Intermediate Evaluation Report

Project Name: Micro-Electronics Cloud Alliance

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Introduction

The MECA project intermediate evaluation report is aimed at (a) critically (self) reflecting on the project's activities and outcomes in the period January 2016 – May 2017 and (b) recommending measures for improvements where needed.

The project's activities and outcomes will be evaluated against a set of criteria as described in the Quality Management Plan, which serves as a formal evaluation framework. The Plan specifies the processes that assure quality, quality control products (deliverables) and tools for conducting the quality assurance processes and accomplishing the quality outcomes (see Quality Management Plan).

Overall evaluation approach

Design-based research and development is the overall project's evaluation methodology. The approach combines (a) curriculum development for building courses that explores the notion of Open Educational Resources in the domain of microelectronics and nanotechnology; (b) instructional design (ID) implementing the most recent developments in higher education teaching and learning and synthesising evidence-based ID approaches such as Four Component Instructional Design (4C/ID), cognitive apprenticeship, cognitive flexibility, problem-based learning to mention some; the project also benefits from the research carried out by some MECA project's members on MOOC didactical approaches, and (c) software design, that is activities carried out with regard to the technical infrastructure, specification, structure and interface of the MECA educational cloud system. The curriculum design, instructional design and software design share some common characteristic, namely: (a) a progressive, spiral refinement through a cyclical prototype development; (b) stakeholders involvement in the design and evaluation of the project's products; (c) evaluation is considered not a single phase but cutting across other phases of the process; also projects' focus group discussions, either face-to-face or online, and peer reviewing have been adopted for all project's evaluation activities; and (d) all of the three specific approaches within the design-based research framework have been based on conducting needs analyses (see Educational Needs Analysis Report, Feasibility Analysis mCloud and Concept for Technical Cloud Environment).

Needs analysis

The needs analysis collects through three separate questionnaires the opinions of students, their teachers, and employees in companies on expected learning outcomes, learning and teaching activities, training characteristics and the role of open educational resources in higher education and work-place learning in micro/nanotechnology. The questionnaires and the report have been subjects of peer reviews. Apart from the questionnaires, a check-list for cloud technical infrastructure has been developed and SWOT analysis has been carried out.

With the need analysis activities the project attempted and achieved a research triangulation, that is including different target groups users (students, teachers and industry trainers and trainees), applying different methods for data collection (questionnaires, check-list, SWOT, and literature review), and exercising both quantitative and qualitative data analysis techniques. This achievement would have been even more significant if individual or group interviews were also included in the data collection to provide a deeper insight into the need analysis issues.

Course syllabuses

The project's content experts from the partner institutions have been busy with proposals for course' syllabuses and a set of expected learning outcomes (what). The team is also working on designing an instructional design blueprint for online cloud–based courses, exploring open educational resources (how). A suggestion in this respect, which is based on research on OER, would be that the project not only should focus on producing courses for free with OER but also to use resources that have been already created somewhere else (MOOCs or OER repositories). An educational cloud template for the courses has been developed, which need further be customised. Two of the partners institutions are universities for distance education and they could contribute not only with their experience on providing online education but also with the research they do to implement the most recent developments in this respect (e.g., MOOCs, open educational resources, learning analytics, trusted on-line assessment). The project can benefit from the one-day seminar organised by a partner institution about online learning.

MECA cloud specifications

The mCloud specifications has been elaborated to architecture solutions such as definition of a security concept to share user accounts between the CloudStack installation at each partner site, secure the access to the virtual machines for the classroom between the partner CloudStack installations, sharing a concept of virtual machine templates, and setup the region definition of the partners' CloudStack installation.

Academia-Business relationship

To address the issue of academia-business relationships, as suggested by the EC, in addition to some obvious measures (e.g., memorandums of understanding and letters of intent), the project has initiated a study on that issue applying an advanced research methodology, Group Concept

Mapping (see Appendix A for a screenshot). Group Concept Mapping is a mixed methods participative research methodology that facilitates project's members to arrive in an objective way at a shared vision regarding a particular issue (e.g., what are opportunities, challenges, issues, or actions that affects higher education-business collaboration in the domain of microelectronics and nanotechnology). The participants are involved in activities they are used to: generating ideas, sorting ideas into groups and rating ideas on some values (e.g., importance and easy/difficult to implement). While the participants generate, sort and rate ideas independently and anonymously of each other, two advanced multivariate statistical techniques - multidimensional scaling (MDS) and hierarchical cluster analysis (HCA) - aggregate the individual contributions to identify patterns in the data and show a common understanding of the group on the issue under investigation. The visualizations of results such as concept maps, pattern matches and "go-zone" help easily grasp the meaning of the findings. The GCM shows not only similarities but also differences in how experts from and outside the project conceptualise opportunities and challenges about the collaboration between higher education and business. The results also suggest short and long term actions. All activities are carried out within a web environment, created on purpose to support this study. Before launching the GCM study, we conducted a targeted literature review (which contains most of the components of a systematic literature review) on several big data bases and found there is a 'gap' in research on this issue, a reason that makes us believe that the results of this study would go beyond the scope of the MECA project. In addition it would produce a strong empirical data for publications in prestigious low acceptance rate conferences and high impact journals, something the project should strive for in the future.

Publications

Currently, there are four conference publications shown on the project web site but in fact they are three as one has been posted twice (Work-in-Progress: MicroElectronics Cloud Alliance). There are two more conference publications, that need to be added to the list: a publication related to the conference Remote Engineering and Virtual Instrumentation (REV) – 24-26.02. 2016, Madrid, and one in the Proceedings of the EADTU conference (19-21.10.2016), Rome, Italy. The project should adopt a reference style for describing publications in the project documents (e.g., IEEE, Harvard, or APA).

One option that needs to be explored in the future is using the golden open access standard for publications. The Dutch universities (including The Open University of the Netherlands), supported financially by the Dutch government, made agreements with almost all major publishers for an open access of publications in which representatives of Dutch universities are part of the authorship. The peer reviewing is still in place, but once the manuscript has been accepted for publication, not payment is needed for the open access, which would considerably increase the number of readers of the paper.

MECA project management site

In general the project web site is well-structured and contains all the necessary information for either the project's partners or visitors. The main tool supporting the communication inside the project is an email list, which works well. To make this communication more dynamic and efficient we created a Basecamp MECA project management environment: https://3.basecamp.com/3102328/projects/2883064 (see Appendix B). It is free for use, easy to work with and it is cloud-based, something that is appealing as MECA aims to build a cloud educational infrastructure. For the time being a relatively small group of people are active on the MECA basecamp site but the number of the project members who use it gradually increases.

MECA and social media

The project uses three social media channels: facebook, researhgate and occasionally individual twitter account. As a whole the project has not been very active on social media but in this stage there are not news that need to be shared on a mass scale.

Measurement instruments

Some preliminary work has been done on selecting measurement instruments for a later stage when the cloud education gets operational. The main criteria for the selection were: (a) the measurement instrument is checked against and provide validity and reliability indicators; (b) it is simple to administer by the researchers; (c) it is easy to handle by the participants; (d) it is appropriate for use by participants from either academia or enterprises; and (e) it is easy to get. The following usability measurement instrument for usability have been examined: System Usability Scale (SUS); The Post Study System Usability Questionnaire (PSSUQ/CSUQ); The Software Usability Measurement Inventory (SUMI); The Questionnaire for User Interaction Satisfaction (QUIS); The Website Analysis and Measurement Inventory (WAMMI); Standardized Usability Percentile Rank Questionnaire (SUPR-Q). The tool that covers all the criteria above is System Usability Scale (SUS) (see Appendix C for a screenshot of SUS).

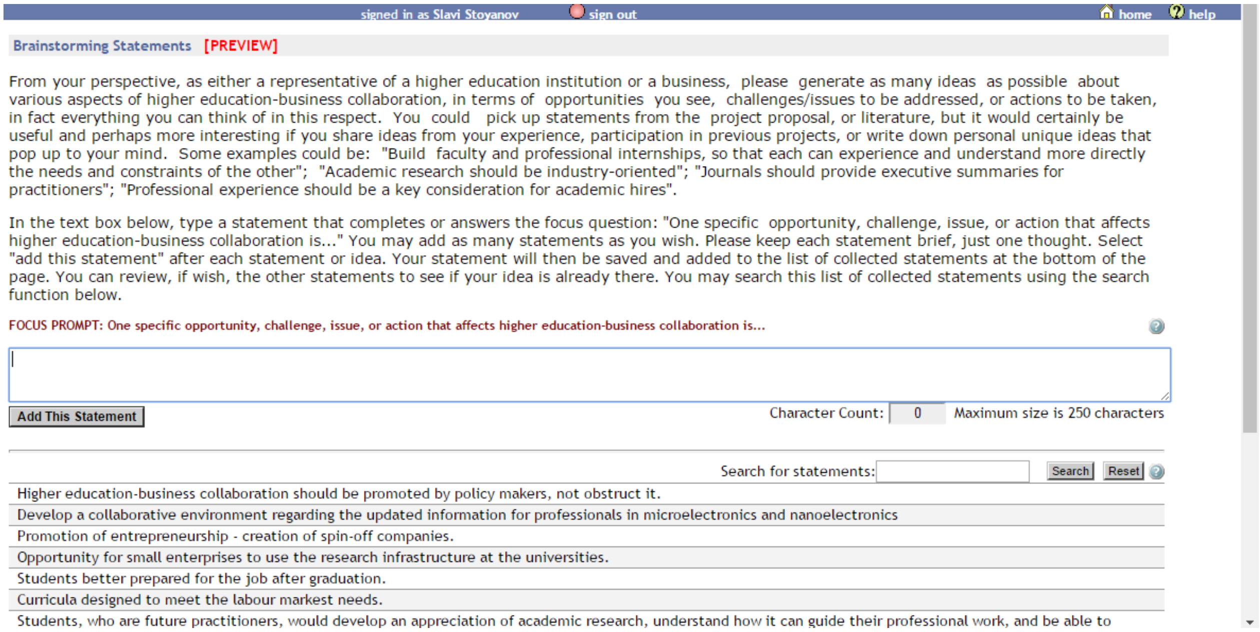
In addition the Usability Test Plan Toolkit has been used to develop an adapted template for an integrated evaluation of the MECA cloud education system.

Conclusion

In general, the project is running smoothly. All planned activities have been completed. It must be emphasized that a number of activities have been initiated, that were not included in the project proposal. Examples are: Group Concept Mapping on academia-business collaboration, MECA literature review on higher education-industry collaboration, a Basecamp project management site, selection of measurement instruments, workshop on online learning and teaching, ResearchGate social media. All this lays a groundwork for the next period of the project execution.

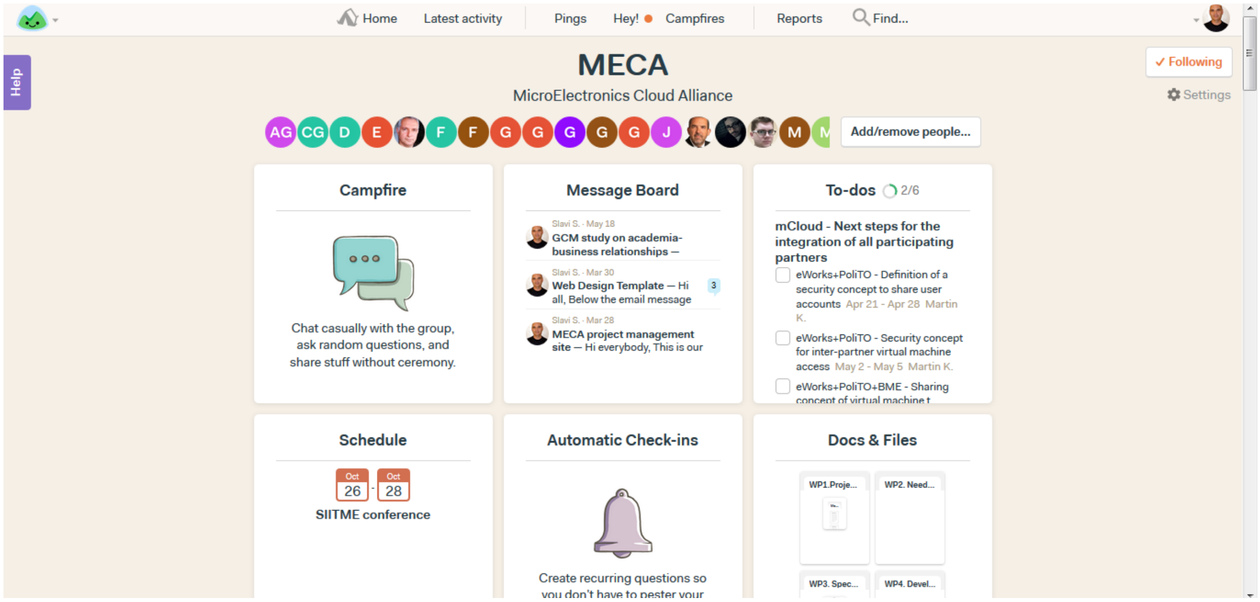
Some suggestions that have been made are as follows: using not only creating of OERs in the course design, updating the publication list on the project web site, adopting a reference style, exploring the possibilities of the golden open publication standard, using more actively the MECA Basecamp project management site.

Appendix A. GCM study

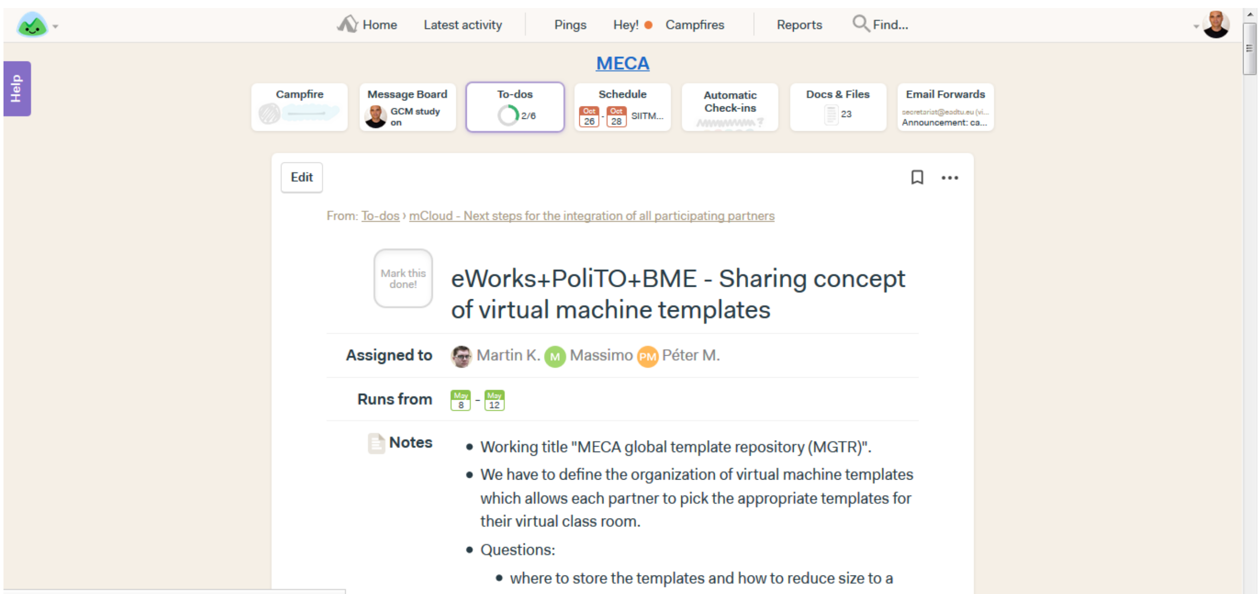


The brainstorming page of the GCM study on academia-business collaboration

Appendix B. MECA Basecamp



MECA Basecamp home page



MECA Basecamp to-dos (e.g., cloud specifications)

Appendix C. System Usability Scale

Contents | measuringusability.com

SUS Scoring Sheet & Reliability Test

Paste raw SUS data (scored from 1 to 5) in the columns labeled Q1-Q10 for upto 1000 responses.

** Required Fields*

Mean SUS Score	79,7		
StDev	16,5		
# Non-Blank	179	*Coding Check:*	Values appear to be coded correctly from 1 to 5
Cronbach Alpha	0,900	*Internal Reliability:*	Good

Orange Highlighted SUS Scores indicate inconsistent respondents

Missing SUS Score

Row	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Scales: SUS	Usability	Learnability
12	I think that	I found this	I thought tl	I think that	I found the	I thought tl	I would im	I found thi:	I felt very c	I needed t .	**79,7**	**77,5**	**88,4**
13	3	1	4	1	3	1	4	1	4	2	80,0	78,1	87,5
14	2	1	4	3	4	2	3	2	4	1	70,0	68,8	75,0
15	5	1	5	1	5	1	4	2	4	3	87,5	90,6	75,0
16	4	2	5	1	4	2	3	1	3	3	75,0	75,0	75,0
17	5	1	5	1	5	1	5	1	5	1	100,0	100,0	100,0
18	4	2	4	2	4	2	4	2	4	1	77,5	75,0	87,5
19	5	3	3	2	3	2	3	2	5	3	67,5	68,8	62,5
20	5	1	5	1	5	1	5	1	5	2	97,5	100,0	87,5
21	5	2	4	1	4	2	4	1	5	2	85,0	84,4	87,5
22	5	2	4	1	4	2	4	1	4	3	80,0	81,3	75,0
23	5	2	5	1	4	2	4	2	5	2	85,0	84,4	87,5
24	2	1	4	1	3	4	3	2	4	1	67,5	59,4	100,0
25	3	1	4	1	4	1	3	1	4	1	82,5	78,1	100,0
26	5	1	5	1	4	1	5	1	5	1	97,5	96,9	100,0
27	4	4	4	3	3	4	5	4	3	4	50,0	53,1	37,5
28	5	1	5	1	5	1	5	1	2	1	92,5	90,6	100,0
29	3	2	4	1	2	1	3	2	4	2	70,0	65,6	87,5
30	3	2	4	2	3	2	5	4	4	1	70,0	65,6	87,5
31	4	2	3	2	2	3	3	4	3	2	55,0	50,0	75,0
32	5	1	5	1	4	1	4	2	5	1	92,5	90,6	100,0
33	4	3	4	2	4	3	4	2	4	2	70,0	68,8	75,0
34	3	4	3	1	3	4	4	2	4	1	62,5	53,1	100,0

Home | **Scoring** | Conf Interval | CI Summary | Dashboard | Comparing (Benchmark) | Comparing (Within-Subjects) | Comparing (Between-Subjects) | Com

System Usability Scale front page