

Workshop on EUD for Supporting Sustainability in Maker Communities

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Abstract. Recently, there has been a proliferation of Do-It-Yourself (DIY) communities that can be generally included in the larger all-encompassing maker movement: Hackerspaces, FabLabs, Transition Town groups etc. Made possible by the new horizons opened by digital fabrication and the Internet, the maker movement has a great potential to foster sustainable living by supporting innovation in this field, facilitating its appropriation and propagating its practical use. However, technology-driven maker communities are often perceived as places for tech-savvy people and have difficulties to attract wider audiences. In this workshop, we would like to discuss how can EUD concepts support sustainability in maker communities by ensuring wider scale access to digital fabrication, supporting user innovation and leveraging knowledge sharing across communities.

Keywords: maker communities, digital fabrication, end user development, prosumption, culture of participation, sustainability.

1 Description

Doing things yourself, on your own initiative with your own hands and head involved is probably one of the oldest and most natural activities of human nature. Parallel to increasing technological advances, a culture of making things yourself—not just out of pure necessity, but also for your own joy and fulfilment—has developed and gained momentum starting in the second half of the 20th century until today. Recent surveys from diverse countries around the world show that consumers spend a significant portion of time and money to create and modify consumer products for their own use. They demonstrate that do-it-yourself (DIY) is not just a marginal phenomenon, but it is also of increasing economic and societal value. Users, as being closest to the products they use and knowing best the needs and expectations associated with them, play an important role for advances and innovation, especially in fields generally considered niches, and thus not pursued by big industries.

In contrast to homemade production—which is rather focused on economic aspects such as cost saving (in the sense of a “make or buy decision”)—DIY is about meeting individual needs. Making in the new sense can be seen as an empowering experience that is supported by new models of communication in communities, making it easier (and socially recognized) to share self-made creations and related innovation. This trend is very much connected to the communities of hobbyists and crafters that have spawned the home computer industry. As the proliferation of digital means of construction have enabled end user production and the appropriation of technologies formerly reserved to specialized companies, the DIY movement has increased potential for innovation. Once they will become available to the general public, digital fabrication technologies are predicted to have an influence comparable to that of the introduction of personal computers.

The maker movement has a great potential to foster sustainable living by supporting related innovations, fostering their appropriation and propagating their practical use. Often though, technology-driven maker communities associated with FabLabs or Hackerspaces are perceived as places for people who are knowledgeable about technology and have difficulties to maintain an open dialogue with the society at large. Hence, attracting wider categories of public, as well as sharing innovations created by users are still seen as challenges.

End User Development (EUD) as research field focuses on methods, techniques, and tools that allow non-professionals to create, modify and extend technologies. Tools for EUD include, for example, visual programming environments, mash-up editors and service orchestration tools. EUD concepts can play a big role in supporting sustainability in maker communities by facilitating sustainable access to digital fabrication, in order to support user innovation and leverage knowledge sharing across communities. In this respect, we understand sustainability from multiple angles:

- disseminating sustainable behaviour and lifestyles by supporting the diffusion of related innovations from the maker culture to the society at large;
- improving innovation sustainability by supporting participation and knowledge exchange across diverse communities and backgrounds;
- supporting diverse communities across the population to embrace emerging digital technologies.

In particular, we believe that EUD research could bring a contribution at several different levels:

- At a **technical level**, EUD concepts can help to support the appropriation of DIY by making it easier for non-professionals to create, modify or extend digital and material artefacts in DIY projects.
- At a **social level**, EUD approaches can contribute to popularize DIY with the help of social media in order to make local DIY initiatives more visible, provide new opportunities for lurking and legitimate peripheral participation, and support knowledge exchange and appropriation of related innovations, technologies and ideas.

- At an **empirical level**, EUD oriented ethnographic studies can contribute to the understanding and analysis of DIY/maker communities practices in minute detail, in order to get a better understanding of their practical needs and opportunities for innovation.

During the workshop, we intend to discuss examples of DIY activities that are of interest in the context of sustainability and End User Development. Related questions include, but are not limited to:

- What are good examples of EUD and DIY tools that support sustainable innovation or could be adapted in this respect?
- How can EUD principles be leveraged to include a more diverse user group, particularly across generations, cultural backgrounds and among people with different levels of technical expertise?
- In the context of projects that address individual needs, how could more citizens become aware and be attracted to use digital fabrication technologies? What are the tools and infrastructure needed to achieve this?
- How can domestic activities constitute a trigger for establishing a sustainable use of personal fabrication technologies? What potential lays in attracting new user groups in order to reach inclusive participation and foster a broad discussion and evaluation of challenges and opportunities?
- How can traditional crafts be integrated in the context of maker communities? How can knowledge about crafts and traditional techniques be included, given that most people possessing this type of knowledge are not amongst the usual users of digital technologies?
- What tools are needed to anchor digital fabrication as a widely accepted possible extension of current fabrication and making routines?
- What are the new production and consumption patterns developed through sharing and collaboration by diverse groups of makers on a local and global scale? How can these be extended to the context of repairing, extending the life cycle of existing products, recycling and upcycling?
- How can practitioners be supported in documenting their work in order to allow knowledge sharing and diffusion of innovation? How could creative forms of documenting be established to better fit the maker culture?

More information on the workshop can be found on our website at <http://eudforsustainability.wineme.fb5.uni-siegen.de/>

2 Workshop Presentations

Hacking Sustainability: Broadening Participation through Green Hackathons. Jorge L. Zapico, Daniel Pargman, Hannes Ebner, Elina Eriksson (Media Technology and Interaction Design – MID, KTH Royal Institute of Technology, SE100 44 Stockholm, Sweden).

Abstract. Green Hackathon is an international series of coding events with sustainability purpose. Developers, researchers, environmental practitioners, and anyone interested, work for a limited and focused amount of time to create innovative software solutions for sustainability. These events have explicitly invited broad spectra of expertises besides technical ones. This article presents the experiences and tensions of including these end users in a mostly technical oriented event, and discusses how end-user development could be used for a more reflective practice empowering broad participation and interdisciplinary collaboration in these events.

Generative Design Materials in DIY Digital Art Creation. Nicolai Brodersen Hansen, Kim Halskov (PIT & CAVI, Department of Aesthetics and Communication, Aarhus University, Denmark).

Abstract. We intend to study the interplay between software tools and artefacts and creativity. We do this through a case study of a community of DIY digital art creation among hobbyists. Specifically we investigate how they, the so called “demo-sceners” collaborate through the use of different design materials to create digital art and how they in that process utilize their different skills, and outline how we intend to study and present their work process at the workshop at IS-EUD.

End-User-Development for Smart Homes: Relevance and Challenges. Rémy Dautriche, Camille Lenoir, Alexandre Demeure (PRIMA, INRIA, LIG, Universités de Grenoble, France), and Joëlle Coutaz (IIHM, LIG, Universités de Grenoble, France).

Abstract. Ubiquitous computing is now mature enough to unleash the potential of Smart Homes. The obstacle is no more about hardware concerns but lies in how inhabitants can build, configure and control their Smart Home. In this paper, we defend the idea that End-User-Development (EUD), which considers inhabitants as makers rather than mere consumers, is an effective approach for tackling this obstacle. We reflect on the lifecycle of devices and services to discuss challenges that EUD system will have to address in the Smart Home context: installation and maintenance, designation, control, development (including programming and testing), and sharing.

EUD@Smart Homes - Smart Refurbishment of Rented Apartments to Improve Energy Efficiency. Timo Jakobi, Gunnar Stevens (University of Siegen, Human Computer Interaction, Siegen, Germany), Tobias Schwartz (Fraunhofer FIT, Sankt Augustin, Germany).

Abstract. The smart home of the future is typically researched in lab settings or apartments that have been built from scratch. However, comparing the lifecycle of buildings and information technology, it is evident that modernization strategies and technologies are needed to empower residents to modify and extend their homes to make it smarter. In this paper, we describe a case study about the deployment, adaptation to and adoption of tailorable home energy management systems in 7 private households. Based on this experience, we want to discuss how hardware and software technologies should be designed so that people could build their own smart home with a high usability and user experience.

If We Build It, Who Will Come? Considering the Who, What and Why of Web EUD. Mary Beth Rosson (Center for Human-Computer Interaction/College of Information Sciences and Technology, The Pennsylvania State University, University Park, Pennsylvania 16802 USA).

Abstract. The increased access to online information, services and tools raises many opportunities for everyday users to develop novel computational products. However very few end users take the time to investigate and acquire skills in end-user development (EUD), whether on the Web or elsewhere. In this brief paper, the author draws from a series of inter-related projects to consider what it is that prompts a non-programmer to invest time in novel technologies such as web development. Building upon previous discussions of the Production Paradox (Carroll & Rosson, 1987) and the Attention Investment Model (Blackwell, 2002), the author characterizes a space of causal factors that include the activity situation, a person's individual characteristics, and the resources that are apparent to the user. Working within this framework, the author summarizes findings from a series of related studies of Web EUD. The paper argues that if we hope to engage a large and diverse population of everyday users in the opportunities inherent in EUD, we must first understand a diverse landscape of activity contexts, and use minimalist design techniques to both attract users' interest and support them in their Web EUD learning processes.

Sustainable DIY Technologies in the Service of Cultural Heritage Professionals. Laura Maye (Interaction Design Centre, University of Limerick, Ireland).

Abstract. The paper presents a research project that aims to demonstrate how DIY technologies can be used in the design and development of cultural heritage interactive artefacts. Current digital interactive exhibits are usually created by technology experts, with limited involvement of cultural heritage professionals. Because of the high levels of technical knowledge required, it is almost impossible for curators to create, re-configure or bring up-to-date such artefacts. Many interactive exhibits end up only being used for demonstration purposes or punctual events and then never again. However, DIY technologies are increasingly becoming easier for amateur and novice users to use. Furthermore, developments in 3D printing and digital fabrication have made it possible to print embedded digital circuitry and recycle used materials. For these reasons, it should become possible for curators to create and adapt their own exhibits with embedded digital materials. The aim of this research project (still in its early stages) is to analyse how interactive exhibits can be created and adapted easily by curators, using sustainable technologies.

3 Workshop Plan

The one day workshop will bring together a maximum of 20 participants. Our intended audience primarily consists of researchers who are actively engaged in studies of EUD in DIY contexts, but also of DIY enthusiasts and members of maker communities. We are encouraging a mix of practitioners, graduate students, new faculty and established researchers to participate.

The accepted papers will be made available to the participants in advance and discussants will be assigned to each paper. The morning session will include an introduction to the workshop objectives, followed by a working session where the discussions will be based on the material provided by the participants. In the afternoon, we will focus on the broad picture resulted, highlighting strengths and limitations of the material presented. We will close the day with a session dedicated to outlining a list of issues that need to be addressed by future research in the area.

4 Organizers

Alexander Boden has a background in Cultural Anthropology and has received his PhD in Information Systems working at the intersection of HCI/CSCW and Software Engineering. He is currently working as a post doc researcher at the University of Siegen and is interested in topics such as supporting the appropriation of digital fabrication technologies by non-professionals, and designing support systems for distributed and co-located communities.

Gabriela Avram is lecturer in Digital Media and Interaction Design and senior researcher at the Interaction Design Centre at the University of Limerick in Ireland. Building on a CSCW and Knowledge Management background, her research currently focuses on mobile and local uses of Social Media, urban communities and facilitating technology adoption. She has an active involvement in the hackerspaces community in Ireland, as well as in urban gardening and biodiversity groups.

Irene Posch is a lecturer and researcher with a background in Computer Science and Media, and active member of the FabLab community. She previously worked on making technology accessible in interactive experiences and exhibitions. Her current research focus lies on the integration of current technological development into the fields of art and craft as well as DIY culture and how this can be achieved in an aesthetic and personal fulfilling way.

Volkmar Pipek is a Professor with the Institute for Information Systems at the University of Siegen, Germany, and chairs the board of trustees of the International Institute for Socio-Informatics (IISI). His research focuses on arrangement and acquirement of cooperative software systems in organisations, questions about communication based knowledge management as well as support of communities.

Geraldine Fitzpatrick heads the Institute for Design and Assessment of Technology at the TU Vienna. Her research focuses on the intersection of social and computer sciences to support social interaction/collaboration, with a particular interest in the potential for new and emerging technologies such as mobile, wireless and sensor-based technologies to support social and community engagement, motivation and behaviour change.