

Multidisciplinary Collaboration in Community-Based Design: A Case Study of 2012 Asian Smart Living International School

Chen-Fu Yang *, Chan-Hsuan Yang, Chung-Ping Lai, Tung-Jung Sung **

* National Taiwan University of Science and Technology, chenfu0510@itri.org.tw

** National Taiwan University of Science and Technology, sungjt@mail.ntust.edu.tw

Abstract: The call for innovative, integrative, and holistic approaches in university education is not a new idea. However, now there seems to be a greater sense of urgency than ever before, because of rapid changes and increasing competition around the world. In fact, to cultivate university students through cross-disciplinary and experiential courses alone is a challenging journey for both curriculum design and learning. In Taiwan, Asian Smart Living International School (ASLIS) has been founded to provide a new multidisciplinary education module since 2011. In 2012, ASLIS (ASLIS2012) gathered 55 participants, including professors and graduated students from 6 countries with diverse specialties to co-create together in three community-based living labs. This study has first presented curriculum design and implementation, especially a set of Smart Toolkits created to assist collaboration with different disciplines. Furthermore, the study concluded the key successful factors of multidisciplinary collaboration in the community-based design projects, including: 1) experience visualization and communication, 2) involvement and commitment from stakeholders, and 3) deep dive into learning sites. Finally, on the basis of the experiences with ASLIS2012, the authors suggested some directions for sustainable development for similar programs.

Key words: *Multidisciplinary, Collaboration, Service Design, Community Based Innovation*

1. Introduction

The 21st century is the combination of complex systems [1], and real-world problems rarely lead to single-discipline solution [2]. In recent years, new global competition of service/product innovation has generated a desire for much broader knowledge and skills in the workplace, requiring academic institutions to respond to the challenges [22]. In fact, considerable attention has arisen over multidisciplinary teams in service/product development in businesses, and multidisciplinary collaboration is seen as a guarantee for successful innovation because of the assumption that they will deal better with the complexity [24]. However, graduate and undergraduate education has been characterized by highly individualized approaches in the past [12], and students rarely get the chance to represent their domain discipline and co-create with others [24]. Furthermore, in a practical context, collaboration across disciplines has new challenges including high heterogeneity, uncertainty, distrust, and difficulties in knowing the “language” of different disciplines [4,7,10], which sometimes even results in a conflict of positions and high costs. Consequently, what is the best way to prepare students for dealing with complex problems through multidisciplinary collaboration in the future? Is there some type of innovative tool that could help them?

With these thoughts in mind, sponsored by Ministry of Education in Taiwan, Asian Smart Living International School (ASLIS) has been founded to provide a new multidisciplinary education module since 2011. In 2012, ASLIS (ASLIS2012) gathered 55 participants, including professors and graduated students from 6 countries (Japan, Korea, Singapore, Netherlands, Taiwan, and United States) with diverse specialties (design, electrical engineering, architecture, journalism, administration, computer science, and geography) to co-create together in a five-day program. All participants were divided into six teams and expected to focus on social and community sustainability in three rural societies of Taiwan. Based on the Service Design approach with the 4Ds (discover, define, develop, and deliver), the students were given the opportunity to experience and explore the three living labs, and interact with local residents and specialists in the fields of traditional industries. By defining the needs and service gaps of the three learning sites, each team developed a community based service design through a three-day workshop, and made a final presentation to the local representatives. Moreover, in order to establish a “communication bridge” among the different disciplines, ASLIS2012 created a set of Smart Toolkits based on the core concepts of Service Design. The Smart Toolkits were not only employed to help the students with different backgrounds to develop and visualize a personal customer journey map, but could also vividly and effectively represent and record the experiences gained through activities. This article presents the design, implementation and outcomes of ASLIS2012, and concludes the key successful factors and insights in multidisciplinary collaboration design.

2. Design Concepts behind ASLIS2012

2.1 Experiential Learning in Living Labs

When we make experiential learning the core concept in curriculum design, all the teachers, staff, and students are a part of the whole learning journey. Basically, experiential learning is learning through reflecting on living and doing. Kolb [14] defines learning as a process based on experience: “Learning is the process whereby knowledge is created through the transformation of experience” (p. 38). Today, experiential learning is one of the most powerful teaching and learning tools [16], and it requires self-initiative, an “intention to learn”, and an “active phase of learning” [17]. Consequently, that is the main reason why we chose the living labs - three rural communities of Taiwan as the learning sites in ASLIS2012. A living lab is not only a user-centered and open innovation ecosystem [5], but a research methodology for sensing, prototyping, validating and refining complex solutions in multiple and evolving real life contexts as well [8]. We hope all participants could get real and deep experiences that inspire self-motivation for learning and collaboration with others. On the other hand, all the community based design outcomes were not only concepts, but also deliverable solutions that could be left with local key stakeholders to carry out in the future.

2.2 Multidisciplinary Value Co-Creation

One of the crucial elements of a living lab is value co-creation [19]. Sander and Stappers [20] defined value co-creation as: “any act of collective creativity that is shared by two or more people.” Visser et al. [23] found that the members of value co-creation can include interdisciplinary experienced experts, such as customers, designers, and related stakeholders. Actually, value co-creation today is not only an open process; it is a common goal that hopes to be achieved through interdisciplinary thinking [9]. In fact, the curriculum design of ASLIS2012 itself is a co-creation journey. Based on the experience of ASLIS in 2011, we formed an organizing committee in early 2012

and invited university professors, students who had already attended ASLIS in 2011, industry practitioners, and even the representatives of the three rural societies to co-create the activities and schedule. Furthermore, from students' perspectives, they could cooperate with team members with different disciplines and nationalities (or cultural backgrounds). ASLIS2012 recruited 36 graduated students from 6 countries with diverse specialties. During the five-day program, they learned from local people's lives through deep dive exploration, and then co-created and tested the design with them.

2.3 Experience Visualization through Smart Toolkits

To enhance the efficiency and effectiveness of communication in multidisciplinary co-creation, the Smart Toolkits was created for ASLIS2012. The Smart Toolkits were designed based on the concepts of a service design tool - *customer journey map* to help students visualize their experiences. The customer journey map is an oriented graph that describes the journey of a user by representing the different touchpoints that characterize his/her interaction with the service [25]. First of all, students take pictures of every service touchpoint with smartphones during activities, which are then compiled on a computer. It not only helps students map their journey with images but also allows them to write freely about each picture so that experiences at each touch point can be elaborated on. This facilitates the recall and discussion of the target experience or location afterwards. In addition, it can be extremely helpful when students deliver their proposals. Here are the steps for using the Smart Toolkits: 1) take photos of touchpoints with smartphones or cameras during field exploration; 2) put photos in order on computer; 3) make an individual customer journey map on website with images. The use of the Smart Toolkits allows the students to transform their concepts and ideas into a systematic format, and helps the organizer evaluate and improve the teaching module for future use, as shown in Figure 1.



Figure.1 Smart Toolkits

2.4 Focus and Objectives in ASLIS2012

The main focus of ASLIS2012 was "Redesign for Sustainability". Students were expected to focus on sustainability in rural societies and, through which, to promote and enhance the community development of smart living in Taiwan. The living labs chosen for this year were three local communities in Yilan County: 1) Baimi Clogs Village; 2) Jenju Village Community; 3) Greater Erjie Community. Each has distinct traditional industries and is facing different problems arising from modernization. Students spent time experiencing and exploring the

three living labs so they could observe, experience, and learn about their environment, history, culture, and industrial development backgrounds. They had opportunities to interact with tourists, local residents and specialists in the fields of traditional industries. In addition, students were also given the opportunity to assess the actual needs, resources, and goals of the communities to generate new ideas.

Moreover, service design, an emerging methodology, has been treated as a feasible approach of designing for holistic experiences to reach people through different touchpoints over time [21], and also refers to the design of an integrated, favorable, and unforgettable service experience [3]. ASLIS2012 addressed topical issues and provides active learning opportunities for students through experiential and community based activities. The curriculum was based on the double diamond design model (4Ds), a prominent service design approach. As stated earlier, this design process was divided into 4 phases: Discover, Define, Develop, and Deliver [6], which mapped the divergent and convergent stages of the process. The three main objectives of ASLIS2012 were: 1) unlocking new community based design concepts for sustainable development of the rural society and economy, 2) adopting smart living technologies as an innovative and effective learning tool in a rural community, and 3) developing community based innovative prototypes of learning courses.

3. The Learning Journey of ASLIS2012

Themes covered this year were designed so students could experience and discover the circumstances and issues related to conservation for quality life, aging happily, and innovation and refinement of tradition. Courses included: 1) KAVALAN; 2) Clogs Music; 3) New Life for Straw; 4) Paper the Future; and 5) Neverland 2.0 Workshop (as Figure 2). First of all, *KAVALAN*, tried to provide students with overall knowledge of Yilan County. By visiting Lanyang Museum, the ecological museum that combines the natural and cultural resources of Yilan, the overview acquainted students with Yilan’s geographical features, history, and cultural and industrial development. This served as a good foundation for further learning when undergoing future activities in this region.

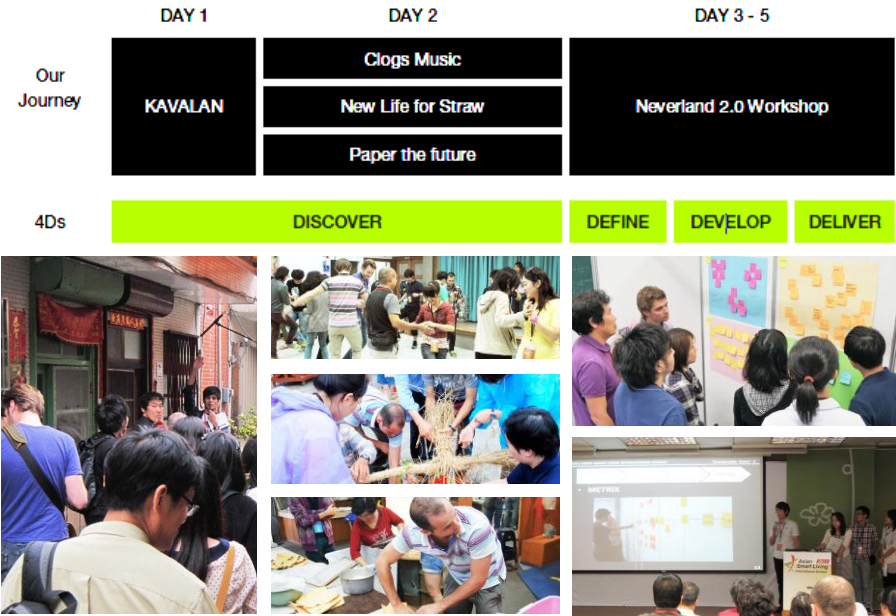


Figure 2 ASLIS2012 Curriculum Design

The second day was spent in three different learning sites allowing students to observe, experience, and learn about their environment, history, culture, and development backgrounds. Each of the three rural learning sites presented a specific theme (as Table 1). First, *Clogs Music* - conservation for quality life, addressed the issue of conservation, seeking to propose convincing alternatives to creating pollution while continuing the development of the local traditional industry. Therefore, proposing convincing strategies that were eco-friendly, low energy, and used recycled content was critical for the Baimi Clogs Village. Second, *New Life for Straw* - aging happily, introduced the growth of the elderly population in Taiwanese communities, and how active aging can be adapted into community settings. Thus, how to make healthy and enjoyable communities for active aging was critical for the Jenju Village Community. Third, *Paper the future* - innovation and refinement from tradition, focused on refining the local industry while preserving its tradition. So how to integrate crafts and design into new products or services for sustainable development was crucial for the Greater Erjie Community. Finally, after everyone had initial understanding and experience regarding the three rural communities, each team then decided on one community as the design target.

Table 1. The Three Learning Sites of ASLIS2012

Theme	Learning Site	Local Industry	Design Challenge
Clogs Music	Baimi Clogs Village	Clogs	<i>Conservation for quality life</i> - how might we fight against pollution for quality life while continuing the development of local traditional industries?
New Life for Straw	Jenju Village Community	Rice/Straw	<i>Delightful way to age</i> - how might we make healthy and enjoyable communities for active aging?
Paper the future	Greater Erjie Community	Paper	<i>Innovation and refinement from tradition</i> - how might we refine the local industry while preserving its tradition?

Finally, during the *Neverland 2.0 Workshop*, every team had a second chance to visit the targeted community to gather more in-depth information. Most of the teams went back to make more observations and have discussions with or interview local residents and tourists. In addition, most of the student recorded the critical touchpoints through the Smart Toolkits. The customer journey map was created to allow the students to record their precious memories and also became a useful tool (or visual language) to communicate with different disciplines. For ASLIS in 2011 we arranged a coach team and an elaborate procedure to guide the design process. However, we decided to give the ownership back to the teams in ASLIS2012. In other words, the mentor (teachers) of each team could arrange their own schedules and design methods in a three-day workshop, and team members (students) developed innovative proposals responding to the themes covered without step-by-step guidelines. We did leave a lot of responsibilities and autonomy to the students during this multidisciplinary collaboration design journey, because we believed this is what they would experience in real life. At the end of the workshop, the key stakeholders and representatives of the three communities were invited to act as critics at the final presentation,

and they gave valuable comments and feedbacks to the students regarding the design proposals. The presence of these community people raised the bar for each team and made this program more serious.

4. Discussion

Learning is the way of developing knowledge, both for the individual and between individuals [11]. The five-day ASLIS2012 program was full of challenges and fun. Each team was ambitious and did an incredible job after the workshop. At the final presentation, most of the three community representatives thought the design concepts were innovative and attractive, although adjustments were still needed from a practical perspective. In addition, it is without saying that through cross-culture and multidiscipline learning, team members helped each other achieve what they never could do on their own. In conclusion, we first conclude three critical successful factors of multidisciplinary collaboration in community based design projects: 1) experience visualization and communication; 2) involvement and commitment from stakeholders; 3) deep dive into learning sites. Then, we suggested the following directions for sustainable development for similar programs.

4.1 Critical Successful Factors

Experience Visualization and Communication. Communication issues are always the main challenge of an interdisciplinary workshop, especially an international one with a very tight schedule. In addition to language barriers, the students had to overcome and get used to the culture differences, because the design problems that were addressed by local students might not be serious issues in other countries. Therefore, we arranged “seed teacher assistants” and “site facilitators” to visit the three communities before ASLIS2012 to obtain basic information and ideas, so they could either give an orientation to the team members or serve as tour guides/translators. Moreover, we believe the students could have better interaction through visual connection, so the Smart Toolkits were created in this program to help students easily build up their own customer journey maps. Although every team had the same schedule, we found there were still some differences among team members’ customer journey maps. By comparing the pictures of touchpoints with each other, students not only got new ideas, but also learned from other disciplines and cultures. Of course, we did see many other design methodologies used by mentors in ASLIS2012, including stakeholders map, service blueprint, rapid prototyping, and so on. One common purpose was to enhance communication and understanding through visualization and prototype. That was also the reason why we recruited many students with design backgrounds this year. Ideally, we liked to have two designers in each team to match other disciplines based on the potential needs of each local community. However, the distribution was not achieved because the program attracted too many design students, and that caused some teams to have more similar discipline backgrounds. To solve this problem, more specific criteria for student recruitment may be required in the next ASLIS or similar multidiscipline learning programs.

Involvement and Commitment from Stakeholders. To create an experiential learning environment based on the three living labs, all the participants of the back and front stages were quite important. First of all, organizing the committee of ASLIS2012 and inviting key representatives of the three local communities to co-create the curriculum. Basically, all the communities were facing the same problems with aging population, local traditional industry development, and job creation. However, on the other hand, each community had its own unique characteristics and internal issues that needed to be solved. Consequently, the early involvement of the three communities helped us clarify their expectations and limitations about program collaboration. In fact, to help

bring local and international students up to speed in a short time, all three communities arranged decent learning and experiential activities and even recommended many key interviewees for team discovery. A community-based design project cannot be successful without the support from the local stakeholders.

Furthermore, another key stakeholder of ASLIS2012 was the team mentors (teachers). Most mentors said that they were also facing new relationship dynamics with the students, because they were not “experts” but “coaches” [18] in the multidisciplinary collaboration process. Sometimes they needed to “let go”, or become one of the team members in certain activities to learn from the communities. Moreover, since there were no specific instructions for design process or method, the mentors were responsible for design facilitation as well. In ASLIS2012, we had mentors from the Netherlands, Japan, Korea, United States, and Taiwan, and they provided different methods and assistance depending on the needs of every team. Finally, it goes without saying that all the staff and assistants were the unsung heroes, who gave unspoken but crucial support throughout this wonderful journey. Those supports included schedule management, resources coordination, and “nanny” service for foreign students. The involvement and commitment of all these people were the foundation in establishing the learning ecosystem.

Deep Diving into Learning Sites. Time is another critical issue of multidisciplinary collaboration, especially for a community-based design project. Learning is the process of discerning new parts and new relations between parts, and thereby constituting a new understanding of the phenomenon by transforming the parts into a new whole [15]. Therefore, every team started their interaction and exploration before this program began through social media - Facebook. Students could get background information of the three learning sites earlier. In addition, during their time in ASLIS2012, every team had the opportunity to explore all three learning sites then choose one as the targeted community. In other words, the design issue was not assigned by us (or chosen randomly), but chosen by students. After that, every team had another chance to go back to the community to do deeper discovery and co-create with local stakeholders. It is similar to the idea – Deep Dive, the generic innovation process in IDEO, which is based on observations, designers’ immersion, and rapid visualization [13]. Although the students were from different knowledge disciplines and countries, they shared a common language – the users’ needed to communicate with each other. In this case, students had active learning because of the true experiences gained through deep dive in communities. However, the five-day program was still too short to have time to test the first design prototype in the three communities, or even discover the new issues brought out by the first design prototype. Notwithstanding the tight schedule in ASLIS2012, we believed the more time spent in experiencing, the better communication and design outcome in multidisciplinary collaboration.

4.4 Following Directions for Sustainable Development

Basically, ASLIS2012 was not seen as a general learning program. That was also the reason we chose three communities to be living labs, because design concepts could be fulfilled through co-creating with local stakeholders. We believe that would increase motivation for active learning and multidisciplinary collaboration. However, in light of sustainable development after similar programs, several suggestions are concluded. First of all, recording the whole learning journey is highly recommended, because a lot of insights could be very helpful for programs in the future or become good material for both teaching and communities. Consequently, after ASLIS2012, we edited a project report including the learning records and feedback of every team (as Figure 3). The project report not only helped us communicate experiences, but also created new ideas for future program design. Furthermore, the three communities were key stakeholders of ASLIS2012 and also crucial in

implementing the concepts in the future. Therefore, in addition to learning from communities, we wanted to leave knowledge and methods with them as well. Because every project has its time and resource limitations, it is very important for communities to have the ability to coordinate the program themselves. More and more ideas could be carried out by long-term co-creation with customers and other stakeholders. Obviously, that would be another learning journey for local communities.

DEVELOP

Next, we brainstormed collectively for solutions to the problems mentioned above. We used a technique called "Five Ideas", where each person writes down his or her idea quickly on a piece of paper, hand it to the person on their right, and the person who receives it either comments on the idea or adds more details to it. We repeat this until the original writer gets her or his paper back. Then, everyone shares their ideas, and we all decide on which ones have the most potential by voting. As we delve deeper into each of these ideas, we merge together divergent viewpoints and get rid of extraneous information. In this sense, the process is similar to cells diving and merging together again.



DELIVER

Although Bai-mi village is close to a train station, it does not see many visitors. This is because there is a lack of publicity and information available for tourists. In order to make Bai-mi more visible to the outside world, we created a graph of loops that link the village itself with visitors, products, and partnerships with other communities. A service which links together these four areas will be sustainable over the long-term. We continued to use this graph to gauge the effectiveness of our service design, and hope that it can be applied to other Taiwanese communities as well. Our goal is to design a service that encourages villagers and visitors to interact with each other, and for visitors to share their experiences with their friends back home. Hence, we want to design a line of postcards with QR codes that link to individual accounts. Each visitor can store their unique photos and memories of Bai-mi in their account, and send the postcard to their friends. Their friends can then, upon just a scan of the QR code, gain access to an individualized impression of Bai-mi. Maybe they will then be inspired to visit Bai-mi themselves!



34 | 2012 Asian Smart Living International School

project report | 35

Figure 3 A Project Report of ASLIS2012

5. Conclusion

To conclude, the present study is preliminary research on multidisciplinary collaboration in community based design projects. Through the case of ASLIS2012, this article presents the curriculum design and implementation process, especially the Smart Toolkits created to assist multidisciplinary collaboration. That helped team members visualize their experiences through a customer journey map that became very useful language in the communication process. Furthermore, the study concluded the key successful factors of multidisciplinary collaboration in community based design projects. First of all, by using the Smart Toolkits and design methods to visualize experiences, the international and multidisciplinary team members could communicate with each other efficiently and effectively. Second, in a community based design project, stakeholders' involvement and commitment are very important to curriculum design. For ASLIS2012, the community representatives, mentors, and staff were all key stakeholders in this learning ecosystem. Third, it is also very crucial for team members to spend time to get deeper understanding of the learning sites. Through deep diving into the community, users' needs were not only clarified, but could be the common language to communicate in the multidisciplinary

collaboration process. Finally, based on the experiences with ASLIS2012, we also provided suggestions for sustainable development after the program. Knowledge management is very crucial to multidisciplinary collaboration program, and recording the whole learning journey is valuable for teaching and local communities. In addition, more ideas could be created and delivered if the key representatives can have the capability to coordinate multidisciplinary collaboration by themselves.

Acknowledgements

Our deepest respect and gratitude go to all participants of ASLIS2012, and the financial support from the National Science Council of the Republic of China.

References

- [1] Alexiou, K., Johnson, J. and Zamenopoulos, T. (2010) *Embracing complexity in design: emerging perspectives and opportunities*, In: Inns, T. ed. *Designing for the 21st Century Volume 2: Research Methods & Findings*. Gower Ashgate, United Kingdom, pp 87–100.
- [2] Behrman, J. N. and Levin, R. G. (1984) *Are business schools doing their job?* Harvard Business Review, January-February, pp 140-147.
- [3] Bitner, M. J., Ostrom, A. L. and Morgan, F. N. (2008) *Service blueprinting: A practical technique for service innovation*, California Management Review, vol. 50, no. 3, pp 66-94.
- [4] Chatenier, E. D., Verstegen, J. A. A. M., Biemans, H.J.A., Mulder, M. and Omta, O.S.W.F. (2010) *Identification of competencies for professionals in open innovation teams*, R&D Management, vol. 40, no. 3, pp 271-289.
- [5] Chesbrough, H. (2003) *Open Innovation: The New Imperative for Creating and Profiting from Technology*, Harvard Business School Press, Boston.
- [6] Design Council (2005) *The design process*. Available at <<http://www.designcouncil.org.uk/designprocess>> [Accessed 10 March 2011]
- [7] Doz, Y.L. and Hamel, G. (1998) *Alliance advantage: The art of creating value through partnering*, Harvard Business School Press, Boston.
- [8] Erikson, R., Goldthorpe, J. H., Jackson, M., Yaish, M. and Cox, D. R. (2005) *On Class Differentials in Educational Attainment*, In Proceedings of the National Academy of Science, vol. 102, no. 27, pp 9730–9733.
- [9] Fullerton, B. (2009) *Co-creation in service design*, interactions, vol. 16, no. 2, pp 6-9.
- [10] Hansen, M. T. (1999) *The Search-Transfer Problem: The Role Of Weak Ties In Sharing Knowledge Across Organization Subunits*, Administrative Science Quarterly, March, vol. 44, no. 1, pp 82-111
- [11] Karlsson, J., Booth, S. and Odenrick, P. (2007) *Academics strategies and obstacles in achieving collaboration between universities and SMEs*, Tertiary Education and Management, vol. 13, no. 3, pp 187-201.
- [12] Karlsson, J., Anderberg, E., Booth, S., Odenrick, P. and Christmansson, M. (2008) *Reaching beyond disciplines through collaboration: Academics' learning in a national multidisciplinary research programme*, Journal of Workplace Learning, vol. 20, pp 98-113.
- [13] Kelley, T. (2001) *The art of innovation*. Doubleday, New York.

- [14] Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*, Prentice-Hall, New Jersey.
- [15] Marton, F. and Booth, S. (1997) *Learning and awareness*, Lawrence Erlbaum Associates, Mahwah.
- [16] McCarthy, P. R. and McCarthy, H. M. (2006). *When case studies are not enough: integrating experiential learning into business curricula*, Journal of Education for Business, vol. 81, no. 4, pp 201-204.
- [17] Moon, J. (2004) *A Handbook of Reflective and Experiential Learning: Theory and Practice*, Routledge, London.
- [18] Newell, W. (1994) *Designing Interdisciplinary Courses*, New Directions for Teaching and Learning, no. 58, Summer 1994, pp 35-51.
- [19] Pallot, M. (2009) *The Living Lab Approach: A User Centred Open Innovation Ecosystem*, [Webergence Blog]. Available at < <http://www.cwe-projects.eu/pub/bscw.cgi/715404> > [Accessed Jan 2012]
- [20] Sanders, E. B. and Stappers, P. J. (2008) *Co-creation and the new landscapes of design*, CoDesign, vol. 4, no. 1, pp 5-18.
- [21] Servicedesign.org (2008) *Service design definition*. Available at <http://servicedesign.org/glossary/service_design> [Accessed 10 October 2009]
- [22] Simpson, T. W., Barton, R. R. and Celento, D. (2008) *Interdisciplinary by Design*, ASME Magazine – Special Design Issue, vol. 30, no. 9, pp 30-33.
- [23] Sleeswijk Visser, F., Stappers, P. J., van der Lugt, R. and Sanders, E. B. N. (2005) *Contextmapping: Experiences from Practice*, Codesign, vol. 1, pp 119–49.
- [24] Svengren Holm, L. (2007) *TED: Multidisciplinary Team Projects Crossing University Borders*, Design Management Review, vol 18, no. 3, pp 90-96.
- [25] Tassi, R. (2010) *Service design tools*. Available at < <http://www.servicedesigntools.org> >