Design Communication & Communication Design - Setting up a Virtual Living Lab across Distributed Spheres of Design & Use

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Abstract. In this paper we describe an approach to support the distributed design of Collaborative Work Environments inspired by Living Labs and Participatory Design. We explore potential benefits of Living Labs for CWE & ICT design and reflect on concepts of this increasingly popular approach to user-centered innovation and co-creation. Finally, we inspect experiences made so far and potential challenges in bringing together concepts from Living Labs, Open Innovation and Participatory Design in distributed contexts.

Introduction

"At its core, software development is people inventing and communicating"
(Alistair Cockburn)

Including users in the development of new cooperation technologies for and within massively distributed contexts & large-scale user groups is a challenging task. For pragmatic reasons, user inclusion is often limited to specific, short-term phases of the development processes and only sub-groups are chosen for User-centered or

Participatory Design approaches. Additionally, many established methods like ethnographic workplace studies, site-visits or workshops aren't easily transferrable to design/use spheres with several hundreds or thousands of distributed stakeholders.

Nevertheless, including users as active participants and co-creators throughout long-term development activities remains highly desirable, not only regarding to matching requirements but also of the innovation[1] potential of new collaboration support.

Within the beginning of a multi-year project aiming at new Collaborative Work Environments, we therefore applied tools & processes to attract relevant user groups and to establish and maintain sustainable communication channels between and within the different distributed design & innovation spheres.

The paper is structured as follows. First, we describe theoretical and conceptual foundations to support the distributed design of Collaborative Work Environments and our approach inspired by Living Labs and Participatory Design. We then explore potential benefits of Living Labs for CWE & ICT design and reflect on concepts of this increasingly popular approach to user-centered innovation and co-creation. Finally, we inspect experiences made so far and potential challenges in bringing together concepts from Living Labs, Open Innovation and Participatory Design in distributed contexts.

Distributed Spheres of Design & Use

Collaborative Work Environments & Supporting Technologies

Collaborative work environments (CWEs) provide the ability “to collaborate over time and space, within and between organizations or communities […] to achieve flexibility by making best use of the knowledge and competences available" (Ballesteros 2006).

Many CWE projects build on the notion of changing work contexts, moving from individual to collective / team-based and community-based workplaces sometimes with the accompanying vision, that "[within a] few years, significant social, organisational and economical changes as well as a relentless technology evolution will dramatically change […] the way eProfessionals work and collaborate. People will no longer work according to chain production models but rather more as dynamically and spontaneously assembled groups of people working together in a collaboration mode, which means a seamless work to achieve common goals" (Pallot et al. 2006).

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[1] In addition to the innovation potential for the developers / suppliers of the technologies involved as described by von Hippel (2005) and Chesbrough (2003), we are specifically interested in innovation in regard to cooperation and work processes within the use sphere.

Current collaboration support is often regarded as not seamless, 'invisible' and suited for the growing need of ad-hoc collaborations (Prinz et al. 2006). Additionally, issues of integration, common architectures and the support of appropriation activities supporting sense-making (Bansler & Havn 2003) are getting more important. These require support for re-negotiation of different work practices and usage conventions, as well as distributed tailoring and appropriation activities including the collaboration technologies involved. Accordingly, communication and cooperation technologies as groupware applications have been referred to as "general-purpose media that [...] must be adapted to the organizational context and appropriate conventions for use must be established. Otherwise the technology will not reflect local conditions, work practices or communication norms and is, therefore, likely to be underutilized, misused or outright rejected […]." (Bansler & Havn 2003:135)

Building Collaborative Work Environments therefore has to include the development of new collaboration tools as well as technical integration and contextual appropriation support, establishing and sustaining communication channels within the iterative, ongoing design/use activities and taking stakeholders seriously as co-creators of their respective cooperation contexts.

Participatory Design

Participatory design is about the direct participation of those whose (not onlyworking) lives will change as a consequence of the introduction of a computer application. Participation potentially relates to all aspects, phases and activities of development, e.g., decision-making, designing, developing, deployment and further development in use. An examination of the PD literature shows that different authors have stressed different aspects of the participatory process when attempting to define the field. Reasons provided for engaging in PD can be categorised as pragmatic, theoretical and political (Greenbaum 1993; Bødker, Kensing and Simonsen 2004, p. 58):

Pragmatic reasons for PD include, for example, that workers, as experts of their work, work practices, work organisation and means of labour, are able to contribute their expertise to discussions about activities shaping their own future work so that it is most beneficial and efficient, the resulting products good and the employed technology appropriate.

Theoretical arguments for PD can be made on the basis of a range of different analytical approaches: phenomenology, as in Ehn (1988), Winograd and Flores (1986), ethnomethodology, as in Suchman and Trigg (1991) or activity theory, as in Bødker (1991). Science and technology studies have provided theoretical arguments for choosing a PD perspective, often derived from arguments about the

inseparability of the social and the material, practice and technology (e.g., Suchman 2000; 2002).

Political arguments in support of participatory design typically refer to industrial democracy and the right of workers to determine their own working conditions, including their means of labour (*e.g.*, Ehn and Kyng 1987).

Major issues of concern for participatory design are: *expertise*, e.g., the expertise regarding workers' own work as a useful resource for designing computer applications; *innovation* that is beneficial and sustainable; *multiple viewpoints* and taking differences seriously as facts and resources; the interplay between work practices, technology, organisational and other aspects of the considered work environment and/or *context*; the meaning of authentic *experience*, of "being there" instead of "talking about" and "developing for"; real-world problems with real-world solutions that get achieved by *hands-on methods* and activity; empowering weak and/or marginalised societal groups as part of ICT design; and *reflective practice* in all those areas of practice where relations of design and use of computer applications are of importance.

One important root of participatory design is in technology development projects with worker involvement that took place from the 1970s onward in Scandinavia and other countries (for an overview see Floyd, Mehl, Reisin, Schmidt and Wolf 1989). The term "participatory design" was introduced after extensive practical experiences had been gained, especially in the Scandinavian projects. It was formulated through an international dialogue that has resulted in and has been expressed through the biannual Participatory Design Conference (PDC), principally amongst scholars interested in worker participation in technology development. When Scandinavian ICT development projects with worker participation are mentioned in publications, the reader is also often referred to the so-called "Scandinavian School" of systems development.

In the years following the pioneering efforts of the Scandinavian School and others, PD has continued to evolve such that now it is not only *about* multiple voices and their inclusion in design, but also *has* multiple voices distinguished by approaches and efforts, proponents, assumptions, design foci, etc.. The field has become internally differentiated so that diverse traditions have been established in PD and related fields and advanced in pursuit of productive working relations.

In one attempt to make this diversity intelligible to potential practitioners, Muller, Wildman and White (1993) devised a taxonomy of PD practices along the following dimensions: time during the development lifecycle (from requirements gathering through to summative evaluation); modes of participation (software professionals participating in the users' world and vice versa) and scale (small groups through to large groups) and then mapped within them many of the common variants of PD.

Muller *et al.'s* taxonomy remains a useful tool to help navigate the space of PD techniques. Overviews from other perspectives can be found in Muller (2002);

Kyng (1998); Clement and van den Besselaar (1993); Floyd *et al*. (1989). Most approaches within and around PD are related in one way or another, often in ways which are not made explicit.

Some PD approaches might be called “comprehensive” because they are meant to cover a very broad range of issues in the whole ICT development process and in many different settings. Examples are the socio-technical approach and the collective resource approach. Other relevant efforts have less far-reaching ambitions, such as efforts that can be labelled "PD in corporate research and development". Many other efforts whose main focus is not participatory design have been influential on the development of the PD community in terms of concepts or methods. These include computer supported cooperative work and workplace studies, as well as science and technology studies.

What unites the various voices in PD is that they tend to view the processes of design and use as being related to each other and mutually shaping, taking place in differentiated environments involving people, artefacts and various historical relations between these.

Distributed Spheres of Design & Use

> “Even though ‘the’ groupware has been in use, the concept of ‘use’ as different from (opposed or complementary to) ‘design’ would not grasp the creativity that has been part of mastering the challenges of computer supported collaboration and coordination.” (Törpel et al. 2003)

With our notion of Collaborative Work Environments (CWE) being complex socio-technical systems, a participatory design approach to CWEs includes boundary-crossing activities of multiple stakeholders. Traditional perceptions of “developers” (in regard to technology producers/stakeholders) and “users” (in respect to stakeholders appropriating technology for local contexts) as separated groups blur towards a perception of design/use spheres in iterative (re-)design/appropriation processes.

CWE Design therefore includes activities related to the creation of cooperation support technologies as well as (meta-)structuring and technology-use mediation activities (Orlikowski et al. 1995; Bansler&Havn 2003) which can be conducted by different stakeholders and over different time-frames of design/use processes. CWE appropriation refers to activities including sense-making, e.g. the individual „assignment of purpose or use“(Pipek 2005: 30) and the “creation, management and communication of meaning” (Dourish 2003), reinventing purposes of artefacts and processes of *Proliferation* and *Differentiation* (Törpel et al. 2003:401).

Setting up a Virtual Living Lab

The Virtual Research & Innovation Cooperation Lab (ViRaL[2]) is an interconnected network of multiple platforms & activities aiming at facilitating research, development, innovation and market validation of new cooperation technologies in real-life environments with stakeholders as co-creators of their cooperation environment. It connects the technology support for the European Research & Innovation Community provided by different large cooperation platforms (e.g. The Ami@Work platform and the Public BSCW platform) with currently more than 100.000 users from all over the world with the user-centred methodology framework created and applied within different European and national research projects towards the iterative design & evaluation of future cooperation support.

The platform has been used in a variety of ways:

- as a cooperation springboard and test-bed for individuals and projects offering an ad-hoc, free and easy to use opportunity to quickly set-up, explore and adopt a mature virtual cooperation environment for distributed collaborative work (cf. e.g. Budweg et al. 2006)
- a platform to research, develop and introduce new cooperation support technologies as a research institute and together with tool developers from leading commercial and non-commercial technology providers (cf. e.g. Seeling et al. 2007)
- to pursue a user-centred development approach and maintaining continuous communication channels and exchange with the user community (cf. e.g. Appelt et al. 1999)
- as incubator to support new business models like spin-offs around the technology itself (e.g. OrbiTeam), partners integrating cooperation & consulting services for specific domains (e.g. www.bscw.at by HolliNetz Consulting) or Open-Source projects extending functionality (e.g. BSCWeasel, cf. Stevens et al. 2004)

In the context of several European-wide projects, the platform began hosting the AMI@Work Communities, which currently consist of more than 2500 registered members from more than 25 countries.

The Virtual Research & Innovation Cooperation Lab has a background in user-centred development approaches and is continuously exploring new design approaches to include users as co-creators in design & innovation processes.

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[2] http://www.cooperation-lab.eu

It is drawing, among others, on the experiences from the design & evaluation of the BSCW system:

- BSCW Community days, bringing together end-users, developers and various experts & facilitators
- Continuously evaluating feedback from different users (e.g. from Mailing lists, cf. Appelt et al. 1999) and integration into the iterative development process
- In-depth case-studies about usage & requirements in different domains (cf. e.g. Mambrey et al. 2003)

With a new approach pursued in a three years multi-national research project, recent work has been done on exploring how concepts from Open Innovation and Living Labs can be applied in massively distributed design/use settings, aiming at enabling stakeholders in taking an active role in appropriation & adoption processes and as co-creators for their cooperative environment.

Design Communication & Communication Design

Our approach included the exploration of new ways of establishing, maintaining and integrating communication channels to support user-centered design & innovation process as well as the appropriation activities within the respective collaboration contexts.

It was inspired by experiences from the user-centered design processes from the development of the web-based cooperation system BSCW (e.g. Appelt et al. 1999) as well as studies on the introduction and appropriation of new organizational communication technology (Orlikowski et al. 1995) and new approaches to Open Innovation and User Co-Creation in ICT with Living Labs (Eriksson et al. 2006):

> "Living Labs are user-centric environments for open innovation characterized by early and continuous involvement of users and by user-driven rapid prototyping cycles."
>
> (Schaffers et al. 2007)

We started by attracting several different groups, projects & communities of users, all of them with different backgrounds & objectives but with a common denominator of being in collaboration contexts with various dimensions of distribution.

As none of the groups were formally part of the development research projects and thus received no financial benefit, attracting implied creating and maintaining a common benefit from participation: active contribution was thus something to be achieved again and again, focusing the development & evaluation activities on concrete benefits for and requirements of the participants.

As Living Labs aim to be Open Innovation Environments, we also engaged other stakeholders outside our own research projects and stakeholder groups, e.g. technology developers from other projects, community managers, open source projects, etc.

Mediating between these heterogeneous stakeholders involves boundary spanning activities, including the "translation" and "bridging" between different languages, objectives and interests and is by nature a multi-contextual activity involving communication and articulation work.

Using ICT to support boundary-crossing activities

As both the "user" and "developer" spheres themselves were distributed, we used ICT technologies to support the exchange and communication, ranging from traditional phone calls & conferences, Voice-over-IP and Skype Calls to Videoconferences for synchronous communication and the use of workspace technologies, wikis and Blogs for asynchronous exchange of requirements, feedback, ideas and discussions.

We were able to initiate the cooperation in most of the contexts with face-to-face meetings & workshops, which we believed to be necessary to build a trustful and sustainable relation which could than be continued over electronic communication channels and media.

Probably one of the most fruitful technologies involved was the use of Blogs in a wide variety of different ways. For one, multiple of our “user” groups had the requirement of an easy-to-use tool for project internal communication, keeping members up-to-date about project evolution and for getting short-term feedback on proposals. While many Blog tools and technologies did already exist when we started, most of them were not ideally suited for multi-author, project-internal ad-hoc communications with user-defined fine-grained access rights.

Consequently, the implementation and introduction of an integrated Blogging feature within the larger cooperation environment available to all “user” groups became part of the technology development and evaluation.

During the progress of our activities, the availability of the Blogging feature originally created for the user sphere diffused into the developer sphere and between them. Multiple Blogs evolved e.g. for collecting feedback on new technology support, discussing requirements and usage conventions.

Reflecting on Virtual Living Labs in ICT Development

Taking “users” seriously as co-creators of their own collaboration or work environments has a long-standing tradition in Participatory Design and goes

beyond many user-centered development approaches involving users as merely subjects or just within specific phases of a user-centered design process.

Probably one of the most challenging aspects within the development of new cooperation support is the real-world introduction and appropriation. Our approach to the user-centered design & innovation and co-creation is aiming at:

- The continuous inclusion of end-users through the development process
- within real-world cooperation contexts instead of well-confined lab-like settings
- in a multi-partner multi-year iterative development & appropriation process

We therefore explored the concept of Living Labs that "refers to an R&D methodology where innovations, such as services, products or application enhancements, are created and validated in collaborative multi-contextual empirical real-world environments." (Eriksson et al. 2005)

With our notion of Collaborative Work Environments being socio-technical systems involving technology development and introduction as well as appropriation and adoption activities, traditional boundaries between "users" and "developers" blur and need to be supported by a communication sphere and boundary-crossing activities. We will continue to explore how this space can be supported by new communication channels and technologies, including the use of Blogs and boundary-spanning mediators.

Lessons learned

Within the first months of a multi-year research project, we have explored how to establish and maintain sustainable communication channels during the development and appropriation activities of new collaboration environments. Our approach draws on experiences from earlier projects (e.g. the development of a Groupware application) and methods (e.g. user advocates (Prinz et al 1998; Mambrey et al. 1998) as a means to establish a communication channel between distributed users and developers).

We explored how the concept of Living Labs, an increasingly popular approach with a strong background in Open Innovation, can be helpful in engaging users in their real-world cooperation contexts and taking them seriously as active participants and co-creators in long-term development activities.

While real-world, long-term user involvement alone is a challenging undertaking, the distributed nature and large-scale context of both the user and

developer spheres within our project raised additional challenges and requirements, among them:

- Issues of representation & legitimacy in large-scale user communities
- "Bridging" and "Translating" between and within user/developer spheres, taking different contexts, agendas and cultural traditions seriously
- Challenges related to the global distributed nature, e.g. different time-zones, work-days, cultural issues

Conclusions

Judging from our experiences collected so far, exploring the concept of Living Labs for the long-term, user-centered development of new collaboration environments seems to have the potential of enriching traditional methods for user-centered and participatory design processes. With a common goal of taking stakeholders seriously as co-creators in design and innovation processes, we believe fruitful inspirations to be possible. However, as both concepts come from diverse backgrounds and have different traditions, we also encountered potential challenges during our activities, e.g. regarding representation and legitimacy.

Acknowledgements

Parts of the work reported on in this paper were conducted within the European FP6-IST Integrated Project Ecospace funded by the European Commission. The authors would like to thank the participants of the CHI 2008 DPD workshop for their comments on an earlier version of this paper and the user/designer participants of the Living Lab activities for their invaluable contributions.

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