undertake initiatives that respond to the future strategy presented in the documents EU2020 and post-i2010;
- Identify advantages, disadvantages and potential pedagogical integration of OCW as a tool "Green ICT" post-i2010.

3.6.8. Award type

The main beneficiaries of OCW are self-learners and participating universities. OCW does not provide any credentials, so self-learners use it solely for personal benefit.

3.6.9. Industry's skills requirements

Not applicable

3.6.10. Analysis

The main beneficiaries of OCW are self-learners and participating universities. OCW does not provide any credentials, so self-learners use it solely for personal benefit.

Those who have no other access to higher education can also benefit from this free access. We can also highlight the potential of OCW when is blended with other forms of learning to enrich student's experience.

The benefit for those who publish their own courses as OCW is related to the fact that they can be recognised as experts in a particular field to a wider audience, and this can attract attention to books and other materials produced by them.

Another aspect is related to the volunteer contributions to OCW. Volunteer instructors could play a significant role, but the volunteers must be trained and prepared to produce such a resource. For example in MIT translated materials we can see that the MIT OpenCourseWare materials were translated into different languages but MIT OpenCourseWare makes clear that these translations were not criticized nor approved these, and neither MIT nor MIT OpenCourseWare are represented in these texts or even give guarantees about the translated materials. MIT OpenCourseWare states that it has no responsibility for errors in translation.

This questions arises some concerns regarding OCW Consortium and the need to provide even more coordination.

After the analysis of this case some questions emerged:

- How are open educational resources altering the access to and engagement with traditional educational content?
- What are the advantages / disadvantages of open courseware for higher education?
- How are open educational resources shaping opportunities for learning?

Interfacing activities

Stakeholders	OpenCourseWare Universia Network Universities Higher Education Students Worldwide Educators and students The main beneficiaries of OCW are self-learners and participating universities.
Finance	No finance model
Role Government	No government involvement
Social Mission	To provide to the cyber world materials of university educational content, from a internationally recognized academy such as the MIT. To develop a significant presence of Latin American Universities, and cultures and languages they represent, in the OCW project worldwide.
Quality Aspect	Educational resources at the university level internationally recognized academy such as the MIT Universia the OCW Consortium has world wide recognizes universities
Infrastructure related interfacing	Teacher may use the tool EduCommons in approach and availability of open content.
Award to interfacing	The main beneficiaries of OCW are self-learners and participating universities. OCW does not provide any

	credentials, so self-learners use it solely for personal benefit. Those who have no other access to higher education can also benefit from this free access. We can also highlight the potential of OCW when is blended with other forms of learning to enrich student's experience.

3.6.11. References

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video de apresentação - http://www.youtube.com/watch?v=Fucpef2K0T4

3.7. OER University (OERU) MOOC platform

3.7.1. Goals and Aims

The Open Educational Resource (OER) university is a virtual collaboration of like-minded institutions committed to creating flexible pathways for OER learners to gain formal academic credit.

The OER university aims to provide free learning to all students worldwide using OER learning materials with pathways to gain credible qualifications from recognised education institutions. It is rooted in the community service and outreach mission to develop a parallel learning universe to augment and add value to traditional delivery systems in post-secondary education. Through the community service mission of participating institutions they will open pathways for OER learners to earn formal academic credit and pay reduced fees for assessment and credit (Bates, 2011; http://wikieducator.org/OER_university/Home).

Directed by the core principles of engagement the OER university collaboration:

- Will design and implement a parallel learning universe to provide free learning opportunities for all students worldwide with pathways to earn credible post-secondary credentials.
- Offer courses and programs based solely on OER and open textbooks.
- Design and implement scalable pedagogies appropriate for the OER university concept.
- Will implement scalable systems of volunteer student support through community service learning approaches.
- Coordinate assessment and credentialising services on a cost recovery basis for participating education institutions to ensure credible qualifications and

corresponding course articulation among anchor partners (http://wikieducator.org/OER_university/Home).

3.7.2. History and evolution

The OERu started out as a loose network of interested individuals within several HEIs who felt a personal mission to promote the idea of enabling universal access to higher education through collaboration around OERs. In February 2011, these individuals met at Dunedin in New Zealand to flesh out their ideas and generate a concrete plan of action. In November 2011, the OERu was officially launched, with 15 'anchor partners' (13 teaching institutions and two non-teaching institutions) having made the commitment to test the OERu concept. Subsequent to that, two further teaching institutions joined the consortium (Witthaus, 2012). These institutions are currently in the process of preparing to implement the OERu concept which was originally proposed by Taylor (2007) in terms of a 'parallel learning universe', in a pilot planned to start in the second half of 2012 (Witthaus, 2012).

The rationale behind it was that according to UNESCO (Altbach et al, 2009), there is a demand for over 100 million places in higher education worldwide that will never be met by existing provision, due to capacity constraints on the part of higher education institutions (HEIs) and fees that are unaffordable for the learners. The OER university aimed at meeting this need (Witthaus, 2012).

The communication hub for the development of the OERu is a wiki (www.wikieducator.org/oeru) and all decisions and processes are recorded there in a deliberately open and transparent way (Witthaus, 2012).

3.7.3. Roles and actors

Providers: The OER university is an open network and public-private partnership (PPP) including post-secondary institutions, the private sector, non-profits, government and international agencies coordinated by the OER Foundation, an independent educational charity headquartered in New Zealand.

Founding anchor partners:

1. Athabasca University (Canada)
2. BAOU (Gujarat's Open University) (India)
3. Empire State College (SUNY) (United States)
4. Nelson Marlborough Institute of Technology (New Zealand)
5. NorthTec (New Zealand)
6. Open Polytechnic (New Zealand)
7. Otago Polytechnic (New Zealand)
8. Southern New Hampshire University (United States)
9. Thompson Rivers University (Canada)
10. University of Canterbury (New Zealand)
11. University of South Africa (Republic of South Africa)
12. University of Southern Queensland (Australia)
13. University of Wollongong (Australia)

14. OER Foundation (non-teaching) (international)
15. BCcampus (non-teaching) (Canada)

Anchor partners:

1. Excelsior College (United States)
2. Kwantlen Polytechnic University (Canada)
3. Open University of Catalonia (Spain)
4. Thomas Edison State College (United States)
5. Unitec Institute of Technology (New Zealand)
6. University of Glamorgan (United Kingdom)
7. University of the South Pacific (Representing 12 Pacific Island Nations)
8. Wintec (New Zealand)

Students: The OER university provides free learning opportunities for all students worldwide using courses based solely on open educational resources (OER) and open access (OA) materials with pathways for learners to earn credible degrees (http://wikieducator.org/OER_university/About).

3.7.4. Topics

The OER university offers courses and programs based solely on OER and open textbooks and based on the profile of partner universities and networks as well as existing OER resources produced elsewhere.

3.7.5. Size

Student population

According to the study of Witthaus (2012), mass-scale international audience of 100 million mentioned by UNESCO (Altbach et al, 2009) was the target population for OERu offerings. However, some institutions had a more defined and localized audience in mind. For example, a major focus for the US-based institutions was the estimated 23 million adults within the US alone (US Department of Education, 2011, p 22 as cited by Witthaus, 2012) who are 'underserved' in terms of higher education, including large numbers of work-based learners who could be reached via partnerships with employers. Within New Zealand, Australia, Canada and South Africa, there was also a high degree of commitment to using the OERu to reach out to local communities who currently have little or no access to higher education.

There was also mentioned that the OERu is potentially playing a role in increasing the existing customer base of some institutions. For example, in the US- and Canada-based institutions where recognition of prior learning (RPL, also known by the term Prior Learning Accreditation and Recognition, or PLAR) is well-established, the OERu may well provide the structure and support needed for RPL applicants to submit a higher quality portfolio, thereby increasing their chances of success. There is also curiosity within some institutions to see whether the OERu might lure potential fee-paying students who want to 'try out' formal education without the large financial commitment that is traditionally required. Such students might later enrol on a fee-paying basis for courses that are not (yet) offered via the OERu (Witthaus, 2012).

Teaching staff

The academic content of the courses comes from the participating universities. OER university also collaborates with the global WikiEducator network of educators in the formal sector for shared course development.

Providers

OER university is working on organizing a volunteer services page to outline volunteer opportunities, collects suggestions, works out coordination and support for volunteers and OERu projects.

3.7.6. Sector of providers

The OER university is an open network and public-private partnership (PPP) including post-secondary institutions, the private sector, non-profits, government and international agencies.

3.7.7. Learning design

Pedagogical mix

The curriculum is probably the least contentious of all issues under discussion within the OERu consortium, since it was the concept of offering services around an OER-based curriculum that united all the partners in the first place. However, although there is a wealth of existing OERs already available on the Web, additional work needs to be done to make these resources suitable for OERu students, for example, including information about learning pathways and assessment requirements, with reference to specific courses or programmes and related assessment opportunities provided by the relevant anchor partners (Witthaus, 2012).

Bearing this need in mind, the participating institutions have three choices: they can use OERs produced by their own institution; they can use OERs produced in collaboration with other anchor partners; or they can use OERs produced elsewhere. Most institutions have gone for the first or second option for the pilot; however, a few are considering using OERs produced by another OER initiative. This has led to some rather intense debates within institutions about the acceptability of offering a course that has not gone through the usual institutional quality assurance and validation processes. From the point of view of the OERu philosophy, it could be said that this argument is irrelevant, since students will be accredited according to their performance in the (institutionally-approved) assessment, regardless of the learning materials they used to achieve that competence. However, for some stakeholders in universities that are used to operating in traditional ways, using externally produced OERs may be a step too far (Witthaus, 2012).

At the core of the OERu is the notion that the disaggregation of teaching, content and assessment – traditionally the three pillars of an educational institution – will enable access to higher education on a vastly greater scale than is currently possible, and that this disaggregation is now possible because of the existence of openly licensed content, combined with a global network of willing institutional partners (Witthaus, 2012).

Assessment type

Students can be assessed for a fee by participating institutions and earn a credible credential (Mackintosh, 2012).

According to Witthaus (2012) some of the OERu anchor partners have very established recognition of prior learning (RPL) programmes (or PLAR programmes as they are called in North America – Prior Learning Accreditation and Recognition), or work in partnership with other organisations that handle this for them (such as CAEL – Council for Adult and Experiential Learning – in the USA) and so RPL is one obvious approach to assessment within the OERu. However, the concept of RPL is not very well defined in some institutions. Witthaus (2012) notes that Otago Polytechnic's (2011) RPL policy, which has been published online under an open licence, could be as a benchmark and potential model for those institutions that do not yet have well-developed policies in this regard.

Another approach to assessment was the notion of 'challenge exams', which involves offering students the option to sign up for an exam without having enrolled in the course. This is already established at some institutions such as Athabasca University, but is not widely taken up. Offering challenge exams on a large scale will therefore be experimental, even for those institutions with some experience. The option for offering students monitored, at-home exams is also a potential future possibility, and with technological advances this is not outside the bounds of imagination. However, the question of identity validation is of concern, and it is unlikely that any form of remote assessment will be prioritized for the OERu until this can be resolved (Witthaus, 2012).

Another form of assessment being considered by the anchor partners is standard assignments or essays, possibly identical to the ones being used for fee-paying students. Some institutions are also considering offering work-based assessment, in partnership with employers (Witthaus, 2012).

3.7.8. Award type

OER university does not confer degrees, but works in partnership with accredited educational institutions who provide assessment and credentialisation services on a fee-for-service basis. The participating organisations as accredited institutions in their local jurisdictions will award credit in accordance with their local policies. The OER university network will provide mechanisms for articulation and credit transfer among participating institutions (http://wikieducator.org/OER_university/FAQs).

3.7.9. Industry's skills requirements

It is expected that courses from accredited programmes are designed to respond to industry's skills requirements.

3.7.10. Analysis

Stakeholders

The OER university is an open network and public-private partnership (PPP) including post-secondary institutions, the private sector, non-profits, government and international agencies.

Teaching staff/content providers: The academic content of the courses comes from the participating universities. OER university also collaborates with the global WikiEducator network of educators in the formal sector for shared course development.

Students: The OER university provides free learning opportunities for all students worldwide using courses based solely on open educational resources (OER) and open access (OA) materials with pathways for learners to earn credible degrees (http://wikieducator.org/OER_university/About).

Volunteers: OER university is working on organizing a volunteer services page to outline volunteer opportunities, collects suggestions, works out coordination and support for volunteers and OERu projects.

Sponsors: Commonwealth of Learning and UNESCO.

Finance

Financial resources including contributions in time from participating institutions and external donor funding for strategic elements are required to address gaps in available OERs and the design of new components of the OER university system. OER Foundation generates funding through contributing partners, public gifting and donations, government contracts, support from international agencies and grants from the international donor community for the development of strategic components of the international OER ecosystem.

The OER university aims to achieve a critical mass of anchor partners who agree to the core principles of engagement for providing formal academic credit for OER university courses. Initially, the project aims to recruit one institution from each of the major regions of the world. As an open project, all post-secondary that care about sharing knowledge as a core value of education are free to join the OER university in planning and implementing sustainable education futures.

Government role

Commonwealth of Learning and UNESCO are supporting the OERUniversity initiative.

Social mission

The overall aim of the OER university intervention is to:

- develop and implement a sustainable and scalable ecosystem which will provide free learning opportunities for all students worldwide using OER
- provide pathways for OER learners to obtain credible certification and qualifications within national education systems.

Quality aspect

Quality is assured by working with high-quality educational partners.

Infrastructure related interfacing

Reliable and scalable support infrastructure including open source software ICT infrastructure and sustainable business models are provided:

- Institution specific services are provided on a cost-recovery basis; and
- Shared infrastructure services are funded through OER university consortium collaboration.

The services are provided through a collaboration among a consortium of participating post-secondary institutions. Supporting infrastructure is administered by the OER Foundation, a non-profit organisation, which generates funding through contributing partners, public gifting and donations, government contracts, support from international agencies and grants from the international donor community for the development of strategic components of the international OER ecosystem.

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3.8. P2PU MOOC platform

3.8.1. Goals and Aims

”The Peer 2 Peer University is a grassroots open education project that organizes learning outside of institutional walls and gives learners recognition for their achievements. P2PU creates a model for lifelong learning alongside traditional formal higher education. Leveraging the internet and educational materials openly available online, P2PU enables high-quality low-cost education opportunities” (p2pu.org, 2013b).

The operation of the Peer to Peer University (P2PU) is driven by three principles: openness, community and peer learning. Openness enables anyone to participate, and the operational model and software platform are also open allowing anyone to adapt or experiment with one or both. All content on P2PU is licensed under a Creative Commons Attribution Share Alike 3.0 license (CC-SA-BY) (p2pu.org, 2013c). The P2PU is built by a community of volunteers, and all aspects of P2PU are organised and progressed by volunteers. The learning and teaching model that is supported by the P2PU platform and encouraged by its community is one of peer to peer learning:

“Everyone has something to contribute and everyone has something to learn. We are all teachers & learners. We take responsibility for our own and each others’ learning” (p2pu.org, 2013d).

3.8.2. History and evolution

The P2PU opened its first pilot in September 2009, and a second iteration of courses followed in February 2010 (Park, 2010). The nature of the courses offered has evolved, as has the software platform used to deliver the learning experience. In the first pilot phase, learning occurred in study groups focused on a particular topic. In the second iteration of courses were more structured and ran for a specific time period (6-8 weeks). During 2011, the P2PU Challenge format was introduced; challenges are self-paced series of tasks leading towards a set goal.

P2PU has run courses in languages other than English since 2010 (Park, 2010) and challenges in Spanish and Dutch (Kahn, 2012).

3.8.3. Roles and actors

Providers: P2PU is registered as a 501(c)(3) non-profit organisation in California.

Teaching providers: anyone with an internet connection.

Students: anyone with an internet connection; there is no admissions process.

Resource providers: anyone with an internet connection.

3.8.4. Topics

P2PU currently has 5 schools, namely Social innovation, Webcraft, Open, Education, and Mathematical future.

3.8.5. Size

The student population varies from course to course and challenge to challenge, but has been smaller than that for courses run on xMOOC platforms. For example, for the 'Mechanical MOOC' course in Python there were just over 6,000 registrations, from which there emerged around 450 learners who actively participated (mechanicalmooc blog, 2012). The P2PU's School of Education courses which began in Autumn 2011 "typically had 2-3 organizers, 20-30 participants, 20-40 followers, and around 600-1000 unidentified visitors" (Ahn, Weng, & Butler, 2013, p. 5).

3.8.6. Sector of providers

Although the P2PU is registered as a 501(c)(3) non-profit organisation in California, the organisations who contribute to the provision of P2PU are in the following sectors.

- The Hewlett Foundation(Benevolent society (charitable services))
- The Shuttleworth Foundation (Benevolent society (charitable services))
- University of California Irvine ('First-degree level higher education' and 'Post-graduate level higher education' sectors)
- Creative Commons (a Massachusetts-chartered 501(c)(3) tax-exempt charitable corporation)
- Aspiriation Tech (non-profit technology organization)
- MacArthur Foundation (Benevolent society (charitable services), supported badge development)
- iCommons (Benevolent society (charitable services)), donated conference attendance funding)
- Oregon State University Open Source Lab (non-profit organization, provided 'service')
- Twilio (Computer programming, consultancy and related activities, provided 'service')
- Sendgrid (Computer programming, consultancy and related activities, provided 'service')
- Stackoverflow (Computer programming, consultancy and related activities, provided 'service')
- Hirelite (Software engineering employment placement, provided 'service').

In addition, several organisations have supported P2PU by hosting events:

- Open University Catalunya, (hosted P2PU's Barcelona workshop, 'First-degree level higher education' and 'Post-graduate level higher education' sectors)
- Palomar 5, (hosted P2PU's Berlin workshop)
- The Loft Boys' Club House (hosted P2PU's NYC camp)
- Carnegie Foundation for the Advancement of Teaching (hosted assessment workshop).

3.8.7. Learning design

Pedagogical mix

Currently, there are two main forms of learning experience offered through the P2PU platform: challenges and courses.

To complete a challenge, learners work at their own pace through a series of tasks, and demonstrate that they have completed the tasks by producing evidence which is peer assessed. The learning model behind P2PU challenges is one that mandates that challenges should have a clear goal, but allows learners to be able to take different paths to reach it. Challenges should provide a scaffolded experience in which an objective is broken down to smaller tasks, and include participants making things as part of their learning, use peer interaction as part of the learning (e.g. people have to share and remix resources together in order to reach a goal). Typically, learners who successfully complete a challenge will earn a badge (Gibson, Halavais, Peterson, Schmidt, & Varelidi, 2012; Varelidi, 2011).

Courses run for a specific time period (usually 6-8 weeks), include one or more mentors/organisers who know the subject area to structure the course around existing OERs, and rely on peer interaction to support learning and assessment. A key component of the learning experience is that the learners carry out projects and create things (e.g. software), as they do in challenges. Badges are also awarded for courses (p2pu.org, 2012).

A special case of a P2PU course is the 'Mechanical MOOC' which uses software to automatically assigns those learners who wish to work collaboratively into groups, and to email learners with the weeks tasks and resources (Chris, 2013).

Assessment type

All work in P2PU is assessed by peers.

3.8.8. Award type

P2PU does not offer formal accreditation of learning. P2PU It offers "a model for lifelong learning alongside traditional formal higher education" (p2pu.org, 2013b). It has worked closely with the Mozilla Foundation to develop, pilot and utilise badges to certify and reward achievement across all its offerings during 2012 (The Mozilla Foundation & Peer 2 Peer University, 2012), and plans to develop this during 2013 (Peeer to Peer University, 2013).

3.8.9. Industry's skills requirements

Many of P2PU's courses are intended to develop individuals skills in internet and software technologies (e.g. School of Webcraft), or in professional development of education skills (e.g. School of Education).

These match some of the needs identified by bodies such as the UK Commission for Employment and Skills (a social partnership, led by Commissioners from large and small employers, trade unions and the voluntary sector http://www.ukces.org.uk/about-us). Their data suggests software professional occupations will grow at 2% per annum leading to an

increase of 67,000 jobs by 2018, and a definite need for a teaching and research professionals across the education sector (UK Commission for Employment and Skills, 2010).

3.8.10. Analysis

P2PU can be regarded as a platform for open interfacing. It is innovatory in that the organisation as a whole is focused on peer-to-peer learning, and it devotes effort towards improving the processes of peer to peer learning.

All P2PU 's offerings rely heavily on peer assessment. This means that they have the potential to run at scale at low cost, though the support individual learners receive may vary considerably. P2PU have already made some of their course data available to researchers, and will do so in the future, so it is likely that the effectiveness of the P2PU approach will be thoroughly tested. Research carried out on some P2PU School of education courses makes some suggestions for required features to ensure effective P2PU courses, including the need for leaders of the learning process to emerge, and for improvements for P2PU's data collection methodology (Ahn et al., 2013, p. 9). It is as yet uncertain if and how far the findings can be generalised.

Stakeholders

Stakeholders in P2PU include those who have provided grants funding the organisation and individuals to work with the organisation, , volunteers (both organisations and individuals), and providers of content and services used within P"PU's courses.

For example, P2PU runs a School of Open as a collaboration between the Commons organisation (CC) and P2PU. This collaboration aims to help individuals and institutions learn about and employ open tools and methods, including CC licenses and copyright in a more general sense (https://p2pu.org/en/schools/school-of-open/).

Finance

P2PU itself is a non-profit organisation that is supported by grants and the efforts of volunteers. Its operating model is that the P2PU organisation provides the platform, anyone can educate and experiment with it.

Government role

There is no direct role of Government in P2PU.

Social mission

P2PU's mission is to facilitate learning with and teaching and from peers. As such it targets no particular social group, though it does exclude those people that do not have the means to connect to the internet.

Quality aspect

There are guidelines (e.g. https://p2pu.org/en/groups/make-a-course/) but no formal quality control. However, this means that individuals using the P2PU platform can apply their own quality procedures. Given that P2PU has made some data on learner behavior available,

it is possible that quality control could include the process of analyzing this data for a particular course and acting on the results.

Infrastructure related interfacing

P2PU has developed an infrastructure called Lernanta for building and delivering its courses (https://github.com/p2pu/lernanta). This infrastructure is open source and is based on the code that powered the Mozillia Foundation's Drumbeat initiative.

P2PU's infrastructure has been used to support collaborations between individuals and organisations to deploy courses e.g. the Mechanical MOOC (coordinated by P2PU, featuring content from MIT OpenCourseWare, communities from OpenStudy, exercises by Codecademy http://mechanicalmooc.org/) and the School of Open. (P2PU and Creative Commons).

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3.9. UDACITY MOOC platform

3.9.1. Goals and Aims

Udacity is the outgrowth of free computer science classes offered in 2011 through Stanford University. Udacity is a private educational organization founded in February 2012, by Sebastian Thrun, David Stavens, and Mike Sokolsky, three roboticists who believed much of the educational value of their university classes could be offered online. A few weeks later, over 160,000 students in more than 190 countries enrolled in the first class, "Introduction to Artificial Intelligence." Udacity started offering courses outside the Computer Science domain in May 2012. However, Thrun has stated in an email interview that Udacity will stay focused in computer sciences rather than humanities. In January 2013, it offers a number of 22 courses, which are divided into three levels: beginner, intermediate and advanced level.

Each course consists of several units comprising video lectures with closed captioning, in conjunction with integrated quizzes to help students understand concepts and reinforce ideas, as well as follow-up homework which promotes a "learn by doing" model. Programming classes use the Python language; programming assignments are graded by automated grading programs on the Udacity servers.

3.9.2. History and evolution

Udacity is the outgrowth of free computer science classes offered in 2011 through Stanford University. As of 4 February 2013, Udacity has 23 active courses. Expectations was, after an enrollment of 160,000 students in the predecessor course at Stanford, Introduction to Artificial Intelligence, and 90,000 students had enrolled in the initial two classes as of March 2012. The history of Udacity appears that in terms of courses and student, it has been noted a gradual evolution that Udacity has a great potential considering the time it is functional.

3.9.3. Roles and actors

Partners: Till the end of 2012, Udacity was not affiliated with any institution. However, it announced a partnership with San Jose State University (SJSU) on 15 January 2013 to pilot three new courses, two algebra courses and a statistics course, available for college credit at SJSU and offered entirely online.

Teaching providers: Teaching providers cover both academic and business market and they are both educators or industry experts; i.e individual professors from academic institutions, experienced entrepreneurs, or high level senior employees from companies such as Google, Nvidia, Microsoft, Autodesk, Cadence Design Systems, and Wolfram Research.

Students: Anyone with an internet connection can register for an Udacity course. Registration requires an email address only. There is no age range, for example in the course CS101 students were from 13 to 80-years-old. Udacity addresses needs of high school students who want to go ahead before going to college, college students who look for an affordable and engaging alternative, and professionals who want to update their skills or shift career. Background needs are faced through the classification of the courses into three levels.

3.9.4. Topics

In January 2013, 22 courses were offered by Udacity platform and they were divided into three levels as following:

Beginner Courses:

- Visualising Algebra
- College Algebra
- Statistics
- Introduction to Computer Sciences
- Introduction to Physics
- Introduction to Statistics

Intermediate Courses:

- Algorithms
- Web Development
- Software testing
- Programming Languages
- Introduction to Theoretical Computer Science
- Introduction to Artificial Intelligence
- Differential Equation in action
- HTML5 Game Development
- Software Debugging
- Interactive rendering
- How to build a start-up

Advanced Courses:

- Design of Computer Programs
- Intro into Parallel Programming
- Functional Hardware verification
- Artificial Intelligence for Robotics
- Applied cryptography

All of courses are closed captioned in English. Many of courses have subtitles available in many different languages, including Spanish, Chinese, French, Portuguese and even less widespread languages such as Croatian. Users are encouraged to help translating the courses in more languages using the Amara.org environment.

3.9.5. Size

Student Population: Demographically, Udacity had students in 203 countries in the summer of 2012, with the greatest number of students in the United States (42%), India (7%), Britain (5%), and Germany (4%). In regards to enrolments, and with a number of 90.000 enrolments in the initial two classes in March 2012, Udacity has reached the total number of 739.000 in almost five months (August 2012).

Teaching Staff: Udacity was founded by: Sebastian Thrun (educator and computer scientist , Google Fellow, part-time Research Professor of Computer Science at Stanford University and former director of the Stanford Artificial Intelligence Laboratory), David Stavens (computer scientist with degrees from Princeton and Stanford. He was a part of the Mars Rover team at NASA and also a part of the team that built the self-guided car), and Mike Sokolsky (electrical engineer from Carnegie Mellon University, robotics researcher at Stanford University and the University of Alberta). It also has an advisory board composed by: Carl Bass, William Bennett, Cathy Davidson, and Laurene Powell Jobs.

Teachers come from both academic and business sector; First class' teacher was David Evans from University of Virginia, and two months later another course began lead by Steve Huffman (Co-founder of Reddit) and Peter Norvig (Director of Research, and formerly Director of Search Quality, at Google).

Providers: Udacity is a private educational organization founded by Sebastian Thrun, David Stavens, and Mike Sokolsky. Udacity is the outgrowth of free computer science classes offered in 2011 through Stanford University. As of 27 January 2013, Udacity has 22 active courses. Udacity was announced at the 2012 Digital Life Design conference. Udacity is funded by venture capital firm, Charles River Ventures, and $300,000 of Thrun's personal money. In October 2012 the venture capital firm Andreessen Horowitz led the investment of another $15 million in Udacity.

3.9.6. Sector of providers

Udacity providers consist of experts from the business and academic sector and this is something that varies from course to course. Except of the partnership with the San Jose State University that started on January 2013, no other partnership with universities have been announced.

3.9.7. Learning design

Pedagogical mix

Udacity courses are based on interactivity and "learning by doing" nature. Project- based exercises and short duration videos that last no more than 2 minutes provoke engagement. User can take the courses at his own pace and can re-watch each videos. The sequence of videos includes a number of quizzes that help on self-assessment; learner has no limitation about the number of tries while he is able to skip a quiz or to ask to view the answer.

In addition to the quizzes, problem set with exercises are with a variety of activities are offered; they can be from a numeric problem to a "please write the Python code that makes..." problem. These exercises count towards the mastery level.

A usual Udacity class follows a basic structure:

Overview: This is the class "identity" that presents the Class Summary, the prior needs of the course, the expected learning outcomes, the profile of the course instructor,

Classroom: This is the main site of the course and involves the course units with the respective problem sets and Q&A, and the Exam parts. Learners can submit their questions while instructors can leave additional useful notes, if needed.

Wiki: This is a kind of course content repository; Learner can download the course videos that are officially served by Udacity and are accessible even if Youtube is blocked. Furthermore, course notes, printable materials, review materials, lecture complements and supplementary resources such as tutorials, additional practice sets and helpful links are provided. Students also have the opportunity to showcase the projects they have completed while taking Udacity courses through the Udacity.me tool.

Community: Udacity nature is based on the community activity; It provides forums where learners can post any ideas and thoughts they have about the course, ask questions, and receive feedback from other students. The forum is an important social element of the classroom where the priority is a friendly, open atmosphere that allows students to ask questions freely. Free flowing conversation is encouraged. If learners are uncomfortable about posting in English, they are encouraged to post in your own language rather than not post at all.

Hence, forum places a role of a classroom where learning is the goal, or of a place where people can ask questions and help each other out, where people can express their feelings about the course and get support and encouragement, where extra information relating to the course can be shared, where students can contact other students to form study groups, arrange hangouts and learn together, where people can get feedback about their code from their fellow students.

This forum is moderated by the students, as well as official Udacity representatives, who can be recognized by two diamonds next to their name. The community features a karma system that allows users to earn rights to perform a variety of moderation tasks. When a question

or answer is up-voted, the student who posted it will gain "karma points". These points serve as a rough measure of the community's trust in him/her. Various moderation tasks are gradually assigned to students based on those points.

Assessment type

Grading: The final grade of an Udacity class is determined by the final exam grade and it is learner's responsibility to take this exam.

Mastert Points: Udacity plans to use the mastery point system; Mastery points are earned when learner completes certain questions correctly in a course. Some questions may be worth more points than others. Each class has a different distribution of mastery points, often they appear in Problem Sets and Open Exams. Learner can see where he can earn mastery points in the course details on the My Courses page after he has enrolled.

Mastery levels are achievement targets for each course. Courses have four different mastery levels, which are reached by accumulating mastery points. In the course details on the My Courses page learner can see how many mastery points he will need to reach each mastery level.

Final exams: For all courses, there will be final assessments that you can take on your own. For courses that need to be proctored (in order for the learner to receive credit or certification, Udacity has both proctored exam at a Pearson VUE testing centre and online proctored exam on Udacity site. Udacity can also provide a "testing kit" to any institution for a low fee if they are interested in providing proctored exams on Udacity courses.

3.9.8. Award type

Once learner has achieved at least level 1 mastery in a course, he can download his certificate from the course section in My Courses page. When he achieves a higher mastery level, he can re-download the updated certificate.

In regards to credits, Udacity has different options for its courses.

For all courses, there will be final assessments that learner can take on his own to earn mastery and receive Udacity certificates. These are free and do not give him college credit.

For courses provided together with Udacity partner organizations learner has to refer to the details of each organization. These tests might be for a fee and might provide learner with a path to receive credit for them.

3.9.9. Industry's skills requirements

Udacity Career Team formally connects students with Udacity partner employers. From an initial number of 12 employers and Udacity now has over 400 companies interested in hiring Udacity students; from tech start-ups to Fortune 500s including: Google, Bank of America, Facebook, Bu.mp and Greylock Venture Partners.

On the other side, learners can submit their resume to Udacity's Career Placement Program by uploading it on their Student Profile Page.

3.9.10. Analysis

Udacity, thanks to its open nature promotes open education while it provides lifelong and vocational learning opportunities for those who are interested mostly in STEM (Science, Technology, Education and Mathematics) and ICT fields. Furthermore, the opportunities of interfacing between its students and the business sector, eliminate the gap between learning and practice, and playing the role of brokering bringing in touch the students of high capabilities with enterprises that seek high competences.

Infrastructure related to interfacing and Social mission: Due to its nature, Udacity could be used to offer courses where academics provide the theoretical background of the course and people from industry provide short hands-on examples in the Udacity nature (short videos), therefore providing a bridge between universities and industry. Udacity Career Team formally connects students with Udacity partner employers. From an initial number of 12 employers and Udacity now has over 400 companies interested in hiring Udacity students; from tech start-ups to Fortune 500s including: Google, Bank of America, Facebook, Bu.mp and Greylock Venture Partners.

Finance: Udacity business model is based on the Career Placement system and their collaboration with the companies interested in hiring Udacity students. From the official Udacity site, its business model is not visible. However it appears to be based in charging employers for access to high-performing students and charging for in-person certification.

Udacity seems to be built on the standard VC model of get scale first, worry about monetizing it later. And if Udacity does end up with millions of students, there will be quite a lot of companies which would pay Udacity to be able to reach those students. Simply charging technology companies to put job opportunities in front of students with given grades and qualifications would probably generate quite hefty fees. So long as the education itself remains free.

Stakeholders: Udacity announced a partnership with San Jose State University (SJSU) on 15 January 2013 to pilot three new courses, two algebra courses and a statistics course, available for college credit at SJSU and offered entirely online.

Infrastructure: In terms of infrastructure, courses have high requirements in Python, since this is the only language Udacity uses. However, course designing, due to high level of interactivity could be considered as time consuming and this could be account for the low number of the offered courses.

Hence, courses need considerable resources that can be reimbursed thanks to the Udacity Career Placement and Student Profile tracking.

Quality: Although Udacity quality standards are not public and therefore are not uploaded in the Udacity official page, Udacity has cancelled courses before their beginning, because they did not live up to the quality standards. Udacity founder Thrun, admitted that they had

recorded the entire class and edited the most of it, but in their internal tests it didn't meet their quality bar. He also noted that they have enormous respect for their students' time and didn't want to release anything that wouldn't meet their bar.

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4. Cluster 2: Educational innovation and knowledge circulation with companies

4.1. ACQA–project in Faculty of Engineering, at KU Leuven

4.1.1. Goals and Aims

This case study concerns the implementation of the ACQA framework and methodology within the Faculty of Engineering Science – Department Materials Engineering (Department MTM) of KU Leuven. 'ACQA' stands for 'Academic Competences and Quality Assurance' and deals with the development and use of competence profiles. ACQA is used 1° in the context of quality assurance and 2° as a tool to improve communication between the university and all partners concerned.

More specific, the case study is related to:

- the structured analysis of the materials engineering curriculum and of the needs of the stakeholders in the labour market;
- the structured input on the incorporation of specific learning tracks (eg sustainability) in the materials engineering curriculum.

The stakeholders of the labour market are represented by the Industrial Advisory Council of the Department MTM.

4.1.2. History and Evolution

2003 – 2006: development of the ACQA framework and methodology

The ACQA framework has been developed by TU Eindhoven (TU/e) in The Netherlands (A. Meijers). Very quickly other European universities have approved the framework.

- 2003: first draft of the ACQA framework by TU/e
- 2003-2004: implementation of ACQA project group at TU/e
- 2005: second (and final) draft of the ACQA framework, in cooperation with 3 TU Federation (TUDelft, TU/e, Universiteit Twente – the Netherlands)
- 2006: trials of ACQA at Politecnico di Milano and TU Berlin

In the same period the ACQA framework was also approved by TU9 (Germany) and by CEASAR (Connecting All European and South American Researchers).

2009 – 2013: implementation of the ACQA framework and methodology at KU Leuven

All the faculties of the Group Science and Technology of KU Leuven have decided to invest in the implementation of the ACQA framework and methodology.

Research on the feasibility to work with ACQA has been carried out by each faculty through means of educational research projects, funded by KU Leuven:

- 2009-2011: at the Faculty of Engineering Science and at the Faculty of Bio-engineering

- 2010-2013: at the Faculty of Science

The implementation of ACQA is funded by each Faculty:

- 2011-…: implementation by the staff members of education at the Faculty of Engineering Science
- 2011-2013: implementation project at the Faculty of Engineering Technology

2011 – 2013: ACQA exercise for the programme of materials engineering

Because of the close collaboration between the Department MTM and representatives of the labour market, the case study is focused on the ACQA exercise for the programme of materials engineering.

- 2011: set up of ACQA exercise and interviews with lecturers. The set-up is discussed with the Industrial Advisory Council of the Department.
- 2012: discussion on ACQA results and reformulation of learning goals of the Master of Engineering - Materials Engineering. The new learning goals are discussed with the Industrial Advisory Council.
- 2013: exploitation of specific learning tracks, partially based on the advice of the Industrial Advisory Council.

4.1.3. Kind of educational innovation

a) Level of educational innovation

The three elements of ACQA are:

- the ACQA Framework = conceptual framework of seven competence areas and dimensions
- the ACQA Methodology = protocol and guidelines for interviews
- the ICT tool (Ice) = software for data gathering and analysis

The innovation is related to: quality assurance; learning design; didactic model; communication; ICT.

b) Discipline

Case study: master of engineering - materials engineering

c) Target groups

The ACQA framework has been developed in the context of engineering curricula, but can also be used for other kind of curricula. One example is the successful use for a curriculum industrial design at TU/e in the Netherlands.

Target groups at KU Leuven are the Faculty of Engineering Science and the Faculty of Science. The assessment of the case study is based on the progress within the Faculty of Engineering Science, Department MTM.

d) Participants

Within a traditional ACQA exercise (based on the lecturers view), as many lecturers as wanted can be involved in the exercise. In the case study of materials engineering, a broader

exercise has been developed in which students, doctoral students and the Industrial Advisory Council have been involved. All lecturers involved in the programme of materials engineering have been interviewed.

Total number of lecturers interviewed = 34
Total number of courses involved = 46

e) Didactic model / Learning design

In the last decennium learning outcomes became a key factor in accreditation procedures and in quality assurance in higher education in Europe. Competence profiles are considered to be crucial in the evaluation of study programmes. ACQA provides the framework and the methodology to define and analyse competence profiles with the final aim of specifying and evaluating learning outcomes for bachelor and master programmes.

The importance of ACQA on didactic level:

- The ACQA criteria provide a language that can be used to describe different perspectives of an educational programme.
- This language can be used by all partners involved in the programme:
  - the direction of the programme has to define the vision of the programme;
  - the lecturers have to define the objectives of their courses;
  students have to understand the objectives of a programme in general.
- The description of a programme in different perspectives is a need because of quality assurance reasons. ACQA provides:
  - the methodology of curriculum description,
  - the process for the production and maintenance of the descriptions,
  - the software for data gathering, management and analysis.
  Based on these descriptions, the functioning of programmes can be investigated and programme changes can be developed in a systematic way.
- The ACQA methodology makes it possible to develop and adjust learning outcomes. Teachers can be inspired to adapt their way of teaching in relation to competences that students have to learn.
- The ACQA profiles are at the same time a language in the communication with the outer world of alumni, labour market and potential students.

In the case study of KU Leuven, bachelor and master programmes in materials engineering have been studied from the point of view of the lecturer's intentions. Lecturer's were asked to specify those competence areas to which they seek to contribute substantially by means of their courses and whether these competence areas are part of the examination. Based on these data competence profiles were constructed and used to define and visualise essential aspects as well as minimum levels in terms of academic competences. Although main focus was on the lecturer's vision, also students and partners on the labour market (members of the Industrial Advisory Council) have been asked to comment the analysed competence profiles.

The ACQA analysis results can be used for a double purpose:

- they are used and discussed by individual lecturers, programme directors and educational committees for internal quality assurance, more specific to adjust and reformulate learning goals and learning tracks;
- they will be presented and discussed in accreditation reports.

f) Organizational model

To start an ACQA exercise within the Faculty of Engineering, the following steps are important:

- *Dean/Vice dean*
  The Dean or Vice dean takes the decision to start-up an ACQA analysis. Until now, all exercises have been started on the explicit demand of the programme director.
- *Programme director*
  The idea to start an ACQA exercise most of the time is launched by the Programme director. He asks the Faculty for the necessary support and makes a proposal on courses and lecturers that can be involved.
  Once an exercise has started, the Programme director has a central function in the management of the POC and the Educational working group.
  At any time programme director and interviewer work together very close.
- *Faculty support: interviewers and staff members on education*
  The Faculty supports every ACQA exercise by providing the interviewers who are faculty staff members. The staff members on education of the Faculty are involved for the support of the didactic aspects of each exercise.
- *POC Materials Engineering (Permanent Educational Committee)*
  During an ACQA exercise, information on the results will in the first place be communicated towards the POC that discusses the information and formulates feedback.
- *Educational working group*
  The working group collaborates with the interviewer and the programme director in the planning of the ACQA analysis and the broadening of the exercise towards the students and the Industrial Advisory Council. They also give input for the set up and the planning of the exercise.
- *Industrial Advisory Council*
  The Department MTM has decided to engage its Council systematically in the discussions and evaluation of the ACQA results. The Council can define new input for the education programmes, formulates needs and expectations from the industry, takes part in the review of learning objectives and helps to explicit which learning tracks are relevant to develop.

g) *Quality assurance*

To assure the quality of every ACQA exercise, the Faculty works with fixed protocols, standardized questioning by the interviewers, … In this stage, this is mainly based on the interviews with lecturers but the same strategy is applied in communication with students, Industrial Advisory Council, …

To guarantee the quality of the data collected, the 'quality' of the interviewer is very important. Every time when a new ACQA exercise has to start, the new interviewers must get the time to get acquainted with the protocols, questions, terminology and software for data analysis. A new interviewer will first join an experienced interviewer to do some interviews together.

Regularly, all faculties of KU Leuven that apply the ACQA methodology have a meeting with the ACQA Working group of TU/e of the Netherlands to evaluate and adjust protocols, to clarify question marks, …

h) What is the 'innovative' element or importance?

- Having a framework, a common language and a methodology to interact and discuss in a structured way (importance of quality control) when discussing curricula (and especially innovation in curricula) with lecturers, students and external partners (like the Industrial Advisory Council).
- During the first years of the ACQA implementation at the Faculty of Engineering Science, representatives of the labour market for engineers were confronted with the ACQA framework en ACQA methodology. They described it to be useful and very comprehensible. They described it to accord well with the competence based language used in HR in the industry.
- The ACQA exercise is very valuable in the communication with students and teachers:
  -students learn to think about themselves in terms of competences (what is often a new experience for them);
  -lecturers benefit from the exercise for their personal reflection on their courses and are stimulated to give feedback at students in terms of competences.
- ACQA is a strong tool in communication at different levels, e.g. in the trialogue teacher – student – mentor in the job.
- Within different Faculties of the Group Science and Technology concertation with stakeholders of the labour market on research and educational topics was an on-going activity at different levels and with different partners from our university. The ACQA project has created new possibilities to join forces between on-going projects within the university because the ACQA framework was seen as a common tool that linked efforts that were spread so far.

4.1.4. Actors and roles

a) Kind of interaction / concertation / dialogue

Kind of interactions with stakeholders, related to the ACQA exercises: Regular meetings between university and industry aiming at concertation and dialogue on ACQA results

b) Objectives

Objectives are multiple:

- Exchange of information and ideas
- Consultation on feasibility of ideas, programmes, …
- Collaboration to develop ideas or projects related to education
- Feedback, evaluation about on-going programmes

- Discussion and evaluation of ACQA results

c) What actors are involved: external and internal

Faculty of Engineering of KU Leuven:

- dean, vice dean of the faculty
- academic staff
- POC and programme director = academic staff, doctoral students, students and others
- educational working group = academic staff, doctoral students and students
- staff members education

Industrial Advisory Council of the Department MTM

TU/e in the Netherlands

Students

d) Role/Function/Kind of involvement of actors

Faculty of Engineering of KU Leuven:

- dean, vice dean:
  decision on start-up of ACQA analysis
- academic staff:
  lecturers, interviewers
- POC and programme director:
  *each education programme is dedicated to a Permanent Education Commission (POC) in the faculty, that is mainly responsible for the quality assurance of the programme. Members are: academic staff, doctoral students, students and others. The POC counts more members than the Educational working group.
  *for the ACQA exercise the POC: takes the decision on courses to be analysed; organises the discussion and gives feedback on results; reformulates learning objectives and learning tracks
- educational working group:
  *the Faculty of Engineering Science has an Educational working group that advises and supports the POC. Specific education topics can be thoroughly investigated by this group as preparation of the agenda of the POC meetings. Members of the working group are the academic staff, doctoral students and students
  *for the ACQA exercise: collaboration with programme director and interviewers on set up and planning of each exercise
- staff members on education:
  support of the enrolment of the ACQA project and exercises

Industrial Advisory Council of the Department MTM:

- The Industrial Advisory Council of the Department MTM has been created recently as an external advisory structure where members of KU Leuven and external specialists can meet each other. The aim of the Council is to participate in discussions on the profiling, strategic choices and content of the education programmes in the field of materials engineering at KU Leuven. Members of the

Council are engineers, scientists or human resource professionals in sectors of the labour market where materials engineers are employed.
- For the ACQA exercise: discussion and evaluation of ACQA results in view of adjustment of education programmes

TU/e in the Netherlands:
- quality control and fine-tuning of the implementation of the ACQA methodology

Students:
- comments on ACQA results

e) Origin of the concertation: education, research

education

4.1.5. Financing

In a first period, the study of the ACQA framework was possible through an educational research project, funded by KU Leuven. The stage of implementation of the ACQA methodology is funded by the Faculty of Engineering Science.

4.1.6. ANALYSIS

Stakeholders: new kind of partnership + Common language with companies
The experience with the ACQA exercise in the Faculties has clearly demonstrated that in discussions on new (competence based) learning tracks in a curriculum, the use of a common and generally accepted, well defined language (like available in the ACQA framework) between all partners (programme director, lecturers, Industrial Advisory Council) is crucial.

Finance
Potential threat of the ACQA methodology: a typical ACQA analysis demands a significant workload (especially for the interviewer but also from lecturers involved) and working cost. At the same time, the method of interview means an added value for teachers and is preferred above the use of electronic questionnaires. The decision to implement the ACQA framework and methodology requires the agreement of the University/Faculty to create sufficient financial means.

Role of the government
The development, analysis and discussion of competence profiles is time consuming for a programme: for the lecturers and for those who realise the interviews. When policy makers want curricula to be approached in a more innovative way, they should be aware of this working cost.

Role of the government + Quality
ACQA analysis results have already been presented and discussed in accreditation reports of several programmes for the Faculty of Engineering Science. Each time, the Visitation commissions expressed their explicit support for the further use of the ACQA framework.

Interfacing activities

Role of the government

- in accreditation procedures input from labour market is demanded by government
- positive support for use of new methodological framework in concertation with companies

Social mission

- not relevant

Quality aspects

- communication between students and teachers has improved because of use of a common language
- thinking in terms of competences was a new and valued experience for students
- introduction of a new methodology has a positive impact on the personal reflection of teachers on their courses
- introduction of a new methodology has a positive impact on collaboration between departments and faculties, at different levels

Infrastructure

- not relevant

Award

- not relevant

Didactics…

- added value for communication between teachers and students to think in terms of competences

4.1.7. REFERENCES

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4.2. Innovation in Engineering Education, at University of Miskolc

4.2.1. Goals and Aims

The case study describes the results of subsequent international and national projects in some engineering topics - Materials Science, Heat Treatment and Surface Engineering, - leading to the development of new concepts, methodologies, learning materials and organisational frameworks for developing multipurpose and multilingual engineering educational programs. In the majority of these projects, active and intensive involvement of industrial partners was provided by the world-wide professional association of the subject: International Federation for Heat Treatment and Surface Engineering. IFHTSE played the role of professional coordinator in some of these projects and keeps the network alive beyond the lifetime of such temporary organisational structures. As the main outcome of this collaboration, the MinSE program – International Master in Heat Treatment and Surface Engineering – will be described in more detailed, however further exploitation activities and results, newly generated initiatives will be also mentioned.

4.2.2. History and Evolution

Just after the political changes in Hungary, in the early 90s, new possibilities opened up for HEIs in professional collaboration: Hungarian experts became free to join international societies, as members, and different EU supported programmes (TEMPUS, PHARE, LEONARDO, MINERVA, ERASMUS) as partners.

1992-1997

In late 1991 two Hungarian chapters of the world-wide professional society for materials, ASM International were established: one of them was initiated by students at the Miskolc University. Miskolc Student Chapter offered unique possibilities for our students (and also for the academic staff) for developing their language competences parallel with professional development. In 1993, a group of delegates from our Student chapter were invited to attend the 2nd European ASM Heat Treatment and Surface Engineering Conference in Dortmund, as technical facilitators – it was not only a great experience, but also we started to build up professional relationships with highly recognised experts in Material Science and Engineering. Even in the same year, we invited the European Lecturer – recognised and financed by the framework of ASM European Council Lectureship Programme – to give presentations in Miskolc and Budapest in some “hot topics” in Surface Engineering. Since that time the late Prof. Tom Bell became our regular visiting professor, and his role in further, professional networking and creating very inspirative project ideas cannot be overestimated. Using the terminology of our scientific area: he acted as a “crystallisation nucleus”, building up networking capital in a very important multidisciplinary engineering field – defined by him in 1986.

Our collaboration in EU supported projects started with a TEMPUS project titled: "Establishment of new courses on Materials Engineering in Hungary" (1994-97). One of its three subprograms focused on SE, based on our collaboration with University of Birmingham, aiming at the development of hand-outs for 15 learning units – still in traditional, printed format. Moreover, samples of engineered surfaces were provided for laboratory practices (microscopic investigation, hardness test may be done by students, while results of more sophisticated tests (done by special equipment) were documented in these hand-outs.

2000-2004

Soon after completing the TEMPUS project we started to plan new opportunities: the Innov@te Leonardo pilot project - International On-Line Voc@tional Training in Surface Engineering – focused on wide-scale methodological experiments in e-learning development. The Innovate consortium (10 partners from 6 countries) represented top-leader experts and societies – the IOM3 (Institute of Materials, Minerals and Mining, UK) was its contractor, professionals were represented not only by universities but also the International Federation of Heat Treatment and Surface Engineering (IFHTSE), while University of Miskolc coordinated the e-learning development. Collaborative work by the Partners in the Innovate project showed that, while some universities offer modules in surface engineering as part of their taught master’s programme, the institutional framework to offer a full master’s degree course in heat treatment and surface engineering is lacking.

2004-2006

The next stage was again a Leonardo project, partly with the same consortium members, titled e2ngineering (Development and testing of multilingual e-learning materials and courses in advanced engineering subjects). Its scope was wider, than SE, but added new and modern cross-disciplinary approach of Computer Aided Engineering. This project focused on the improvement of multilingual delivery of e-learning materials and video-lecture presentations - offered in EN, HU, SK, PL & RO languages. Parallel with e2ngineering project, support of a national project made it possible to translate and adapt some of the Innovate materials for our regular courses widely used - in blended learning approach – for full time learners in Hungarian, as well as a 72-hours continuing education e-learning course has been accredited as a professional development course, using bilingual delivery.

2007-2010

A next initiative, MinSE project was launched to respond to the need for a full, international master's degree course in heat treatment and surface engineering. MinSE aimed to develop a strongly multidisciplinary, Bologna-conform second cycle programme, covering a wide range of technologies, both traditional and state of the art, with due emphasis on industrial applications and environmentally benign processes. University of Malta coordinated the project, while IFHTSE provided secretariat and professional networking background. The part-online, part face-to-face course has been developed by a consortium of five universities and six industrial partners (scaling from SMEs to huge multinational firms). University of Miskolc was involved in both content and methodological development, playing the interface role between professionals and e-learning experts, providing e-learning development and delivery support.

4.2.3. Kind of educational innovation

a) Level of educational innovation

The level of educational innovation was different in the subsequent projects.

In the first, TEMPUS project traditional (printed) learning materials were developed for regular courses. Special attention was paid on learning design: all technological processes were described in the same structure (including self-evaluation questions) and real samples were provided for laboratory practice. In Innovate project we aimed to develop a system and elements of flexible and effective forms of knowledge transfer based on advanced e-learning methodology. Using a 'rapid prototyping' method for training material development plus a flexible, resource-based curriculum design system, the Project developed training materials as elements of a variety of courses at various levels and with correspondingly flexible content and methodology. Three different e-learning scenarios were tested, innovative multilingual methodology has been developed and wide range of versatile learning materials: core units, video lectures and multimedia case studies.

E2ngineering project focused on improvement of multilingual delivery in a special e-learning scenario, while MinSE developed a four-semester, International Master of Science degree in Heat Treatment and Surface Engineering, including 22 study units + one semester of final project work, leading to a total of 120 ECTS. Its structure is illustrated by figure 2.

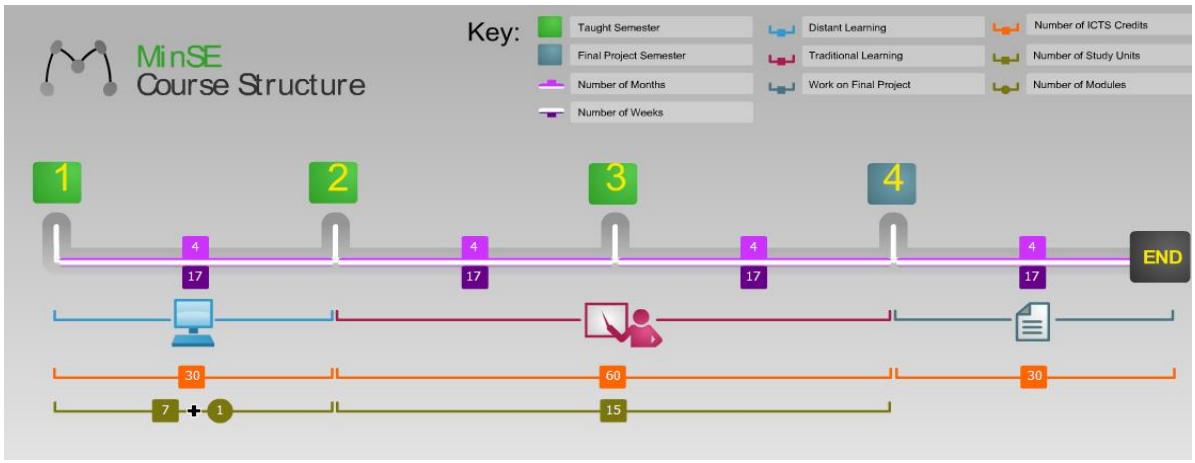

Figure 2: MinSE Course structure

As shown in figure 2 the first semester is delivered in fully on-line, however e-learning methodology and advanced ICT tools are planned to be used in blended learning approach throughout the whole course. MinSE e-learning environment is based on Moodle (figure 3), video-conferencing and webinars are planned to be used to offer academic support for students from the international team of lecturers.

Figure 3: Demo course for MinSE project can be visited by guests at http://edu.uni-miskolc.hu/minse

Teaching language is English; however, the planned delivery and structure of the Course provides many opportunities for familiarisation with multilingual terminology and encouragement to improve language capability. Some of the learning materials are available in HU, RO as a former joint course development projects, Innovate and e2ngineering focused on innovative methodology of multilingual delivery as well.

b) Discipline

Heat treatment and surface engineering processes have a core importance and a vast potential in several fields of engineering, such as transport, space, nanotechnology, biomaterials, the polymer industry, tool making and many others. “Road map” of Surface Engineering is shown in figure 4. In MinSE our intention was to offer students a comprehensive view of the subject, enabling them to evaluate all criteria for decision-making, individually or in a team, on materials and processes for routine and new and challenging applications.

The Programme has a well balanced mix of theoretical and practical components and is firmly focused on industrial relevance. The course is post-graduate or post-experience education. Its target audience is relatively broad and the programme has some characteristics of a conversion degree. Student and staff mobility is a feature of the plan and an interdisciplinary approach is encouraged, embracing scientific, engineering, environmental, energy, health and safety, management and economic issues.

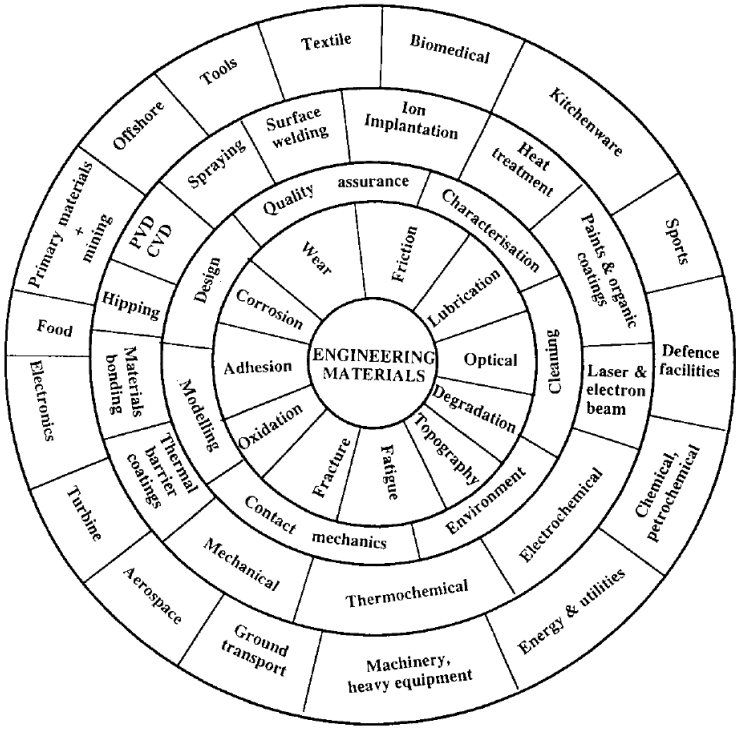

Figure 4: The surface engineering road map: a multisectoral, interdisciplinary technology

c) Target groups and admission requirements

MinSE is mainly targeted at mechanical engineering and materials science/engineering graduates wanting to continue studies and gain further qualification. It is, however, an extent ‘vocational’ qualification in that it is concerned with real and specific industrial functions and processes. The target group covers:

- Recent graduates moving immediately to a Master's qualification
- Individuals in materials engineering activity needing knowledge upgrade or extension
- Individuals wanting to move to heat treatment and surface engineering from positions in more or less related industries.

Admission criteria, as defined for the course, accredited by University of Malta:

1. Applicants shall be in possession of: Bachelor degree in engineering or science awarded by the University of Malta or an appropriate degree from another university recognised by the Senate for the purpose , or
2. With the specific approval of the Board of Studies, another suitable degree accompanied by at least five years of industrial experience in the field of heat treatment and / or surface engineering
3. Academic qualifications implied in (1) and (2) above shall be at least at second class.
4. The Board shall recommend to Senate the number of applicants that may be allowed to register for the Course. The number of available places shall be announced at the time of the call for applications. If there are more eligible applicants than the number of places available, applicants shall be selected on their performance in an interview held for the purpose and their qualifications, aptitude, experience and commitment.

d) Number of participants

Considering the number of participants in the subsequent EU projects, it would be difficult to estimate the large number of academics, involved in content development, ICT experts, developing e-learning tools, students, testing the materials and learning their elements as part of their regular courses either as modules or just some "remixed" or adopted versions of that. Unfortunately, the MinSE course as a whole has not been delivered yet, as due to the economic crises, firms are less interested in education their staff members in a fee-paying and - even because of living costs in Malta – a relative expensive training program. At this stage, partnership considers restructuring the MinSE Master course according to the ERASMUS MUNDUS scheme and plans to apply for a grant to launch the program.

e) Didactic model / Learning design

In all of the previously mentioned projects, we followed a flexible, resource-based approach in content development methodology. Wide range of training materials have been developed as more or less independent, self-standing training units – "bite-sized" and reusable elements of knowledge transfer, offered in standardised format of the following types of learning elements:

- Core units (multilingual, text-based learning materials + questions and exercises)
- multilingual glossary, collection of links and further related resources,
- video-recorded lectures of leading professionals + subtitles or lecture notes in English and native languages
- case studies as illustrations of practical applications – as platform free multimedia elements, offered not only on-line but also in CD/DVD format.

These course elements and even their building blocks, the learning objects can be remixed and used for compiling versatile course content for different target groups – as we call it,

using a “lego”-system for course development. Reusability of high quality content element may decrease the costs of e-learning development, while providing effective and versatile tools for knowledge transfer.

f) Organizational model

The MinSE Master’s Degree is currently being offered by University of Malta as a single Degree, but possibility of offering it as a joint Degree is open for any of the partner HEIs. It is for blended learning delivery, using live contact lectures and distance learning techniques.

The programme of studies includes 4 semesters and three parts:

1. Distance Learning study units, to which 30 ECTS credits shall be assigned.
2. Taught study units, to which 60 ECTS credits shall be assigned
3. A dissertation carried out at one of the Partner universities or companies, to which 30 ECTS credits shall be assigned. The final project may be carried out at any of the Partner universities or Partner companies which offer an extensive range of state-of-the-art facilities.

Each study unit typically represents

- 20 hours of contact time and/or distance learning followed by discussion sessions. Face-to-face delivery will be 4 hours per day over a 5 day period.
- 12 hours practical sessions - hands-on or computer-based, delivered 3 hours per day over a 4 day period.
- 4 hours for general discussion, case studies and assessment.

Students are expected to dedicate a total of 100 hours to each study unit, including contact time, laboratory sessions, private study and assessment. Taught courses of the second and third semesters are also offered as independent professional development courses for practitioners from industry, as each of the courses are taught in two week periods, sequentially and not parallel to each other. Such a way – in contrast to Erasmus Mundus scheme – teaching staff is expected to travel for such short teaching periods of their modules to Malta and the students remain for the 2nd and 3rd semesters in Malta. Travel costs of academic staff is foreseen to be covered by Erasmus staff mobility scheme – bilateral ERASMUS agreements have been established by all partners with the University of Malta.

All partners are free to use any of the elements of the course and may accredit the course as a whole, or in parts. This is the practice of the University of Miskolc, where several learning elements of both Innovate and MinSE projects have been translated and adopted and are used either in Hungarian or in bilingual format. ERASMUS students, learning a study period in Miskolc are also taught for Heat Treatment and Surface engineering, applying Innovate and MinSE course materials. Moreover, a professional development course has been accredited according to the Adult Education Law of Hungary, offering 72 hours of learning programme for practicing engineers of industry.

g) Quality assurance

The MinSE MSc course is awarded by the University of Malta, and its accreditation and quality assurance system is applied for that. As an international initiative, it is also accredited by the Institute of Materials Minerals and Mining, UK, offering worldwide recognition, acceptance and transportability. It is structured on the European Credit Transfer System (ECTS) and in accordance with the Bologna Process. Some study units are designed as stand-alone and can thus be taken separately as staff development courses and/or continuing professional development. Obviously, in such cases, educational institutions apply their own QA system for delivery.

h) The 'innovative' elements or importance

As also described before, subsequent projects of this development process focused on different innovations. The most important innovative elements may be summarised as follows:

- Series of surface treated samples for lab exercises were provided for each module of the traditional learning materials of the Tempus project.
- Three different e-learning scenarios were tested, and a unique multilingual methodology has been developed in Innovate project. Generally, when a course is offered in more languages, it means separate language versions of the course materials from which the student can select at the entry point. In contrast, we developed a special methodology, where multilingual delivery relates to content elements: learners may switch between the language versions *within the courses, paragraph-by-paragraph,* and the same content will be displayed in different languages, when clicking on their flag symbol.
- Video-conferencing (Miskolc-Malta-Birmingham) proved to offer extremely effective method for enriching the professional content and improving multicultural competencies of learners in both Innovate and MinSE project.
- Videod lectures are special and outstanding opportunities for our students to attend the virtual (videod and edited) lectures of the world famous experts of the given subjects e.g. they can learn about thermochemical treatments from the late Prof. Tom Bell, who was the initiator of defining this multidisciplinary subject as Surface Engineering (figure 5).

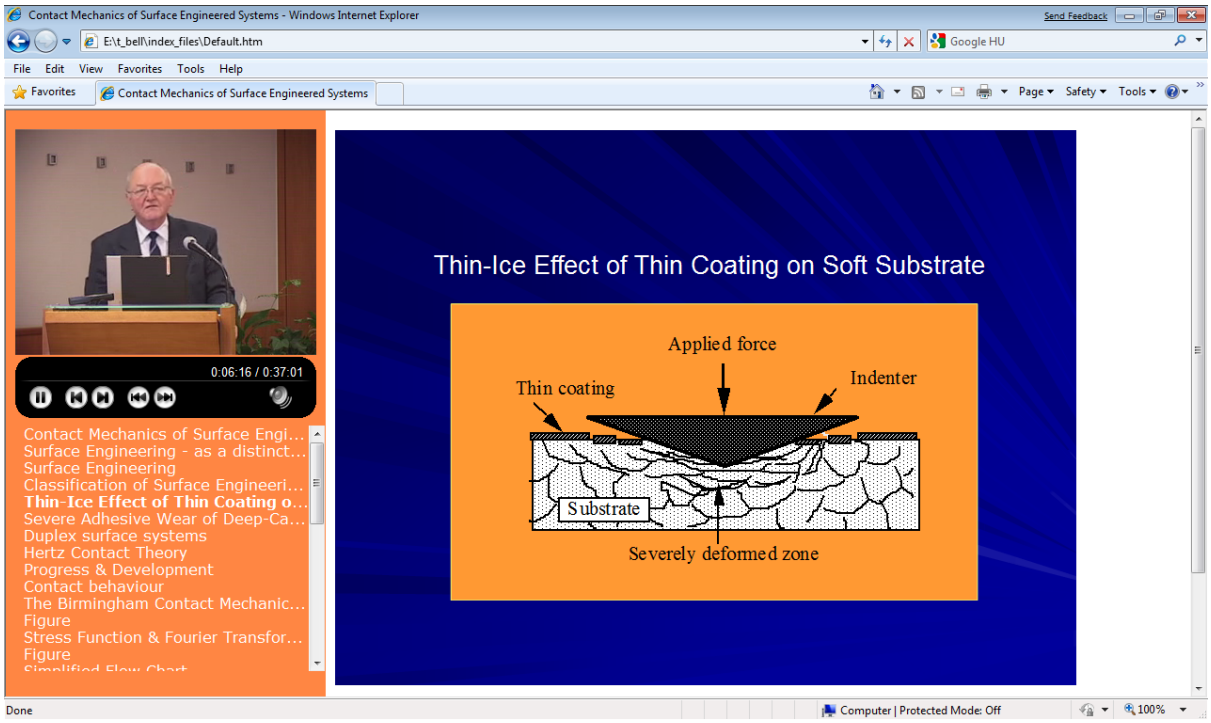

Figure 5: Video lecture of Prof. Tom Bell in e2ngineering project – recorded at the 3rd Intrnational Conference on Thermal Process Modelling and Simulation, IFHTSE Conference, 2006

- By our own, newly developed software, videod lectures may be edited with subtitles - simultaneously showing written text of the lecture in different languages (figure 6).

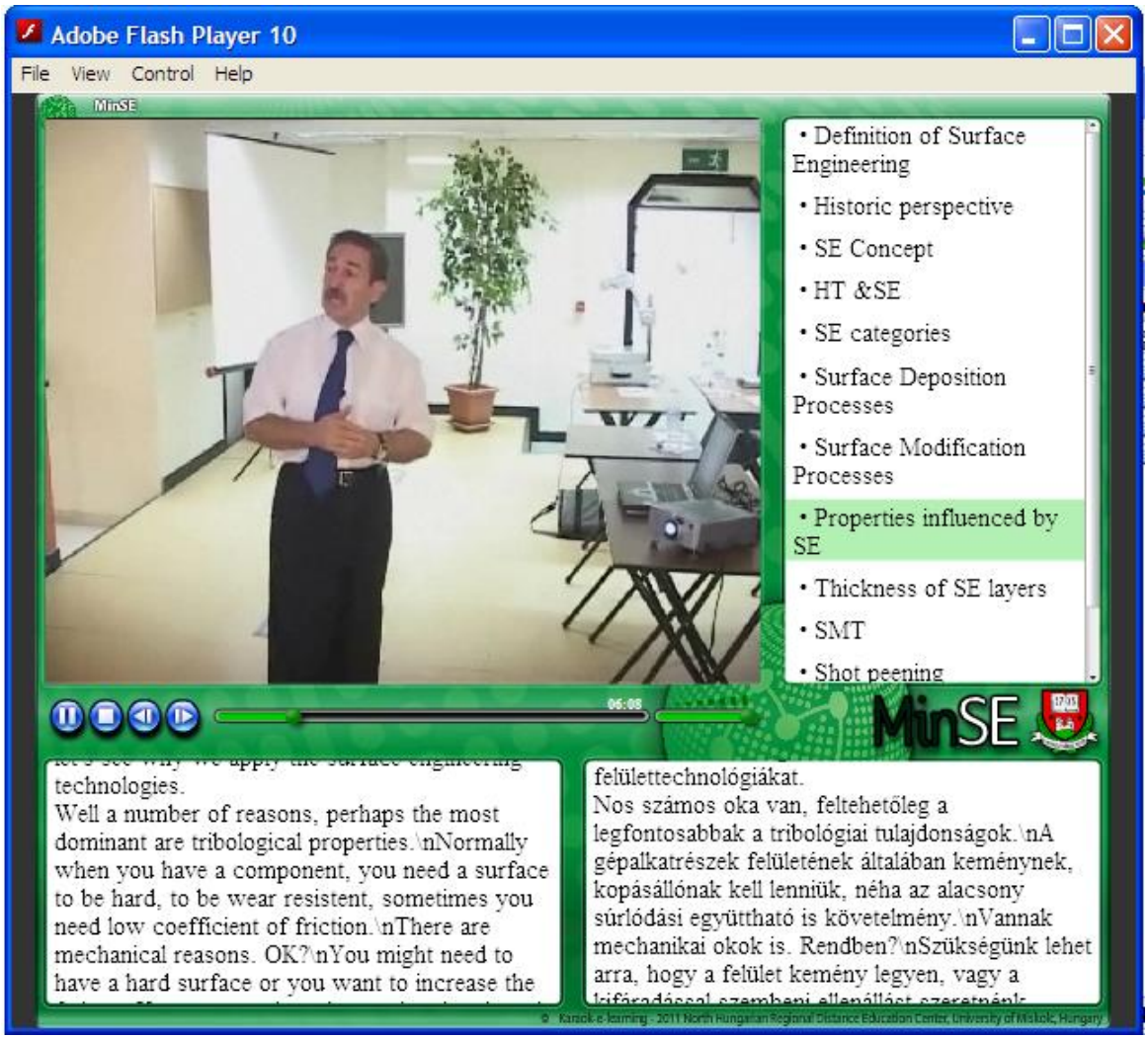

Figure 6: Video lecture of Prof. Maurice Grech, University of Malta easy to navigate, subtitled in English and Hungarian

- Industrial partners developed either short, illustrative videos/animations (e.g. on a special equipment, or testing method) or complex case studies (e.g. comparison of two competitive technological solutions, from all different aspects (including economical and environmental issues. Virtual laboratories and industrial case studies are valuable learning materials for recruiting students for the course as well.
- Based on the continuously widening knowledge pool of HTSE, different courses can be "remixed" for different target groups, either in regular HEI programs, or for company training. All learning materials are available for all partners in the main Moodle platform (http://edu.uni-miskolc.hu/, MinSE), managed by the University of Miskolc, but may be also transferred to the e-learning system of the partner universities. Partners may reuse, adopt and translate these learning objects, and may deliver them to their own students as well. Instead of reinventing the wheel, multimedia illustrations can be cost-effectively shared and integrated into our own curricula. Moreover, links to further open learning materials may be integrated with great benefit (e.g. steeluniversity.org, DOITPOM portal of Cambridge University, CORE project repository, etc.)

- Synergy with national projects, as well as with other EU supported projects may multiply the previously achieved results and may lead to even more added values.

4.2.4. Actors and roles

a) Kind of interaction / concertation / dialogue

Based on continuous dialogue, personal networking of the "core"-group of experts, initiatives – based on needs analysis and recommendations of IFHTSE members – are formulated into project proposals and realised in such temporary, but effective and operative framework. Results are validated by the involvement of further experts, observers, accreditation bodies. Regular workshops, seminars and conferences of IFHTSE offer possibilities for discussions on the progress achieved and trends, new initiatives to be considered in further development process.

b) Objective: exchange of information, ideas; survey of needs; development of ideas

As described in the previous sections: collaboration between Heist and industrial companies in this challenging field of materials engineering covers wide range of objectives, ideas and initiatives, analytic surveys and joint development of different learning scenarios and course materials - its complexity resulted in a sustainable, permanent progress and innovation.

c) What actors are involved: external and internal

As a continuous development process of multinational initiatives and activities, typically external actors are involved in these processes. Here are the details just for the MinSE project:

Academic partners

- University of Malta (Coordinating organisation of MinSE project)
- University of Birmingham, UK
- Technical University of Clausthal, Institute of Welding and Machining Germany
- University Petru Maior Romania
- University of Miskolc Hungary

Industry partners

- AdSurfEng, UK
- Bodycote plc, UK and global
- Micro Materials Ltd, UK
- Plasmaterm SA, Romania
- Surface Engineering Ltd, Malta
- Hempel A/S, Denmark

International association partner

- International Federation for Heat Treatment and Surface Engineering (IFHTSE)

Accreditation body

- Institute of Materials, Minerals and Mining, UK

Observers

- UTN FRBA Argentina
- Xi'an Jiao Tong University China
- Kansai University Japan

d) Role/Function/Kind of involvement of actors

IFHTSE as a world-wide professional association provided the framework for such a permanent dialogue on educational needs and resources, as well as for channelling the results of R&D activities into the educational progress. It served as a basis for temporary, project-based, intensive development periods as well. Roles of actors are not strictly separated - all partners are involved in generating ideas and defining the frameworks, in developing and in evaluating learning content - however in the previous projects typically HEIs were responsible for didactic, methodological and ICT development, as well as for developing "core" units, while practice oriented case studies and illustrative multimedia materials were developed by industrial partners. Seminars, workshops and conferences organised by IFHTSE offer excellent opportunities for involving wide range of experts in evaluation of results and needs analysis.

University of Miskolc plays a very special role in these collaborative projects: besides being involved in content development, we have brought the distance learning and e-learning concept into the mainstream of our educational innovation in HTSE. In the first period of our collaboration, the most demanding task was to play an "interface" role between content and IT specialists. Due to achievement of mutual understanding, we have become the e-learning service provider of the MinSE consortium; we host its main portal and its centralised Moodle platform with all content elements, accessible for all partners.

e) Origin of the concertation: education, research

Professional networking covers both education and research, however this special track of projects, described in previous chapters have been focusing definitely on education and is still in progress. Follow-up activities of the mentioned projects and experiences of pilots were discussed in different conference papers and workshops, leading to the recent decision of IFHTSE to launch an education and training project. Consideration is being given to building a portal leading to all authoritative suppliers of online, CD/DVD hard copy courses and material for education and training in heat treatment and surface engineering. Executive Board of the IFHTSE commissioned University of Miskolc for formulating and leading this project. Synergy with another LLL project – also coordinated by Miskolc – may be mentioned as engineering students are involved in the data-mining and testing phase of this development programme in the framework of their internship, as part of International Internship Agora LLL dissemination (KA4) project. The Education and Training Portal will serve as a gateway to information and resources – with special emphasis on OER – for all forms and levels of education in Heat Treatment and Surface Engineering.

4.2.5. Financing

Course development was supported by some EU projects as well as national funds as follows:

- INNOVATE - International On-Line Voc@tional Training in Surface Engineering - Leonardo da Vinci UK/01/B/F/PP/129_462 – running in the period of 2001 - 2004. The total Project budget of EUR 758 000 was 75 % funded by EU grant.
- E²ngineering - Development and testing of multilingual e-learning materials and courses in advanced engineering subjects based on reusable elements (LOMs), second generation e-learning architecture and methodology - Leonardo HU/04/B/F/PP-170029 – two of the 12 modules developed in this project focused on Materials Science & Heat Treatment and Laser Surface Treatments.
- MinSE: European Master's in Heat Treatment and Surface Engineering - Socrates 74922-IC-1-2005-1-MT-ERASMUS-PROGUC-6 – running in the period of 2006-2009. The total Project budget of EUR 560000 was 75 % funded by EU grant.

National support was provided in two Hungarian projects for adaptation and translation – both funds were quite low amounts, so the majority of work for language adaptation was done on voluntary basis.

Industrial partners have made a significant in-kind contribution, as they were intensively involved in programme and course development without getting any fund from the mentioned projects.

4.2.6. Analysis

Traditionally universities have had two major missions – i.e. being the sources of knowledge and providing education on the highest level – which strongly and mutually strengthen each other. But now, these missions are complemented with a new function: the university is becoming one of the most important actors of the knowledge economy, and it may shift the attention more radically from the education to the research. Unbalanced recognition and respect may not only cause short term malfunctioning, but even more serious problems: failing to meet the changing needs of teaching the "digital" generation, failing to find proper answers for the radical changes and new challenges in education.

Responsiveness for dynamically widening training needs is evidently considered by academics, but their focus is limited mainly to the content. At an early stage of undergraduate courses, curriculum is tailored for fitting to very specific areas – sometimes as dictated by local enterprises - graduates will not have a solid basic and transferable knowledge. And which is worse, when they have to change to another engineering field, they do not find appropriate courses for improving their mobility - HE should also reconsider its role in continuous education and vocational training.

Not enough attention is paid on the methodology of teaching: engineers are taught by engineers, applying the same methodology as they themselves have been taught - while extended content and complexity should require more effective, modern pedagogical approaches and tools. Academics have to recognise: we cannot "transfer" all the knowledge, what our students will need in their life-time as engineers – instead, we should provide them solid fundamental knowledge on the basics, and we should equip them with skills of finding and critically evaluating, filtering the enormous mass of information, integrating them into their own problem-solving competencies.

Methodological modernisation, wide scale, but critical and responsible use of ICT for educational purposes, blended and e-learning approaches may be considered as major tools for supporting the educational reforms and extension of LLL concept. E-learning has become the mainstream of education in the majority of EU countries – due to several support programs - and shows dynamic progress in developing countries as well. Not only new tools, but new approaches have to be implemented, considering the paradigm shift initiated by the WEB2.0 technologies: moving the focus from the education materials and technology to the user-student, to user generated content and social networking.

Flexible e-learning methodology has been experienced to be the most suitable tool for enhancing educational networking, offering several benefits of increased accessibility, cost effectiveness, individualisation of learning process, widening inclusion and balancing regional, social and cultural differences. The most important, common characteristics of our course development projects are the followings:

- Flexibility of creating different courses meeting with different needs in relevant subjects as well as flexibility of the courses using Open and Distance Learning methodology, basically asynchronous, autonomous self-learning, but also advanced networking facilities, e.g. video-conferencing.
- Open source and standardised e-learning tools are simple to use, free programs, so academics may use them for improving their teaching activity based on their individual motivation. Sharing of resources may multiply the values generated.
- Availability and delivery of the materials in multi-lingual versions support simultaneous development in professional content as well as in professional English, promoting harmonisation in adequate usage of terminology of advanced, interdisciplinary areas, and also supporting ”virtual” mobility of students in the globalised educational scenario.

International network of IFHTSE, which embraces university departments, companies, and small groups on the one hand, and materials and mechanical engineering associations on the other, can contribute significantly to the generation of new, collaborative initiatives, to the spread and sharing of valuable resources, to give access to reliable, fundamental knowledge in Heat Treatment and Surface Engineering.

4.2.7. References

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4.3. Master of Science in Safety Engineering, at KU Leuven

4.3.1. Goals and Aims

The casestudy is about a new offer of a master, the Master of Science in Safety Engineering. It concerns a so-called 'master after master' programme, which means that students must have previously obtained a master degree (or equivalent professional expertise) before they are accepted in this kind of master programme.

The development of the Master in Safety Engineering is the result of an intensive collaboration between the Faculty of Engineering and the Department of Chemical Engineering of KU Leuven with the chemicals and life sciences industry. The collaboration between university and external stakeholders is continued in the structure, management, financing, evaluation, … of the Master.

4.3.2. History and Evolution

1975 – 2010

The Faculty of Engineering offers the advanced Master in Safety Technology (programme in Dutch 'Master in de Veiligheidstechniek'). The programme prepares participants for the role of safety officer in large industrial plants, as required by Belgian law.

Since 2002

Rising questions on the continuation of the existing Master programme because of:

- internal changes in the coordination of the programme,
- problems with the financial viability of the programme because of lack of government subsidies,
- need of an internal, educational programme reform because of changing industrial demands and major new developments in the field of technical and occupational safety.

2005 - 2009

- Through personal contacts of academic staff with representatives of the chemical industry, the financial concerns of the programme become a topic of concertation.

- Partners in the chemical industry regret that the programme would risk disappearing. Because of their interest in and appreciation of the existing Master programme, they are willing to collaborate on the reform of the programme.
- The members of the Industrial Advisory Council of the Department of Chemical Engineering also launch the idea of a complete review of the existing Master programme.

2009

- Creation of the Knowledge Platform SCORES4CHEM (Safety, Control and Optimization: Research, Education and Services for the CHEMicals and life sciences industry) by the Industrial Research Fund of KU Leuven. Promoters of SCORES4CHEM are Prof. Jan Van Impe (KU Leuven, Dept. of Chemical Engineering, BioTeC), Prof. Bart De Moor (KU Leuven, Dept. of Electrical Engineering, SCD), Prof. Raf Dewil (Thomas More, ProMil) and Prof. Jos De Brabanter (KaHo Sint-Lieven, ElAu); daily management is in the hands of Dr. Geert Gins (KU Leuven, Dept. of Chemical Engineering, BioTeC).
  Mission: to bring academia and industry closer together in a major knowledge center for process design, modelling, safety engineering, optimization and control for the chemicals and life sciences industry in Belgium.
  Tasks are threefold: research, education and services.
- November 2009: Grant of the 'essenscia Chair Safety Engineering' to Jan Van Impe (teacher and researcher in chemical engineering at KU Leuven) as a co-funding of the education component within SCORES4CHEM, aiming at the development and operation of the new Master in Safety Engineering.

2009 – 2010

- A working group ('Think tank Safety Engineering') with representatives from KU Leuven, the chemical industry and essenscia prepares the reform of the Master programme.
- In collaboration with the Faculty of Engineering, the new Master programme is developed according to the official guidelines of curriculum development.
- The working group continues its work on the design of the new programme, search and selection of new teachers from academia and industry, …

2010-2011

Start of the 'Master of Science in Safety Engineering' (MNM SafEng), as part of the education task within SCORES4CHEM and based on a joint management between university and representatives of the chemicals and life sciences industry.

4.3.3. Kind of educational innovation

a) Level of educational innovation

Reform of an existing training (master) programme.

b) Discipline

- Development of the programme: in the field of chemical engineering.

- Content of the programme: engineering in general (different disciplines) with emphasis on chemical engineering for some parts of the programme.

c) Target groups and admission requirements

Considering the many different aspects related to safety, quality, reliability, efficiency, technical and regulatory constraints, the correct management of industrial process operations is becoming increasingly complex. At the same time, modern society is being confronted with safety-related problems in many different areas, such as traffic and transport, logistics, environment, consumer products, etc. There are, moreover, a growing number of rules and regulations at the European level with respect to health and safety issues. The MNM SafEng teaches participants how to apply their knowledge and skills in order to improve and realise safety in all these areas.

Graduates of the MNM SafEng

- fill vacancies in small national and large multinational industrial companies at home and abroad, or in private and/or governmental organisations that need experts with the ability to conduct research, carry out analyses, and perform inspections, monitoring and certification in the broad field of safety;
- acquire – through the 'Prevention' option - the certificate of prevention advisor ('Certificaat Preventieadviseur Niveau 1'), as required by law in Belgium for companies beyond a certain size dealing with specific risks;
- can start a career as an independent consultant with expertise in safety and environmental areas.

A previously obtained master degree (or suitable equivalent experience) is a condition to start the MNM SafEng. Are admitted:

- holders of an academic Master degree in Science (Physics, Chemistry, Biochemistry), a Master degree in Engineering (including Architecture) or in Bioscience Engineering, or a Master degree in Nautical Sciences;
- others based on a review of their academic curriculum and professional experience.

Because the programme also aims at international students, a sufficient knowledge of English is required. The option 'Prevention' requires a good knowledge of Dutch.

d) Participants

Number of students (full-time and part-time students):

- 2010-2011: 18 newly registered, 27 in total (no international students)
- 2011-2012: 15 newly registered, 23 in total (2 international students)
- 2012-2013: 12 newly registered, 20 in total (2 international students)

Maximum capacity of the MNM SafEng: 25 students.

People who just finished their studies as well as working professionals participate in the programme. Students can choose to finish the programme in one year full-time or to spread over two years. About 50 % are part-time students who combine the study with a job and therefore spread the programme over two years. The number of international students has so far been less then expected, a point of attention for the next years.

e) Didactic model / Learning design

The MNM SafEng is an *advanced academic programme* comprising a total of 60 ECTS (1 year):

Common compulsory courses in English (23 credits)	
Option "Process Safety" 1. compulsory courses in English (16 credits) 2. elective courses in English (6 credits) >for participants interested in mainly technical aspects of safety study of safe and reliable plant operation	Option "Prevention" 1. compulsory part in Dutch (16 credits) 2. elective courses in English / Dutch (6 credits) >includes non-technical aspects >routinely refers to the local Belgian context >leads to 'Certificaat Preventieadviseur Niveau 1' as defined by Belgian law
Master's thesis (15 credits)	

The programme can be completed in one year of full-time study or on a two-year part-time basis (to facilitate participation of active professionals).

Teaching activities consist of a combination of classroom lectures, practically oriented seminars and site visits.

A total of 38 teachers are involved in the programme; 16 are working fulltime in industry.

An important characteristic of the didactic model is the choice for team-teaching: most of the courses are given by a mixed team of academic teachers of the university and professionally oriented teachers from industry. A 'team of teachers' consists of at least 1 fulltime academic of the university and 1 or more visiting professors. Additionally, external guest speakers can be engaged for specific aspects of a particular course. The team is responsible for the content of the course, methodology of teaching, topics and guidance of master's thesis, … The collaboration between academics and external experts guarantees the academic level of each course.

The visiting professors are also involved in the master's thesis: selection of suitable topics, guidance of students as promotor and as assessor for evaluation.

Due the strong multidisciplinary character of the programme, involved staff comes from several faculties and research departments from the 3 main groups of faculties at KU Leuven (Science and Technology, Biomedical Sciences and Human Sciences).

f) Organizational model

The MNM SafEng is part of the regular offer of master degrees of KU Leuven. At KU Leuven, the organisation of education is in hands of the faculties. Each education programme is assigned to a Permanent Education Commission (POC) in the faculty, which is mainly responsible for the quality assurance of the programme.

The MNM SafEng has its own POC Safety Engineering, presided by professor J. Degrève, the programme director.
Twice a year, the POC reports to the Industrial Advisory Council of the Department of Chemical Engineering on the current state of the MNM.
Feedback and evaluation of the programme is also discussed in the Steering Committee of SCORES4CHEM.

Student administration is run by the central services of KU Leuven in a similar way as for all other bachelor and master programmes.
Students of the MNM can make use of all student facilities of KU Leuven as other bachelor and master students of the university.

g) Quality assurance

The MNM SafEng has been developed according to the procedure of curriculum development that applies to all bachelor and master programmes. 'Master after master' programmes are subject to the same quality assurance (internal from KU Leuven and external from Government) as all bachelor and master programmes. In 2011-2012 the MNM SafEng has been officially evaluated by an external visitation commission installed by the Flemish Authorities with a positive result for future continued accreditation.

h) What is the 'innovative' element or importance?

- Unique model of financing with support from the stakeholders in industry.
- Development of a training programme on an academic level through a joint collaboration between university and industry.
- The aspect of 'teamteaching' for many courses in the programme.
- The active input of working students based on their experience is an added value for the courses.

4.3.4. Actors and roles

a) Kind of interaction / concertation / dialogue

Kind of interactions related to the MNM SafEng:

- Regular meetings between university and industry aiming at concertation and dialogue on educational topics
- Formal participation of external stakeholders in the Permanent Education Commission Safety Engineering

b) Objectives

Objectives are multiple:

- Exchange of information and ideas
- Consultation on feasibility of ideas, programmes, …
- Collaboration to develop ideas or projects related to education
- Feedback, evaluation about on-going programmes

c) What actors are involved: external and internal

Faculty of Engineering of KU Leuven:

- academic staff
- dean of the Faculty
- POC Safety Engineering (academic staff, students and representatives from industry)

KU Leuven Industrial Research Council

Industrial Advisory Council of the Department of Chemical Engineering: advisory structure where members of KU Leuven and specialists of specific domains in engineering exchange ideas on research and education

Working group (Thinktank) with partners from KU Leuven, essenscia, chemical industry

essenscia: association of chemicals and life sciences industry in Belgium

SCORES4CHEM: knowledge platform aimed at Safety, Control & Optimization: Research, Education and Services FOR the Chemicals and life sciences industry; funded by the Industrial Research Fund of KU Leuven; the education activities of SCORES4CHEM are co-financed by the essenscia Chair Safety Engineering

- Steering Committee (representatives from KU Leuven, Association KU Leuven and industry)

d) Role/Function/Kind of involvement of actors

Faculty of Engineering of KU Leuven:

- Academic staff: teachers in the MNM; researchers inform their network about the MNM
- dean: recognition and support of the MNM
- POC: evaluation and quality assurance

KU Leuven Industrial Research Council:

- financing of innovative research, through mandates, projects or knowledge platforms.
- financing of the knowledge platform SCORES4CHEM

Industrial Advisory Council of the Department of Chemical Engineering:

- partner in launching the idea to review the existing master programme
- follow-up of the MNM twice per year

Working group (Thinktank):
preparation and realisation of the reform of the existing master programme

essenscia:

- financing of the MNM SafEng through the grant of the Chair Safety Engineering
- partner in the publicity for the programme
- member of POC Safety Engineering

- member of Industrial Advisory Council
- provides external teachers

SCORES4CHEM and its Steering Committee:

- partner in the reform of the existing master programme
- follow-up and evaluation of the MNM SafEng
- advice about profiles and needed competences of external teaching staff for the MNM
- strong support and stimulus for the international character of the MNM

e) Origin of the concertation: education, research

As described in Deliverable 7 (Cross-comparison report for WP2), some departments of the Faculty of Engineering of KU Leuven collaborate with industry through the organisation of "Industrial Advisory Councils" to exchange ideas on research and education. The idea and final decision to develop the MNM SafEng was launched by members of the Industrial Advisory Council of the Department of Chemical Engineering.

4.3.5. Financing

There are no official *government* subsidies for master-after-master programmes. This kind of master programme must therefor be financially self-supporting.

Three sources of financial support are available to cover the costs:

- *The tuition fee of the participants:*
  .Since the start of the new master, the tuition fee for participants admitted to the programme on a one-year full-time basis = 5600 Euro.
  .Participants who are not active professionally and are applying to the programme no later than two years after obtaining a master (of science) degree, pay a reduced tuition fee = 1400 Euro.
- *The essenscia Chair 'Safety Engineering':*
  Financial support of 65.000 euro / year for the period 2009-2014, mainly used to cover costs of honoraria for teachers. One of the goals of this Chair is the promotion of high quality education in the field of industrial safety.
- *Financial support by the Faculty of Engineering for the Department of Chemical Engineering:*
  Limited support that already existed for the former master programme, to cover part of the honoraria for external teachers.

The financial support of the essenscia Chair is a strong point but at the same time a threat because the Chair has been granted for a period of 5 years. The tuition fees and the financial support of the Faculty by itself are not sufficient to cover all costs related to running the programme.

4.3.6. Analysis

Stakeholders: new kind of partnership

The MNM SafEng is not a specific example of innovation on educational level. Innovative (and unique in its discipline) is the model of concertation and collaboration between

university and industry and the way in which this model has supported the whole process from (i) a first idea, through (ii) the development of the MNM until (iii) its management. In this case study, the focus is on the interfacing between university and industry. Research networks are more and more addressed on educational matters. At KU Leuven this interest is experienced in both directions, as a potential basis for reorientation and innovation of education.

Stakeholders: alumni
There is a limited involvement of alumni although they can be helpful for further publicity for the progra
mme.

Stakeholders: success factors
The engagement and enthusiasm of all partners (academics and visiting teachers) is a strong success factor.
Constraints in the collaboration with external partners are:

- lack of time,
- fundamental and complex changes in the area of higher education that are not easy to capture by the external partners,
- lack of or limited accessibility of educational means and platforms for external teachers.

Stakeholders: broadening the network
The topic of safety is specifically developed for the chemical industry. Other sectors could be interested in this kind of training programme. Broadening of the network with industry to other sectors as construction, food industry and transport is a future working point.

Finance
An important strength but at the same time a constraint of the MNM is the financing. The development of the MNM was only possible thanks to the grant of the essenscia 'Chair Safety Engineering'. The Chair ends in 2014, new financing must be found by then because there are no formal subsidies and the tuition fees and the limited financial support of the Faculty are not enough to cover all costs of the MNM.

Role of the government
As a university master degree the academic level of the programme must be guaranteed. The strong link with the research activities of the academic staff and the initial master degree as a condition to start the MNM, are guarantees for this academic level within a strong professionally oriented organisation of the MNM.

Quality
In the recent Government evaluation of the MNM, further development of this academic character of the MNM has been asked.

Didactics…:
The international character of the MNM has not yet been fully realised. Publicity is an

element that can be strengthened but this remark is also related to an element of innovation. The interest for the MNM abroad is real but for reasons of accessibility, international students ask for the use of 'distance learning' in the MNM. However, direct contact with practice is a must for the topic of safety. Therefore, this kind of changes in the programme will not be introduced.

Interfacing activities

- *Finance*
  - Business model: unique (for our university) model of financing education with support from stakeholders in industry
- *Role of the government*
  - lack of government subsidies encourages universities to find financial support among stakeholders
  - in accreditation procedures input from labour market is demanded by government
  - education, developed in collaboration between university and companies, is evaluated within the same framework and according to the same criteria as all officially recognised higher education programmes
- *Social mission*
  - programme = support for legally obliged functions in companies
- *Quality aspects*
  - the importance of 'team teaching'
  - close collaboration with companies brings in extra expertise from the workplace through: external teachers/visiting professors; integration of the practical experience in courses; variety of site visits
  - active input of working students = added value for many courses
- *Infrastructure*
  - site visits are easier and more varied due to collaboration with industry
- *Award:*
  - Master degree
  - Possibility of additional certification for specific legally obliged functions on the workplace

4.3.7. References

URL's of the programme:

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essenscia Vlaanderen: http://www.essenscia.be/nl/gezondheid_veiligheid_milieu
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KU Leuven Industrial Research Council (Dutch)
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4.4. Telecom Italia, at International Telematic University UNINETTUNO

4.4.1. Goals and Aims

The pilot concerns the special agreement between the International Telematic University UNINETTUNO and Telecom Italia, the main Italian telecom operator and one of the largest Italian companies. The agreement arises from the Telecom Italia training needs, in order to improve the skills of its employees adopting a workplace learning modality, and the competences and the reputation that UNINETTUNO has acquired over the years in the field of distance learning.

4.4.2. History and Evolution

The agreement between UNINETTUNO and Telecom Italia arises from Telecom Italia training needs; in order to improve the skills of its employees, Telecom Italia has chosen to focus on distance education technologies by identifying UNINETTUNO as a partner, for the fame and the excellent reputation that the UNINETTUNO University has managed to build both nationally and internationally over the years. For their special training needs Telecom Italia was looking for:

- Well qualified institution/university;
- Learning at distance;
- Flexibility in time;
- Exam centres available on the national territory.

The UNINETTUNO didactic and organization was able to suit all these needs. A specific agreement has therefore started an innovative experience of cooperation between the University and the business world. This is the beginning of the UNINETTUNO-Telecom Italia program called:

"*I care myself: I learn, the company is with me*".

On the basis of these considerations, the agreement has been signed between UNINETTUNO and Telecom Italia at the end of 2010. This agreement has led to the enrolment, in February 2011, of more than 2500 Telecom Italia employees to Uninettuno degree programs and single courses. The didactic activities are currently on-going.

4.4.3. Kind of educational innovation

a) Level of educational innovation

Special agreement between the International Telematic University UNINETTUNO and Telecom Italia, in order to improve the skills of its employees.

b) Discipline

Various degree programs at UNINIETTUNO.

c) Target groups and admission requirements

Telecom Italia employees

d) Participants

From February 1st 2011, 2562 Telecom Italia employees were enrolled on various degree programs at UNINETTUNO. In addition 350 employees enrolled in 900 single courses, covering a very wide scale of topics, offered by Faculties of Economics, Law, Engineering, Literature, Psychology and Communications Sciences.

Welcoming more than 2500 students from a single organization with offices located throughout the country, trying to avoid impacting on business processes and working time, still ensuring the best possible learning and organizational service, has led to a series of adjustments in the student support and in logistics organization.

e) Didactic model / Learning design

UNINETTUNO didactic model is based on cognitive and constructivist theories, and is declined in a complex online model; learning environments on UNINETTUNO portal provides students a set of features and high quality didactic materials; students are supported in their learning process by professors and tutors from top Italian and international traditional Universities.

Each course in each degree involves three different teaching categories: Video professors are Full professor from Italian and international universities that designed and recorded the video course; Teaching Professors are responsible of the course for UNINETTUNO; tutors are Ph.D. and Researchers both from Italian traditional universities and from UNINETTUNO, and are the real didactic interface between students and the online institution, providing support, motivation, real time tutoring sessions, guiding practical activities. Teaching professors and Tutors evaluate students' activity during course delivery, both through UNINETTUNO portal automated students' activities tracking and reporting system and through qualitative assessment, and decide whether or not students are admitted to final exam for each course. Students are grouped in classes made up by a maximum of 30 students in order to grant and provide them a personalized assistance from tutors and professors.

Learning environments provide students different sets of tools and materials:

- support, orientation and planning tools, such as syllabus, concept maps, didactic planning, exam guide, and an interactive agenda used by tutors and professors to set Virtual classrooms and chat events for their classes, provide students tools and information about courses before starting studying on the didactic materials;
- individual study didactic materials are the core-component of a course; video-lessons recorded by the best Italian and international professors for each subject are digitized, indexed and hyper-medially linked to support material, in order to provide students a complete customizable studying experience. Students can watch the lessons in a linear way, or can stop the teacher and make him repeat the concept again; or can jump to a sub-topic using the index box on the left; or, when a red rectangle inscribes a specific didactic material category, can open the related material in a pop-up windows, pause the lesson and go deep on the specific topic the video professor was talking about; besides the video-lessons, UNINETTUNO model provides for each course slides (used by video-professors during video-lessons

recording), text, books, essays, articles, bibliographies, web-links, multimedia material related to the video-lessons;
- learning by doing materials, such as exercises and virtual laboratories, designed to make students test through practical activities the theoretical knowledge learned through didactic materials;
- online tutoring tools: chat, forum, web-based live streaming conferences, virtual classrooms, SecondLife based virtual conferences systems let students and professors meet in virtual environments and create a set up for collaborative learning activities.

Introductory mentoring sessions were conducted for new Telecom Italy students: UNINETTUNO researchers and experts have planned a total of 12 sessions (two for each of the six UNINETTUNO faculties) showed to new students the peculiarities and the characteristics of the teaching and organizational models used, and the educational objectives of the degree courses they had chosen to enrol in, in order to provide new students with an immediate and simplified approach to the new online learning experience.

f) Organizational model

UNINETTUNO organizational model is designed to give students flexibility and customization in their learning paths.

- Course delivery: each course for each degree is delivered three times a year; each session lasts two months; at the end of each session, a final exam session with two exam days for each course is provided. If in a traditional university missing a course means having to wait one year to enrol that course again, in UNINETTUNO model students can design their study plan according to their personal needs;
- Classes: students are grouped in classes made up by a maximum of 30 students in order to provide them a proper assistance. Classes are created using a geographical criterion: the whole national territory has been divided in 8 macro-areas (North-West, Lombardy, North-Est, Center, Latium and Sardinia, Center-South, South, Sicily) based on the students' residence; the classes have been created grouping students in the same area. In several cases students working in the same facility have meet each other in the same virtual class, naturally enhancing the interactions during the learning process.
- Exam admission: in order to be admitted to final exam, UNINETTUNO students must prove their course attendance. Attendance is witnessed by three factors:
  - the student must have seen the video lessons and used the teaching materials provided in the course;
  - the student must have delivered the required exercises assigned by teacher and tutor;
  - the student must have participated in collaborative activities in the virtual classroom.

  Teachers and tutors verify students' attendance and admit them or not to final exam. Moreover, the agreement provides that Telecom Italia pays the fees for the successive years only for the students passing at least 50% of exams. This system incentivises students to attend courses and exams' sessions, making them more responsible of their study process.

- Exam sites: final examinations are conducted in person. To ensure maximum flexibility in logistics, UNINETTUNO inherits and extends the Technological Poles concept from NETTUNO Consortium. Students enrolled in UNINETTUNO are not forced to move to Rome - UNINETTUNO headquarters - for the exams, but they can take the exams at one of UTIU Technological Poles set up as examination sites: UNINETTUNO professors and tutors go to the various examination sites to enable all students to take exams. In addition to the 15 UNINETTUNO Technological Poles (TP) on the Italian territory (not to mention the several others international TP), the agreement with Telecom Italy has provided new examination centers located in geographically strategic points that serve a large number of new Telecom Italia students.

Figure 7: Division of the national territory for the creation of the virtual classes and location of the TP

- Social networks: at the beginning of the program UNINETTUNO and Telecom Italia HR staff has agreed to realize an institutional blog as communication channel for the students enrolled under this particular program. The blog is hosted by Telecom Italia and it is one of them main interaction channels regarding the organizational aspects of the program. It is also adopted by the students to ask clarifications about the program rules and to enter requests. Since the blog is an institutional discussion space, at the same time students have created several Facebook groups, about one for every degree program. These groups are closed and populated by students only, so they are *free to express their opinions*. They are mainly adopted to share impressions and suggestions about the exams and the professors, to collect copies of the past exams and to support each other in the study process.

g) Quality assurance

The quality assurance is generally performed at UNINETTUNO by a specific Evaluation Team, composed by professors and experts in the field of evaluation and quality assessment. They perform periodical analyses and surveys on the students and professors activities. The results of the evaluations are reported at the Board of Directors, which takes corrective decisions on the didactic and organizational aspects. This activity is performed for the standard students as well as for the students enrolled in the UNINETTUNO-Telecom Italia program.

In addition, a team from Telecom Italia Human Resources staff is charged to perform a quality assessment inside the company. They manage an internal blog to collect the students' requests and feedbacks. They are part of a joint committee, involving also UNINETTUNO staff, aiming improving the didactic and organizational aspects. Their activity particularly focus on:

- regularly analyse the performance of students enrolled;
- plan the actions for motivating less active students;
- analyse organizational problems emerged during courses delivery and find effective solutions.

h) What is the 'innovative' element or importance?

The innovative importance of the agreement between UNINETTUNO and Telecom Italia lies in the organizational model. It is a concrete example of how distance learning can meet the company needs of workplace learning.

Another innovative aspect lies in the fact that the unions and the company found, for the first time in the history of negotiation, an agreement that will provide the opportunity for employees to enrol in a degree program and the opportunity to improve their social and cultural status in accordance with the working time and duties, through the use of new distance education technologies.

Both the trade unions and the company agree that this agreement represents an important sign of attention to the issues of workers training along with the attempt to advance the level of the group industrial relations.

4.4.4. Actors and roles

Due to complexity of the program and the high number of involved students, the interaction between UNINETTUNO and Telecom Italia is organized at different levels.

Previous collaborations on didactic, research and technical aspects have created into Telecom Italia the awareness of the UNINETTUNO capabilities. The idea of the "*I care myself: I learn, the company is with me*" Program was born at top level and has involved the Rector of UNINETTUNO, Prof. Maria Amata Garito, on one side and the Governance Board of Telecom Italia on the other side. In several discussions an optimal matching has been found between the company need and the University didactic and organizational offer.

The discussion has been enlarged involving the Trade Unions, that have approved and undersigned the activation of the program. The involvement of the Trade Unions has

allowed considering the scholarships offered by the company among the incentives that the company offers to its employees.

After the signature of the agreement between UNINETTUNO and Telecom Italia, a joint working group has been set-up, involving the UNINETTUNO technical and administrative area and the Telecom Italia Human Resources. This group has worked on the following aspect:

- define the organizational model of the program, the administrative and logistic aspects and the management procedures;
- empower the technological infrastructure of UNINETTUNO in order to support the massive enrolment of the Telecom Italia students;
- include new functionalities in UNINETTUNO web portal, to manage the Telecom Italia students with dedicated functionalities;
- organize a call for application for the Telecom Italia employees, and the successive massive enrolment into the University.

The same group currently works on the management and the quality assurance activities related to the program.

All the UNINETTUNO academic staff has been involved in the program. They have been made aware of the program and of the terms of the agreements between UNINETTUNO and Telecom Italia. So they have been informed about the organizational model studied for the program, and trained in order to correctly apply it. Finally, the academic staff has played an active role in welcoming the Telecom students in the virtual environment, organizing virtual conferences and chats in order to show the Uninettuno didactic model and its implementation in the web-platform. This activity has helped to reduce the impact of students in facing a new didactic model, especially for the more aged one, and so to have a small drop-out rate.

The academic staff is currently involved, beside the didactic activities, in stimulating and supporting the students in their learning process.

4.4.5. Financing

The admission fees are fully covered by Telecom Italia. Due to the huge number of enrolled students, a special reduced fee is agreed. As stated before, at the end of each academic year Telecom Italia pays the fees for the successive year only for the students passing at least 50% of exams. This system aims to incentive the students and to guarantee the company from wasting money. The students not passing at least 50% of exams in one year can continue to attend the courses but they have to provide for the fees.

4.4.6. Analysis

These achieved results in terms of students enrolled at the different degree programs and single courses, the didactic performances and students' overall satisfaction demonstrate the effectiveness of the proposed organizational and didactic model. The number of exams passed by students is significant, and the average grade obtained by students is certainly very encouraging. The educational and organizational model that forces the students to use educational materials and to follow online tutoring sessions, allowed the students to be

admitted to the exams and to achieve significant and stimulating results. The tutoring activities allowed even elderly students to overcome their initial difficulties and help them to plan the time devoted to work and to study and achieve results that motivated them and made them more self-confident.

At about one year from the launch of the *"I care myself: I learn, the company is with me"* Program and from a qualitative analysis of the results achieved we can say that, beside the success of the individual students that can be measure based on their learning performances, the initiative succeeded in overcoming some old-fashioned clichés such as "company status". Thanks to the new technologies, even in the company microcosm, the idea of democracy and sharing allows to overcome the pyramidal organization of human resources and offer to the company and to its employees new opportunities for development. The working students included into the program come from all regions of Italy and, from the very beginning, they started a collaborative training experience that allowed to revive their sense of belonging to a group and develop thematic communities on study subjects by a regular use of the tools made available on the learning platform and some of these students gave rise to true spontaneous and fully independent community. Actually, the motivation arisen by their coming back to study through innovative modes stimulated the employees to achieve their own objectives starting a positive competition among colleagues giving them new motivations and an renewed feeling of belonging to a group. In the company blog devoted to the project, on Facebook and Twitter, now working students exchange views, notes and information; this new community, born from the wish to enhance one's own cultural background is re-creating a sense of company identity by improving individual situations. So doing, a technician, working at a telephone switchboard and living in the south of Italy, has finally had the opportunity to get his first degree in computer engineering and finds himself giving advice to a manager working at the head office and sharing with him his notes and preparing together for their next exam.

The case of the program launched proved that a new highly-sustainable organization approach capable of changing and renewing the relationships between university and company in the light of an appropriate and scientific utilization of the new technologies applied to teaching and learning is possible.

Key aspects of the knowledge transfer mechanism:

- More skilled e qualified people work in the company;
- More motivated people;
- Increased self-esteem and social-status improved
- Sense of belonging to the company
- Other employees may be willing to get additional training
- Employees can advance in career;
- Student-professor interactions can start new scientific cooperation between the University and company branches.

Key success factors can be identified as follows:

- Quality of didactics and research
- Flexibility of study programs
- Students-professor relationship

- Richness of content
- Capability to reach a wider audience
- Convergence of interests in University and Company

Interfacing Activities

- Stakeholders: University:
  Other employees may be willing to get additional training and enrol as students; Student-professor interactions can start new scientific cooperation
  between the University and company branches;
- Stakeholders: Company:
  More skilled e qualified people work in the company; more motivated people;
- Stakeholders: Employee:
  Increased self-esteem and social-status improved; sense of belonging to the company; Employees can advance in their career;
- Finance:
  University give discount on tuition fees; Telecom pays tuition fees to students that pass successfully at least two exams per year;
- Role government:
  mostly none, but indirect regarding accreditation;
- Social mission:
  Employees augment job security;
- Quality aspects:
  the University guarantee the quality of the training; Telecom Italia is part of a joint board the oversee the quality process; Human Resources Services of Telecom Italia monitor the quality process;
- Infrastructure related interfacing: the University e-learning platform provides authentication and it is usable on all Internet devices and platform: desktop (Microsoft, Apple, Linux), tablet (iOS, Android), smartphone (iOS, Android); exams at Telecom Italia premises;

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5. Cluster 3: (Social) innovation and crowdsourcing

5.1. Prosperidad Adult Popular School (Escuela Popular de Adultos la Prospe)

5.1.1. Goals and Aims

The main aim of the School is to build a permanent collective pedagogical-political space. Self-management, collective learning and participation are the keys for the definition of the project and its implementation, organization and daily development.

The axes of its educational project are based on the Critical Pedagogy of Paulo Freire and the assumptions of Intercultural Education, from which arise the following objectives:

- To reflect on the social reality, in two aspects: making individual and collective consciousness of the situation, and awareness of the need for individual and collective action to overcome it.
- To acquire knowledge, skills, working methods, forms of expression, organizational experiences, and information to analyse reality, take a stand on it and actively contribute to the development of alternatives towards human emancipation and social justice.
- To develop solidarity and a collective, non-competitive, mutual support space.
- To enhance handwork at the same level of intellectual work, criticizing the different valuation of both.
- To take public stand, and where appropriate, participate and networking with other social groups and movements in the complaint and resolution of social conflicts that somehow affect the members of the School, such as environmental, peace and anti-war or gender issues, as well as against human oppression and exploitation of the "South" population ...

5.1.2. History and Evolution

The project started in 1973, under the Franco dictatorship, upon detection of a relatively high rate of illiteracy in the district and the need of promoting non-clandestine associations. In this context the Popular School begins its journey teaching literacy and basic skills for adults.

In 1977 the neighbourhood of Prosperity is plenty of diverse countercultural associations: The neighbourhood association, a libertarian nursery, and different music and theatre groups. These groups, along with the Popular School, occupy an old and abandoned school to establish a cultural centre. Further on, after a negotiation process, the Madrid council assigns the afternoon shift space in a public centre for the development of adult teaching activities by the Popular School. In 1983 this centre becomes full use and self-managed by the Popular School.

Again, in 1991, the Council asks the school to leave this building. This results in a long campaign which lasts until 2000 and had 3 axes:

- Mobilization through a protest campaign demanding a new space in the same condition.

- A pedagogical campaign, aimed to gain the recognition of the Popular School as an official Adult Education centre. This recognition is finally achieved and the Popular School starts to officially certify the qualification of Graduate School. By this time, several awards are won due to the integration of people with disabilities and other goals.

- A judicial process: different instances were used to avoid the eviction during 11 years. As a result of this campaign, the Ministry of Education of the Community of Madrid provides the assignment of the current location of the Popular School

During this time new people and groups, coming from different social movements, approach the School helping to formulate a project of popular education, beyond literacy and the Graduate School, towards building a self-education process that is embodied in the development of various workshops and the creation of Collaborative Learning Groups (*Grupos de Aprendizaje Colectivo*, GACs).

In this period there is also a significant change of tendency related to the migratory flows, passing from country-city to South-North global and massive movements. In addition to Latin-American people, who share the Spanish language, African and East people arrived to the neighbourhood implying a new pedagogical need: the Spanish language learning. At the same time the generalization of compulsory education in Spain provokes the progressive disappearance of the adult literacy groups and in 1994 the Popular School started to develop classes of Castilian language for migrant people.

By this time, new initiatives also arise linked to the uncertain and precarious living imposed by neoliberalism and the need of collective proposals to face and overcome it. A specific workshop is created to analyse the different aspects involved: Employment, Health, Education, Housing, etc. From this collective work emerges a “Barter Network” as a space to exchange needs and offers among Popular School participants and to promote an alternative non-monetary exchange. The “Free shop”, a self-managed space for clothes exchange, is an example of this.

Currently, the Popular School activities are pursued by various groups, among others:

- Spanish classes (with three levels: welcome, beginner and intermediate)
- Digital literacy classes
- Arabian language classes (for beginner and intermediate levels)
- Collective reading workshop
- Taichi workshop
- A workshop on biking
- GAC on Gender issues
- GAC on economic alternatives
- GAC on political reflection and action
- A group that engages people with disabilities in hobbies and leisure
- Popular Library

- Cine-Forum

Other projects are also developed in the space of the Popular School, as a self-managed Agricultural Cooperative, composed by ecological and social responsible farmers making decisions together with consumers in a collaborative basis) and a self-managed Consumers Network.

5.1.3. Kind of educational innovation

The Prospe's Popular School is an open and self-managed space. All pedagogical and political decisions, as well as everything that affects the School project, are made in the General Assembly, which is held in a monthly basis with the participation of all members of the School and open to everybody interested. All organizational aspects, for example the school cleaning and maintenance, are cooperatively assumed by School participants.

The GACs (Collaborative Learning Groups) enhance critical learning processes that lead to a transformative practice, in a circular method of reflection-action-reflection, and action returning. These groups imply the disappearance of the role of teacher and a socialization of the learning, in which the collective process of learning has the same importance as the contents.

Spanish language classes are a bit different from the GACs, as there is a person who assumes the role of monitor, usually somebody whose mother tongue is the Spanish. However, the didactic model is very different from those that are based on grammatical contents. The learning design includes a programme build on "generative issues" (similar to the generative words proposed by Paulo Freire in his literacy proposals): They are significant issues linked to the social reality in which participants aspire to critically intervene, such as Work, Family, Health, Leisure Time, etc. Along with these generative issues, there are a series of transversal issues invading the whole programme, such as Gender, North-South inequity, Community participation, etc. The objectives for each one of the issues are formulated following the scheme of "contents analysis – reflection on them – action proposal".

Currently, more than 80 people are permanently committed in the different activities Popular School, and more than 200 participate on a regular basis in its different activities and workshops.

5.1.4. Actors and roles

The Popular School is a learning space open to any kind of initiative coming from individuals and groups with the only requirement of being a non-lucrative activity and being accepted by the School Assembly, which is the only decision making actor. Everybody is a member of the Assembly, where decisions are horizontally and collaboratively made. Self-management is the main principle of the School, so there are no external actors. There are no different roles established, all participants are expected to be involved in the common activities and duties at the same level (School cleaning, Assembly organizing, etc.).

5.1.5. Financing

Currently, there are three different sources of funding:

- Participants are asked to pay a small fee on a monthly and non-compulsory basis (everybody is entitled to participate in the activities even if they are not able to pay the fee).
- Voluntary contributions of members, usually people formerly involved in the School.
- The organization of micro-events where people can freely contribute to the maintenance of the Popular School Project.

5.1.6. Analysis

Self-management and collective learning are the keys of innovation in this case study. The way of operating could be an example for some activities in Universities, for instance providing a space for learning in a collaborative way, with a horizontal structure (in spite of the hierarchical structure in higher education institutions).

This initiative has been politically initiated, but with no involvement from government. We can say it is idealistically driven based on a strong advocation for social justice, providing educational opportunities to people who otherwise would not have them, and promoting their participation in many spheres of society.

5.2. Medialab Prado

5.2.1. Goals and Aims

Medialab-Prado is a program part of the Department of Arts, Sports and Tourism of the **Madrid City Council.** It is conceived as a citizen laboratory for the production, research and dissemination of cultural projects that explore collaborative forms of experimentation and learning that have emerged from digital networks. It is a space for dissemination, meeting, documentation, research and production around digital culture where projects and ideas are developed from an experimental, interdisciplinary perspective, aiming to include a variety of types of users in these processes.

Medialab's goals are:
To enable an open platform that invites and allows users to configure, alter and modify research and production processes.
To sustain an active community of users with the development of these collaborative projects.
To offer multiple forms of participation that allow people with different profiles (artistic, scientific, technique), levels of specialization (experts and beginners) and degrees of implication, to collaborate.
The information has been obtained from the website http://medialab-prado.es, as well as on-site visits to the program and interviews with staff and participants in March-April 2013.

5.2.2. History and Evolution

Medialab-Prado is a programme of the Madrid City Council's Arts Area (Área de Las Artes del Ayuntamiento de Madrid). Created initially in 2000 as *Medialab Madr*id at the Centro Cultural Conde Duque, it moved in September 2007 to its permanent location in the Plaza de

las Letras in the lower level of the Antigua Serrería Belga (former Belgian Saw Mill), which has been under renovation from May 2012 to April 2013. At that time, its name was changed to Medialab-Prado, a reference to its new location near the Paseo del Prado, close to the Museo Nacional del Prado and the Museo Nacional Centro de Arte Reina Sofía. In April 2013 Medialab-Prado moves to the Serrería Belga renovated building. During the renovation period, Medialab was located in Matadero Madrid.

5.2.3. Kind of educational innovation

Medialab-Prado holds intensive workshops for collaborative project production, training workshops, theoretical seminars, talks, presentations and roundtables, gatherings on experimental music and live audio/video, as well as meetings for research groups and work groups on a variety of subjects. In addition, the Medialab-Prado space is permanently open to the public to consult information related to its on-going programmes and the projects created in its workshops, with the support of cultural mediators.

In order to achieve its goals, Medialab-Prado offers:

- A permanent space for information, consulting and encounters, attended by **cultural mediators**, who explain the nature of the space and connect different people and projects with each other.
- **Open Calls** for the presentation of proposals and the participation in the development of collaborative projects.
- **Activities Program** that comprises workshops, seminars and debates, as well as the meetings of different work groups, exhibitions, conferences and other events such as concerts and performances.
- A work atmosphere dedicated to the **encounter**, **cooperation** and **exchange**, where there is room for life and affects; and informality and closeness are appreciated.

The Open Calls and the Activities Program become the core of the educational innovations:

Open Calls
Throughout the year, Medialab-Prado announces numerous open calls on its Web site for the submission of theoretical and practical proposals and for participation in the collaborative development of projects, as part of our various on-going programmes.

Open Calls for projects and collaborators
As part of the various types of project development workshops, people can take part either as the promoter of a project –if the project one submitted to an open call has been selected– or as a collaborator, as a member of the collaborative development groups that work together to carry out the selected proposals. In these spaces, a horizontal work dynamic is created in which authors and collaborators contribute knowledge and ideas, while they learn from the rest of the group and the workshop instructors. Project submissions and collaborator registration are done via online forms on the website.

Open Calls for papers

These calls are for the submission of theoretical works related specifically to the subjects proposed. Selected works are presented in public by their author(s) as part of the activities scheduled for that particular seminar. Papers are submitted via the website.

Activities programme

International workshops and seminars
Workshops organized at Medialab-Prado are conceived as spaces for collaborative work, knowledge exchange and theoretical-practical training related to digital culture. The subjects proposed for intensive collaborative project development workshops are linked to Medialab-Prado's various on-going programmes. As explained in the previous section on open calls, people can take part either as a promoter of a project or as a collaborator in developing the selected proposals. In seminars, people can take also take part as the author of a theoretical paper.

Training workshops
Medialab-Prado offers courses on technical know-how, like programming and electronics. Due to limited space, people must sign up ahead of time on the website.

Workgroups
At Medialab-Prado various groups made up of local users meet regularly to discuss different subjects and develop projects. The groups' meetings and activities are announced on the Web site and are open to anyone interested. People can sign up for work groups on specific subjects. Regular meetings and other related activities like mini-workshops and presentations are held. To take part in these groups, Medialab-Prado suggests that people sign up.

Examples of work groups:
Openlab Fridays (Viernes Openlab), for example, is a stable work group that meets on Friday evenings at Medialab-Prado. It is a meeting and experimentation space open to anyone interested in developing or collaborating on projects, prototypes, or experiments with interactive, sound, artificial vision, etc. electronic devices.
Commons Lab (Laboratorio del Procomún) includes different groups around the topic of commons, such as City and Commons, Culture(s) of the common or Memory and commons**.**

Actors and roles
Medialab-Prado is a free space open to the general public, so you can take part in all the activities as part of the public (AVLAB meetings, presentations, debates, seminars, exhibits of projects created here, etc.) Occasionally, prior registration is necessary for certain activities due to space limitations. Medialab-Prado is open to the public Monday to Friday from 10 a.m. to 8 p.m. and Saturday from 11 a.m. to 8 p.m. During these hours, you can come to consult information related to the activity programmes, get advice from cultural mediators, visit temporary exhibits of the projects created here, consult the library, etc. In addition to individual attention, group visits can be arranged.
Medialab-Prado's activities are for everyone, regardless of any professional or specialized background in a given area. Its users are students, professionals and amateurs from a wide range of fields including art, technology, design, engineering, physics, biology, history, sociology, anthropology, education, and communications.

Medialab-Prado serves as a hub among people with different backgrounds and common interests, enabling all types of synergies that often prove the potential and creativity inherent in working together.
Medialab-Prado has approximately 20.000 participants per year in the different activities.
Via the Web site, anyone can keep up to date on the activities and projects being carried out and also see documentation and recordings of presentations and lectures. Many of the activities are broadcast live via streaming. When this option is available, it is announced on the Website. Moreover, throughout the year, several open calls are announced to participate in international project production workshops. For these two-week workshops, Medialab-Prado covers travel and lodging expenses for selected projects and papers. For those who participate as collaborators and do not live in Madrid, lodging is available in shared rooms at a youth hostel.

A specific and relevant role within Medialab-Prado is that of the *Cultural mediation programme*. The role of cultural dynamizers or mediators is essential to the work of Medialab-Prado. They are always present in the activity space, fostering not only information dissemination but also reception, meeting and connection among a variety of agents. Mediators are researchers and socio-cultural agents making scheduled activities a productive, meaningful experience for the public in all its diversity. They offer orientation to the public and users, facilitate contact between people and projects linked to Medialab, gather documentation and make information available to users about on-going programmes and current activities.

Students can do a non-paid *internship* or develop a research project in Medialab-Prado. In order to do so it is mandatory to sign an agreement between Medialab-Prado and the institution that the student belongs to. The following departments accept professional interns: Audio-visual Dept., Communications Dept., Technical Dept. or Project Development Dept., depending on necessities and circumstances at the time of the application for the requested period of time. Students who want to develop their own research project related to any of the lines of work or activities of Medialab-Prado, will be able to use all the available material and resources, as well as take part in the development of the activities.

5.2.4. Financing

Medialab-Prado is funded by the Madrid City Council's Arts Area. All the activities are free and open to everybody. Unfortunately, this funding will probably be cut down in the near future, affecting the activities, or their openness.

5.2.5. Analysis

The educational innovation in the case of Medialab-Prado is based on their open and collaborative methodologies, both for management and for work. It generates a space that facilitates new forms of relationship, participation and collective creation. The role of cultural mediators as dynamizers is crucial for the development of the different activities and projects.

It is a good example of how citizens can get together and create things collectively. However, they need to create a structure which is independent from the city's council funding, as this is now unstable.

Annex 1: Template for case studies in Cluster 1

1. Goals and Aims
A short description of the rationale for a given MOOC platform.

2. History and Evolution
Background bringing out how the innovation was established and initiated.

3. Roles and actors
Individuals and social groups can act through a MOOC, as providers, teachers or students; an individual or group can play more than one of these roles simultaneously. The teaching and student roles are mainly self-explanatory though the concepts are sometimes less clear in open contexts. The provider roles accounts for the organisation and/or people who organise, administer and fund the provision of a MOOC.

4. Topics
Various topics have been covered by MOOCS. One way of a MOOC platform being innovative is if it is used to address a topic which is not covered by conventional courses (e.g. seeks to exploit the long tail effect). It may be of interest to investigate how much topics covered in MOOCS duplicate those that are covered in conventional courses.

5. Size
E.g. the minimum and actual population of provider, student body and teaching staff, for particular MOOCS run on the platform.

6. Sector of providers
E.g. HE, publishing industry etc.

7. Learning design
7.1 Pedagogical mix
E.g. proportions of constructivism, connectivism etc.
7.2 Assessment type
E.g. None, simple interactive Computer Marked Assignments (e.g mulitiple choice questions), complex iCMA, human-marked, peer assessment.

8. Award type
E.g. scope for formal accreditation, badges etc.

9. Industry's skills requirements
See e.g. Skills for Jobs: Today and Tomorrow. The National Strategic Skills Audit for England 2010 (UK Commission for Employment and Skills, 2010).

10. Analysis
Draw out key points and issues from the case study with respect to the open education innovation and incubation, interesting points to be recorded, space for reflection. Add the analysis of interfacing activities.

Annex 2: Template for case studies in Cluster 2 & Cluster 3

1. Goals and Aims
Brief overall description of the kind of case-study.

2. History and Evolution
Background bringing out how the innovation was established and initiated.

3. Kind of educational innovation
Assessment of the kind of educational innovation that is realised. Elements of assessment can be:

3.1 Level of educational innovation
course or training (regular education, continuing education, other); learning design; ICT- or other technology related; didactic model; organizational model; …
3.2 Discipline
3.3 Target groups and admission requirements
3.4 Participants, ...
3.5 Didactic model / Learning design
3.6 Organizational model
3.7 Quality assurance
3.8 What is the 'innovative' element or importance?

4. Actors and roles
Assessment of the kind of interaction between universities and companies, its origin and development, and the actors involved. Elements of assessment can be:

4.1 Kind of interaction
concertation / dialogue / …
4.2 Objective
exchange of information, ideas; survey of needs; development of ideas; collaboration on development of a product; …
4.3 What actors are involved: external and internal
4.4 Role/Function/Kind of involvement of actors
4.5 Origin of the concertation: education, research

5. Financing
How is the educational innovation as described in the case studies financed (subsidy, self-supporting, paid by participants, …)? What kind of financial obstacles/opportunities have been experienced?

6. Analysis
Draw out key points and issues from the case study with respect to the open education innovation and incubation, interesting points to be recorded, space for reflection. Add the analysis of interfacing activities.