ISSN 0105-8517

ECSCW 2013 Adjunct Proceedings

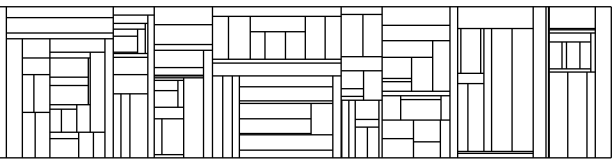
The 13th European Conference on Computer Supported Cooperative Work

21 - 25. September 2013, Paphos, Cyprus

Matthias Korn, Tommaso Colombino, Myriam Lewkowicz (eds.)

DAIMI PB - 596
September 2013

DEPARTMENT OF COMPUTER SCIENCE
AARHUS UNIVERSITY
IT-parken, Aabogade 34
DK-8200 Aarhus N, Denmark



Preface

This volume presents the adjunct proceedings of ECSCW 2013, the 13th European Conference on Computer Supported Cooperative Work, held in Paphos, Cyprus on September 21-25, 2013. It comprises of the following categories: Work in Progress, workshops and master classes, demos and videos, the doctoral colloquium, and keynotes.

While the proceedings published by Springer Verlag contains the core of the technical program, namely the full papers, the adjunct proceedings includes contributions on ongoing work, thus indicating what our field may become in the future.

As a new thing for ECSCW 2013, the Work in Progress category has been introduced. Work in Progress is a peer-reviewed track at the conference that offers a possibility to present and discus ongoing work. Work in Progress sessions provide a unique opportunity for sharing valuable ideas, for getting early feedback on current work and preliminary results, and fostering discussions and collaborations among colleagues. Each Work in Progress submission was reviewed by a minimum of two members of the Program Committee. We were able to accept 11 papers out of a total of 19 submissions. This acceptance rate of approximately 58% acknowledges the early-stage nature of the work.

The adjunct proceedings also includes three demonstrations, as well as descriptions of the 6 workshops and one master class. We have also included short descriptions of the 7 Ph.D. projects of the participants accepted for the doctoral colloquium, as well as abstracts of the two keynote lectures.

Matthias Korn, Tommaso Colombino,
and Myriam Lewkowicz

ECSCW 2013 Conference Committee

General Chair
George Angelos Papadopoulos, University of Cyprus, Cyprus

Programme Chairs
Olav W. Bertelsen, Aarhus University, Denmark
Maria Antonietta Grasso, Xerox Research Centre Europe, France

Workshops and Master Classes Chairs
Matthias Korn, Aarhus University, Denmark
Pär-Ola Zander, Aalborg University, Denmark

Work in Progress Chairs
Tommaso Colombino, Xerox Research Centre Europe, France
Myriam Lewkowicz, Troyes University of Technology, France

Demos and Videos Chairs
David Kirk, Newcastle University, UK
Abigail Durrant, Newcastle University, UK

Proceedings Chair
Luigina Ciolfi, Sheffield Hallam University, UK

Adjunct Proceedings Chair
Matthias Korn, Aarhus University, Denmark

Doctoral Colloquium Chairs
Antonella De Angeli, University of Trento, Italy
Wayne Lutters, University of Maryland Baltimore County, USA

Student Volunteer Chair
Stina Matthiesen, IT University of Copenhagen, Denmark

Local Organizers
Christos Mettouris, University of Cyprus, Webmaster
Petros Stratis, Easy Conferences Ltd., Finance Chair

ECSCW 2013 Program Committee

Mark Ackerman, University of Michigan, USA
Alessandra Agostini, Università di Milano-Bicocca, Italy
Antonella De Angeli, University of Trento, Italy
Gabriela Avram, University of Limerick, Ireland
Liam Bannon, University of Limerick, Ireland and Aarhus University, Denmark
Olav W. Bertelsen, Aarhus University, Denmark
Pernille Bjørn, IT University of Copenhagen, Denmark
Jeanette Blomberg, IBM Almaden Research Center, USA
Alexander Boden, University of Siegen, Germany
Claus Bossen, Aarhus University, Denmark
Nina Boulus-Rødje, IT University of Copenhagen, Denmark
Tone Bratteteig, University of Oslo, Norway
Susanne Bødker, Aarhus University, Denmark
Federico Cabitza, Università di Milano-Bicocca, Italy
Lars Rune Christensen, University of Aalborg, Denmark
Luigina Ciolfi, Sheffield Hallam University, UK
Gregorio Convertino, Xerox Research Centre Europe, France
Andy Crabtree, University of Nottingham, UK
Francoise Darses, Conservatoire National des Arts et Métiers, France
Prasun Dewan, University of North Carolina, USA
Monica Divitini, Norwegian University of Science and Technology, Norway
Benjamin Fonseca, UTAD/INESC TEC, Portugal
Sebastian Franken, University of Aachen, Germany
Víctor M. González, Instituto Tecnológico Autónomo de México (ITAM), México
Antonietta Grasso, Xerox Research Centre Europe, France
Marianne Graves Petersen, Aarhus University, Denmark
Tom Gross, University of Bamberg, Germany
Jörg M. Haake, Fern University Hagen, Germany
Richard Harper, Microsoft Research Centre Cambridge, UK
Kori Inkpen, Microsoft Research, USA
Giulio Jacucci, Helsinki Institute for Information Technology, Finland
Nils Jeners, University of Aachen, Germany
Nina Kahnwald, University of Dresden, Germany
Helena Karasti, University of Oulu, Finland
Wendy Kellogg, IBM T. J. Watson Research Center, USA
Michael Koch, BW-University, Munich, Germany
Timothy Koschmann, Southern Illinois University, USA
Charlotte Lee, University of Washington, USA
Myriam Lewkowicz, Université de Technologie de Troyes, France
David Martin, Xerox Research Centre Europe, France
David W. McDonald, University of Washington, USA

Giorgio De Michelis, Università di Milano-Bicocca, Italy
David Millen, IBM T. J. Watson Research Center, USA
Preben Holst Mogensen, Aarhus University, Denmark
Keiichi Nakata, University of Reading, UK
Iivari Netta, University of Oulu, Finland
Maria Normark, Södertörn University College, Sweden
Gary M. Olson, University of California, Irvine, USA
Volkmar Pipek, University of Siegen, Germany
Michael Prilla, University of Bochum, Germany
Wolfgang Prinz, Fraunhofer FIT/RWTh Aachen, Germany
Dave Randall, University of Siegen, Germany
Madhu Reddy, Penn State University, USA
Toni Robertson, University of Technology Sydney, Australia
Markus Rohde, University of Siegen, Germany
Mark Rouncefield, Lancaster University, UK
Pascal Salembier, Université de Technologie de Troyes, France
Kjeld Schmidt, Copenhagen Business School, Denmark
Carla Simone, Università di Milano-Bicocca, Italy
Cleidson da Souza, UFPA and ITV-DS, Brazil
Gunnar Stevens, University of Siegen, Germany
Hilda Tellioğlu, Vienna University of Technology, Austria
Ina Wagner, Vienna University of Technology, Austria and University of Olso, Norway
Volker Wulf, University of Siegen, Germany

Table of Contents

I Work in Progress Papers

II Descriptions of Workshops and Master Classes

III Extended Abstracts of Demos and Videos

IV Doctoral Colloquium Papers

V Keynote Abstracts

Part I

Work in Progress Papers

Social Awareness Support for Meeting Informal Carers' Needs: Early Development in TOPIC

Ivan Breskovic, Aparecido Fabiano Pinatti De Carvalho, Susanne Schinkinger, Hilda Tellioğlu[1]
Vienna University of Technology, Multidisciplinary Design Group, Austria
{ivan.breskovic, fabiano.pinatti, susanne.schinkinger, hilda.tellioglu}@tuwien.ac.at

Abstract. This paper explores the use of social awareness support as a potential solution to alleviate informal carers' burden stemming from the heavy physical, psychological, and emotional load habitually associated with their duties. This is a preliminary contribution of the Vienna University of Technology to TOPIC project that is currently under development. In this paper we report on relevant literature, identify and consider technological and interaction challenges, and suggest mobile and ubiquitous computing for ambient solutions. We illustrate our approach by presenting briefly a prototype from our pre-study before concluding the paper.

Introduction

In Europe, as well as in other parts of the world, the number of people in need of special care is increasing (Magnusson *et al.*, 2002). In the majority of the member states of the European Union family carers are responsible for more than 80% of all the care provided. Hence, both elderly and working-age family carers are submitted constantly to heavy physical, psychological, or emotional burden resulting from taking care of someone else. Past research has shown that these people are more susceptible to both psychical and physical morbidity (Chwalisz &

[1] Authors are listed in alphabetical order.

Kisler, 1995; Coon & Evans, 2009), facing an increased risk of mortality compared to their non-care giving counterparts (Schulz & Beach, 1999).

Literature highlights that informal carers often express the need for help, not only in terms of financial assistance, as often proposed by social institutions, but also in regards to social and emotional support (Brownsell *et al.*, 2012; Magnusson *et al.*, 2004; Nies, 2004). They clearly lack a means of expressing their feelings and finding a hearing for their problems in order to obtain information and comfort. Projects addressed in this paper have already explored possible solutions for such needs; however, there is still room for research on the matter (Levine *et al.*, 2010).

Acknowledging the need for further investigation and technological development in this area, TOPIC[2], a European project by the AAL[3] Joint Programme, aims to advance the understanding of informal carers' needs and design information and communication technology (ICT) solutions to support them in their daily needs. The project addresses the lack of an integrated social support platform and the lack of accessible ICT applications for elderly. The project congregates 10 partners located in Austria, Germany, and France[4].

As a first step towards meeting these challenges, the research group in Austria is currently investigating the state of the art of the field and exploring innovative ways by means of prototypes to support informal caregivers. This paper reports on some of the findings from the literature and explores some preliminary ideas to address technological and interaction challenges. We focus only on social awareness in this paper. Other aspects of support will be part of our future work.

In the following section, we present briefly some related projects, comment on the methodology they employed, and the outcomes they generated. Then we illustrate our approach in TOPIC by presenting one of the prototypes we designed and implemented as a pre-study. Finally, we stress out the importance of support for social awareness and delineate the next steps.

Related Research on Support for Care Giving

Increasing attention has been paid to technological support for care giving in the past few years (Brownsell *et al.*, 2012; Kraner *et al.*, 1999; Nies, 2004). The main reason for pursuing these projects is that population is aging (Magnusson *et al.*, 2002). CARMEN worked on elaborating a research agenda for design and developing technologies that could be used for integrated care of older people (Nies, 2004). It identified different research themes, elaborated on methodological issues yet to be overcome, and searched for conditions and measures to implement

2 The Online Platform for Informal Caregivers, http://www.topic-aal.eu
3 Ambient Assisted Living, http://www.aal-europe.eu/
4 We would like to thank the Ambient Assisted Living Joint Programme for financial support and the members of the TOPIC consortium for the insights and input in the project development.

and assess the support that they would provide. ACTION has worked on developing ICT solutions to support family carers and the ones they were caring for with their needs. ACTION followed a user-centred design approach, focusing on people older than 60 years of age caring for frail older people, and employed different data collection methods (surveys, semi-structured interviews, and focus groups) (Kraner *et al.*, 1999; Magnusson *et al.*, 2002). As a result, a TV-screen based solution and a range of multimedia programs were made available, which impacted positively on enhancing carers' competence and supporting them in a way that they would feel less isolated by creating a sense of presence and facilitating access to care professionals. SOPRANOs goal was the development of a supportive environment for older people to increase their independence and quality of life (Müller *et al.*, 2008). It used a user-centred design approach based on interviews, surveys, and focus groups. Carers need something to reduce social isolation, enhance safety and security, minimise effects of forgetfulness, and remain healthy and active. The suggested solution was based on participation and contribution to local communities of people in the similar situation, access to information, as well as to stores and services. The findings also highlight the importance of designing solutions that overcome users' anxiety and intimidation by technology and their fear about breaking or becoming dependent of such technologies. Same observations were possible in other projects and studies (Akesson *et al.*, 2007; Brownsell *et al.*, 2012; Chambers & Connor, 2002).

Torp *et al.* (2012) explored whether informal caregivers made use of ICT to gain knowledge about caring and to form informal support networks to improve their health. Based on 17 interviews, they concluded that the prior experiences with similar networks have great positive impact on the satisfaction and extensiveness of the use of the tools. Manthorpe (2001) explored how the "distant" caregivers can be emotionally and practically supported and how their level of involvement in care services can be increased. In general, family members are highly involved whereas professional caregivers have to distance themselves from getting too much emotionally involved (Christensen & Grönvall, 2011). Bossen et al. (2012) discovered that the system CareCoor facilitated organisation of care for both informal and formal carers, but created redundancy in data management. Furthermore, the participants reported the lack of trust in the system in critical situations (e.g. urgent messaging) and relied on traditional communication media instead (e.g. telephone).

There exist several commercial projects[5] applying telehealth and telecare services in the homes of older people to contribute to their independence. These services enable caregivers to remotely monitor patients and provide appropriate prompt support with regard to health education and treatment compliance.

[5] Health Buddy (http://www.bosch-telehealth.com/en/us/products/health_buddy/health_buddy.html), MobiHealth (http://www.mobihealth.org/), Doc@Home (http://www.docobo.co.uk/ArticlePage.aspx?articleId=6&topParentId=7).

However, by focusing solely on remote surveillance and control, these works consider almost exclusively formal caregivers and not patients' family members.

The PREP model is amongst one of the first telephone support models with the aim to help increase the knowledge and skills of family caregivers by working with a professional carer or a nurse who helps them in organisation, preparedness, enrichment, and predictability in terms of their caring situation by providing individualised telephone-based advice and support (Archbold *et al.*, 1995). TLC applied a similar approach and demonstrated that this type of intervention mostly has an impact on female caregivers with high levels of anxiety and low mastery over their caring situation (Mahoney *et al.*, 2003). Computer Link delivered support for dementia caregivers via the Internet by allowing them to discuss with each other via a public bulletin board, to have access to an electronic encyclopaedia for information, as well as the facility to seek personalised advice and support via private emails to a nurse who acts as facilitator for the overall service (Pierce *et al.*, 2002; White & Dorman, 2000). The approach was not user-oriented and technical solutions are limited to a small number of purely web-based services.

Some Preliminary Ideas

As observable from past research, social and emotion support are important elements for the well being of informal carers. Besides home inhabitants there are intimate socials, who are persons having a tight relation to a person but not sharing the same home, and extended socials, who are important but not connected closely to a person (Neustaedter *et al.*, 2006). To keep a relation active, social awareness must be maintained at least to a certain degree (Figure 1).

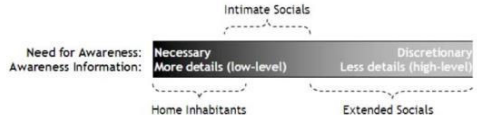


Figure 1. Need for awareness and awareness information in relation to friends and family members.

Whilst considerable effort has been put forward towards the development of effective ICT solutions (Brownsell *et al.*, 2012; Kraner *et al.*, 1999), informal carers' reactions to these interventions are ambivalent: whilst they cherish the access to information that may support them to enhance their caregiving skills and the social contact that those solutions allow for, they recurrently notice that these systems are not the simplest to use or the most intuitive to interact with. This suggests that it is necessary to explore new forms of interaction that may provide them pleasant and easy use of the system and positive impacts on their lives. We propose to investigate informal carers' reaction to the use of tangible artefacts and ambient technologies for social awareness.

To provide implicit and active awareness mechanisms to intimate and extended socials, without disturbing the ambient in users' homes, we designed embedded

solutions to integrate into the domestic environment. *Howdy?* is a RFID-based input and output device to support social awareness at homes[6]. *Howdy?* enables entering data created by a friend who is thinking of a friend and wants to make his/her friend aware of that. By means of holding a tag to the RFID reader, users can trigger the communication. *Howdy?* supports several modes. Friends can be represented by photos or images or by abstract colours or shapes projected onto a wall (Figure 2), or by colours or photos projected in a cube (Figure 3).

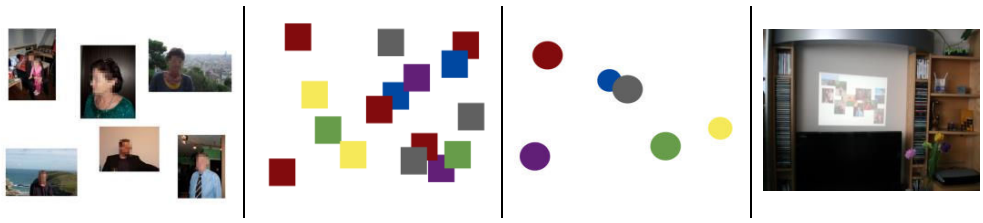


Figure 2. Ambient representation of friends by photos or abstract shapes with *Howdy?*.

More often a friend thinks of someone, larger gets his/her photo on the wall (Figure 2). Users can configure more than one picture for a friend to display in a sequence. Depending on the amount of triggers done by a friend, the user-configured shapes increase or decrease. Another option is to change the number of shapes depending on the activity of a friend. Many shapes with same colour or larger shapes represent the friend who is interacting more often than the others.

The third mode of *Howdy?* is implemented in a cube projecting photos or colours assigned to friends (Figure 3). The colour of a friend triggered latest or triggered most can be shown. The cube allows users to start an animated projection: it changes the colour after a while depending how often a friend has activated the system, i.e., more often a friend was thinking, longer his/her colour is displayed.

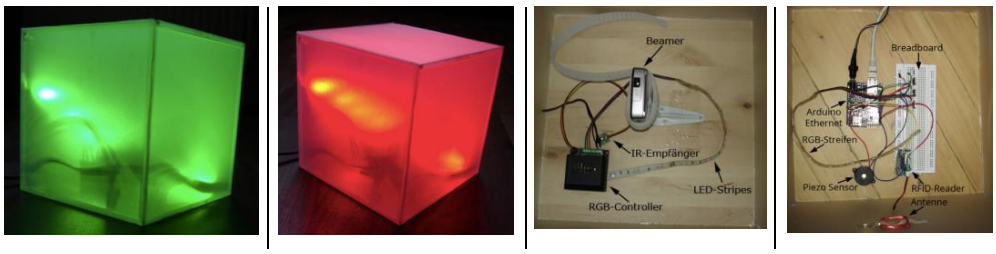


Figure 3. Ambient representation of friends by colours and the components of the cube *Howdy?*.

6 The idea is originated by one of the authors. The prototype is developed in the scope of a master thesis by Stefanie Guggenberger („I think of you“ Visualisierung sozialer Interaktionen, Master Thesis at the Vienna University of Technology, Austria, 2013).

Conclusions and Future Work

Taking account of current and past developments of technological solutions to support caregivers with their duties, it is evident that there is an urge for innovative research using the most recent technological developments in mobile, ubiquitous, and ambient computing, as well as in tangible interaction to tackle the challenges associated with it. TOPIC sets out to address this challenge and is currently working on ideas for meeting it. In this paper, we presented only one idea of many to illustrate that ambient technologies can be innovative solutions to facilitate social awareness when integrated and embedded in homes. To achieve the most appropriate interaction we need to work with our users, e.g., not only in a lab environment, but also in their real life situations. Participatory observations help us understand the challenges our users face and support our design process. Following this approach we will next launch an ethnographic study both for capturing the user requirements and to evaluate our suggestions.

References

Akesson, K. M., B.-I. Saveman & G. Nilsson (2007). Health care consumers' experiences of information communication technology - A summary of literature. *International Journal of Medical Informatics*, 76(9), 633-645.

Archbold, P. G., B. J. Stewart, L. L. Miller, T. A. Harvath, M. R. Greenlick, L. Van Buren, J. M. Kirschling, B. G. Valanis, K. K. Brody & J. E. Schook (1995). The PREP system of nursing interventions: a pilot test with families caring for older members. Preparedness (PR), enrichment (E) and predictability (P). *Research in nursing & health*, 18(1), 3-16.

Bossen, C., Christensen, L. R., Grönvall, E. & L. S. Vestergaard (2012). CareCoor: Augmenting the coordination of cooperative home care work. *International Journal of Medical Informatics,* Volume 82, Issue 5, 189-199.

Brownsell, S., S. Blackburn & M. Hawley (2012). User Requirements for an ICT-based System to Provide Care, Support and Information Access for Older People in the Community. *Journal of Assistive Technologies*, 6(1), 5-23.

Chambers, M. & S. L. Connor (2002). User-friendly technology to help family carers cope. *Journal of Advanced Nursing*, 40(5), 568-577.

Christensen, L. R., & E. Grönvall (2011). Challenges and Opportunities for Collaborative Technologies for Home Care Work. *ECSCW 2011: Proceedings of the 12th European Conference on Computer Supported Cooperative Work*, 24-28 September 2011, Aarhus Denmark: Springer London, 61-80.

Chwalisz, K. & V. Kisler (1995). Perceive Stress: A Better Measure of Carer Burden. *Measurement and Evaluation in Counseling and Development*, 28, 88-98.

Coon, D. & B. Evans (2009). Empirically Based Treatments for Family Carers Distress: What Works and Where do We Go From Hear. *Geriatric Nursing*, 30(6), 426-436.

Kraner, M., D. Emery, S. R. Cvetkovic, P. Procter & C. S. Smythe (1999). Information and Communication Systems for the Assistance of Carers based on ACTION. *Informatics for Health and Social Care*, 24(4), 233-248.

Levine, C., D. Halper, A. Peist & D. Gould (2010). Bridging Troubled Waters: Family Caregivers, Transitions, and Long-Term Care. *Health Affais*, 29(1), 116-124.

Magnusson, L., E. Hanson & M. Borg (2004). A literature review study of information and communication technology as a support for frail older people living at home and their family carers. *Technology & Disability*, 16(4), 223-235.

Magnusson, L., E. Hanson, L. Britto, H. Berthold, M. Chambers & T. Daly (2002). Supporting Family Carers Through the Use of Information and Communication Technology - the EU Project ACTION. *International Journal of Nursing Studies*, 39(2002), 369-381.

Mahoney, D. F., B. J. Tarlow & R. N. Jones (2003). Effects of an automated telephone support system on caregiver burden and anxiety: findings from the REACH for TLC intervention study. *The Gerontologist*, 43(4), 556-567.

Manthorpe, J. (2001). Caring at a distance: Learning and practice issues. *Social Work Education*, 20(5), 593-602.

Müller, S., M. Sanit & A. Sixsmith (2008). Eliciting User Requirements for Ambient Assisted Living: Results of the SOPRANO Project, In *eChallenges 2008* (pp.81-88). Amsterdam: IOS Press.

Neustaedter, C., Elliot, K. & S. Greenberg (2006). Interpersonal Awareness in the Domestic Realm. OZCHI '06 Proceedings of the 18th Australia conference on Computer-Human Interaction: Design: Activities, Artefacts and Environments, 15-22.

Nies, H. (2004). A European Research Agenda or Integrated Care for Older People. Dublin: 24 p.

Pierce, L. L., V. Steiner & A. L. Govoni (2002). In-home online support for caregivers of survivors of stroke: a feasibility study. *Computers, informatics, nursing: CIN*, 20(4), 157-164.

Schulz, R. & S. R. Beach (1999). Caregiving as a Risk Factor for Mortality: The Carer Health Effects Study. *Journal of the Amarican Medical Association*, 282, 2215-2219.

Torp, S., P. C. Bing-Jonsson & E. Hanson (2012). Experiences with using information and communication technology to build a multi-municipal support network for informal carers. *Informatics for Health and Social Care*, 0(0), 1-15.

White, M. H. & S. M. Dorman (2000). Online support for caregivers. Analysis of an Internet Alzheimer mailgroup. *Computers in nursing*, 18(4), 168-76- quiz 177-9.

Integrating work in new models of primary health care

Elizabeth Hanley, Toni Robertson, and Nicky Solomon
University of Technology Sydney, Australia
Elizabeth.Hanley@student.uts.edu.au, Toni.Robertson@uts.edu.au, Nicky.Solomon@uts.edu.au

Abstract. This paper introduces a large research project that investigates the remaking of professional practices in new models of primary health care. One strand of the research explores the roles of information and communication technologies in practice change. The project involves long-term ethnographic engagement in two sites that are part of an Australian primary healthcare change initiative. This initiative aims to provide integrated care for complex and vulnerable clients by linking general practitioners and other professionals in community, allied health and acute care. We introduce the research settings and summarise progress to date of the project and then explore an aspect of the major shaping role of ICT in how the work of new models of health care gets done. We consider the effect on current practices of an absent common information space to support patient trajectories through diverse healthcare services that assume integrated models of patient care. A range of workarounds continues to support the healthcare professionals while they wait for a common information space.

Introduction

We are engaged in a project that investigates the remaking of professional practices in new models of primary health care. The project is framed by understandings of the close relationships of work, learning, technologies and change, together with a commitment to participative research methods and an analytic approach that accounts for the sociotechnical environments of changing practices. The research settings are within a major state government primary healthcare reform initiative in Australia called HealthOne. This initiative requires health professionals individually and collectively to make significant changes in a

number of domains of healthcare practice. The expectation is that healthcare practices will be multidisciplinary, integrated across professional, agency and sectoral boundaries, and developed in an active partnership with health consumers and communities.

A major strand of the research is to explore how information and communication technologies (ICTs) contribute to the everyday practices of those involved in our research settings. In particular we are interested in the role these and future technologies currently play - and might play - in ongoing efforts to achieve practice change. This focus is a familiar one within CSCW and related research. It acknowledges the way ICTs are deeply embedded in work practices and in the policies and planning strategies of new work environments. Most importantly, it also acknowledges that assumptions about work and how it gets done are embedded in the design of technologies themselves, making them active players in shaping how people are able to do their work and their capacity for action and change.

In this short paper we introduce the research settings, our research design and methods and summarise progress to date in the project. From there we explore one aspect of the major shaping role of ICT in how the work of new models of health care gets done. We consider the effect on current practices of an absent common information space to support patient trajectories through diverse healthcare services that assume integrated models of patient care.

The research settings

This research is located in a time of significant reform in health service delivery in Australia, which is intended to bring about more effective primary healthcare models, minimising fragmentation and improving access to services. Better coordination and integration of primary health care is aimed at managing Australia's emerging health issues, including the ageing population and the burden of chronic disease (Australian Government Department of Health and Ageing, 2011). Australia has a complex health system with interwoven components operated by the Federal and State Governments, non-government organisations and private sector organisations and individuals (Dugdale, 2008). Breaking down the silos and developing sustainable relations between these interwoven components through interprofessional and interorganisational collaboration (McDonald, Powell Davies, Jayasuriya and Harris, 2011) is seen as the mechanism to integrate service delivery for more effective and streamlined patient trajectories.

HealthOne, the setting for our research, aims to provide integrated care for complex and vulnerable clients by linking general practitioners, and other professionals in community, allied health and acute care. The objective of enrolling clients in HealthOne is to reduce preventable hospitalisations, to

minimise the impact of chronic and complex conditions, and to support client self-management of health. In practice, HealthOne operates as a network of activities traversing the health and community service sectors. Its work is organisationally complex and distributed; it has "become a multifaceted and intricate constellation of people, technologies, activities, entities, and relations: and the boundaries of the field site are less clear, even unbounded, involving extended spatial and temporal scope" (Blomberg and Karasti, 2013, 15, 33). Clients may attend dedicated clinics or have contact with a range of health professionals and services, in the home, in hospital and in the community, across the public, private and non-government sectors. As a state-wide initiative, there are a number of local HealthOne sites. This project focuses on just two, along with the relevant links in the various organisational networks in which they are situated.

Initially, a major focus of the development of HealthOne was for each site to develop a model of care to address the particular health needs of the local population. For example, one site with a relatively stable population has a strong focus on chronic disease and child and family services. The other is an area favoured by newly arrived migrants, especially refugees and has a high birthrate; so it needs a focus on refugee health as well as child and family, and chronic, aged and complex care. However, there were some underlying common aims for HealthOne, which have continued to inform local interpretations. The impending implementation of standard operating procedures accompanied by standard templates is intended to affirm these common aims, and reduce ambiguity, while allowing local organisation toward a common goal.

The research to date

The research design relies on standard ethnographic approaches to data gathering. Two local healthcare settings in metropolitan Western Sydney have been studied in the project, which has been spatially and temporally dispersed, spanning multiple organisations. Almost one hundred participants have been involved including clinicians, managers, and clients, during an ongoing period of data collection that began in September 2011. A core interdisciplinary research team of four researchers has completed a comprehensive series of 25 semi-structured workplace interviews with health professionals and with key stakeholders from steering and local implementation committees and from the state government heath ministry. 23 meetings have been attended in various locations in Western Sydney, usually by two or more of the research team. Over 140 hours of participant observation have been completed to date by the first author. Over 150 policy and practice documents have been collected along with relevant policy documentation from local and state health bureaucracies. Researchers have attended meetings and shadowed the HealthOne Liaison Nurses both in their

offices and as they travelled across the region to presentations, case conferences, GP surgeries, home visits, hospitals and other community and health services. The research team has held 27 meetings to reflect on and begin the initial analysis of this enormous and complex corpus of data using a range of theoretical and conceptual approaches including Actor-Network Theory, learning theory and those common within CSCW and interprofessional education. This process has seeded an ongoing series of presentations and discussions with our research participants (three to date) to further develop the analysis and to identify the key constraints on and opportunities for practice change, as well as how such new practices might be (re)designed.

While our research focus is the remaking of professional practices in new models of health care, our major challenge in managing the research and coming to terms with our data has been the constancy, the ubiquity and extent of change both within and around our sites: *we've been in a restructure I think, for five years, and the decisions haven't been made. . .* This has continually redefined the three social arenas identified by Gärtner and Wagner (1996) as sources of variation in local practices: the political and policy-making context, the institutional/organisational context for action and the context of systems and workplace design. Legislative, regulatory and ministerial changes have occurred at the federal, state and local levels of government. Such major structural change was mirrored during our research by constant changes in the staff attached to each HealthOne, and also in the management structures, governance practices and funding arrangements within the various related federal, state and local agencies. Only a few key health professionals interviewed in the early stages have remained in their roles. Others have either moved to other roles, some are still associated with HealthOne, or have disappeared. This means that the effects of ongoing contextual change continually compete with, and frequently overshadow, the remaking of professional practices in HealthOne.

Within these research settings, defined by constant fluidity and instability, our two major foci were the roles of learning and ICTs in the work practice changes required by HealthOne. In the remainder of this paper we briefly introduce one aspect of the major role of ICT in shaping new models of health care: supporting the integrated model of care that is the essence of the HealthOne initiative.

Waiting for a common information space

Technology is ever present, a presence made more visible and active by the practices it does not yet enable: *we are completely constrained by technology, even though there's all sorts of technology available.* Although the work of HealthOne involves consistent use of ICT, clinicians have access to multiple information systems that are not interoperable. Hence the relations between work and technology have to be made and continually remade. Clinicians in acute care

and some key HealthOne professionals have access to the hospital's clinical information system (CIS) (purchased from an international vendor). There is a separate CIS accessed by community health (developed in NSW), a separate obstetrics CIS and a range of desktop applications for GPs. Health professionals working in public hospitals and community health, do not generally have access to general practice systems. More recently, the area was a pilot site for implementation of the national Personally Controlled Electronic Record, with Electronic Discharge Summaries, sent from hospitals to GP systems, being trialled. Yet despite all these systems there is no repository of information held in common: *for me to be able to do this job you will notice I have up to nine or 10 windows open. These are all different systems I'm trying to get in … I'm acting as the conduit between the three [acute, community and GP systems]*.

Interoperability of information systems between professionals and organisations associated with HealthOne is still a vision:

> *the lack of compatible IT systems and we had working groups and we met with …. and they had a consultant and they spend hundreds of thousands of dollars and it was just like oh my God, can we just talk to each other? Let's just pick up the phone, let's not worry about having IT solutions because that was also a constraint: that was stopping us from - we were waiting for something that would enable us to have a compatible system.*

Practices to enable shared communication become essential workarounds; for instance, case conferences are held with professionals attending in situ to exchange information and work out what to do next; and 'feedback forms' are populated with current clinical information and progress notes about HealthOne clients, and emailed to GPs.

The notion of a common information space for sharing of information in the diverse, distributed healthcare work place has been given considerable research attention and scrutiny in CSCW, focusing on interrelationships between information, workers / actors, artefacts, and cooperative work, mainly in acute care settings (e.g. Blomberg and Karasti, 2013; Bossen, 2002; Munkvold and Ellingsen, 2007; Reddy, Dourish and Pratt, 2001). In primary health care where multiple professionals from different organisations are involved in collaborative care of a client in separate settings and contexts, rather than one common information space, there is a multiplicity of information spaces. Information about a HealthOne client's health is emergent, reshaped over time, and "entangled with the context of its production" (Berg and Goorman, 1999, 52). In HealthOne this information currently only intersects within the transient information space of a multidisciplinary case conference, which in this context is a face to face meeting attended by various health professionals. Just as there is a "complex body of socially shared practices" involved in reading and writing medical records (Heath and Luff, 1996, 362), in our sites we see collaboration and shared practices enacting a common information space at the case conference.

There is a hint here of the possibilities of uncovering invisible work, "the things people do to integrate and connect people, artefacts, and information"

(Blomberg and Karasti, 2013, 7) when integrated information systems are still on the horizon (Ellingsen and Roed, 2010), and the "web of conversations" linking individuals (Coiera, 2000, 277-278) acts as the information system for the work of HealthOne. The hope sustaining this initiative is that: *we're at the very edge of the new world and that we are progressing headlong into it……because it gives us the capacity to share clinically relevant information about patients that are jointly serviced by us all.* We anticipate that the effects of technology on practice change will be a major actor in the final phase of research.

Acknowledgments

The Australian Research Council Linkage Programme and the NSW Ministry of Health funded this research. We are grateful to our participants for their generous sharing of their expertise and insights.

References

Australian Government Department of Health and Ageing (2011): *Medicare Locals: Guidelines for the establishment and initial operation of Medicare Locals*, Australian Government, Canberra.

Berg, M. and Goorman, E. (1999): 'The contextual nature of medical information', *International Journal of Medical Informatics*, vol. 56, nos 1-3, pp. 51-60.

Blomberg, J. and Karasti, H. (2013): 'Reflections on 25 years of ethnography in CSCW', *Computer Supported Cooperative Work (CSCW)*, Springer Published online.

Bossen C. (2002): 'The parameters of common information spaces: the heterogeneity of cooperative work at a hospital ward', *Proc. CSCW 2002*, ACM, pp. 176-185.

Coiera, E. (2000): 'When conversation is better than computation', *Journal of the American Medical Informatics Association* vol. 7, no. 3, pp. 277-286.

Dugdale, P. (2008): *Doing health policy in Australia*, Allen and Unwin.

Ellingsen, G. and Røed, K. (2010): 'The role of integration in health-based information infrastructures', *Computer Supported Cooperative Work (CSCW),* vol. 19, no. 6, pp. 557-584.

Gärtner, J. and Wagner, I. (1996): 'Mapping acting and agendas: political frameworks of systems design and participation', *Human Computer Interaction*, vol. 11, pp. 187-214.

Heath C, and Luff P. (1996): 'Documents and professional practice: 'bad' organisational reasons for 'good' clinical records', *Proc. CSCW* 1996. ACM, pp. 354-363.

McDonald, J., Powell Davies, G., Jayasuriya, R. and Harris, M.F. (2011): 'Collaboration across private and public sector primary health care services: benefits, costs and policy implications', *Journal of Interprofessional Care*, vol. 25, no, 4, pp. 258-264.

Munkvold, G. and Ellingsen, G. (2007): 'Common information spaces along the illness trajectories of chronic patients', *Proceedings of European Conference on Computer Supported Cooperative Work (ECSCW'07)*, Springer, pp. 291-310.

Reddy, M., Dourish, P. and Pratt, W. (2001): 'Coordinating heterogeneous work: information and representation in medical care', *Proceedings of European Conference on Computer Supported Cooperative Work (ECSCW'01)*, Springer, pp. 239-258.

Designing for iPad-classrooms

Isa Jahnke, Lars Norqvist, Andreas Olsson
Umeå University, Sweden
(isa.jahnke, lars.norqvist, andreas.olsson) @umu.se

Abstract. Our study explores Digital Didactics Designs using mobile technology in co-located settings. What kinds of *digital didactical designs* do teachers apply in their iPad-classes in schools? Classroom observations and qualitative data were collected in a Danish community where 200 teachers and 2,000 students aged 6-16 use iPads in classrooms implemented in 2012. Based on the theoretical framework called Digital Didactics (DD), five patterns of Digital Didactical Designs and following the innovative designs, three key aspects could be explored: The teachers' digital didactical designs embrace a) new learning goals where more than one correct answer exists, b) focus on learning as a process in informal-in-formal learning spaces, c) making learning visible in different products (e.g., text, comics, podcasts). The study informs system developers for mobile learning applications in schools and teachers as workplace designers.

Introduction

Traditionally, Information and Communication Technology (ICT) "has been segregated from the normal teaching classroom" (Henderson, 2012), e.g. in computer labs. This has been changed with the advent of smaller devices like iPads. There is a shift from separating ICT and education to co-located settings in which digital technology becomes part of the classroom. Mobile devices like iPads are not only a version of a lightweight laptop; they combine several features of both laptops and handheld devices and became a rather new multimodal device (Johnson et al. 2013). Research on mobile technologies in K-12 education reports opportunities for improving student engagement and achievement of learning aims (e.g., McCombs & Liu, 2011). For instance, Melhuish & Falloon's study in K-9 schools (2010) shows that iPads have the potential for "consuming and

creating content in a collaborative, interactive way" (Hutchison et al. 2012). Mobile devices foster student-centered activities and enhance teaching practices (Chou et al. 2012). We wanted to know what kinds of *designs* do teachers apply in their iPad-classrooms to enable learning, is it surface and/or deeper learning?

Theoretical framework

Knowledge construction and collaborative learning are defined as a form of co-creation of new knowledge among a group of people that is "an active process of constructing rather than acquiring knowledge" (Duffy & Cunningham, 1996). An active process refers to the need for learners to become active agents within the learning process (pro-sumers). This approach stresses learning as an ongoing activity. Following this understanding of learning, teaching is more than information delivery and remembering facts (surface levels). An appropriate didactical design enables a "conceptual change" to deepen learning (Kember, 1997) including critical reflection and multiple perspectives. Active learners expand their thinking beyond consumptive behavior in schools and beyond the traditional reproduction of existing knowledge. Laurillard (2007) provides a concept for different pedagogical forms of mobile learning from Kolb's learning circle (1984), wherein learning includes a) a concrete experience, b) reflective observation, c) abstract conceptualization, and d) active experimentation. The goal of a *design* is to integrate possibilities and opportunities to enable active individual and collaborative learning to reach the teaching aims.

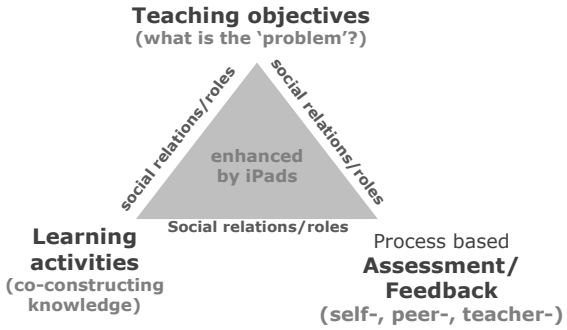


Fig 1. Digital Didactical Design (DDD)

The term *didactical design* is inspired by Klafki's Didaktik (1963), Hudson (2008), Fink (2003) and Lund & Hauge (2011) who stress the differences between teaching activities and learning. A didactical design includes five design dimensions, which have to be in an alignment in order to boost learning (fig. 1):

1. Designing teaching objectives
2. Designing learning activities
3. Designing process-based feedback (for individual and group learning)
4. Designing social relations in forms of interactions (dynamics of social roles)
5. Designing the integration of mobile devices and apps into learning practices

The design of learning activities include the plan how to reach the teaching aims (e.g., individual and group phases; assignments) and integrates different

forms of feedback (e.g., when to give feedback, how often, how, peer-reflective and teacher-feedback). A didactical design also includes the social relations in forms of student-teacher-interaction and student-student interaction by the dynamics of social roles (Jahnke, 2010). The 5th design dimension stresses out the integration of different forms of technology (e.g., apps, ICT) that can be used to varying degrees: from a low and medium to a high extent. For each of the design dimensions the design-question is, how can mobile devices support teaching and learning activities? One argument for using ICT in general is that they can "make learning visible" (Mårell-Olsson & Hudson, 2008). Their ePortfolio study showed that students "become more active … in the development of knowledge" (p. 73).

An optimal digital didactical design is characterized by a "constructive alignment" (Biggs & Tang, 2007) of all its constitutive elements; the assumption is that the aligned *design-in-practice* enable learning and increase the likelihood to reach the teaching aims and expected learning outcomes. Our study aims to make the different implicit and hidden digital didactical designs applied by the teachers in iPad-classrooms visible. Our main research question is: What digital didactical designs do teachers apply in iPad-classrooms?

Methods

In Jan. 2012, the Danish community Odder implemented iPads for all their 7 schools. Around 200 teachers and 2,000 students in K-9 (from preschool class until 9th grade) got iPads in a 1:1 iPad-program. Odder is a municipality in a rural area (about 20,000 inhabitants). As the existing old laptops had become obsolete, there was a need to acquire new technology. Instead of laptops, the politicians in Odder decided to use iPads. Headteachers, school principals, the local department of the teachers union were consulted to make sure that all parties agreed.

An explorative approach with mixed methods has been applied, particularly, partially structured classroom observations, teacher interviews, school visits (usually 1 school per day) and meetings with head teachers, as part of a larger study of iPads in schools and universities. In 2012, 15 classroom observations (45-90 mins. each) and 13 interviews with the teachers (ca. 60 mins. each) were conducted in six (out of 7) schools. The teaching subjects ranged from Native Language, Math, English, Art to Physics; classes ranged from preschool to K-9; class sizes of 14 to 25 students. Classroom observations have been based on the didactical triangle design including teaching aims, learning activities, different forms of feedback/assessment and the purposes of the iPads and conducted usually by two to five researchers. They took notes, photos and video recordings. The interview guide was divided into five parts and contained 12 questions focusing on teaching and learning activities in the classrooms and how and why they use iPads. The recorded interviews were conducted by a total of three researchers (Bryman, 2008).

Results

We analyzed 15 classrooms in order to make possible different patterns of digital didactical designs visible. Table 3 shows the results.

Table 3. Analysis for all 15 classrooms

No	**Class (grade)**	**Class-Content** and **Evaluation of Digital Didactical Design (DDD)** (from 1-5: 1= alignment; 5=non-alignment of DDD elements)	**Ipad-use** (low, medium, high)
6	Reading skills (K-0)	Complex learning, individual learning by creating a book review: A – 5 elements of DDD addressed and aligned (1-2)	High extent of Ipad-use
11	Physics (K-9)	Collaborative production of experiments (small groups): A – 5 elements of DDD addressed and aligned (1-2)	High
5	Math (K-2)	Transforming a math story into a new story: A – 5 elements of DDD addressed and aligned (2)	High
10	Arts (K-8)	Collaborative writing about arts: A – 5 elements of DDD addressed and aligned (2)	High
4	Math (K-1)	Collaboration in small group discussions about math: A – 4 elements of DDD are addressed and aligned (2)	High
7	Music (K-6)	Collaborative productions of music in small groups: B – 3 elements of DDD are addressed, alignment differs (3)	High
15	Geography (K-3)	Groupwork, 2 students in a group to find distances: B – 2 elements of DDD addressed, alignment differs (3-4)	High
8	Writing Skills (K-7)	Peer-reflective learning, producing text documents: B – 5 elements of the DDD aligned (1-2), medium extent of Ipad-use	Medium
3	History (K-2)	Collaborative production of a movie or a book: C – 2 elements of DDD addressed, alignment differs (4-5), but high extent of ipad-use	High
2	Proverbs (K-2)	Individual learning by creating a story using Puppet Pals: D – 4 elements addressed, alignment differs (2-3), medium extent	Medium
12	Geography (K-5)	Groupwork to create a presentation (Middle East): D – 3 elements addressed, alignment differs (2-3), medium extent	Medium
1	English (K-6)	Individual production by recording the own voice in English: D –2 elements addressed, alignment differs (3-5)	Medium
13	Preschool class (K-0)	Role-playing: D– 3 elements, alignment differs (4), low extent Ipad-use	Low
14	Language (non-fiction)(K-3)	Individual learning: E – 3 elements addressed, but no alignment (4) -- Case shows iPad use reduced the quality of the didactical design and limited learning	Low
9	Natural Science (biology) (K1)	Group-assignment to make a mind-map: E – 4 elements addressed, no alignment at all (5) -- Case shows iPad-use reduced the quality of the didactical design and limited learning	Low

Five patterns occurred:

A. Innovative iPad-classrooms: alignment of didactics & technology (5 classes)
B. Almost ipad-didactics: alignment is not a strong as in pattern A (3 classes)
C. DDD is not in an alignment but through the ipad-use learning has been enabled stronger than without the iPads, high extent of iPad-use (1 class)
D. Potential for ipad-didactics: The alignment of the five elements of a DDD differ, but it does not limit learning, there is potential for a better alignment (4 classes)
E. The applied designs reduce the possibility of learning, restrict learning (2 classes)

We studied the 15 iPad-classrooms in detail. We cannot describe all of them here due to limited space; more cases are available in Jahnke & Kumar (2013).

Classroom No 5 (pattern A). In the main part of the lesson, the students got the assignment to design mathematical stories transformed from a given problem delivered on a piece of paper. Such an already existing mathematical problem was a) "minigolf – count the points" and b) "My brother Mike was 5 years old when I was born. I am now 4, how old is Mike now?" The students got the task to transform this given math problem into a new story. To make the transformation of these existing "math stories" visible (here the principle of addition, to count what is 5+5), the assignment was to create a comic. The students used a template of the mobile app Strip Designer and uploaded pictures from the Internet or from the camera roll (photos they had taken). They created speech bubbles and included text. The students collaborated to discuss the different ideas in order to create their new stories. In this phase of the lesson, a change of communication patterns took place, the students were active and a collaboration between the students started. When the students were ready, the teacher showed the solutions, gave feedback and discussed them in the classrooms according to a) to what extent is the new story similar to the given story, and b) is the transformed story a successful story. Summary: The teacher created assignments where no correct answer exists; it was an open assignment where the students got an open informal space and needed creativity to transform the given story into a new story. In producing a new story (product), the students showed they understood the principle of mathematical addition.

Classroom No. 3 (pattern C) addresses only 3 of 5 digital didactical design issues; the design of social relation and feedback were not included in the didactical design made by the teacher, and they were not supported during class. This from a didactical perspective, the quality of the design ranged towards a not so good quality (3-5) that indicated a not so well-designed classroom in order to reach the teaching aims. However, and that is a surprise, the characteristics of the iPad use shows a different picture. The students got the assignment to show the teacher what they have learnt about the historical person by creating a movie or creating a joint book. To enhance learning, the iPads were used to support a *collaborative production* of a new movie. The high extent of the iPad use was visible in its use as a multimodal device: the camera, the portability and the specific adoption of the app iMovie that was originally not intended for teaching. This mode of learning called "learning by producing something" has been transformed into collaborative production. The iPad-use in this class shows a high extent although the didactical design was not a well thought design. Summary: The teacher created learning goals in which more than one correct answer is possible. Instead of making tests where the teacher asked the students what they know about the historical person, the students produced a short movie or an eBook (they could choose) to make visible what they have learnt.

After analyzing all 15 classrooms in detail, following *design principles* could be explored. Teachers…

- do design new learning goals where more than one correct answer exists and assignments in which a right answer is not known (it supports to deepen learning)
- do design informal-in-formal learning spaces and focused on learning as a process,
- support to make learning visible in different products; choice of diverse assignments
- use apps that are primarily not built for education (e.g., PuppetPals, StripDesigner).

The study illustrate that didactical designs *cannot be just added to* ICT or vice versa. Teachers in the workplace have designed new forms of Digital Didactics (ipad-didactics) to enable and boost student learning. The complexity and richness of their Digital Didactical Designs inform system developers for mobile learning applications in schools.

References

Biggs, J. & Tang, C. (2007): *Teaching for Quality Learning at University*. 3rd, New York.

Bryman, A. (2008). *Social research methods* (Third Edition). New York: Oxford U Press.

Chou, C.C., Block, L., & Jesness, R. (2012). A case study of mobile learning pilot project in K-12 schools. *Journal of Educational Technology Development and Exchange*, 5(2), pp. 11-26.

Duffy, T. M. & Cunningham, D. J. (1996). Constructivism: Implications for the design and delivery of instruction. In: *Handbook of research for educational communications and technology*, pp. 170-199. New York: Simon & Schuster Macmillan.

Fink, D. L. (2003). *Integrated Course Design*. Idea paper #42. Idea Center, Kansas.

Henderson, S.; Yeow, J. (2012). iPad in Education: A Case Study of iPad Adoption and Use in a Primary School. In *System Science (HICSS*), 2012, 45th Hawaii International Conference, pp.78-87.

Hudson, B. (2008). A Didactical Design Perspective on Teacher Presence in an International Online Learning Community. *Journal of Research in Teacher Education*, Umeå Univ., Vol. 15, Issue 3-4, pp. 93-112.

Hutchison, A., Beschorner, B., Schmidt-Crawford, D. (2012). Exploring the Use of the iPad for Literacy Learning. In *The Reading Teacher*. Vol 66, issue 1, pp. 15-23 DOI: 10.1002/TRTR.01090

Jahnke, I. (2010). Dynamics of social roles in a knowledge management community. In *Computers in Human Behavior*, Vol. 26, Issue 4. DOI 10.1016/j.chb.2009.08.010

Johnson, L., Adams Becker, S., Cummins, M., Estrada, V., Freeman, A. & Ludgate, H. (2013). NMC Horizon Report: 2013 Higher Education Edition. Austin, Texas: The New Media Consortium.

Kember, D. (1997). A reconceptualisation of the research into university academics' conceptions of teaching, *Learning and Instruction*, 7(3), pp. 255–275.

Klafki, W. (1963). *Studien zur Bildungstheorie und Didaktik*. Weinheim: Beltz.

Kolb, D. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Prentice-Hall, Inc., Englewood Cliffs, N.J.

Laurillard, D. (2007). Pedagogical Forms for Mobile Learning: Framing Research Questions. In Pachler, N. (ed.) *Mobile learning: towards a research agenda*. WLE Centre, IoE, London, pp. 153-175.

Lund, A. & Hauge, T. E. (2011). Designs for teaching and learning in technology-rich learning environments. *Nordic journal of digital literacy*. (4), pp 258-272.

Mårell-Olsson, E. & Hudson, A. (2008). To Make Learning Visible: In what way can ICT and Multimedia Contribute? *Tidskrift för lärarutbildning och forskning*, no3-4, pp. 73–90.

McCombs, S. & Liu, Y. (2011). Channeling the channel: Can iPads meet the needs of today's M-Learner. In *Proceedings of Society for Information Technology & Teacher Education International Conference 2011* (pp. 522-526). Chesapeake, VA: AACE.

Melhuish, K. & Falloon, G. (2010). Looking to the future: M-learning with the iPad. Computers. In *New Zealand Schools*, 22(3), 1-16.

Detecting user's interests based on the accuracy of collaborative tagging information

Manel Mezghani[1,2*], André Péninou[2*], Corinne Amel Zayani[1*], Ikram Amous[1+] and Florence Sèdes[2*]

[1]Sfax University, MIRACL Laboratory, Sfax, Tunisia. [2]Paul Sabatier University, IRIT Laboratory.

*surname@irit.fr, [+]*ikram.amous@isecs.rnu.tn*

Abstract. A user profile has to reflect the user's needs according to his characteristics (personal data, interests and preferences), his context, and his situation. In this article, we focus on the problem of adaptation quality in social networks, which is affected by the accuracy and relevance of the user's interests. The originality of our approach is the proposal of a new technique of interests' detection by analyzing the accuracy of the tagging behaviour of the user in order to figure out the tags which actually reflect the resources' content. Our approach has been tested and evaluated on the Delicious social database.

Introduction

Social information is permanently growing. Consequently, the adaptation process becomes more complex. The adaptation is a process strongly related to user's profile modelling. A profile that reflects the appropriate characteristics (interests, preferences, etc.) could avoid cognitive overload and disorientation of the user when accessing the information space. In our work, we are interested in detecting the user's interests that will be used in further works for an adaptation purpose.

Detecting social user's interests' is a non trivial problem (Milicevic *et* al., 2010). In fact, the user's profile building process suffers from the lack of information provided by himself. Indeed, the user generally doesn't give all the information related to his interests. So his profile can never be considered fully

known by a system.In order to overcome such a problem, the researchers have analyzed the social environment of the user such as his neighbours (the persons connected to the user explicitly or implicitly), his tagging behaviour (the collaborative action of tagging resources), or even the objects (the resources) he interacts with (see for example (Astrain *et* al., 2010)).

In this paper, we firstly present some existing works integrating the social environment of the user to detect interests. Then, we show the differences of our approach compared to the other approaches in the same context. We then describe our proposal for detecting interests and the experiments done to validate it. Finally, we conclude and discuss some future works.

Related works

According to (Astrain *et* al., 2010), interests could be deduced from the social environment based on the **user**, the **object** or even the **tag**. The collaborative tagging behaviour is described as the connection of these three elements: it represents the action of tagging a resource (object) by each user.

For the **user**, interests could be explicitly provided in the user's profile (Zayani *et* al. 2007), or implicitly deduced from his behaviour of navigation (Rebai *et* al., 2012) or behaviour of tagging (Kim *et* al., 2011). The user-based interest could be deduced from other users in the networks (neighbours) (Kim *et* al., 2011) (Tchuente, 2013).

For the **object**, interests are deduced based on the objects that the user accesses (White *et* al., 2009) (Ma *et* al., 2011). Objects could be any type of resource (URL, web page, image, etc.). Although these works are object-based, they do not analyze object's content. To analyze resource content, different techniques exist such as the indexation technique. Indexation is used in order to extract the significant terms from resources. After indexing resources different scoring function could be applied in order to detect the most relevant resource according to a specific query (Vallet *et* al., 2010).

For the **tag**, its utility has been proven to detect user's interest (Kim *et* al., 2011). **Tag**-based interest detection could be deduced by analyzing used tags (De Meo *et* al. 2010) or by analyzing the semantic of tags (Kim *et* al., 2011).

Synthesis

After presenting some researches done to analyze the tagging behaviour elements, we now discuss the main differences between our approach and the other researches: i) Unlike most of researches which focus on the tag content considered as an interest (by analyzing the semantic of the tags for example), we will focus on analyzing the accuracy of the tags with the resources' content. ii) We focus on analyzing the object-based rather than the user-based interest

detection. In fact object-based interest detection provides richer information than the user-based method (Song *et* al., 2011). iii) for object-based interest detection, most of researches do not consider the accuracy of the tags with the object (resource) content. This problem has been addressed in (Milicevic *et* al., 2010). However, the proposed approaches use techniques such as clustering, semantic processing, etc. and none of them use the resources' content analyze in their works. iv) dealing with the accuracy of the tag could overcome problems related to the nature of these social annotations. The main problem is the ambiguity associated to these tags since they are user generated keywords and do not follow any rules. This problem has been explicitly addressed in some researches (see (Mezghani *et* al., 2012) for more details). In our approach, this drawback will be treated automatically while detecting the accurate tags.

To summarize, our approach uses the users' tags and treats them according to the content of their respective resources. The accurate tags are those reflecting the resources' content. In order to validate our research, we will use the social environment that reflects the user's interests. The interests are stated accurate for a user since they exist in his neighbours' profile (Tchuente, 2013).

Proposed approach

In this section, we will propose our approach for detecting accuracy of the user's interest. This approach is based on the hypothesis that a user, who tags a resource with keywords reflecting its content, is really interested with the thematic of this resource. This observation will be experimented and validated on the Delicious social dataset.

Description

In our approach, we analyze the tags assigned to the resources to detect user's interest. The resources are generally a set of URLs describing them. We extract in the first step the tagging behaviour relations, composed by the tags applied to the resources by each user. Generally this activity is represented in a tripartite model which describes the users U={*u1,...ul*}, the resources being tagged R={*r1,...,rm*} and the tags T={*t1,...tn*} :

$$\text{Tagging relation} : <U, T, R> \quad (1)$$

where *l* the number of users, *n* the number of tags and *m* the number of resources. In the second step, we extract the content of these URLs and index them as semi-structured (XML) files, using the Lucene indexing tool API[1]. We will use it in order to figure out the most accurate tags with regard to the content of the tagged resources. Lucene relies on a field-based indexation technique. This characteristic

[1] http://lucene.apache.org/

enables indexing the documents according to one or more fields. Our indexation process is done according to the fields: title, content and URL. After indexing the content of the resources, we assign a rank to each resource according to the assigned tag. This rank is computed from a similarity between the resource (as a XML file) and the query (as a tag). Many similarity functions exist in the literature such as the similarity function supported by Lucene[2].

We run this scoring function according to the field content. After ranking the resources, we test if the resource tagged by the query exists in the top-k result provided by the ranking function. If it's the case, we state the tag as relevant to the resource. This step is iterated for all tags of each user's neighbour. In order to validate the relevant tags list, we compare the founded relevant tags (of the user's neighbours) with the user's tag (real tagging behaviour). The validation step will be detailed in the next section. Figure 1, describes the interest's detection process.

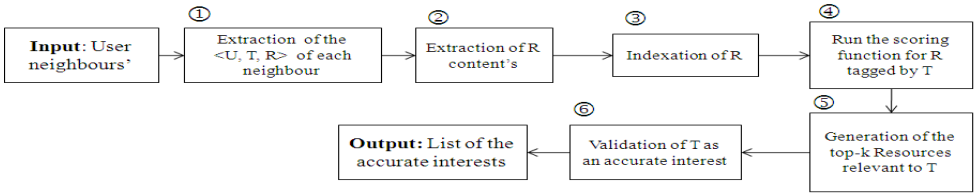


Figure. 1. The interest detection process.

Validation

We validated our approach upon the Delicious database that contains social networking, bookmarking, and tagging information. It provides information about the user's friend relationships and the tagging relation information <U, T, R>. The users U are described through their ID. The resources R are described through their ID, URL and title. The tags T are described through their ID and value. We have tested our approach on a set of 100 users. These users have different number of neighbours (varying from 1 to 20). The number of tags, documents and tagging relations is different for each user. This number may roughly vary from 10 to 500 for the tags, from 10 to 500 for the documents, and from 20 to 600 for the tagging relations. For the result of the top-k documents relevant to a query, we have chosen k=10000. The value of k is chosen according to the largest possible value, as-we wanted to test (in this first stage) with the maximum of results achievable (even those with lower scores). Also, the choice of the k value is proportional to the number of resources (69226 URLs) and tags (53388 tags) in the database.

Let's take as an example the tag "math" assigned by a user to different resources. This tag has a higher score according to the resource's title "IXL Math", which contains math related thematic, then the resource title "Online Dice Roller", which does not contain any information related to the thematic. So, according to this example, the tag "math" is relevant to the resource "IXL Math". After

[2] http://ipl.cs.aueb.gr/stougiannis/default.html

detecting this relevant tag, we will validate this result by using the user's neighbours. The validation objective is to show if this relevant tag is accurate to the user or not.

In this experiment, the neighbours are the explicit friendship relation (the user's egocentric network). The method of validation uses the social environment of the user (the neighbours) to detect interests. In fact the neighbours provide information that reflect the user's interests (Tchuente, 2013). We calculate the precision of the detected interests according to the tags in the neighbours' profiles. The precision is calculated according to the number of accurate tags (which exist in the user's neighbours profile) and the total number of tags provided as accurate.

$$\text{Precision} = \frac{\text{Number of accurate results}}{\text{Number of accurate results} + \text{Number of inccurate results}}$$

This precision is calculated for each single user's neighbour. The overall precision is the average of all the neighbours' precision. Figure 2, shows the overall precision, for this set of users, between the calculated relevant tags and the user's tag (real tagging behaviour).

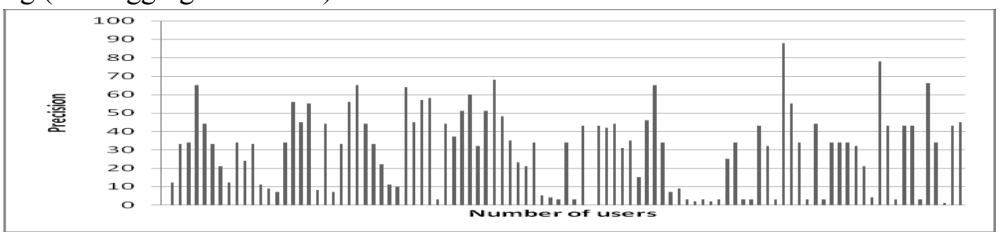


Figure. 2. Precision of the accurate interests detected for a set of 100 users.

Discussion

From this set of users, we have found that the precision vary according to different cases: i) for users who have a lot of friends, the precision is higher than those who have less friends, ii) the test has provided a precision for a few users equal to zero. This is due to the fact that a user may be friend to another user without sharing with him common interests. We have found that this special case is related to the users who have a little number of neighbours.

Also, the accurate interests provided by our approach are comprehensible keywords which reflect really the resource's content like "technology", "foursquare", "history", etc. This is an advantage since the tags are user-generated keywords. Our approach has filtered the ambiguous tags (i.e:"gis") that are not comprehensible by other users. The tags' ambiguity has decreased from 52% to 23% according to WordNet[3].

Conclusion

In this paper, we have proposed an approach for detecting accurate user's interests

[3] http://wordnet.princeton.edu/

based on the social environment. We have exploited the content of the tagged resources in order to figure out the tags reflecting really the thematic of the resources. We have validated our approach through the tagging behaviour of the neighbours (his egocentric network).

In future works, we will test our approach on a larger population of users in order to have more scalable results. Also, we will test other forms of neighbours such as, users tagging the same resources, or even users belonging to the same "community". In fact, a user may share common interests with other people than his explicitly friend relationship. Our approach could be used for an adaptation purpose (i.e.: enrichment of the user's profile, recommendation, etc.), since it provides a solution for detecting user's interests.

References

Astrain, J. J., Cordoba, A., Echarte, F. and Villadangos J. (2010): "An algorithm for the improvement of tag- based social interest discovery". SEMAPRO: The Fourth International Conference on Advances in Semantic Processing. 2010, pp. 49-54.

De Meo, P., Quattrone, G. and Ursino D. (2010):"A query expansion and user profile enrichment approach to improve the performance of recommender systems operating on a folksonomy". User Modeling and User-Adapted Interaction. 2010, 20(1), pp. 41–86.

Kim, H.-N., Alkhaldi, A., Saddik, A. E. and Joi G.-S. (2011): "Collaborative user modeling with user- generated tags for social recommender systems". Expert Systems with Applications, 2011, pp. 8488–8496.

Ma, Y., Zeng, Y., Ren, X., Zhong, N. (2011): "User Interests Modeling Based on Multi-source Per-sonal Information Fusion and Semantic Reasoning". Active Media Technology (AMT) 2011: 195-205.

Mezghani, M., AmelZayani, C. A., Amous, I. and Gargouri, F. (2012): "A user profile modelling using social annotations: a survey".WWW (Companion Volume), 2012, pp. 969-976.

Milicevic, A. K., Nanopoulos, A. and Ivanovic, M. (2010):"Social tagging in recommender systems: a survey of the state-of-the-art and possible extensions". Artif. Intell. Rev. Vol. 33 no. 3, 2010, pp. 187-209.

Rebai, R.Z, Zayani, C. A. and Amous, I. (2012): "An Adaptive Navigation Method for Semi-structured Data". Advances in Databases and Information Systems ADBIS (2), 2012, pp. 207-215.

Song, Y., Zhang, L., and Giles, C. L. (2011): "Automatic tag recommendation algorithms for social recommender systems". ACM Trans., Web.Vol.5, no.1, Article 4, 2011, pp. 1-31.

Tchuente, D., (2013): "Modélisation et dérivation de profilsutilisateursà partir de réseauxsociaux :approche a partir de communautés de réseaux k-egocentriques". Doctoral thesis, University of Toulouse, 2013.

Vallet, D., Cantador, I. and Jose, J. (2010): "Personalizing Web Search with Folksonomy-Based User and Document Profiles Advances in Information Retrieval". Advances in Information Retrieval, 2010, Vol. 5993, pp. 420-431.

White, R., Bailey P. and Chen, L. (2009): "Predicting user interests from contextual information". International Conference on Research and Development in Information Retrieval (SIGIR), 2009, ACM, New York, NY, USA, pp. 363–370.

Zayani, C. A., Péninou, A., Marie-Françoise, C. and Sedes, F. (2007): "Towards an Adaptation of Semi- structured Document Querying". Proceedings of the CIR'07 Workshop on Context-Based Information Retrieval CIR 2007, CEUR-WS.org, Vol. 326.

Semi-Automatic Tagging for Email

Mateusz Dolata[1], Nils Jeners[2], Wolfgang Prinz[3]
University of Zurich[1], RWTH Aachen University[2], Fraunhofer FIT[3]
dolata@ifi.uzh.ch, nils.jeners@rwth-aachen.de, wolfgang.prinz@fit.fraunhofer.de

Abstract. Processing email messages is an essential part of personal information management. It is a complex task enforcing users to develop individual strategies, which are sometimes not in line with functionalities offered by various email clients. This paper addresses these strategies and offers a tag-based solution for organizing mailboxes. The results of the evaluation confirm the desirability of the presented prototype for email structuring and retrieval. The discussion opens perspective on future developments.

Introduction

Asynchronous, distributed communication plays an important role in daily work practice. *Email* remains the dominating professional communication paradigm, while its importance for informal correspondence has been decreasing. Email remains popular, even though or rather due to its simplicity (Prinz et al., 2009). The protocol is straightforward and implements the metaphor of sending a traditional letter. This openness of email is considered a reason for its popularity. According to Bellotti et al. (2003) people use their virtual mailboxes as: a calendar, a to-do repository, an archive, a contact list, and finally a message collector. Such observations lead to the definition of *email overload* (Whittaker and Sidner, 1996).

To cope with such problems, particular email clients extend the simple email metaphor. The focus of email processing moves towards proper structuring and efficient retrieval. The offered mechanisms do not always support the user, but demand his attention for preparatory filtering or good memory of wording for an *ad hoc* search. This paper assumes that users apply a mixture of strategies to facilitate the email processing. Field observations and interviews resulted in specific usage scenarios. They were further used to define and develop a prototype de-

scribed below, which enables observing how *semi-automatic tagging of messages leverages efficient email structuring and retrieval*. In particular, the following initial research questions are asked: (1) *what are the advantages of supported tagging for email processing*; (2) *do users accept and find it attractive to use such tags for email processing*. Future tests and refinements of the presented prototype shall yield a coherent requirements catalogue for design of semi-automatic approaches for email processing.

Related work

Email processing is addressed by a vivid discussion in the community. Particular studies range from understanding the role of email for communication till evaluation of practical systems.

Classification of the virtual correspondence was addressed in the past. While focusing on email as a communication channel, Winograd (1986) proposed a model based on Searle's Speech-Act Theory (1969). By convention, two standard email acts emerged: response and forwarding. Based on those message attributes, email clients support threading, without support for classification into speech acts. Other approaches for automatic email classification choose transactional activities (Dredze et al., 2006) or tasks (Bellotti et al., 2003) as a target domain.

While addressing email as a personal information management domain, several studies propose classification of activities. Venolia et al. (2001) suggest a model for email workflow consisting of: flow, triage, task management, archive, and retrieve. Based on a user study, they propose, among others, labels as a way to support users at archiving messages, triage, task management and retrieval. They also suggest automatic elicitation and suggestions regarding labelling. This solution has been partially implemented by Google's GMail™ , so that users are able to apply numerous tags to a simple message, without any further automatic support. Venolia et al. (2001), however, explicitly stress the role of supportive and intuitive UI as highly relevant for labelling. Different labelling approaches (with or without automatic processing) resulted from numerous research project, however did not find their way to the market (cf. (Crawford et al., 2002; Segal and Kephart, 2000; Kerr and Wilcox, 2004). Matysiak Szóstek (2011) focuses on elicitation and dependencies between latent user needs. She follows a model consisting of just two activities: organization and retrieval. Message annotation seems to be the most relevant need for organization of virtual correspondence, whereas informative overview and flexible sorting play an important role during retrieval. In general, needs linked to retrieval are perceived as more important than those associated with organization. This sets the feeling of email overload in relation with processing older messages (cf. Dabbish and Kraut, 2006). Matysiak Szóstek (2011) provides numerous design requirements regarding email processing, including automatic maintenance of priority indications and linking between related messages, as well as flexible sorting according to people involved.

As discussed, email is the ultimate system in CSCW. However, email clients did not evolve over the past decades. Recently, productive systems appeared

which change the tradition, e.g. GMail™ , MailPilot, etc. The above review shows that academia is attracted by the topic of email management and provides evaluation results of numerous prototypes and broad studies on email usage. However, a clear and consistent catalogue of design principles for automatic or semi-automatic support of email processing is still missing.

Semi-Automatic Tagging

Development: Given the results of the literature review and insights from observations and interviews in form of usage scenarios, a concept for semi-automatic tagging of messages was developed. Particularly, tagging means to add tags to messages: either manually or automatically. Semi-automatic tagging in our prototype is realized by enabling easy and efficient changes to automatically generated tags. This, also, implies that the tag generator learns from examples.

The system generates tags for a respective message when it arrives. The decisions of the system are understandable and reproducible reflecting the content of the message. Also, the user has the possibility to change the behaviour of the system and adjust it to own needs. Consequently, the system does not only tag incoming messages, but also learns how to tag from the previously labelled messages. The desired functionality along with the insights from preliminary interviews leads to additional technical requirements. First, the program shall provide tags, even when no tags are available in the mailbox, i.e., no training data exists. Second, it shall adapt to user needs. Third, the system shall be robust and fast.

Under consideration of the above requirements, a hybrid solution was chosen to generate tags. Its essence lies in combination of heuristic and *machine learning* (ML) approaches. In particular, the algorithm combines information from linguistically motivated text processing and from a learnable keyword extractor when generating set of tags for a given messages. The heuristics rely on the extraction of nouns and named entities from the text. *Nouns* play an important role in transporting meaning, therefore filling variety of semantic roles in Indo-European languages (cf. Fillmore et al., 2003). The Stanford Part-Of-Speech-Tagger (Toutanova et al., 2003) is used to obtain nouns from the text. *Named entities* (NE) are phrases or words that refer to particular, unique entities (Sundheim, 1995). As they are mostly names of people, places or organization, they are assumed good candidates for message tags. The Stanford NE Recognizer (Finkel et al., 2005) is employed for extraction. In addition, results of learnable *key phrase extractor* from MAUI indexer (Medelyan and Witten, 2008) are heuristically combined with nouns and named entities and form a candidate set. Each candidate is assigned a weight depending on its frequency and character (noun vs. NE vs. key phrase). The weights change with number of tagged messages in the mailbox, such that the role of the machine learnable key phrase extractor grows with the number of available examples. Further processing, such as removal of stopwords and nearly duplicates, leverages the quality of the candidate set. Finally, the top ranked candidates are assigned as labels to the considered message.

User interface plays an extraordinary role in our approach. Not only the purely technical possibility to change a tag, but also the low burden related to this, stand for adjusting the tagging system to ones needs. It leverages the interaction with tags, makes the user more familiar with them, and finally raises the trust in system decisions. This paper addresses only tagging and not the design of email clients in general. Therefore, efforts were made to test the approach in a traditional, very common email client interface. The prototype presented here builds on top of Roundcube (0.7.2.). Figure 1 presents the user interface of the prototype.

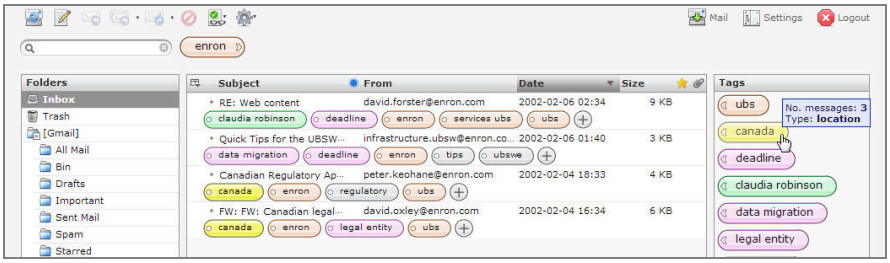


Figure 1. User interface of the prototype showing the toolbar, folders, tags, and messages with given tags.

The most obvious modification is the introduction of a separate frame on the right including all tags used for emails presented in the message list. Labels are ordered according to their frequency in the mailbox. In case the user wants to use tags for retrieval, a single click suffices to filter messages. Figure 1 presents the situation where filtering by tag "enron" was applied already. Choosing additional labels can further specify the search. For instance, if the filter was extended by tag "data migration", only the second message would remain in the view – tags assigned to messages are placed directly below their headers in the message list.

Colours of tags depend on their category (location, topic, time, etc.). Users are of course allowed to adjust them. For automatically generated tags categories are obtained through the NE Recognizer. It suffices to click the tag only once to reach a menu with tag operations, such as: renaming, deleting or category change. Opposite to email clients like GMail™, it is not necessary to define labels first before assigning to a message. Opening the "+" dialogue and providing a name suffices. If the name does not yet exist in the mailbox, a new label will be generated and added to the tag list. Otherwise, the message is assigned the already existing tag.

Evaluation: The evaluation aims at providing answers to the research questions. Since the areas approached by the questions (usability, acceptance and attractiveness) are tightly interwoven, the proposed test observes numerous variables, while giving the possibility to interact with the system and reflect on it.

For evaluating the system, an in-lab experiment with users was conducted. The user was asked to solve two basic tasks testing the usability of the system, such as tagging of two predefined messages, navigational search for a message and summarizing a message given its tags. Between the tasks, short interview was incorporated to collect additional opinions. Finally, data regarding acceptance and attractiveness of the system were collected through UTAUT (Venkatesh et al.,

2003) and AttrakDiff2 (Hassenzahl et al., 2003) questionnaires. All 14 participants, aged 24-59, are frequent email users and merely do not use tagging. Only three participants of the study use it for their main professional mailbox.

The result of the tagging task shows that the tag generator in its original mode makes its predictions with high accuracy measures (0.86 recall, 0.73 precision). The opinions regarding the tagger itself are very positive, but due to the task setting users feel encouraged to change tags. They appreciate the easiness of changing a tag, while seeking faster access to the *remove* command. Indeed, there is a strong tendency towards removal, compared to renaming and adding tags (22%, 5%, 7% respectively). Filtering tests again show vivid user interest and acceptance, even though performance values for tag-based search do not significantly differ from those for query-based search. The average number of clicks, scrolls and typed signs required for finding the desired message is similar with slight tendency towards the tag-based solution (60 vs. 69 operations). Finally, the last assignment yields to the conclusion that tags facilitate message summarization. 10 out of 14 participants can provide full summary and explain the meaning of tags in the context. Three other participants forget to mention one important characteristic. Comparison with other "summarization" paradigms, such as snippets containing first two lines of the message, could provide further insights.

The results of the acceptance and attractiveness questionnaires enable further conclusions on semi-automatic tagging. The UTAUT provides very positive values regarding performance and effort expectancy (5.3 and 6.1 out of 7 respectively). In other words, users anticipate the system to fulfil their needs without requiring much work from them. It is in line with the tendency to assist the user at structuring while providing easy-to-use paradigms. The results of the AttrakDiff2 also confirm the high pragmatic value of the proposed solution (1.3 on a scale ranging from -3 to 3). The general attractiveness reaches the same level, while the hedonic quality is graded 0.8, thus suggesting further improvement regarding, e.g., visual elements and speed, as confirmed in the interviews.

Discussion

This paper shows the drawbacks of the most popular methods for email structuring and retrieval. It aims at launching an intensive research path on semi-automatic support of email processing. It also shows how such a paradigm can be implemented it into daily practice, while extending existing email client with novel functionality. The results of the final evaluation enable observations on positive user's attitude towards the introduced solution, as well as its usability for common email tasks. All this leads to the conclusion, that semi-automatic tagging facilitates easier and efficient structuring and retrieval of messages in the mailbox. Therefore, development of further prototypes, while following the Usability Engineering approach by Rosson and Carroll (2002), will be continued in order to establish a catalogue of relevant and generalizable design principles for semi-automatic email processing.

References

Bellotti, V., Ducheneaut, N., Howard, M., and Smith, I. (2003): 'Taking email to task', in Proc. Conf. Human Factors in Computing Systems - CHI, pp. 345.

Crawford, E., Kay, J., and McCreath, E. (2002): 'An intelligent interface for sorting electronic mail', in Proc. Intl. Conf. Intelligent User Interfaces - IUI, pp. 182–183.

Dabbish, L.A. and Kraut, R.E. (2006): 'Email overload at work: an analysis of factors associated with email strain', in Proc. Conf. Comp. Supported Cooperative Work - CSCW, pp. 431–440.

Dredze, M., Lau, T., and Kushmerick, N. (2006): 'Automatically classifying emails into activities', in Proc. Intl. Conf. Intelligent User Interfaces - IUI, pp. 70.

Fillmore, C.J., Johnson, C.J., and Petruk, M.R.L. (2003): 'Background to Framenet', Intl. J. of Lexicography, vol. 16, no. 3, pp. 235–250.

Finkel, J.R., Grenager, T., and Manning, C. (2005): 'Incorporating non-local information into information extraction systems by Gibbs sampling', in Proc. Conf. Assoc. for Comp. Linguistics - ACL, pp. 363–370.

Hassenzahl, M., Burmester, M., and Koller, F. (2003): 'AttrakDiff: Ein Fragebogen zur Messung wahrgenommener hedonischer und pragmatischer Qualität', Mensch & Computer, pp. 187.

Kerr, B. and Wilcox, E. (2004): 'Designing remail: reinventing the email client through innovation and integration', in Extended Abstracts. Conf. Human Factors in Computing Systems - CHI, pp. 837.

Matysiak Szóstek, A. (2011): '`Dealing with My Emails': Latent user needs in email management', Computers in Human Behavior, vol. 27, no. 2, pp. 723–729.

Medelyan, O. and Witten, I.H. (2008): 'Domain-independent automatic keyphrase indexing with small training sets', J. of the American Society for Information Science and Technology, vol. 59, no. 7, pp. 1026–1040.

Prinz, W., Jeners, N., Ruland, R., and Villa, M. (2009): 'Supporting the Change of Cooperation Patterns by Integrated Collaboration Tools', in L.M. Camarinha-Matos et al. (eds.): Leveraging Knowledge for Innovation in Collaborative Networks, pp. 651–658.

Rosson, M.B. and Carroll J.M. (2002): Usability Engineering: Scenario-Based Development of Human-Computer Interaction. Morgan Kaufmann.

Searle, J.R. (1969): Speech acts: An essay in the philosophy of language, Cambridge Univ. Press.

Segal, R. and Kephart, J.O. (2000): 'Incremental Learning in SwiftFile', in Proc. Intl. Conf. Machine Learning - ICML, pp. 863–870.

Sundheim, B.M. (1995): 'Overview of results of the MUC-6 evaluation', in Proc. Message Understanding Conf. - MUC, pp. 13.

Toutanova, K., Klein, D., Manning, C.D., and Singer, Y. (2003): 'Feature-rich part-of-speech tagging with a cyclic dependency network', in Proc. Conf. North American Ch. of the Association for Computational Linguistics on Human Language Technology - NAACL, pp. 173–180.

Venkatesh, V., Morris, M.G., Davis, G.B., and Davis, F.D. (2003): 'User Acceptance of Information Technology: Toward a Unified View', MIS Quarterly, vol. 27, no. 3, pp. 425–478.

Venolia, G.D., Dabbish, L., Cadiz, J.J., and Gupta, A. (2001): Supporting Email Workflow: Technical Report MSR-TR-2001-88, Microsoft Research, Redmond and WA.

Whittaker, S. and Sidner, C. (1996): 'Email overload: exploring personal information management of email', in Proc. Conf. Human Factors in Computing Systems - CHI, pp. 276–283.

Winograd, T. (1986): 'A language/action perspective on the design of cooperative work', in Proc. Conf. Computer-Supported Cooperative Work - CSCW, pp. 203.

Application of Icon System for multiple viewpoints collaboration in design project

Xiaoyue Ma[1], Jean-Pierre Cahier[1], Régine Teulier[2]
[1]ICD/ Tech-Cico University of Technology of Troyes (UTT) Troyes, France
[2]CNRS, France
[1]*{xiaoyue.ma,cahier}@utt.fr*
[2]*Regine.Teulier@polytechnique.edu*

Abstract. Iconic tagging system could be useful for centralizing and providing the fine-grain annotations in classifying, sharing and seeking documents within a designers' group in a civil engineering activity. Such icon system based on a visual distinctive language (VDL) is useful for iconic tagging ideas, plans and design. It will facilitate design discussions by symbolic interpretation and graphical organization of tag structure. We propose an experiment for cooperatively creating and using such icon system within designers to share iconically-tagged design documents of CAD/CAM system. Semiotic components of icons are organized in relative "points of view" according to various dimensions of design activity (rhetoric status of the proposals, operational status, multi-disciplinary design thematic and project management focus…) This kind of icon system is assumed to improve communication and solve design conflicts (named "clashes").

The aim of this paper is to design conceptual specifications for a tags system added to a CAD. This is assumed to develop a prototype by CAD editors who are engaged in the research project MINND. This paper follows studies in collective design activities (Guibert et al., 2009; Schmidt and Wagner, 2005). This paper attempts to contribute as a research as design explorations (Fallman and Stolterman, 2010). It is to use the results of doctoral work of the first author on Icon System (Ma, 2013) in another field and to ask « what if ? » questions through design, and experiment alternatives for designers communication. As Fallman and Stolterman point "this form of design research is strongly shaped by the ambition to explore new solution …and new usages … ".Interesting research

addresses problems, challenges, or themes that are important to professionals (Halkov and Dalsgard, 2006). The problem, we want to address is the communication between designers who are over load by messages.

Scientific purpose

Our objective is to explore former applicable field of VDL-based icon system from knowledge organization system into a particular social community: teams of designers in Civil Engineering(CE) (e.g. buildings highways, bridge, railway), where tags will not be used as key words for knowledge management but as exchange language (textual annotation) in collaboration. Our work on icons design can be compared to design method literature such as Halkov and Dalsgard (2006). Appropriate and specific icons can be considered as design concepts that will be further explored in prototypes (Halkov and Dalsgard, 2006). The scientific purpose of the paper is an experiment primarily focused on future practice, secondarily the authors will use the observations acquisition made during this project to understand how icons will be used by designers.

This work will be carried out in the context of a research project on digital mockup (from now on referred to as DM) in civil engineering: the MINND project, a "National Project" of Ministère de l'Ecologie, du Développement Durable et de l'Energie, and which extends the research of COMMUNIC, an ANR project (Communic, 2010; Malavergne, 2010). The aim of MInnD project is to conceive a specific DM for civil engineering which does not yet exist. Our experiment will take place in this context: which DM will be useful for civil engineering designers? And for us the question is: will icons be useful for their exchanges in their design activity? We want to propose specific ways to cooperate through icons with specific meaning to a design team. Communication between CE engineers is very specific and marked by their profession including "site reviews"(Teulier, Rouleau, 2013).

The civil engineering design activity includes strong cooperation and discussion phases between several professional specialities, a large amount of annotation of plans, design documents and geographic information (Boland *et al*, 2007). The knowledge organization system that will be tagged by the icons is composed of documents, plans, 3D schemes managed with a CAD system. The 3D representation means one can view a set of objects and also the space they occupy together. The propagation of constraints and assumptions depends on each actor specifying the design of objects for which he is responsible. Most of discussions between designers are about the competitive use of a space. Conflicts between propositions are regularly settled during the "project review". Most of the time, the method adopted is as follows: the *clashes* (geometric interference or incompatibility between attributes of identifiable objects in the mockup) that occur are allocated by the project manager (or DM manager or review manager) to one of the participants in conflict who must then offer an alternative solution at the next project review. Project meetings are often split between settling old clashes and updates on new ones.

VDL-based iconic tagging system

Semiotic visualization is crucial for coordination: icons systems are codified languages of signs, useful as active parts of virtual design landscapes (2 or 3D), to visualize at one glance artifact mock-up representations, topic maps or project milestones. Such virtual landscapes facilitate mutual asynchronous awareness in teamwork (Pankoke-Babatz *et al.,* 2004). Textual annotation and tags, which can be used in design project teams, may create problems on understanding too much textual elements or identifying the typology or the structure of annotations.

Studies on cognitive psychology like Dual-coding Theory (Pavio, 71, 86) have gradually postulated that both visual and verbal codes are used to organize incoming information into knowledge that can be acted upon, stored, and retrieved for subsequent use. In addition, empirical researches have reflected the notion of "Icons System" like road signs, symbols of fire safety (Collins *et al.*, 1982) and medical icon system (Lamy *et al.*, 2008). We propose to use icons for annotating and tagging design items in design activities where this solution could improve communication and cooperation. Once an icon system provides the icons for knowledge tagging, it will be equally called an iconic tagging system. An icon system is not only interested in representing each tag, but also the tag structure which is increasingly essential to find, and be able to find again later, a proper tag for knowledge sharing, especially when more diverse knowledge is concerned. However if knowledge categorization is represented by icons without an explicit structure, users may experience disorientation when faced with too many isolated symbols (Ma and Cahier, 2011).

The visual distinctive language (VDL)-based iconic tagging system we propose has been previously described and evaluated (Ma and Cahier, 2012a) in which iconic tags were organized under graphical regularity and semiotic strategy (Nakamura *et al.*, 2012). Experimental results have proved that these iconically structured tags were able to develop tagging efficiency taking advantage of explicit tag construction. There is a cross-fertilization between the icon system (e.g., for its advantages in terms of semiotics, playfullness or memorization) and the textual system (e.g., for its advantages in terms of disambiguation and lexical precision). Icons existed in these previous experiments were purely suggested by specialists without users' participation. Thus in this paper we need to ameliorate it by more participative experiments, including real users groups (our second aim).

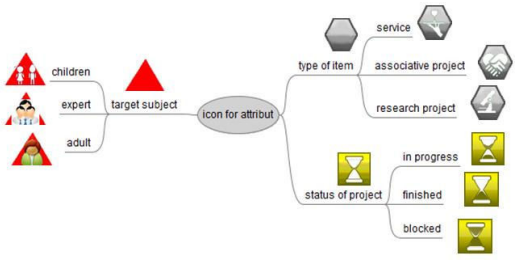


Figure 1. Examples of Hypertopic-based iconic tags.

In an icon system used by a working group, new icons have to be easily designed in a cooperative manner, especially when shared domain changes, and it

is the case in civil engineering project which are recomposed for each infrastructure. Designers have to think of sustainable construction of icon system to adapt different cases while simultaneously users have also to get used to new graphical regularity which arises the problem of tiring learning.

The experiment will allow cooperatively building up the icon system within a group of designers. Due to the cooperative dimension of our research, we have used a knowledge model respecting the principles of Social Semantic Web (Bénel et al, 2009) to structure knowledge tags. This model, called Hypertopic (Zhou *et al.*, 2006), available for social experiments by using a set of software tools (Bénel *et al*., 2013), indicates that all the topics and attributes of the tagged items (Figure 1).are from different viewpoints in correspondence with the various kinds of information goals. In this project Hypertopic will continue to be applied for multi viewpoint topics management however with the resources including rhetoric status of the proposal, operational status, business thematic and so on, instead of only tagged documents]. In the bootstrap phase of the experiment, the icon system will be created based on this kind of multi dimensions cooperative work. Meanwhile users will as well be invited to propose additional attributes, topics and viewpoints and complete the icon system, according to a simple architecture of participation (Figure 2).

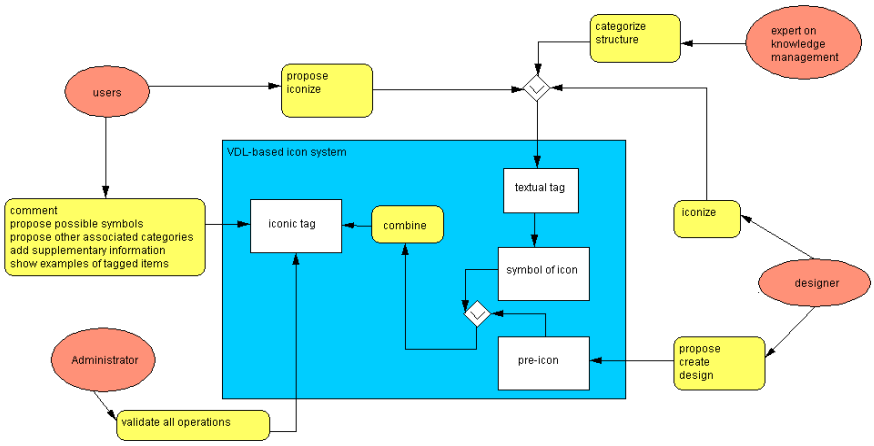


Figure 2. The proposed participation architecture for icon system co-building

Experiment will include continuous co-construction of icon system within a team of designers. Collaboration from all users is assumed to facilitate icon design and icon understanding. Established with the CSCW method SeeMe (Herrmann *et al.*, 2000), four essential roles participate in the participation architecture necessary to this co-construction of icon system (Fig.3): experts on knowledge management, designers, users and administrators (Ma, Cahier, 2012b).

The aimed experiment

From passed observations of engineers working on a design of highway. We assume several types of tags to complement the functionality of CAD (e.g. the

status of proposals) and to organize reading and sharing patterns products. Tags can be organized according to the roles that the product and the audience to which they are destined. We give some examples of labels below.

- By the author of a scheme to give an opinion on its own production, for example : “This object attribute is”, “I propose this solution, but I'm OK to change”.
- By the author, to draw attention to an identified colleague: “This can be a problem, what do you think, Marc?”, “Constraint consumed, but I was forced to change”
- As a report authored point throughout the project: “Diameter of reinforcement changed, to talk meeting clash”, “Stress X of Y121 feature unfulfilled”.
- By the proposal reader: “I don’t agree with this proposal, to see at meeting clash”
- By the project manager: “identify as problem”, “priority one for the meeting clash”

We shall proceed by observing real work situations, observing engineers working on different design tools (e.g. Autodesk software tools) and refine our assumptions. The observations will be made on actual site, but an activity with software tools that will not necessarily those for which the system is organized tags specified. The icons will be designed in a second step from a first test of our hypotheses with CE engineers, ergonomists and designers tags, the method is participatory (Ma, 2013).

The work is in preliminary phase, which characterizes it is its insertion into a much larger project that involves several research and industry. We expect the following steps. Step 1: test our first hypotheses in the form of text, not icons by interviews with designers in stage two industrial partners of the project, completed e an observation stage designers working with existing software i.e. not with the door on which the DM mark). Step 2: Development of new set of tests with paper labels and validation designers. After this validation, development of a few icons and several set of tests will be test. Step 3: Design and drafting of conceptual specifications to deliver the software for validation, this document will form part of a deliverable MINND and will be elaborated with software engineers of CAD editors and civil engineers.

Tags are annotations on the content of the documents exchanged by the designers, but they can also be of a different nature: they can represent elements of cooperation between designers, messages that allow them to communicate with "anchoring" of their trade on the documents. For example, we shall test Icons produced by the designers could be collected in a summary table for the project, and will constitute a sort of table of "alerts" helping prepare his review of clashes.

References

Bénel, A., Salembier, P., Cahier J.P. (2013): 'Towards non-disposable Software Architectures for Participation', *Workshop "Cultures of Participation in the Digital Age" @ IS-EUD Conference*, June 10, 2013, IT Univ. of Copenhagen, Denmark.

Bénel, A., Zhou, C., Cahier, J.P. (2009): 'Beyond Web 2.0...And Beyond the Semantic Web', *Design of Cooperative Systems*, Chapter 1, Springer.

Boland, R.J., Lyytinen, K. and Yoo, Y. (2007): 'Wakes of innovation in project networks: The case of digital 3-D representations in architecture, engineering, and construction', *Organization Science*, 18(4), 631-647.

Collins, B.L., Lerner, N. (1982): 'Assessment of Fire Safety Symbols', *Human Factors* 24(1), pp.75-95

Communic (2010) : 'Livrable 3, Programme fonctionnel pour la maquette numérique', *Retrieved from communic.fr/projet_anr_communic.htm*

Fällman, D., Stolterman, E. (2010): Establishing criteria of rigour and relevance in interaction design research. Digital Creativity, 21(4), 265-272.

Guibert, S., Darses, F., Boujut J-F. (2009): 'Using Annotations in a Collective and Face-to-Face Design Situation'. ECSCW.

Halskov, K., Dalsgard, P. (2006). Inspiration card workshops. In Dis 2006 (pp. 2-11). University Park, PA, USA: ACM Press.

Herrmann, Th., Hoffmann, M., Loser, K.-U., Moysich, K. (2000): 'Semistructured models are surprisingly useful for user-centered design', In: Dieng, R.; Giboin, A., Karsenty, L., De Michelis, G. (Hrsg.): *Designing cooperative systems*. Amsterdam: IOC press, pp 159 -174.

Lamy, J. B., Duclos, C., Bar-Hen, A., Ouvrard, P. and Venot, A. (2008): 'An iconic language for the graphical representation of medical concepts', *BMC Medical Informatics & Decision Making*.

Ma, X. (2013): Système participatif de tags iconiques basé sur un langage visuel distinctif multipoints de vue. Thèse soutenue le 19 juin 2013 à l'Université de Technologie de Troyes.

Ma, X., Cahier, J.P. (2011): 'Iconic Categorization with Knowledge-Based Icon Systems can Improve Collaborative KM', In: *CTS2011*, pp. 216 – 223, IEEE Conference Publications.

Ma, X., Cahier, J.P. (2012a): Visual Distinctive Language: using a Hypertopic-based Iconic Tagging System for Knowledge Sharing*Web2Touch 2012: IEEE WETICE Track - Modeling the Collaborative Web Knowledge Conference*, June 25-27, 2012, Toulouse, France. In Proceedings 21st IEEE International WETICE Conference, WETICE 2012, pp 456-461.

Ma, X. and Cahier, J.P. (2012b): 'Collaboratively construct a Hypertopic-based Icon System for Knowledge tagging, International Conference on Social Informatics', 5–7 December 2012, Lausanne, Switzerland, *Lecture Notes in Computer Science series*, pp. 309-322.

Malavergne F. (2010) : 'Projet de recherche Communic : la maquette numérique pour les infrastructures'. *Revue Travaux* 877, déc 2010/jan 2011, pp. 82-85. www.revue-travaux.fr/media/deliacms/media/22/2284-1312ba.pdf

Nakamura C., Zeng-Treitler Q., (2012): 'A taxonomy of representation strategies in iconic communication', *International Journal of Human-Computer Studies*, Volume 70, Issue 8, P. 527-576, August 2012, pp. 535-551.

Paivio, A. (1986): *Mental representations: a dual coding approach*, Oxford University Press.

Paivio, A. (1971): *Imagery and verbal processes*, New York: Holt, Rinehart, and Winston.

Pankoke-Babatz, U., Prinz W. and Schäfer L., (2004): 'Stories about Asynchronous Awareness', *Cooperative Systems Design - Scenario-Based Design of Collaborative Systems*, F. Darses, R. Dieng, C. Simone and M. Zacklad, IOS Press (eds.), pp. 23-38.

Teulier, R., Rouleau, L. (2013): Middle Managers'Sensemaking and Interorganizational Change Initiation ; Translation Spaces and Editing Practices. Journal of Change Management. Sept.

Schmidt K., Wagner I. (2005): 'Ordering systems: Coordinative practices and artifacts in architectural design and planning', *Computer Supported Cooperative Work*, 13: 349-408.

Zhou, C., Lejeune, C.H., Bénel, A. (2006): 'Towards a Standard Protocol for Community Driven Organizations of Knowledge', *ISPE Conference on Concurrent Engineering*, pp. 33 -349. IOS Press.

‘Practice turn’ and CSCW identity

Kari Kuutti
University of Oulu, Finland
kari.kuutti@oulu.fi

Abstract. The paper reflects the position of CSCW research against the ‘practice turn’ and ‘practice theory’ discussion in social sciences. The practice approach is an attempt to find an intermediate unit of social analysis between individuals and institutions. The ‘practice turn’ has influenced IS, HCI and CSCW research, in particular European CSCW is very practice-oriented and the paper suggests that this orientation might serve an anchor for the identity of CSCW research. CSCW and PD research might also be able help the practice theory discussion with specific contributions on artifacts and change.

Introduction

During the last years the CSCW research field has been in flux. It has been suggested that the original workplace-oriented research agenda of CSCW has in the course of time become outdated (Crabtree et al. 2005), to the extent that “each word in ‘Computer Supported Cooperative Work’ has lost its relevance” (Grudin 2010). On the other hand this has been sharply countered by demands to maintain the CSCW workplace focus (Schmidt 2011). The ACM CSCW conference has already broadened its profile beyond workplaces to almost any ‘social’ uses of information technology, and the debate of the direction of CSCW as a field is going on. The purpose of this paper is to seek a position from where the potential contribution and direction of CSCW research can be discussed and evaluated. To enable this CSCW field must be seen in a broader perspective, in this case that of ‘practice turn’ or ‘practice theories’ in social sciences. The paper will first give a general outline of the practice approach and list the major schools of thought within it. Then the paper will analyze three IT disciplines – IS, HCI, and CSCW –

through the lens of practice theories. Although the practice approach has gained acceptance both in IS and HCI, CSCW – in particular European CSCW – has always had practice as a point of central interest. Based on this it is suggested that the practice orientation might be a useful anchor when discussing about the potential contribution and future direction of CSCW research.

'Practice turn' in social sciences

A significant development in social sciences during the last decades has been the emergence of a rather radical reorientation, often called as a 'turn to practice' (Schatzki et al. 2001, Miettinen et al. 2009); what follows is an attempt to distill some main issues of this turn into a few paragraphs.

Reckwitz (2002) offers the following overview on the position of practice approaches within the field of social science. First there is a divide between 'traditional' and 'cultural' theories. Traditional explanations are based on something 'given', either on individual needs (homo economicus) or on social norms (homo sociologicus). Cultural theories challenge these explanations as too narrow and limiting, and maintain that human actions take place in a cultural context that allows humans to interpret world and thus make the actions meaningful. All practice theories are cultural in this respect, but according to Reckwitz there is a second division between cultural theories, based on what is the base of social, and all cultural theories are not practice-oriented. Cultural mentalism locates social in human mind. Cultural textualism locates social in symbols, discourse and texts. Finally intersubjectivism locates social in interaction between actors.

Practice theories do not locate the origin of social in mind, discourse, or interaction, but in 'practices', routines consisting of a number of interconnected and inseparable elements: physical and mental activities of human bodies, material environment, artifacts and their use, context that contain understanding, human capabilities, affinities and motivation. Practices are wholes whose existence is dependent of the temporal interconnection of all these, and that cannot be reduced to or explained with any one single element. Practices are relatively stable performances, ways how things get done.

There are a number of approaches how practices are conceptualized (or not) and studied, and these are commonly called practice theories – a family of different approaches connected together by a network of historical and conceptual similarities. The overview here follows Nicolini's recent account (Nicolini 2012).

According to Nicolini the historical and philosophical roots of practice theories can be directly traced to the groundwork done by Marx, Heidegger and Wittgenstein, who each in their critiques of contemporary philosophy gave practices a pivotal role in the development of their own system. Their influences have in various ways and combinations led to a number of different approaches.

Nicolini has identified six main schools of practice theories: the 'praxeology' by Giddens and Bourdieu, practice as tradition and community (Nicolini uses studies by Jean Lave and Etienne Wenger as examples), practice as activity (Activity Theory), practice as accomplishment (ethnomethodology), practice as 'the house of social' – direct followers of Heidegger and Wittgenstein (Theodore Schatzki as an example), and practice as discourse (conversation analysis, Foucault).

Although these approaches differ in many ways, there are a number of common features as well; Nicolini lists the following five.

- Process view on social life; also structures and institutions are realized through practices; practices are local and timely and they have histories.
- The critical role of materiality of human bodies and artifacts; there are no practices without them.
- Different role of agency and actor than in traditional theories: 'homo practicus' is both the bearer of practices in his or her mind and body, and the one who in action produces the practices.
- Seeing knowledge as a capability to act in practices in meaningful and productive way.
- Centrality of interests and motivation in all human action and corresponding focus on power, conflicts and politics.

Seeing social life as consisting of practices that have to be studied as wholes is a radical ontological commitment, leading to a complication and restructuring of the whole research process. But it also seems to offer a wide potential for better explanations, and opening a possibility to alleviate many of the dichotomies that have been plaguing social sciences, such as social vs. material, mind vs. body, knowledge vs. action, and so it has been gaining more and more momentum within social sciences.

In practice theories human actions can be seen as meaningful only within the context of specific, concrete practices, and thus they can only be studied 'at close'. This is in a sharp contrast with the mainstream social science that typically takes isolated features of human behavior and studies them 'at a distance', through modeling and generalization.

IT research disciplines and practice theories

What are the connections between disciplines related to the design of information technology – here information systems (IS), human-computer interactions (HCI) and computer-supported cooperative work (CSCW) – and practice theories?

IS has been an "early adopter" – the first attempts to use Giddens' structuration theory to IS issues appeared already in 1980s by authors such as Lyytinen and Orlikowski. The interest in practices within organizational studies (OS) in general took off in 1990s and, because of the overlap between IS and OS publication channels, research drawing from practice theories has become an established

genre also in IS. The connection to practice discussion in social science is also openly admitted. In most of the IS 'practice' research is, however, practice is used as yet-another-theoretical-lens without any serious ontological commitment. Also the interest in materiality, embodiment, and artifacts has remained rather weak in IS research (Orlikowski & Iacono 2001).

HCI has a more complicated history. Certain practice-oriented elements have been around already from the start of the '2nd wave' of HCI research in 1980s (Bødker 2006), like the influence of Lucy Suchman and the WPT group at Xerox PARC, and some practice theories, like Activity Theory, came along during the 1990s, but the focus of mainstream HCI has remained long at interaction, usability, and user-centered design. During the 1990s interest in what is around interaction ('context') grew stronger and stronger, resulting for instance the emergence of Contextual Design method, already somewhat interested in work practices. The broadening of the areas of IT application beyond the workplace and widespread use of mobile technology launched the '3rd wave' in the turn of millennium, bringing in even more practice elements, in particular the interest in embodiment and personal experiences. During the last years we may have entered in the next phase, when the scope of HCI applications has expanded rapidly and questions of agency, engagement, and social responsibility have become fashionable. It is – a bit ironically – as if the emancipatory and social responsibility aspects of Scandinavian participatory design, stripped off in early 1990s to produce a US-acceptable version of PD, would have suddenly become re-recognized some 15 years later. Current HCI is a mix of research drawing from technocratic usability tradition and a broad and diverse variety of various practice influences, but without a clear direction. Direct references between HCI research and practice discussion are largely absent, but HCI seems to be anyway moving closer to a practice orientation.

While in HCI the practice approach initially remained marginal, it has been embraced within CSCW, and especially within the European variant: there practice-oriented research has been the mainstream from the beginning. In CSCW practice approach to IT design has had a possibility to grow and mature so that towards the end of 1990s it started to influence HCI research. Two of the 'practice theories' identified by Nicolini, ethnomethodology and Activity Theory, are among the basic staple in European CSCW research, and ethnomethodology in particular has been quite influential in defining the whole research agenda of it. Unique feature of the CSCW is the interest in and theorizing about artifacts, for example studies on coordination mechanisms (e.g. Schmidt & Simone 1996) and complex mediation (Bødker & Andreasen 2005). Direct references to practice discussion have started to emerge (Wulf et al. 2011)

Not all aspects of practice approach are equally developed: interest in both agency and power in CSCW have been rather muted. In this respect the position can be complemented, however, with Scandinavian PD, also very well in harmony

with the practice approach: Pelle Ehn's 'PD theory book' (Ehn 1988) used explicitly Marx, Heidegger and Wittgenstein to support the PD ideas. Unlike CSCW in Scandinavian PD the question of agency and power is taken seriously, and the grassroots level agency it is one of the leading ideas.

Discussion

The practice approach offers a different perspective to the workplace-leisure CSCW debate. According to practice theories life consists of practices, and there is no fundamental difference if those practices are part of a paid work or not. In this sense the suggested broadening of the area of study does not seem harmful. The broadening of topics in US CSCW conference has, however, also brought with it a flood of contributions that do not see 'social' from a practice point of view, but largely fall back to the (social psychology) studies of isolated details, against which the practice approach has been raising in the first place. The CSCW research has – together with PD – been in the vanguard of practice-oriented IT related research, and the question if this position is worth of maintaining and strengthening can perhaps lead to a constructive discussion within the CSCW research community. Maybe practice orientation could even serve as a good anchor for the whole CSCW research identity.

The practice theory field itself has two weaknesses that are relevant to information technology design and to corresponding disciplines. Despite the general interest in materiality the artifact side of practices is still somewhat neglected, because most practice theories have difficulties in finding meaningful ways to discuss about artifacts. The main emphasis is in social interaction, the materiality focuses on human bodily experience, and artifacts have often no more significant role than that of stage props for interaction and bodily experiences. Another weakness is the question of dynamics, change and development. Most practice theories are much more at ease and better conceptually equipped to discuss and analyze stable situations and reproduction of existing practices than dynamic situations, change and emergence of new practices.

Both of these issues should, at least in principle, be among the strengths of information technology design. Designing artifacts is not possible without a rather good and detailed understanding of them. Moreover, every interaction with IT artifacts must be specified with far more exactness than those with physical artifacts. Thus information technology design and corresponding disciplines could well have well-developed conception of the artifacts they are conceiving, specifying, and producing.

On the other hand, design is about change, and designing artifacts is a major way of making changes in practices. Novel IT artifacts, penetrating in every sphere of life, are currently perhaps the dominant factor shaping our practices. Thus information technology design and corresponding disciplines should have

well-developed notions how to deal with dynamics and change. A closer connection between the practice theory discussion and information technology design (CSCW & PD) might be beneficial for both partners. The design side might gain a wider and enriched understanding on practices, while it is not too farfetched to think that the design's detailed practical understanding of both artifacts and change might contribute back to alleviate the weaknesses of practice theories in this respect. CSCW might well become the future powerhouse about the role of artifacts in practices. Among practices salaried work indeed forms the constitutive bedrock of our society, and many if not most practice-related issues can be studied at the workplace. But seeing the world only through the lens of salaried work also limits and distorts, and to serve the practice research community we should know how.

Acknowledgments

Emil Aaltonen foundation has supported the research for this paper.

References

Bødker, Susanne & Andersen, Peter Bogh (2005) Complex Mediation. *Human-Computer Interaction*, vol. 20, no. 4, pp. 353-402.

Bødker, Susanne (2006) When Second Wave HCI meets Third Wave Challenges. *Proceedings of the NordiCHI 2006 conference*. ACM, New York, pp. 1-8.

Crabtree, A., Rodden, T. & Benford, S. (2005) Moving with the Times: IT Research and the Boundaries of CSCW. *Computer Supported Cooperative Work* vol. 14, pp. 217–251.

Ehn, P. (1988) *Work-Oriented Design of Computer Artifacts*. Arbetslivscentrum, Stockholm.

Grudin, J.(2010) CSCW: time passed, tempest, and time past. *Interactions*, v. 17, no. 4, pp. 38-40

Miettinen, R. Samra-Fredericks D. & Yanow, D. (2009) Re-Turn to Practice: An Introductory Essay. *Organization Studies*, vol. 30, no.12, pp. 1309-1327.

Nicolini, Davidi (2013*) Practice Theory, Work, & Organization. An Introduction*. Oxford , UK.

Orlikowski, W.J. & Iacono, S. (2001) Research Commentary: Desperately Seeking the 'IT' in IT Research--A Call to Theorizing the IT Artifact. ISR, vol. 12, no.2 pp. 121-134

Reckwitz, Andreas (2002) Toward a Theory of Social Practices: A Development in Culturalist Theorizing. *European Journal of Social Theory*, vol. 5 no. 2, pp. 243-263

Schatzki, T.R. and Knorr-Cetina, K. and Savigny, E. Von (2001) *The practice turn in contemporary theory* . Routledge, London.

Schmidt, Kjeld and Simone, Carla (1996) Coordination Mechanisms: Towards a Conceptual Foundation of CSCW Systems Design. *CSCW*, vol. 5, no. 2/3, pp. 155-200.

Schmidt, Kjeld (2011). 'The concept of "work" in CSCW'. *CSCW*, vol. 20, no. 4-5, October 2011, pp. 341-401.

Wulf, V., Rohde, M., Pipek, V. & Stevens, G. (2011). Engaging with Practices: Design Case Studies as a Research Framework in CSCW. In *Proceedings of the conference on Computer Supported Cooperative Work (CSCW),* 2011, S. 505-512.

Social Edition 4 *The Book of Disquiet*: The Disquiet of Experts with Common Users

António Rito Silva[(1)] and Manuel Portela[(2)]
[(1)]INESC-ID/IST Department of Computer Science and Engineering / University of Lisbon, [(2)]CLP-Centre for Portuguese Literature / University of Coimbra
rito.silva@ist.ult.pt, *mportela@fl.uc.pt*

Abstract. In this paper we describe the collaborative aspects of our current project on a collaborative digital archive for Fernando Pessoa's *Book of Disquiet* (LdoD). The set of fragments written by Pessoa, and diversely grouped by different editors as the *Book of Disquiet* is the ideal context for the study and research of techniques for a social edition in digital humanities. The implementation of a digital archive for the *LdoD* provides an opportunity to experiment with the use of Web 2.0 techniques in constructing a social edition where expert and common users can engage on the social construction of new editions of *LdoD*. In this paper we discuss how to deal with the conflicting forces of expert and common users on the social creation of *LdoD* editions. As research is being done, a prototype is being developed to validate our ideas.

Introduction

The *LdoD* project consists of designing and developing a collaborative digital archive for Fernando Pessoa's *Book of Disquiet* (*Livro do Desassossego* – LdoD). *LdoD* is an unfinished book project. Pessoa wrote more than five hundred texts meant for this work between 1913 and 1935, the year of his death. The first edition of this book was published only in 1982, and another three major versions have been published since then (1990, 1998, 2010). As it exists today, *LdoD* may be characterized as (1) a set of autograph (manuscript, typescript, and printed) fragments, (2) mostly unpublished at the time of Pessoa's death, which have been (3) transcribed, selected, and organized into four different editions, implying (4)

various interpretations of what constitutes this book. Editions show four major types of variation: variation in readings of particular passages, in selection of fragments, in their ordering, and also in heteronym attribution.

The goal of the *LdoD Archive* is twofold: on the one hand, we want to provide a scholarly archive where experts can study and compare *LdoD's* authorial witnesses with their critical editions; on the other hand, we want to design a virtual archive that allows non-experts to experiment with the production of different editions of *LdoD*. Therefore, this latter virtualization goal, which is built on top of the archival goal, extends a scholarly understanding of *LdoD* as both authorial project and editorial construct to a new perspective of *LdoD* as an individual and/or community editing environment based on the authorial and editorial witnesses.

Considering these two goals, the main problem resides in the management of the conflicting perspectives on the *LdoD* of expert and common users. Although this is not an uncommon problem in the Web 2.0 context, it is particularly relevant in electronic editing because of the traditional scholarly authority placed on the critical edition of literary works. In this paper we intend to answer the following question: *how do we design a collaborative archive that achieves the right compromise between the expectations of experts and common users?*

We present our current project for a social edition and the existing open problems. In the following section we describe the challenges for a social edition from a digital humanities perspective. Then, we introduce the concepts and model structure of the *LdoD Archive* to show how collaboration can be supported. Finally, we describe how our proposal can foster a community that integrates expert and non-expert users. A computational prototype is being implemented for testing the research concepts and solutions.

Social Edition in Digital Humanities

Siemens et al (2012) have defined the requirements for a social edition in Digital Humanities projects. They acknowledge that humanities' scholars already use social media tools for their daily work and suggest that some of these social software features can be integrated into electronic scholarly editions following a Web 2.0 approach that narrows and blurs the distance between readers and editors. These new models of engagement are: (1) collaborative annotation; (2) user derived-content; (3) folksonomy tagging; (4) community bibliography; (5) text analysis. According to the authors, in a social edition the role of the editor will become more like a coordinator of community contributions than an isolated and central authority.

However, some criticism has been made of this too open perspective on the social construction of editions. Francese (2013) argues that the social edition has several challenges to face and points out some examples where going social was

not successful[1], although he also acknowledges projects that seem to have succeeded. Francese (2013) concludes that social edition is "a totally unpredictable new thing" which requires "the mix of social media and good old fashioned expert editorial authority that works in each case".

Fernando Pessoa's *Book of Disquiet* (*LdoD*) is particularly suited for testing the challenges raised by social editing in a scholarly context. The book itself does not exist in a finished single form. It was an idea in Pessoa's mind and a set of scattered fragments, some of them unfinished and others not definitively assigned to this book project. Therefore, there is not an *LdoD* book, but the book each one of the four editors envisaged as their interpretation of the fragments and documents where Pessoa's describes his project for *LdoD*. On the other hand, Pessoa's experts are reticent about the advantages of having a social edition of *LdoD* due to the amount of specialized knowledge required.

The main goal of our project is to design and implement an *LdoD Archive* that supports social interpretations of the *LdoD* while preserving the experts' interpretations. It should allow the construction of social editions on top of expert's editions without mixing them.

The *LdoD Archive*

We designed the *LdoD Archive* around two concepts: edition and interpretation. An interpretation represents how a person, or a community, makes sense of a fragment. This interpretation ranges from transcription of the fragment to its semantic interpretation, the latter using annotations and tagging. An edition aggregates a set of fragment interpretations sharing a common interpretation criterion. Therefore, an edition can be seen as the set of fragment interpretations that comply with a set of criteria. Editorial work is the definition of these criteria and their application to the fragments, as annotations and tags.

Figure 1 presents the relevant entities of the *LdoD Archive* model. It contains a set of EDITION objects that aggregate FRAGMENTINTERPRETATION objects and TAXONOMY of TAGS. The transcription of a FRAGMENTINTERPRETATION is implemented by a tree of TEXTPORTION objects, where the root object refers to its FRAGMENTINTERPRETATION object. Actually, class TEXTPORTION abstracts the TEI-P5 elements that are used in the encoding of the transcription. TEI-P5[2] is the standard used by scholars for encoding texts in digital form. RDGTEXT is a relevant subclass of TEXTPORTION that represents a reading variation, for instance, when a part of a fragment has two different transcriptions they are represented by different RDGTEXT objects. Note that a RDGTEXT object can be shared by several FRAGMENTINTERPRETATIONS whenever they contain the same

1 Open Utopia was not successful in the elicitation of crowd annotation, http://theopenutopia.org/home/.

2 TEI: Text Encoding Initiative, http:// http://www.tei-c.org/.

transcription of a part of the fragment. TEXTPORTION objects constitute a typed structure that efficiently implements different transcriptions of the same text.

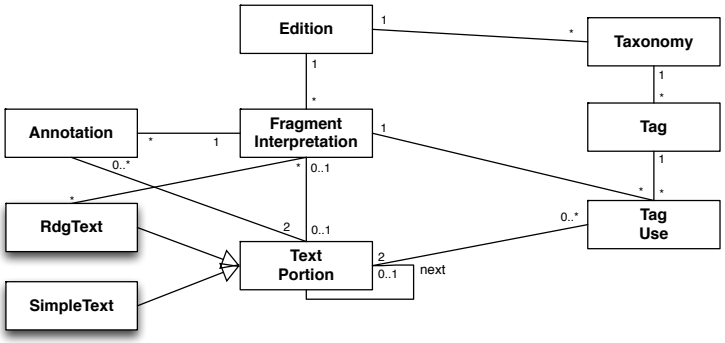


Figure 1. Model (UML) of the *LdoD Archive*.

ANNOTATION and TAGUSE objects are responsible for supporting the semantic interpretation of a fragment, and refer to two TEXTPORTION objects that delimit the interpreted text, which must belong to RDGTEXTs of their FRAGMENTINTERPRETATIONs. Note that, the semantic interpretation should be consistently done in the context of its FRAGMENTINTERPRETATION's transcription, it must not cross different interpretations.

A SIMPLETEXT object contains a part of the fragment, i.e., any sequence of words, and constitutes the minimal part of the text that is interpreted as a unit: there is not a subsequence of its sequence of words requiring another semantic interpretation. Therefore, part of a SIMPLETEXT does not need to be referred by different ANNOTATION, or TAGUSE. Note that, as a consequence of this model, the change in semantic interpretations may require the redefinition of SIMPLETEXT objects. For instance, when a tag or annotation is applied to one part of a SIMPLETEXT object, it should be dynamically split into two SIMPLETEXT objects.

A Collaborative Archive

The collaborative features of the *LdoD Archive* are designed around the concept of virtual editions. Like an edition, a virtual edition contains a set of fragment interpretations, and, additionally, it has a set of users that collaborate in the construction of the edition.

This model is represented in Figure 2, where EDITION has two extensions, EXPERTEDITION and VIRTUALEDITION. Expert editions are statically encoded by experts using TEI-P5, whereas virtual editions are dynamically created by common users through a web interface. To do so, the community of users associated with a virtual edition can collaboratively annotate and tag fragment interpretations. In its current stage, in what concerns collaboration, the project is

focused on semantic interpretations. Transcription interpretations by common users are not being addressed. Therefore, a virtual edition is built on top of the transcription interpretations in the expert's editions through a categorization and annotation process that defines the edition criteria.

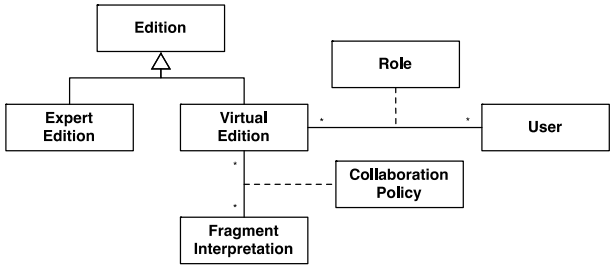


Figure 2. Collaborative Model (UML) of the *LdoD Archive*.

In the creation of a new virtual edition its community can use fragment interpretations of other editions and enrich them with new annotations and tags. The use of a fragment interpretation is governed by a COLLABORATIONPOLICY, which determines the level of collaboration. A virtual edition can import a fragment interpretation, which means that it inherits its annotations and tags but does not receive further changes made to the original interpretation, like new tags or annotations. This corresponds to a copy, actually a lazy copy strategy. Using the import policy users are allowed to delete some of the imported annotations and tags. Another COLLABORATIONPOLICY is to extend a fragment interpretation, i.e. to replicate all of its tags and annotations. When a virtual edition extends a fragment interpretation all the changes that occur in the original are synchronized in the extension. In this case it is not possible to change any of the extended interpretations. Note that the import policy can be used to merge virtual editions.

A special case of a virtual edition is an implicit, system-generated, virtual edition that aggregates fragment interpretations according to the log of interactions between the users and the archive. Several aggregation criteria can be considered, e.g., number and duration of accesses, users' profiles, etc. This implicit virtual edition can also be imported, or extended, by other virtual editions.

The *LdoD* Community

How does the *LdoD Archive* foster an *LdoD* community that preserves the separation between experts' and common users' contributions while promoting their collaboration?

When an anonymous user accesses the archive she can browse through the four expert editions and compare their fragment interpretations. This corresponds to

the traditional scholarly interaction with an electronic archive. However, an anonymous user may also access the virtual editions interface and explicitly select the set of public virtual editions that she wants to consider when browsing fragment interpretations. Of course, an authenticated user can additionally tag and annotate the fragment interpretations of the virtual editions she is a member of. Following this strategy, by separating the different types of editions, supporting different policies of use, requiring an explicit action to interact with a virtual edition, and allowing the composition of editions, it is possible to have a living archive which preserves the experts' views while enabling non-experts to experiment with the production of different editions of *LdoD*.

In its current stage, the prototype supports four experts' editions – allowing comparison of fragment transcriptions done by the various editors. Additionally, it supports the creation of virtual editions and the inclusion of fragments' interpretations. As regards user interface, expert and virtual editions are presented in the same way but virtual editions may be explicitly selected to become visible. A virtual edition by the project team is being developed to define a general taxonomy of concepts that other virtual editions may decide to use through one of the collaboration policies.

We are currently addressing some of the project's open challenges: how to collaboratively create taxonomies for *LdoD*, i.e., how to balance experts' authority with common users' suggestions, from broad to narrow folksonomies; human and automated merge of virtual editions, and the synthesis of their taxonomies; categorization of types of communities that will use the archive, such as students and teachers; definition of roles for users, and their capabilities; and promoting the experimental use of the archive accompanied by empirical studies of its use.

Acknowledgments

This work was supported by national funds through FCT – Fundação para a Ciência e a Tecnologia, under projects PTDC/CLE-LLI/118713/2010 and PEst-OE/EEI/LA0021/2013.

References

Siemens, R., Timney, M., Leitch, C. Koolen and C. Garnett, A. (2012): 'Toward Modeling the Social Edition: An Approach to Understanding the Electronic Scholarly Edition in the Context of New and Emerging Social Media', *Literary & Linguistic Computing*, vol. 27, no. 4, December 2012, pp. 445-461.

Francese, C. (2013): 'The Scholarly Edition Goes Social', Dickinson College Commentaries Blog, http://blogs.dickinson.edu/dcc/2013/01/07/the-scholarly-edition-goes-social/. Accessed on June 7, 2013.

Enabling Social Media Research Through Citizen Social Science

Rob Procter[1], William Housley[2], Matthew Williams[2], Adam Edwards[2], Pete Burnap[3], Jeffrey Morgan[3], Omer Rana[3], Ewan Klein[4], Miranda Taylor[4], Alex Voss[5], Chris Choi[5], Panos Mavros[6], Andy Hudson Smith[6], Mike Thelwall[7], Tristan Ferne[8], Anita Greenhill[9]

[1]Department of Computer Science, University of Warwick
[2]School of Social Sciences, Cardiff University
[3]School of Computer Science & Informatics, Cardiff University
[4]School of Informatics, University of Edinburgh
[5]Department of Computer Science, St Andrews University
[6]Centre for Advanced Spatial Analysis, UCL
[7]University of Wolverhampton
[8]Internet Research & Future Services, BBC R&D
[9]Manchester Business School
[1]*rob.procter@warwick.ac.uk*

Abstract. This paper explores how 'citizen social science', may help professional social scientists deal with the challenges of exploiting the growing range and volume of 'born digital' social data. We outline a social media analytics platform that we have developed and describe how we plan to use crowdsourcing to improve the performance of our tools.

Keywords. Social media, Twitter, crowdsourcing, citizen social science, curation, annotation

Introduction

This paper explores how 'citizen social science', as a new example of the wider citizen science arena[1], may help social scientists deal with the challenges of exploiting the growing range and volume of 'born digital' social media data. We report on work in progress to establish and exploit the potential of crowdsourcing for large-scale social media data curation and analysis. Our aim in this research is to explore the benefits and limitations, and develop ways of maximising the former

[1] http://scienceforcitizens.net/

while minimising the latter. Specifically, our objective is to devise approaches to crowdsourcing in this context that are scalable but do not sacrifice the quality of contributions and investigate how these can be used to improve the performance of computationally-generated annotations.

The rapid growth of the Web as a publishing tool, and the recent explosion of social media such as blogs (and micro-blogs such as Twitter) and social networking sites (such as Facebook) presents both an opportunity and a challenge to social researchers. Data that can shed light on people's habits, opinions and behaviour is available now on a scale never seen before, but this also means it is impossible to analyse using conventional methodologies and tools.

We are building COSMOS[2], a platform providing an integrated suite of tools for harvesting, archiving, analysing and visualising social media data streams for use by social researchers (Burnap et al., 2013; Edwards et al., 2013), with the capability to link with other kinds of data, e.g. from ONS via open APIs. A critical task in the COSMOS research workflow is annotation of incoming social media streams. We have developed a range of computational tools (language detection, gender assignment, location, sentiment, tension, topic discovery). However, despite the growing sophistication of computational tools for social media analysis, they are not sufficiently reliable to substitute for human expertise. Hence, what is needed is a way to combine computational tools with human expertise in ways that make the best of their respective strengths (Procter et al., 2013a; 2013b). This human expertise is essential for benchmarking and improving the performance of computationally generated annotations and analyses, and curating datasets. If this is to be feasible, then human expertise needs to be readily available and in numbers sufficient to deal with the quantities of data.

One way for providing this expertise is through volunteer efforts in the manner of crowdsourcing (Doan et al., 2011), as is now widely exploited under the rubric of citizen science[3] and which projects such as Galaxy Zoo[4] have already demonstrated the potential for in the physical sciences.

To test the feasibility of 'citizen social science' for social media analytics we are building a web-based tool, which volunteers will be able to use to access social research collected by COSMOS and perform simple annotation tasks. These volunteered annotations will then be used to check and improve the quality of the COSMOS computationally-generated annotations.

Our approach is modelled on a crowdsourcing facility now being piloted by the BBC to put massive, searchable media archives online using a combination of algorithms and crowdsourcing (Raimond and Lowis, 2012). BBC Research & Development has built a browsable and searchable online archive, which uses crowdsourcing to validate and improve the quality of computationally-generated annotations. Registered users can listen to programmes in the archive, add new annotations and vote on the quality of existing annotations.

We begin by outlining the ways in which we generate social media annotations computationally. We then outline the BBC pilot and how we plan to build on that to improve the quality of computer-generated annotations for social media dataset curation and analytics.

Computer-generated annotations of social media

COSMOS harvests and annotates content from a number of social media sources. In this paper, we will focus on Twitter for the purposes of illustrating its capabilities and the challenges of improving the quality and reliability of our analysis tools.

[2] www.cosmosproject.net
[3] http://en.wikipedia.org/wiki/Citizen_science
[4] http://www.galaxyzoo.org

Gender, location and language

To identify the gender of the tweeter, the name the user added to their profile is extracted from the tweet meta-data. The first name is mapped on to the 40k Namen database – a database of over 44,000 names from 54 countries around the world – with each name classified as male, female, or unisex (Michael, 2007; Morgan et al., 2013). One limitation to this approach is that there are clearly more than 44,000 names in use around the world, so crowdsourcing could assist in classifying previously unclassified names.

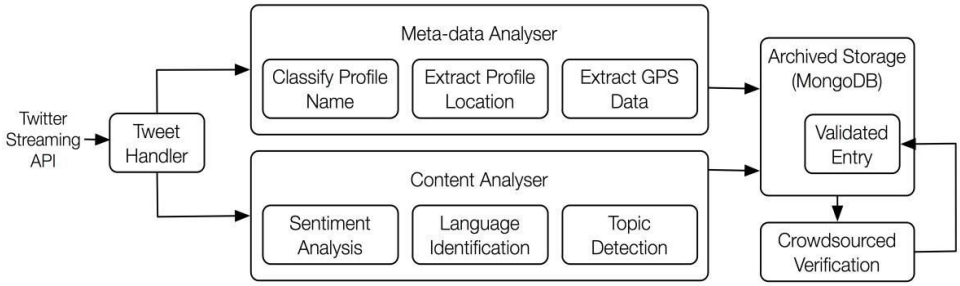


Figure 1: COSMOS annotation workflow.

Twitter enables users to provide their 'location' as an attribute in their profile. This can provide information about where the user lives. There are granularity issues with this approach. Some users simply state 'UK', others state 'Cardiff, UK', and some provide a locality down to area or street level. Some tweets contain GPS metadata. However, our investigations suggest that very few users enable GPS on their tweets (0.85%). To enhance accuracy, we plan to use crowdsourcing to analyse the text of the user's last *n* tweets to determine if there are clues in the text to suggest their location. Language is identified using the Language Detection Library for Java, which can identify 53 different written languages from a text sample. As with names, there will be languages, such as Welsh, that are not among the known languages. Crowdsourcing could be used to extend the number of languages COSMOS can detect by classifying 'new' languages.

Topics

In order to help researchers gain an overview of topics that are prominent in a corpus, COSMOS provides clustering algorithms. COSMOS clusters tweets incrementally in chronological order, using a sliding window of adjustable size. This makes it possible to investigate how topics change over time or to investigate topics within a specific time range.

COSMOS provides two algorithms: incremental online clustering, using cosine distance, and latent Dirichlet allocation (LDA). LDA is a probabilistic algorithm, which requires the number of clusters to be specified *a priori* and assigns each tweet to the cluster with the highest probability. These probabilities make it easy to identify tweets that are most representative of a cluster as well as outliers. The incremental algorithm compares each tweet to clusters that have already been formed and either assigns it to the nearest cluster, based on cosine distance, or creates a new one. The incremental algorithm is better suited for real-time clustering because it is faster and doesn't require the number of clusters to be specified. However, it is more sensitive to differences in datasets and requires more parameter tuning to obtain good results. In both, each tweet is represented as a list of word counts or 'features' and any term not considered a feature is ignored. Consequently, it is the number and quality of features that determines the quality of the resulting

clusters.

Clustering performance can be adjusted by tuning parameters for specific corpora and research questions, such as selecting appropriate features, including keyword inclusion and exclusion, top term exclusion, feature weighting and feature number specification. Crowdsourcing could be used to improve clustering performance by ranking cluster quality and harvesting candidate cluster labels.

Sentiment

Sentiment is an important aspect of online communication. Emotional exchanges can have different dynamics to more emotion-free communications and it is impossible to fully understand exchanges if their affective component is ignored. SentiStrength is a sentiment analysis program that has been purpose-built for analysis of social web texts, such as tweets, Facebook wall posts and short blog posts. It estimates sentiment content in two dimensions: the strength of positive sentiment on a scale of 1 (no positive sentiment) to 5 (very strong positive sentiment) and the strength of negative sentiment on a scale of -1 (no negative sentiment) to -5 (very strong negative sentiment).

The main method SentiStrength uses is a lexicon of 2,310 words and word stems with a predefined sentiment polarity and strength. For example, *angry* is a negative term with strength -4. If fed a sentence, SentiStrength will match all the words with its lexicon and assign the sentence the highest positive score of any matching term and the highest negative score of any matching term (Thelwall and Buckley, 2012). This method is supplemented by a set of linguistic rules to cover things like negations, questions and booster words (e.g. very). In addition, there are rules for identifying expressions of sentiment in ways that are in non-standard English. These include emoticons and emphatic spellings through repeated letters. For instance, the word angggggrrrrry would score -5 rather than -4 (the default for angry) due to emphatic spelling. Combining the word list and the linguistic rules gives approximately human level accuracy in the sense that (carefully selected, accurate) humans agree with each other about the same amount as they agree with SentiStrength (Thelwall and Buckley, 2012).

SentiStrength sometimes does not perform well on collections of topic-specific texts due to extensive exhibiting unusual sentiment language. For example, tweets about the UK riots used negative terms that are relatively rare in general social web texts, such as ‘baton’, ‘fire’, and ‘arrest’. In response, a method has been developed to customise SentiStrength for specific topics. It works by identifying the appropriate mood for the collection of texts and then identifying new potential sentiment-bearing terms that are candidates to be added to the lexicon for the topic, as well as suggestions for changing the sentiment weights of existing terms (Thelwall and Buckley, in press). One application of crowdsourcing would be to assist in customising SentiStrength by selecting candidate sentiment-bearing terms and adjusting their weight.

BBC crowdsourcing pilot

BBC Research & Development is running an experiment with the BBC’s World Service radio archive to demonstrate a way to put massive media archives online using a combination of algorithms and crowdsourcing.[5] We think we can automatically generate metadata for the archive that is good enough to kick-start crowdsourced metadata improvement.

The archive has around 50,000 digitised programmes from the World Service English-language radio service (Raimond and Lewis, 2012) from over 50 years. It has high-quality audio, but limited

[5] http://worldservice.prototyping.bbc.co.uk

metadata. We bootstrap the online archive by generating metadata automatically. We run the audio through a speech-to-text process using CMU Sphinx with the HUB4 acoustic model. This generates quite noisy transcripts, which are not normally readable, but from which we can still extract topics. For the extracted topics we use linked data entities from DBPedia[6], so that everything in the system is a 'thing' with a unique URI. Using this data, we built a browsable and searchable online archive[7], which uses crowdsourcing to validate and improve the machine-generated annotations. Registered users can listen to programmes in the archive, add new topics and vote existing topics up or down.
We identified a number of potential user groups, including BBC production staff, academic researchers and fans of radio, the World Service, particular programmes and topics. So far, it has been used mainly up by fan communities and some BBC staff. The number of registered users is fairly small (1300 by March 2013), but there has been a significant amount of activity.

About half of the registered users are active (i.e. they've carried out some action in the prototype) and so far they've listened to 8,533 distinct programmes (17% of the entire collection), taken action on 4429 distinct programmes (9%). On these programmes where activity has happened, users have added 7085 new tags (mean of 1.6 per programme) and voted on tags 34,000 times (mean of 8 votes per programme). From our initial work we appear to have a long tail distribution of how many times a programme has been listened to and tagged, and this corresponds to programmes we have promoted on the prototype or that have been linked to by the active user groups. Along with these 'defined' activities, users have also contacted us with corrections for existing metadata. We have seen two primary kinds of user; one is people who want primarily want to listen to programmes in the archive and might tag things whilst they are there, the other is people who either want to help or see tagging as an enjoyable task in itself. This latter group have done a lot of tagging, either around topics or around particular programmes. This is consistent with studies that have found it is often a small number of participants who do a large amount of the work (Dunn and Hedges, 2012).

The plan is to feed back the crowdsourcing into the topic extraction algorithms to improve them. For example, it has been noticed that people often down-vote particular tags. One way to feed this back into the algorithms is to reduce the confidence score wherever this is the computationally-generated tag.

Crowdsourcing for social media curation and analysis

The BBC crowdsourcing pilot provides a useful template for citizen social science and for how crowdsourcing may be used to improve the quality of computationally-generated annotations. However, there are some important features of the latter that may dictate that we have to employ different solutions. This enables us to define a series of specific objectives for this project.

First, given the potential size of social media datasets, to identify ways to select a representative sample for annotation by crowdsourced effort. This sample must be chosen so as to maximise the value of the crowdsourcing for improving the quality of computationally-generated annotations, while keeping the effort required within feasible bounds.

Second, this raises the question of how to recruit crowdsourcing contributions to match the volume of data (Willett et al., 2012). One challenge is to identify 'communities of interest' whose efforts may be leveraged. We also need to explore how to incentivise volunteer contributions (e.g. entertainment, games, prizes, peer esteem, recognition for participating in a research project, getting feedback on results) while maintaining the quality and to understand what appears to explain the

[6] http://dbpedia.org/About
[7] http://www.bbc.co.uk/blogs/researchanddevelopment/2012/11/the-world-service-archive-prot.shtml

interest in citizen social science, both in terms of scale of volunteered effort and the quality assurance of contributions. Examples from successful (and unsuccessful) citizen science projects will be instructive here.

Third, and linked with the above is the need to provide a range of options for contributing (e.g. voting on annotations, adding new annotations, etc.). To minimise the effort involved, we also need to investigate ways of linking annotation tasks as seamlessly as possible with volunteers' everyday uses of social media, so that rather than being experienced as additional work, it becomes a simple extension of their normal activities. One possibility for tweets would be to integrate annotation within an adapted Twitter client and to select content for annotation for presenting to individual volunteers that matches their social media usage and interests. In this way, we aim to increase both the scale and quality of the annotations crowdsourced.

As yet, we only have limited experience (e.g. Procter et al., 2013a; 2013b) on which to base estimates of the scale of crowdsourcing effort required for social research. The annotation effort required was quite modest (up to 15 volunteers annotating a few hundred tweets each). Determining a sampling strategy that balances effort required against quality improvement will be important for determining whether citizen social science can scale to add value to much larger corpora. Our ongoing work is aimed at exploring and resolving these issues, using the BBC pilot to identify lessons for crowdsourcing annotations and investigating how to translate these lessons to the context of social media research.

References

Burnap, P., Rana, O. and Avis, N. (2013): 'Making Sense of Self-Reported, Socially Significant Data Using Computational Methods'. International Journal of Social Research Methodology, Computational Social Science: Research Strategies, Design and Methods. Volume 16:2.

Doan, A., Ramakrishnan, R. and Halevy, A.Y. (2011): 'Crowdsourcing systems on the world-wide web'. Communications of the ACM, 54(4), 86-96.

Dunn, S. and Hedges, M. (2012): 'Crowd-Sourcing Scoping Study - Engaging the Crowd with Humanities Research'. Centre for e-Research, King's College London. http://crowds.cerch.kcl.ac.uk/wp-uploads/2012/12/Crowdsourcing-connected-communities.pdf

Edwards, A., Housley, W., Sloan, L., Williams, M.L. and Williams, M. (2013): 'Digital Social Research and the Sociological Imagination: Surrogacy, Augmentation and Re-orientation'. International Journal of Social Research Methodology, Computational Social Science: Research Strategies, Design and Methods.

Michael, J. (2007): '40000 Namen, Anredebestimmung anhand des Vornamens'. *http://www.heise.de/ct/ftp/07/17/182/*

Morgan, J., Sloan, L., Housley, W., Williams, M.L., Edwards, A., Burnap, P. and Rana, O. (2013): 'Knowing the Tweeters: Deriving Sociologically Relevant Demographics from Twitter'. *Sociological Research Online*.

Norman, G., Norris, C., Gollan, J., Ito, T., Hawkley, L., Larsen, J., Cacioppo, J. and Berntson, G.G. (2011): 'Current emotion research in psychophysiology: The neurobiology of evaluative bivalence'. Emotion Review, 3, 3349-59.

Procter, R., Vis, F. and Voss, A. (2013a): 'Reading the riots on Twitter: methodological innovation for the analysis of big data'. International Journal of Social Research Methodology, Special Issue on Computational Social Science: Research Strategies, Design & Methods.

Procter, R., Crump, J., Karstedt, S, Voss, A. and Cantijoch, M. (2013b): 'Reading the riots: What were the Police doing on Twitter?' Policing and Society, Special issue on policing and cybercrime, April.

Raimond, Y. and Lowis, C. (2012): 'Automated interlinking of speech radio archives'. WWW 2012 Workshop on Linked Data on the Web, Lyon, France. http://ceur-ws.org/Vol-937/ldow2012-paper-11.pdf

Thelwall, M., Buckley, K. and Paltoglou, G. (2012): 'Sentiment strength detection for the social web'. Journal of the American Society for Information Science and Technology, 63(1).

Thelwall, M. and Buckley, K. (in press): 'Topic-based sentiment analysis for the social web: The role of mood and issue-related words'. Journal of the American Society for Information Science and Technology.

Willett, W., Heer, J. and Agrawala, M. (2012): 'Strategies for crowdsourcing social data analysis'. In Proceedings of the 2012 ACM annual conference on Human Factors in Computing Systems, pp. 227-236. ACM.

Starting a Garden, Caring for It, Growing with It - a Study on Collective Practices in Urban Gardening

Gabriela Avram
Interaction Design Centre, University of Limerick, Ireland
gabriela.avram@ul.ie

Abstract. While previous sustainability studies in HCI and CSCW focused on the development of persuasive technologies and behavioural change, the current post-sustainability trend puts the emphasis on resilience and transformation strategies in a world where growth is not seen as linear and taken for granted anymore. The scarcity of resources and an increased responsibility for the environment and its future are some of the major drivers of the urban gardening phenomenon. In this paper, we will present two case studies of urban gardening communities, focusing on the collective practices and the technologies in use. We will show how the development of the two communities was intertwined with their ad-hoc choices of supporting technologies, resulting in organic growth, practical ways of managing know-how and the establishment of shared understandings. The mapping of existing articulation mechanisms and the evolution of Common Information Spaces are followed by an exploration of future design opportunities. A critical perspective of the role of social media and new opportunities opened by the inclusion of smart objects are part of the study's future contributions.

Introduction

In a recent CHI workshop dedicated to the discussion of post-sustainability matters in relation to HCI, there was an emphasis on the fact that future economic growth should not be taken for granted and we might have to prepare ourselves

for “a world of limitations and a world of scarcity” (Pargman 2013). Such scenarios would have implications on the role of computers and information technology in our society and on the future research agenda of HCI and CSCW.
As the role of communities becomes increasingly important in how we deal with limitations in today’s world, the interest in phenomena such as hackerspaces, transition towns, urban gardening and other local initiatives that involve new settings for cooperative work is gaining momentum. Our study draws on two urban gardening case studies in Limerick, Ireland, based on ethnographic studies and participant observation and focusing on the collective practices and the role of technologies in use.

Resilience and the Renewed Interest in Urban Gardens

The previous emphasis on sustainability, growth and finding ways to alter individual behaviour has shifted, leaving the place to a new focus on resilience, resilient communities and grassroots initiatives. Resilience constitutes a key factor in the communities’ ability to adapt to unexpected changes. Resilient communities are characterized by access to a wide range of resources, strong social ties and availability of support (Dillahunt 2013). Grassroots movements shape our cities, cultures and politics and enable stakeholders to voice their concerns and act as agents of change (Kuznetov et al 2011). Looking at the role of research in relation to how we understand society and our role in it as consumers and makers of things (Heitlinger 2013), it is important to try and understand the underlying values of urban communities such as maker spaces, urban food communities, citizen activist groups, in order to map the technologies they currently use and explore new design opportunities.

In the last few years, a series of researchers have been attracted by grassroots urban food communities and studied their use of collaborative technologies. Odom (2010) focused on food growing communities in Australia, while Tran (2012) looked at an urban food growing project in Central Harlem and Ilsted (2013) at the Spitalfields City Farm East London.

The reasons why people get involved in urban gardening communities often have to do with classical sustainability ambitions to promote bio diversity, reduce the distance food has to travel from its production place, avail of fresh fruit and vegetable produced locally and recycle biodegradable waste. Urban gardening also presents an interesting resilience strategy in response to volatile global food markets and breakdowns of the supply infrastructure in the case natural or man made disasters.

Case Studies: Gardening on a Roof and Planting a Secret Orchard

We will introduce here two of our case studies. The first one revolves around a Community Roof Garden at the University of Limerick, while the second is focusing on an initiative of a local group of biodiversity activists, Limerick Riverpath Volunteers, who are attempting to create a "secret orchard" along the Canal Bank in Limerick, Ireland.

The Community Roof Garden

The UL Community Roof Garden was created in September 2012, although the initiative can be tracked back in time several years. While an adequate space (an enclosed terrace) existed behind the façade of the university's main building since its inception, the members of the university's Environmental Committee pushed the agenda and created momentum in the last 2-3 years.

In January 2013, a wide consultation process was initiated to research the volunteers' attitudes and motivations towards the rooftop garden development.

Emails were sent to the university mailing lists for staff (1100) and students (10,500) requesting expressions of in interest to become involved in the roof garden. 30-40 people answered and they were invited to participate in a series of face-to-face meetings (in a meeting room) meant to shape the future of the roof garden. The result of these consultations lead through facilitated meetings and surveys showed that people were mostly interested in learning about gardening, meeting likeminded people from across the university, relaxing and exercising in fresh air after hours spent in an office or a classroom. The following diagram was drawn as result of these consultations:

Figure 1. Diagram representing the aims and motivations of the community garden members.

A mission statement was prepared, stating the open character of the community (see: www.ulcommunityroofgarden.com).

Applications like doodle.com and surveymonkey.com were used extensively for finding the best suitable time to meet and respectively for surveying the aspirations and expectations of the staff and students involved.

The consultations also showed that the community lacked expert knowledge within the community (there were no seasoned gardeners involved) and the need for a chief gardener. A farmer teaching extra-mural gardening evening courses at the university was approached and he agreed to help with devising a general plan for the garden and meeting the volunteers for a gardening session during lunchtime every Thursday.

The communication within the group started with regular emails to a list of email addresses, reminding of the gardening sessions and sharing information on the upcoming activities and meeting points (some of the sessions were held in other locations than the roof garden itself). This involved adding new names to the list or taking them off manually. While in the beginning, the chair of the Environmental Committee coordinated all the activities, later on this responsibility was delegated to other volunteers, based on a roster. People who are approached to add new members to the list draw the others' attention that there were updates and that the latest version should be used for all the emails from then on.

Figure 2. The UL community roof garden during a gardening session in May 2013.

Since the very beginning, the volunteers brought to discussion the need for having a website/blog as a public-facing information outlet. The blog is meant to provide public visibility and transparency for the group activities, as well as to document the activities for those who, for various reasons, cannot participate in some of the gardening sessions. On top of this, the photos, videos and text posted on the blog by volunteers proved to be very useful for sharing snippets of gardening know-how with the wider community. The blog also serves as coordination mechanism: it hosts the roster for a 3 months period and a watering

schedule. Also, the plans for the upcoming gardening sessions are shared on the blog.

While 63 volunteers are currently on the list of emails, the number of participants in the weekly gardening sessions is on average 10-15.

Regarding the introduction of new technologies to support the activities, the ones that gained the interest and the support of the members include:

- mounting a camera above the garden level to allow both recording and displaying the evolution of the garden throughout the seasons;
- installing temperature and moisture sensors in the vegetable beds to allow distant monitoring and allow the garden to "ask for help" via Twitter or email.

The creation of a Facebook group/page in July 2013 allowed a wider dissemination of the information on the community roof garden and attracted visitors from outside the university.

The idea of automating the watering process was opposed by the chief gardener and by volunteers, as it was seen as alienating and not necessarily reliable – similar with the findings revealed by other researchers (Odom 2010).

The "Secret Orchard"

The Limerick Riverpath Volunteers is a biodiversity activist group created in January 2012 by people who care about the river and canal banks connecting the university and the city. The initiative was triggered by the severe littering of the river and canal banks, resulting from various human activities around the river. The volunteers set to demonstrate that ordinary people using the area can contribute to its maintenance without relying exclusively on the local authorities. For several years, the local authorities hired people on a community scheme to maintain the area. When recession hit and funds dried out, maintenance was reduced to major works (tree surgery, road maintenance) once or twice a year. The group of volunteers started by organizing major clean-up operations of the banks and on the water of the canal itself. As clean-ups are not necessarily the nicest of all activities, picnics, guided walks and native Irish wildflower sowing were organized over the spring, summer and autumn of 2012. Influenced by the ideas of urban forests (Husted 2012), guerilla grafting (La Ganga 2012) and community orchard planting (Fallon 2013), the volunteers brought up the proposal of planting a "secret orchard" on the Canal Bank. The "secret" character has to do with the planting and maintenance of trees and fruit bushes in the first few years, to avoid their destruction. Once the trees will start producing, it is expected that all the people currently using the footpath (for traveling to and from work or for recreation) will be able to enjoy the fruit. A first apple tree was planted in the spring of 2013 and the planting is set to continue in late autumn.

Figure 3. The planting site; volunteers before a clean-up; apple tree in bloom - May 2013.

For reaching out to the local community, mobilizing resources and spreading its message, the group chose to use a Facebook page (facebook.com/LimerickRiverpathVolunteers) and Facebook events associated with the page from its very inception. The evolution of the group is entwined with that of the Facebook page. Started by two people who set a date for a first clean-up, shot a video and posted it on Facebook, the group expanded continuously by attracting like-minded people belonging to other environmentally aware local groups (Transition Towns, Birdwatchers etc.).

One major concern of the group was to also reach out to locals who were less likely to discover the Facebook page. While posters displayed in local shops, sports clubs, parishes boards, university and schools were good for raising general awareness, walking the river and the canal bank and handing out cards with the date of the upcoming event to passers by brought more people to the Facebook page, increased awareness related to the group's activities and allowed keeping in touch with potential volunteers on the long run.

Realising the volatility and rapid expiration of information posted to a Facebook page, combined with the difficulty of searching through the archives, the volunteers decided to move relevant information to a purpose-built website based on Wordpress. It also became obvious that people who didn't have a Facebook account had difficulties in accessing the page. This is how http://limerickriverbanks.org was born.

For the Secret Orchard project, the volunteers are planning to dedicate a webpage to each tree, showing its evolution from its planting on - throughout the seasons. It is planned for each tree to be adopted by an individual or family who uses the canal bank daily and could care for it. Each "tree diary" will be maintained by the tree's steward, who will add pictures and notes, allowing for the story of the secret orchard to unfold. The volunteers are totally opposed to having the trees labeled or marked visibly, so a solution is being currently researched for allowing passersby to "read" a tree and access its history (possibly based on RFID tags or motes).

Discussion

There are a few themes that were common to the two studies presented:

- Technology was chosen as deemed appropriate (whatever the volunteers felt comfortable with or knowledgeable about)- email, Facebook page, in a sort of "bricolage" mode;
- Technology was used for specific purposes- coordination(dates of gardening sessions, dates of riverbank activities, meeting points, planned activities; communication; knowledge-sharing (via video and photos from gardening sessions); articulation mechanisms (who planted a tree knows there are other tree stewards around, although he hasn't met them; planning for the next gardening activities based on what happened in sessions that were missed);
- An overall reaction against technological augmentation is noticeable; technology is not invited in when it comes to the gardening work itself; it is merely seen as a means for coordination and communication. Volunteers bring in their own expertise – software tools are chosen based on what they use for work or in other volunteer groups;
- Information technologies are brought in to add an extra layer to the physical gardening activities, adding an information layer on top of the physical layer;
- The inclusion of smart objects- "objects connected to the Net; objects that can sense their users and display "smart" behaviour" (Manovich 2005)- will be explored, but not imposed. The use of Arduino, motes and other wireless sensors are being evaluated currently.
- The activities revolve around food growing and healthy eating, but also include capacity building by strengthening knowledge and skills within communities.

Conclusion

The preliminary findings presented in this short paper are meant to shed a light on the cooperative work practices of two urban gardening communities that are built upon and organically intertwined with existing technologies that the volunteers adapt and combine to suit their needs. Future work plans include co-design workshops with the members of each community, a critical examination of the role of social media for supporting such practices and an exploration of potential opportunities opened by the incorporation of smart objects into existing practices.

References

Dillahunt, T. (2013): "Creating Resilient Communities for Post-Sustainable Times", *Post-Sustainability-A CHI 2013 Sustainability Community Workshop* - 27 April 2013, Paris, France, available online at <http://sympact.cs.bris.ac.uk/post-sustainability/dillahunt.pdf>, last accessed 15 Jun 2013

Fallon, F.(2013) Orchards for everyone, Irish Times, March 2, 2013, available online at <http://www.irishtimes.com/life-and-style/homes-and-property/2.770/orchards-for-everyone-1.1316944>, last accessed on 7 Aug 2013

Heitlinger, S.(2013): "Moving Beyond the Individual Consumer in Sustainable HCI" ", *Post-Sustainability-A CHI 2013 Sustainability Community Workshop* - 27 April 2013, Paris, France, available online at < http://sympact.cs.bris.ac.uk/post-sustainability/heitlinger.pdf >, last accessed 15 Jun 2013

Husted, K. (2012) Seattle's First Urban Food Forest Will Be Open To Foragers, NPR, March 01, 2012, available online at <http://www.npr.org/blogs/thesalt/2012/02/29/147668557/seattles-first-urban-food-forest-will-be-free-to-forage>, last accessed on 7 Aug 2013

Kuznetsov, S., Odom, W., Moulder, V., DiSalvo, C., Hirsch, T., Wakkary, R. and Paulos, E. (2011): "HCI, politics and the city: engaging with urban grassroots movements for reflection and action". In PART 2-*Proceedings of the 2011 annual conference extended abstracts on Human factors in computing systems (CHI EA '11)*. ACM, New York, NY, USA, pp.2409-2412.

La Ganga, M.L. (2012) In San Francisco, a secret project bears fruit, Los Angeles Times, September 11, 2012, available online at < http://articles.latimes.com/2012/sep/11/local/la-me-guerrilla-grafters-20120912>, last accessed on 7 Aug 2013

Manovich, L. (2005) The poetics of urban media surfaces, *First Monday*, Special Issue #4, available online at < http://www.firstmonday.org/ojs/index.php/fm/article/viewArticle/1545/1460>, last accessed on 7 Aug 2013

Odom, W. (2010): "'Mate, we don't need a chip to tell us the soil's dry': opportunities for designing interactive systems to support urban food production". In *Proceedings of the 8th ACM Conference on Designing Interactive Systems (DIS '10)*. ACM, New York, NY, USA, pp. 232-235.

Pargman, D., Walldius, Å. and Eriksson, E.(2013): "HCI in a World of Limitations: Addressing the Social Resilience of Computing", *Post-Sustainability-A CHI 2013 Sustainability Community Workshop* - 27 April 2013, Paris, France , available online at <http://sympact.cs.bris.ac.uk/post-sustainability/pargman.pdf>, last accessed 15 Jun 2013

Food awareness through collaboration from farm to fork

Hanna Koskinen and Leena Norros
VTT Technical Research Centre of Finland
hanna.koskinen@vtt.fi, leena.norros@vtt.fi

Abstract. All of us are actors in the food chain - either as consumers (making decisions on daily food supplies) or as producers (producing of some fraction of those supplies). Actors and activities within the food chain are tightly intertwined and coupled together. The food chain is also confronted with a number of global challenges including food safety, environmental aspects and diversity in ethical and socio-cultural preferences. This makes the food chain a complex system to design for. The context of our study is the Future Internet (FI) and the development of a food chain specific application. The smart farming system aimed to enable better information flow and integration of consumers and producers to improve food chain awareness. In the paper, we present the smart farming concept and the responses that it received when the end-user representatives were asked to evaluate its potential benefits and risks i.e., the future value of the system. These early insights were then integrated in setting the experiential targets and the domain specific requirements for the FI and the further development of the system.

Introduction

Designing future technologies to support and assist people in their everyday living and working life is challenging. This is also the case when the designed system serves a socioeconomically critical and all-embracing food chain activity. All of us are actors in a food chain system in one way or the other; either as a consumer, purchasing and making decisions on daily food supplies or as a producer participating in producing some function or fraction of those supplies. In this

paper, we present a system to support the food chain processes and the flow of information between different actors in the food chain.

Our study was carried out within the EU funded SmartAgriFood project. The context of our study is the Future Internet (FI) and the development of domain specific requirements for FI to support the food chain activity. In particular, we concentrate on FI-supported farming activity. In this project, FI is seen as a possibility to improve food-chain awareness, i.e., awareness of different actors about issues relating to food safety, environmental aspects, ethical issues and socio-cultural preferences dealt within the food chain. In order to support the involvement and work of different actors and, in the end, improve food chain awareness, it was considered necessary to ground the development of the FI applications on a deep understanding of the real life context and the needs of the end users. In the paper, we describe how this understanding came to be.

The paper is organized as follows. We begin by introducing the general context of the study, the food chain activity and the challenges associated with establishing food awareness. Next, we present a food chain specific application of FI, an initial smart farming system concept and the functionality and benefits that it provides. Finally, we present the results from the end-user evaluations and how the opinions and insights of different food chain actors were integrated in setting the experiential targets and requirements for the FI technologies.

Food chain awareness

In recent years many food related scandals have reached the public and shook the trust of the consumers on the quality of the food chain and the integrity of its actors. This has increased the demand for traceability in the food chain. FI is expected to increase the food chain transparency as it provides effective tools for collaboration among different actors and through that enables the creation of a new kind of food awareness.

Our model of FI-supported food-chain awareness (Figure 1) illustrates how all the actors and processes of the food chain (farming, logistics, and retail activity) must take into account the global food chain challenges (food safety, environmental issues, ethical and socio-cultural aspects). Not only the customers, but also the three food chain processes (farming, logistics and retail) must participate in the creation of understanding of the global food chain challenges, and must facilitate awareness of the ways the challenges are actually met in the food chain. As shown in the model, the customers participate in the process by expressing their consumption preferences with reference to the global challenges. The three food chain processes portray their positions to these same global challenges, firstly, via decisions on business models and, secondly, via

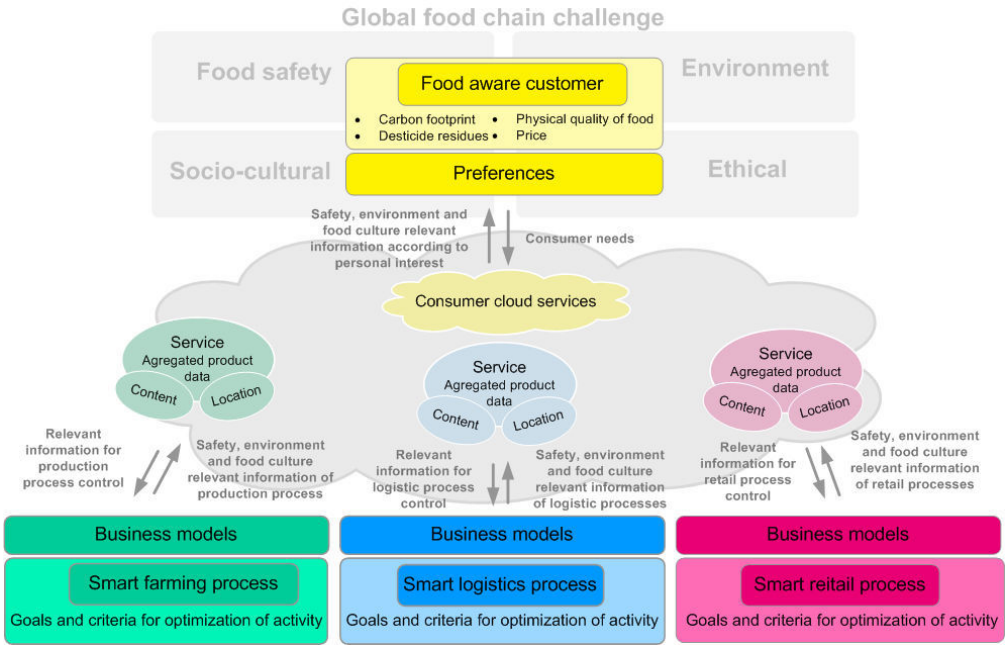


Figure 1. The model of FI-supported food-chain awareness.

considerations of the global challenges while accomplishing each of the three processes. Figure 1 also illustrates that it is the FI-based services that provide improved possibilities for all actors to become better informed and influence the decisions of the other actors.

Modern farming activities entail many challenging and wide-ranging decisions and management tasks (e.g., conforming regulations, budgeting and organizing work force) (Nurkka et al, 2007). In our case, we focused on examining the technological support provided by the FI to enhance the abilities of farmers to take care of their core tasks (Norros, 2004) and manage the growing complexity of activities and demands for better food awareness (Pesonen, 2008).

Future Internet enabled food chain activity

There is an on-going development effort shared by the EU technology community to develop the FI to serve socially important functions (e.g., healthcare and telecommunication). Generally, FI is expected to provide an innovative infrastructure for smart services across different domains. Smartness of system or service means that it is able to learn and communicate the results to other devices and users and develop their behavior to best fit the situation (OECD, 2013). FI-based service applications are realized using the Generic Enablers (GE) offered by the FI-WARE Core Platform and the Domain Specific Enablers (DSE) identified as common within one specific domain such as in this case the food chain

(Delgado, 2008-2012). Furthermore, as FI and its service applications represent a high-tech innovation in the food chain domain, it is expected to involve substantial leaps in terms of 1) the benefits that FI provides to food chain activity; 2) the technological capabilities FI equip the food chain actors; and 3) the food chain actors' production and consumption patterns (Veryzer, 1998).

The particular application of the FI enabled food chain activity reported here concerns the food production and more specifically the smart precision farming and the activity of smart spraying. The spraying activity involves the complexity related to precision farming operation management, the dynamicity caused by the online and mobile information requirements and the environmental uncertainty (for example those due to changing weather conditions). Thus, it demonstrates one of the most challenging set of the requirements for FI technologies.

The integrated model of smart farming is depicted in Figure 2. The functional model provides a description of the innovative features of the future system in relation to the value structures and the demands of specific work activity. The smart farming includes two distinct levels of abstraction; smart farming *service framework level* and smart *spraying system level*. The service level enables the farmer to build and employ a tailored set of services addressing the farm specific needs and demands. The smart spraying level demonstrates the use of particular spraying related services giving assistance to the planning, executing and reporting of spraying task.

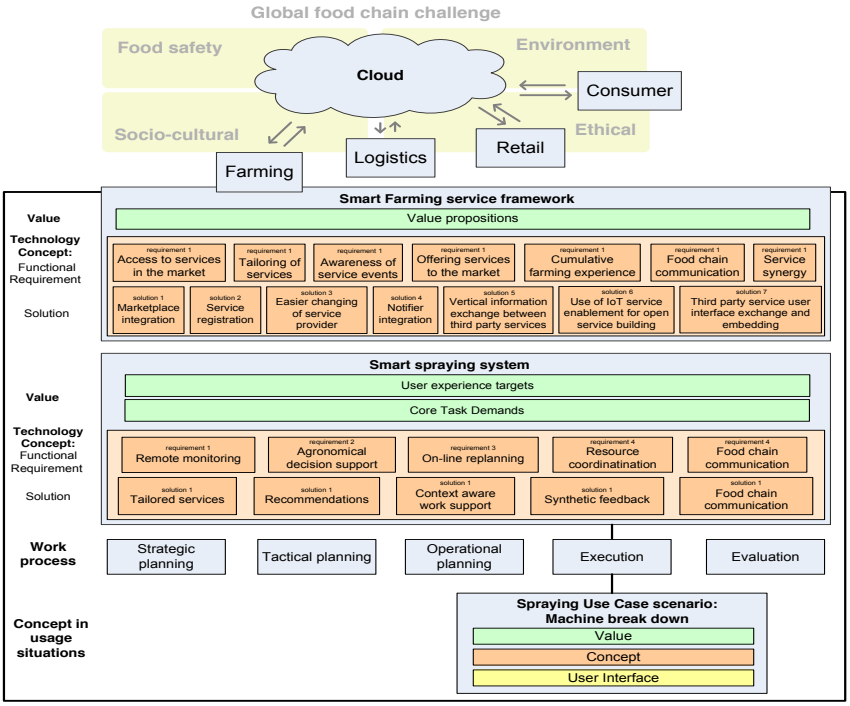


Figure 2. The integrated model of smart farming concept.

Methodology

The detail in which, the users understand the properties and functionality of a technology strongly influences the actual use of that technology, and most likely also their evaluations of the appropriateness of technology in their future work. Therefore, the smart farming service framework and the smart spraying concept were presented to the food chain actors through the integrated model of smart farming (Figure 2) and through a machine break down use case scenario and UI mockups. Two kinds of user interventions were organized to gain insights about the value connected to the concept; national discussion panels with participants from different food chain actor groups and design workshops with domain experts (e.g., farmers, spraying contractors). A total of 80 end users participated in evaluating the functionality and benefits of the proposed FI-based smart farming.

Expectations of food-aware farming work

As a result of the end-user interventions, feedback and insights about the smart farming were received. Three general topic areas emerged in the discussions 1) information content, 2) availability of ecosystem, and 3) value sharing.

The *information content* deals with the different functions of the farming process and the general demands that it sets. The benefits of improved quality of information were seen to enable better management and thus optimization of the processes according to the global food chain challenges. Semantic analysis and modelling of food chain process are required in order to structure the vast amount of data into meaningful contents. The question of *availability of ecosystem* concerns the technical capabilities and functioning of the system as well as the readiness (e.g., technical skills and willingness) of the farmers to adopt such FI-based system. End users often mentioned the data management aspect as the data handled is often means for earning once living and therefore one of the main concerns when discussing the use of advanced FI technology to support farming activity. While the benefits of one structurally organized infrastructure provided by the FI was admitted, also the drawback of the open information sharing was acknowledged namely the threat to privacy of business and production data. The presented FI-based smart farming was seen to support a new kind of food chain awareness as it improved the transparency of the whole system and enabled new kind of information sharing among the actors. The main questions here would be the ownership and control of data. Thus, the FI-based food chain activity was thought to require adaptation of new *value sharing* patterns as well as development of new business principles.

Drawn from experiences and expectations of the end-users four main user experience targets (UX targets) i.e., experiential qualities aimed at design of

technology could be formed (for more information about those targets see Koskinen et al, 2013). Below, these UX targets are discussed from the collaboration point of view. The first UX target concerns FI enabled meaningful exchange of information and especially that through collaboration and the synthesis of information from different actors, new understanding of the phenomenon can be created. The second UX target addresses the experience of work-flow and that FI-based smart farming enables ease of cooperation among the relevant actor groups. Thirdly, the FI application should also support users' sense of control by facilitating and building trust within the community of actors. Finally, the smart farming application should foster the experience of developing farming work and culture. One aspect of this is the just sharing of costs within the value chain i.e., building the collaboration and businesses around new shared principles.

Final remarks

In the next phase, we will extend the smart farming concept in a real life context and test it in a living lab setting. Our aim is to understand how food chain ecologies can emerge around the service framework, and how FI-based services can facilitate food awareness through collaboration from farm to fork.

Acknowledgments

We would like to acknowledge all members of the SmartAgriFood project and in particular the end-user representatives that expressed and shared their thoughts about the developing concept.

References

Delgado, J. J. (2008). Future Internet Core Platform. In European Future Internet Portal. Retrieved June 15, 2013, from http://www.future-internet.eu/home/future-internet-ppp/fi-ware.html.

Koskinen, H., Karvonen, H. and Tokkonen, H. (2013). User experience targets as design drivers: A case study of the development of a remote crane operation station. *In proc of ECCE 2013*.

Norros, L. (2004) *Acting under uncertainty – The core-task analysis in ecological study of work*. VTT Publications, Espoo.

Nurkka, P., Norros, L. and Pesonen, L. (2007). Improving usability of and user acceptance of ICT systems in farming. *EFITA/WCCA Joint Conngress in IT in Agriculture*, Edinborough.

OECD (2013). Building blocks for smart networks. *OECD Committee for information, computer and communications policy,* DSTI/ICCP/CISP(2012)3/FINAL

Pesonen, L., Koskinen, H. and Rydberg, A. (2008). InfoXT - User-centric mobile information management in automated plant production, Nordic Innovation Centre (NICe).

Veryzer, R.W. (1998) Key factors affecting customer evaluation of new products. J. Prod. Innov. Manag. 15 (2) 136-150.

Part II

Descriptions of Workshops and Master Classes

Master class: Co-producing assisted living technologies and services

Rob Procter[1], Joe Wherton[2], Paul Sugarhood[3], Mark Rouncefield[4], Guy Dewsbury[5], Trish Greenhalgh[2]

[1]Department of Computer Science, University of Warwick
[2]Blizard Institute, Queen Mary University London
[3]Barts Health NHS Trust, Newham University Hospital
[4]Department of Computer Science, Lancaster University
[5]guydewsbury.com
[1]*rob.procter@warwick.ac.uk*

Abstract. An aging population is fuelling interest in assisted living technologies (ALTs) to support independence at home. This includes telecare and telehealth, which are intended to deliver better and more cost effective social and health care into the home. This masterclass aims to raise awareness of the value of co-production approaches to the delivery of fit-for-purpose telecare are telehealth solutions and an understanding of practice.

Keywords. Assisted living technologies, co-production, cultural probes, ethnography, bricolage

Overview

Throughout the OECD nations, an aging population is fuelling interest in assisted living technologies (ALTs) and services to support 'ageing in place' through 'care at a distance' (Roberts et al. 2012), that is to enable older people to live independently at home, avoid or defer institutional care in later life and remain active participants in society (Lewin et al. 2010). In response, numerous ALTs and services have been developed and deployed. However, uptake and use has fallen short of levels desired by policymakers (Vasunilashorn et al. 2012) and there is evidence of significant reluctance to adopt by those who would supposedly benefit (Sanders et al. 2012). Hence, there is a risk that much of the current and planned investment in assisted living programmes will be wasted.

The ATHENE (Assistive Technologies for Healthy Living in Elders: Needs Assessment by Ethnography) project[1] (Greenhalgh et al., 2011) is funded by the Technology Strategy Board under

[1] www.atheneproject.org

its Assisted Living Innovation Platform programme[2]. It seeks to produce a richer understanding of the lived experiences and needs of older people (Greenhalgh et al., 2012a; 2012b; 2013; Wherton et al., 2012; Sugarhood et al., 2013). Its findings demonstrates that the problems of telecare and telehealth adoption cannot be resolved without a richer understanding of the complex and diverse living experiences and care needs of older people. More than that, they suggests that if the needs of older people are to be met, then industry, health and social care providers must evolve ways to work with older people and their informal carers (family, friends, neighbours) to 'co-produce' (Hartswood et al., 2002; 2008) useful and useable assisted living technology and service designs.

Successful deployment of assisted living technologies often depends on 'bricolage' (pragmatic customisation, combining new with legacy devices), by the user or someone who knows and cares about them. If assisted living technologies and services are to be fit-for-purpose, their design and deployment must be grounded in older people's lived experience. Currently, this is not being achieved. Stakeholders need to rethink how they produce assisted living technologies and services and, in particular, how they involve older people and their informal carers.

Bricolage allows users and informal carers to take the initiative in 'co-producing' solutions. Bricolage also exposes that making assisted living 'work' relies on collaboration, involving not only formal carers (health and social care professionals) but also informal ones (family members). Yet, the latter's role has gone unnoticed by technology designers. Where the former's role is designed for, its configuration can create vulnerabilities in care provision.

Bricolage is a pragmatic response to failures of design, but there are ways in which design can support it, e.g. by providing customisable features. However, the wider issues co-production raises are about how to afford a greater degree of collaboration between members of formal and informal carer networks. At a time when tight budgets preclude constant physical contact between older people and care services, and informal care networks are often widely dispersed, technology must inevitably play an important role in crafting an affordable and workable solution to supporting ageing in place for older people: the critical question is how we go about building this technical infrastructure so as to pay proper attention to the needs of the social infrastructure or soft periphery of ageing in place.

Twenty years ago, the 'turn to the social' (Hughes et al., 1994) marked a fundamental shift in conceptualising ICT design challenges. It is time this was acknowledged by assisted living technology designers and service stakeholders.

Objectives

In this master class, we develop and expand on themes concerning the challenges of understanding the assisted living needs of older people in domestic settings, and methods for involving them and their carers in the co-production of assisted living technologies and services. It has the overall objective of developing an understanding and appreciation of the benefits and the various practical issues involved in facilitating a 'bricolage' approach to the dependable co-production of assisted living technologies.

The master class will include comprehensive slides and a website where other relevant material will be hosted. It will build on our experiences and understanding gained from following a co-production approach with older people in the ATHENE project and will maintain a strong practical focus with an emphasis on active participation.

[2] https://connect.innovateuk.org/web/assisted-living-innovation-platform-alip

Learning objectives

Participants will be able to:

- Understand merits and limitations of different ways of engaging with older people and their carers, and exploring their assisted living technologies and service needs.
- Analyse data gathered through user engagement activities and communicate results to stakeholders.
- Understand limits of current assisted living technologies (co-)design approaches and how bricolage/co-production can overcome them.
- Evaluate the role for bricolage/co-production within a given assisted living technologies application scenario.
- Select and apply design approaches to facilitate bricolage/co-production.

Web-based resources: www.atheneproject.org

Target audience

The tutorial will be of use to people involved in the design and development of assisted living technologies, healthcare professionals involved in the planning, management and delivery of assisted living services, CSCW and Social Science researchers, including those in health and social care, and commercial researchers and consultants working in the field.

Provisional agenda

Time	**Topic**
10 min	Introduction
30 min	Ethnographic methods and materials
40 min	Case studies of assisted living needs
15 min	Coffee break
30 min	Bricolage/co-production overview
30 min	Challenges for designers and service providers
25 min	Discussion: take home lessons

About the presenters

The presenters, from Queen Mary University of London, Warwick and Lancaster Universities, and Barts Health NHS Trust are members of the ATHENE project. They are particularly associated with developments in methodologies for the ethnographic study of domestic environments and practices associated with the participative design and co-production of technologies.

Rob Procter is Professor of Social Informatics in the Department of Computer Science at Warwick University. His research is strongly inter-disciplinary and focuses on socio-technical issues in the design, implementation, evaluation and use of ICTs, with a particular emphasis on ethnographic studies of ICT systems in diverse use settings, including the workplace and the home, computer-supported cooperative work and participatory design.

He has pursued these interests over twenty-five years in fifty funded projects undertaken within a wide variety of application domains, organisational contexts and sectors, including financial services, health services, manufacturing and research. He has published over 200 academic,

refereed papers and is editor of the Health Informatics Journal.

He has made a significant contribution to methodologies for user-centred, participatory design, with an emphasis on the co-production ('co-realisation') and co-evolution of ICTs with and by users. He is Co-I on the ATHENE project.

Joe Wherton is a Research Fellow at the Centre for Primary Care and Public Health, Queen Mary University of London. He has a research background in psychology and human-computer interaction, with a focus on the design of assisted living technologies to support older people living at home. For ten years his research has involved interdisciplinary collaborations with academic, industry and healthcare organisations to support the design of new technologies to address problems of dementia, loneliness and caregiver burden. He uses qualitative and participatory design methods to inform the development of solutions that meet older users' needs in real domestic settings.

Paul Sugarhood is an occupational therapist based at Newham University Hospital, Barts Health NHS Trust, London. He is currently a Research Fellow on the ATHENE project. He has 16 years clinical experience as an occupational therapist in the UK and Brazil, working in a variety of acute and community settings, including paediatrics, mental health and care of the elderly.

His research interests focus on older people, particularly ageing in place, active ageing and environmental interventions to support these. He is undertaking a Professional Doctorate in Occupational Therapy at London South Bank University, researching "Participation from the perspective of community-living older people aged over 80 years".

Mark Rouncefield is a Senior Research Fellow in the School of Computing and Communications, Lancaster University and a recent holder of a Microsoft European Research Fellowship for his work on social interaction and mundane technologies. He is a consultant on the ATHENE project.

His research interests are in Computer Supported Cooperative Work and involve the study of various aspects of the empirical study of work, organisation, human factors and interactive computer systems design. This work is strongly inter-disciplinary in nature and has led to extensive and continuing collaborations with colleagues in Sociology, Computing, Informatics and Management departments both in the UK and abroad.

His empirical studies of work and technology have contributed to critical debates concerning the relationship between social and technical aspects of IT systems design and use. He is particularly associated with the development of ethnography as a method for informing design and evaluation. This work has included the study of financial services, assistive technologies, information giving services, hotels, hospitals, steelworks and libraries. Recent work has focused on socio-technical aspects of the design and deployment of technologies in domestic and healthcare settings. He has written or edited six books, and over 100 journal and conference papers. He has worked as a consultant on projects with a number of organizations including Microsoft, Vodafone, Xerox and NatWest Bank. He has served on the editorial boards of the International Journal of Organisational Transformation and Social Change (OTSC), Sociological Research Online, the Journal of Computer Supported Cooperative Work and the Health Informatics Journal.

He has presented tutorials on the use of ethnography for design at major international conferences, such as the ACM CH Conference on Human Factors in Computing Systems and the ACM CSCW Conference.

Guy Dewsbury is a social scientist with a professional background in research into assistive technology and specialises in the design of person-centred technology to support older and disabled people. His expertise includes environmental controls, smart homes, telecare, telehealth, eHealth, mHealth, HIS, EHRs, PERs and ambient assistive technology. He has researched and worked for over fifteen years in the field of assistive technology, smart homes and telecare, and has considerable expertise in the use and deployment of cultural probes as an aid to designing for

people's needs. He is managing director of gdewsbury.com, an assisted living consultancy service and a consultant on the ATHENE project.

He is on the editorial boards of the Health Informatics Journal and the Journal of Assistive Technology and currently teaches on the University of Trieste's Web based Masters level in Assistive Technology. He has published over 100 papers and book chapters. Guy also co-designed the first fully inhabited 'smart home' in Scotland for a person with an acquired brain injury and has been the co-designer of 54 homes for people with autistic spectrum disorders. Guy has twice been awarded best paper at conferences in computing and was also Co-Chair of the Smart Homes and Ambient Assisted Living IMIA Working Group from 2006-2009.

Trish Greenhalgh is a GP in north London and Professor of Primary Health Care at QMUL. Her research interests lie at the interface between medicine, sociology and innovation. She is PI on the ATHENE project.

Bibliography

Greenhalgh, T., Procter, R., Rouncefield, M. and Dewsbury, G. (2011). ATHENE–Assistive Technologies for Healthy living in Elders–Needs assessment by Ethnography, Digital Economy All Hands Meeting, Newcastle.

Greenhalgh, T., Procter, R., Shaw, S., Wherton, J., and Sugarhood, P. (2012a). The organising vision for telehealth and telecare: discourse analysis. BMJ Open 2012;2: e001574 doi:10.1136/bmjopen-2012-001574

Greenhalgh, T., Procter, R., Rouncefield M. Wherton, J. Sugarhood, P., Dewsbury, G. (2012b). Involving older adults in the co-design of assisted living technologies. Workshop on the Elderly's everyday practices as a design approach, NordiCHI, Copenhagen, October.

Greenhalgh, T., Wherton, J., Sugarhood, P., Hinder, S. and Procter, R. (2013). What matters to older people with assisted living needs? A phenomenological analysis of the use and non-use of telehealth and telecare. Submitted to Social Science and Medicine.

Hartswood, M., Procter, R., Rouchy, P., Rouncefield, M, Slack, R., & Voss, A. (2002). Co-realisation: Towards a Principled Synthesis of Ethnomethodology and Participatory Design. In Berg, M., Henriksen, D., Pors J., & Winthereik, B. (Eds.), special issue on Challenging Practice: Reflections on the Appropriateness of Fieldwork as Research Method in Information Systems Research, Scandinavian Journal of Information Systems, 14(2), p. 9-30.

Hartswood, M., Procter, R., Rouncefield, M, Slack, R., & Voss, A. (2008). Co-realisation: Evolving IT Artefacts by Design. In Ackerman, M., Erickson, T., Halverson, C., & Kellogg, W. (Eds.) Resources, Co-Evolution and Artefacts, Springer.

Hughes, J., King, V., Rodden, T., & Andersen, H. (1994). Moving out from the control room: Ethnography in system design. In Proceedings of the 1994 ACM conference on Computer supported cooperative work (pp. 429-439). ACM.

Lewin, D., Adshead, S., Glennon, B., Williamson, B., Moore, T., Damodaran, L., & Hansell. P. (2010). Assisted living technologies for older and disabled people in 2030: A final report to Ofcom. London: Plum Consulting.

Martin, S., Kelly, S., Kernohan, W.G., McCreight, B., & Nugent, C. (2008). Smart home technologies for health and social care support. Cochrane Database of Systematic Reviews; Issue 4. Art. no: CD006412. DOI: 10.1002/14651858.CD006412.pub2.

Roberts, C., Mort, M., & Milligan, C. (2012). Calling for Care: 'Disembodied' work, teleoperators and older people living at home. Sociology, 46(3), 490-506.

Sanders, C., Rogers, A., Bowen, R., Bower, P., Hirani, S., Cartwright, M., ... & Newman, S. P. (2012). Exploring barriers to participation and adoption of telehealth and telecare within the Whole System Demonstrator trial: a qualitative study. BMC health services research, 12(1), 220.

Sugarhood, P., Wherton, J., Procter, R., Hinder, S., Greenhalgh, T. (2013). Technology as system innovation: a key informant interview study of the application of the diffusion of innovation model to telecare. Disability & Rehabilitation: Assistive Technology.

Vasunilashorn, S., Steinman, B., Liebig, P., & Pynoos, J. (2012). Aging in place: evolution of a research topic whose time has come. J Aging Res 2012:120952.

Wherton, J., Sugarhood, P., Procter, R., Rouncefield, M., Dewsbury, G., Hinder, S., Greenhalgh, T. (2012). Designing assisted living technologies 'In the wild': preliminary experiences with cultural probe methodology. BMC Medical Research Methodology 12 (1), 188.

Workshop for ECSCW 2013 Participatory Publics: Civic technology and local communities

Olav W. Bertelsen[1], Susanne Bødker[1], Martin Brynskov[2], Christopher A. Le Dantec[3], Anne Marie Kanstrup[4], Volkmar Pipek[5]
1) Centre for Participatory IT - Computer Science, Aarhus University, Denmark, 2) Centre for Participatory IT - Aesthetics and Communication Aarhus University, Denmark, 3) Literature, Media, and Communication, Georgia Institute of Technology Atlanta, GA, USA, 4) Aalborg University, Denmark, 5) University of Siegen, Germany.
olavb@cs.au.dk, bodker@cs.au.dk, brynskov@imv.au.dk, ledantec@gatech.edu, kanstrup@hum.aau.dk, volkmar.pipek@uni-siegen.de

Teaser: New forms of community technologies are focused on supporting local, geographically connected communities directly through neighborhoods and civic activity. The workshop will address the following questions: What constitutes participation in community settings and how is it supported/augmented through IT? How do we understand the relationships between participation, community and technology in these (emerging) settings? It will be based on examples of technology supported participatory publics brought to the workshop by participants.

Workshop activities and goals

This workshop aims to understand these settings better and discuss the roles of CSCW in understanding and designing for them. In particular, the workshop will discuss various definitions of "publics," "the public," and the theoretical frames

those definitions provide. We will also examine the roles of participatory methods, and technology mediated participation across these different contexts. The workshop will address the following questions: What constitutes participation in community settings and how is it supported/augmented through ICTs? How do we understand the relationships between participation, community, and technological platforms in these (emerging) settings? What methods are appropriate in which situations?

An intended outcome of the workshop is to produce an overview of the many projects addressing participation mediated through collaborative technologies in public and semi-public spaces, and to work towards a better methodological and conceptual basis for addressing them.

Our discussion and exploration will be based on examples of technology supported participatory publics brought to the workshop by participants through position papers submitted prior to the workshop. We will seek a variety of current projects, case studies, and present challenges to CSCW researchers to build a rich discussion during the workshop. Given the opportunity to hold this workshop at ECSCW, we will also be looking for specific instances where different cultural, social, and political realities come in contact with systems and networks derived primarily in and for a western commercial setting.

As a result of the workshop, we will maintain the web-site and hope to produce a survey article with a summary of the discussions. Position statements and additional material can be found at: http://pit.au.dk/news-events/upcoming-conferences-workshops-and-summer-schools/ecscw-2013-ws1/

Program of the workshop Sunday September 22

1. Introduction and presentation
2. Presentation of themes and examples to think from by workshop organizers
3. Presentation of two position papers with initial discussions:
   - Micheel, I. and Novak, J: Elocal: An exploratory approach to designing for civic participation.
   - Katja Neureiter, Alina Krischkowsky, Verena Fuchsberger, Manfred Tscheligi: Supporting Community Building through VMC Systems
4. Lunch.
5. Workshop participants work in groups to discuss remaining position statements, specific themes from the presentations with an aim of developing responses to theoretical challenges, design challenges, and deployment/intervention challenges.
6. Plenary and planning of future activity

Theme of the workshop

Participation and collaboration through new forms of community technologies is the focus of this workshop. We will explore the evolving context of digital democracy in the face of new social technologies and trends that have arisen in the past few years. These include social media platforms used around the world to connect people across physical, political, and cultural distances as well as systems designed to better support highly localized action with geographically bounded communities. By looking at these diverse venues of interaction we will engage with publics as a theoretical and pragmatic frame for understanding and designing systems in community settings.

By activating the notion of participatory publics, we will address the theoretical breadth of publics as a site for understanding collective action and democratic discourse. The concept of a public has evolved through different philosophical and scholarly traditions: from a focus on the common good attained through rational discourse in Habermas' early definitions of the public sphere (Habermas 1991[1962]), to Warner's perspective of multiple audiences and mechanisms for including marginalized or disenfranchised publics from media studies (Warner 2005), to Dewey's notional public focused on the contingent ways groups of people form together to confront shared issues (Dewey 1954[1927]). In this workshop we are most interested in the problem-driven communities of Dewey's publics and the way that participation shapes and forms their response to particular issues. Within this, we want to explore how practices in these particular publics might be connected to more general publics that operate at different scales.

Participation in and through technology supported or mediated communities takes many forms. Social Networking Sites such as Facebook, Twitter, and Google+ are providing new and rapidly evolving ways for communities to interact with each other. At the same time, new forms of social technologies are focused on supporting the local, geographically connected who may otherwise be strangers. Sites like Nextdoor in the US focus on supporting neighborly connections and developing stronger community ties within a bounded space. This form of mediated participation harkens back to earlier community-based sites such as the Public Electronic Network, HomeNetToo, the Creating Community Connections system, and Netville all of which focused on supporting participation and social awareness in geographically connected communities (Hampton, 2010, Jackson et al. 2004, Pinkett & O'Bryant 2003, Rogers et al (1994).

Beyond technology-mediated communities, there are purpose-built sites to help communities take on collective action and manage shared resources. Websites such as Citizen Connect, FixMyStreet and SeeClickFix act on the idea that the management of public goods can be driven by citizens, and supported by

technology. While such systems are limited by a 'report-and-forget' approach, rather than cultivating active participation and deliberation within the community, they do begin to touch on what Schuler (2007) called civic intelligence as a way to embrace the idea of cooperative creation and knowledge sharing in civic and democratic settings. Community-focused technologies like those mentioned above enable alternate forms community to emerge, suggesting questions about how community participation is changing and how community-focused technology offers itself to participation and sharing, among friends as well as strangers, over time and place.

Classical participatory arenas such as politics and urban planning have tried to make use of these kinds of technological platforms as well. However, there are challenges to shifting such civic activities to mediated technologies (see Schuler 2009, De Cindio & Peraboni 2009): relying on technology mediated interactions privileges those with access, there is often resistance to new forms of public consultation and participation as they may disrupt established power relations, and the legitimacy of mediated participation can be difficult to manage as in-person public meetings make such participation visible (and public) in a way that on-line participation may not—raising questions of identity, privacy, and accountability. Furthermore, the gap between what is occurring in the for-profit world of social technologies and the way politicians and civic institutions are able to incorporate and respond to these potentials suggests we need to carefully examine the specifics of where commercial systems are and are not appropriate for public, civic endeavors (Brynskov et al 2011).

Finally, completely new and transient communities are being formed through the use of these social platforms. Widespread social uprisings where social issues and common cause are transmitted and amplified through social networking sites demonstrate how social media platforms can be enlisted for public action in diverse settings: from the protests in the UK to the revolutions still unfolding from the Arab Spring. In these cases, the technology was a component of the constitution of publics as social issues were transmitted across the network in ways that were highly personalized and contextualized. The personalization of social issues over media like Twitter has been called “connective action” and focuses on the way social technologies provide not just a new medium for activists, but a new relationship between how activists can get their message out—both to others who would act and to raise the visibility of the action (Bennett & Segerberg 2012).

Whether used for connecting geographically disperse friends and family, or providing a platform for neighbors to interact, or empowering individuals to take action in their communities, or creating more personalized ways of relating to social issues each suggest questions about how community participation is changing in the face of mass-market technologies with multiple paths for membership, association, and action. They provide a number of different settings

to understand the development and constitution of publics—of issue-bound communities that take action on a particular social condition (Le Dantec 2012, Le Dantec & DiSalvo in press). And they push participatory methods to contend with settings where multiple authority dynamics and conflicting or contentious outcomes force an engagement with the political in ways that challenge models of participation from the "neat" world of corporate or institutional design (DiSalvo, 2012, Bohøj et al. 2011, Brynskov et al. 2009).

While all of this is happening, we struggle to understand the social phenomena as such and the potentials and problems of the technological augmentation underlying them: we need to better understand where and how to adjust our methods, scale our tools, and calibrate a larger CSCW research agenda to contend with this rich, and rapidly evolving, socio-technical domain. This workshop will set out to bring a more careful focus to these questions by jointly interrogating multiple perspectives, practices, and places of digital democratic and civically engaged research.

Background of the organizers

Olav W. Bertelsen has been doing research in participatory design, HCI and CSCW since the early 1990s. He is also an activist in the social housing movement where he is engaged in the development of new form of (democratic) participation.

Susanne Bødker has been doing research in participatory design, computer supported cooperative work and HCI since the early 1980s. She is currently doing research in the area of public services and citizen participation. She is co-managing the Aarhus University inter- disciplinary Center for Participatory IT.

Martin Brynskov is heading Aarhus University's Smart City initiatives. He specializes in participatory digital urban spaces and city development, and has previously worked with children and technology-supported play and learning.

Christopher Le Dantec's research integrates theoretical, empirical, and design-based investigations of mobile and social technologies in support of community and civic engagement. Le Dantec's research examines socio-economic constraints on mobile computing in urban life, information technology and social institutions, and the use of participatory design in constructing publics and articulating social issues.

Anne Marie Kanstrup works in the eLearning Lab of Aalborg University. Her research focuses on participatory design methods when it comes to chronically ill patients, the home and the public.

Volkmar Pipek holds a professorship at the Institute for Information Systems at the University of Siegen. Since 2006 his research is focused on the domain of emergency management.

References

Bennett, W. L., & Segerberg, A. (2012). The Logic of Connective Action. Information, Communication & Society, 15(5), 739–768.

Bohøj, M., Borchorst, N. G., Bødker, S., Korn, M., & Zander, P. O. (2011). Public deliberation in municipal planning: Supporting action and reflection with mobile technology. Communities & Technologies'11, pp. 88-97.

Borchorst, N. G. & Bødker, S. (2011). You probably shouldn't give them too much information– towards citizen-government collaboration. ECSCW'11, pp. 173- 192.

Brynskov, M., Dalsgaard, P., Ebsen, T., Fritsch, J., Halskov, K., Nielsen, R. (2009). "Staging Urban Interactions with Media Façades", Proceedings of INTERACT 2009. LNCS 5726, Springer Verlag, p. 154-167.

Brynskov, M., Fritsch, J. & Leong, T.W. (2011). Bridging the affective gap to make news felt: Spaces of aestheticized public voice. 5th Int'l Conference on Communities & Technology.

De Cindio, F. & Peraboni, C. (2009). Fostering e-participation at the urban level: Outcomes from a large field experiment, in Proceedings of ePart'09 (p. 112- 124).

Dewey J (1954[1927]). The Public and Its Problems. Athens, OH: Swallow Press.

DiSalvo, C. (2012). Adversarial Design. MIT Press.

Habermas J (1991[1962]). The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society. Cambridge, MA: The MIT Press.

Hampton, K., "Grieving for a Lost Network: Collective Action in a Wired Suburb," The Information Society 19, 5 (2010), 417-428.

Jackson, L.A., von Eye, A., Barbatsis, G., Biocca, F., Fitzgerald, H.E. and Zhao, Y., "The Impact of Inter- net Use on the Other Side of the Digital Divide," Communications of the ACM 47, 7 (2004), 43-47

Le Dantec, C. A. (2012). Participation and Publics: Supporting Community Engagement. CHI 2012.

Le Dantec, C. A., & DiSalvo, C. (in press). Infra- structuring and the Formation of Publics in Participatory Design. Social Studies of Science.

Pinkett, R. and O'Bryant, R., "Building Community, Empowerment and Self-Sufficiency," Information, Communication & Society 6, 2 (2003), 187-210.

Rogers, E.M., Collins-Jarvis, L. and Schmitz, J., "The PEN Project in Santa Monica: Interactive Communication, Equality, and Political Action," Journal of the American Society for Information Science 45, 6 (1994), 401-410.

Schuler, D. (2007), "Civic Intelligence and the Public Sphere", in Tovey, Collective Intelligence: Creating a Prosperous World at Peace, Oakton, Virginia: Earth Intelligence Network.

Schuler, D. (2009). Communities, technology, and civic intelligence. In Communities & Technologies'09 proceedings (p. 61-70).

Warner M (2005) Publics and Counterpublics. New York, NY: Zone Books.

CSCW at the Boundary of Work and Life

Luigina Ciolfi°, Gabriela Avram*, Erik Grönvall`, Chiara Rossitto^ and Louise Barkhuus^

°Sheffield Hallam University, UK
*University of Limerick, Ireland
`Aarhus University, Denmark
^ Stockholm University, Sweden

L.Ciolfi@shu.ac.uk, Gabriela.Avram@ul.ie; gronvall@cs.au.dk; chiara@dsv.su.se, barkhuus@dsv.su.se

Abstract. This ECSCW 2013 workshop discusses the topic of extending and applying CSCW themes, concepts and sensibilities to practices at the boundary between work and life. We provide a rationale for the workshop, grounded on the need to extend current work examining the blurring between work and non-work activities, and also to look at design approaches to address this through collaborative technology. The paper also includes information on the program for this event and biographical details of the proposers.

Workshop Theme and Rationale

Over the past 20 years, technology has moved from workplaces to become part of nearly every aspect of everyday life, from leisure to domestic activities, and of even more private spheres of life such as personal health management.
This change in the use of technology has also been reflected in CSCW research: for many years, CSCW has been including not only studies of work settings and practices, but also of other life domains. Some examples include studies focused on specific private life settings only, such as family communication - for example how photo displays are created and arranged in the home (Taylor et al., 2007), and how technology is involved in the management of a person's end of life (Massimi et al., 2011) - as well as research on work practices blurring into private spaces, from work that is performed at non-work locations (e.g. work on the move), to professional practice that takes place in private domains (e.g. home care). CSCW has also extended its boundaries to focus on different leisure activities from tourism, to music sharing, to game playing (Barkhuus and Brown, 2007; McEwan et al., 2012).

Thus, as digital technologies pervade our lives, they become a constant presence in people's everyday practices, rather than tools used merely in specific work situations (Hallnäs and Redström, 2002). This has been addressed by research looking at work/life balance and sustainable lifestyles (Sengers, 2011) and by studies looking at the socio-material practices around the use of phones in work settings, at how they redefine the

boundaries of the workday, and at the expectations concerned with co-workers' availability (Orlikowski, 2007).
There is currently an interesting debate on how to look at this blurring of practices, spheres of life and expectations: is it a problematic issue that should be addressed, or a new way of working and living that people are increasingly embracing? These are open questions in need of further research.

The field of Human Resources has looked at the notion of work-life balance, whereby work and life are seen as two things that should have some distinct separation and certain guidelines should help workers achieve it. This however can be seen as an artificial distinction (e.g. is it always a positive thing where the two are separated, rather than when they are mixed?). Furthermore, a balance between activities might not be achieved by segregating the two, but allowing for some flexibility where concepts of time and space at work are increasingly fluid. Some HR studies have also found that work-life balance does not equal to organizational performance by reducing conflict (Beauregard and Henry, 2009).

In HCI, there is an interest in work/life blurring with respect to the performance of HCI practitioners themselves (Peters et al., 2012), as well as a number of explorations on how work and life and their multiple interrelationships are managed. Technological changes make it increasingly difficult to keep work and life separated, to the point that attempting to achieve work-life balance might be counter-productive or more demanding than managing the blurring between them. Studies on the use of mobile phones, instant messaging and social media, have shown how the same communication channel is often used for work and private activities almost at the same time (Lindley et al., 2012). For example, for certain typologies of work, such as that of freelancers, mobile technology is used to support both aspects of their life and it is difficult to see a neat separation (Sadler et al., 2006) .
Mobile technology and mobile interaction have often been a frame for looking at these phenomena, linked to the idea of "mobilization" of practices as well as of infrastructure, and mobilities studies have been the frame for other examples of existing work on shifting patterns of home life and work life physically, temporally and organisationally (Ciolfi et al., 2012).
Overall, with regard to the blurring between work and private domains there is a focus on how people manage to do their work "despite" interruptions. However, the blurring might not necessarily be disruptive and/or avoidable: it might be something that people are willing to put effort on, or something that is accepted as part of everyday life and dealt with through different strategies.

Finally, another aspect to consider is when one person's home is another person's workplace, as in the case of referred homecare: not only may the role people attribute to a place such as the home change when shared among different roles and interests, but technologies that are there for the 'worker' can invade the private space of the inhabitant. However, technology can also provide different stakeholders with new possibilities to collaborate across organizational, social and temporal boundaries (Bossen et al., 2012). In cases such as telecare and video consultancy, it is not the mere technology that must be negotiated, but also the planning of, and availability to, an online meeting and other professional activities that must be woven into everyday life activities.

These occurrences happen increasingly in other domains as well, especially when looking at new forms of distributed work and of use of personal technologies and platforms in the workplace and vice versa.

Considering all the issues we have outlined thus far and their implications, the blurring of work and non-work activities is clearly a topic relating to much contemporary CSCW research, and we believe there is room to bring the study of these complex practices further into the field - as more work is needed on how people coordinate and interact when work tasks, personal tasks and leisure tasks blur into each other, and how to support/facilitate/mediate this through design.

Issues that the workshop explores further with the participants include:

- Coordination, awareness, planning around work/life practices;
- The permeation of work and private life with respect to managing work despite interruptions;
- The permeation of work and private life with respect to achieving a suitable pace of life;
- Design for the support of both work and life practices;
- How collaboration and social interaction occur across work and life domains;
- New interaction modalities that support/mediate the blurring of work and life;
- Theoretical and methodological issues on how to study these issues (merging and/or developing existing frameworks, new conceptual approaches, developments in methodology, etc.);
- Explorations of settings where this occurs (at home, in the workplace, on the move…).

Agenda

The workshop includes the presentation of position papers. Moreover, during the workshop, we will foster debate by facilitating discussions on shared artifacts. We will invite the participants to contribute to the workshop with either posters illustrating a concept/framework, or samples of data collected during fieldwork, or demos/prototypes, and these materials will be the main subject of the discussion following the presentations. In the afternoon session, we will lead more focused discussions on specific questions/issues, and practical brainstorming exercises. A workshop blog will be used during these exercises to aid and document the event, and to disseminate results to the wider Conference. It can be found at: http://cscwworkandlife.wordpress.com/

List of Paper Presentations

"SME owners work-life arrangements: types, ICT use and needs and recommendations"
Daniel Boos, Thomas Robinson, Sandra Moscatelli-Steiner
Swisscom (Schweiz) AG (Switzerland)

"Doing taxes - between work and life"
Guri Verne, Tone Bratteteig
University of Oslo (Norway)

“Boundaries, work and the rest”
Susanne Bødker
Aarhus University (Denmark)

“Materials Enabling Cooperation”
Verena Fuchsberger, Roland Buchner, Ilhan Aslan, Manfred Tscheligi
University of Salzburg (Austria)

“Technology for Work-Life Balance in Terms of Informal Care Work”
Aparecido Fabiano Pinatti de Carvalho, Susanne Schinkinger, Ivan Breskovic, Hilda Tellioğlu
Vienna University of Technology (Austria)

“Caring for Facebook Pages -When Is It Work, and When Isn’t It?”
Gabriela Avram
University of Limerick (Ireland)

“Making Place for Work and Life”
Luigina Ciolfi
Sheffield Hallam University (UK)

“Aspects of family-managed care at home”
Erik Grönvall
Aarhus University (Denmark)

"Managing Constellations of Technologies Between Work and private Life"
Chiara Rossitto
Stockholm University (Sweden)

Profile and Skills of Organizing Group

The organizing group brings together expertise in studying various aspects of work, leisure and private life, and in mobile computing and mobile interaction, both from the point of view of informing design through studies of collaborative conduct, and of developing novel interaction modalities. Members of the organising group have also developed conceptual approaches for the study of situated interaction in a variety of settings. Domains covered by the organisers’ expertise include: healthcare, education, software development, social media, cultural heritage, family life and leisure activities.

Luigina Ciolfi is Reader in Communication in the Communication and Computing Research Centre, C3RI, Sheffield Hallam University (UK). Her main research interests focus on people’s experience of technology in the physical world, notions of space and place and situated conduct, and practices of mobility in context. She has worked on several research projects exploring interaction with technology in public spaces, heritage settings, and practices of work and life on the move. She is interested in exploring placemaking and mechanisms of coordination and planning around work and non-work activities and in developing insights on how technology could be designed to better support this.

Gabriela Avram is lecturer in Digital Media and Interaction Design and senior researcher at the Interaction Design Centre of the University of Limerick (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. Her previous research focused on distributed work practices in Global Software Development (socGSD), Open Source communities, cultural and social aspects of collaboration and the adoption and uses of Social Media for work purposes.

Erik Grönvall is a Post-doc researcher at Aarhus University (Denmark), Computer Science department and is affiliated with the Center for Pervasive Healthcare and with the research center Participatory IT (PIT). Erik holds a Ph.D. from the University of Florence (Italy) and he works mainly within the fields of Participatory Design, Pervasive computing and healthcare. His current research interests can be found at the boundary where technology and users meet and include issues like Pervasive Healthcare, Method development for user driven innovation, end-user control in ubiquitous systems and how to develop technologies that can be used by diverse and heterogeneous user groups. Lately, a focus has been on the home as a setting for (healthcare) design, from both a CSCW and HCI perspective.

Chiara Rossitto is a Lecturer in Human-Computer Interaction at the Dept. of Information and Systems Sciences at Stockholm University (Sweden). Chiara holds a PhD in Human-Computer Interaction from the Royal Institute of Technology (Sweden) and a Master Degree in Communication Sciences from the University of Siena (Italy). She has worked on a variety of research topics, including the analytical investigation of mobility in collaborative work settings, mobile learning, web-based support for collaborative writing. Chiara's research is characterized by a combination of social theory and empirical investigations aiming at understanding the situated use of technologies, and at exploring new design spaces.

Louise Barkhuus is an Associate Professor at Stockholm University and a senior researcher at the Mobile Life Centre (Sweden). Her research focuses on social interaction through and around mobile and ubiquitous technologies, particular in relation to issues of privacy, friendship maintenance, location-reporting and game playing. She looks at the intersection of technology and social interaction by combining the development of prototype applications with newly adopted commercial technologies. Her recent work includes studies of social media as facilitators of ad-hoc socializing and analyses of privacy issues within ubiquitous computing research.
Before coming to Stockholm University and the Mobile Life Centre, Louise Barkhuus was working as a research scientist at the University of California, San Diego, serving as the PI of an NSF funded project on technologies for supporting social science research.

References

Barkhuus, L. and Brown, B. (2007), "Leisure and CSCW", *CSCW Journal*, 16:1-2, London: Springer.

Bossen, C. Rune Christensen, L., Grönvall, E. and Steenbock Vestergaard, L. (2012), "CareCoor: Augmenting the coordination of cooperative home care work", *International Journal of Medical Informatics*, 10.1016/j.ijmedinf.2012.10.005.

Beauregard, T. A. and Henry, L. C. (2009), “Making the link between work-life balance practices and organizational performance”, *Human resource management review*, 19, pp. 9-22. ISSN 1053-4822

Ciolfi, L., Gray, B. and D’Andrea A. (2012), “Social Aspects of Place Experience in Nomadic Work/Life Practices”, in Dugdale, J., Masclet, C., Grasso, A. and Boujut, J-F. (Eds) *Proceedings of COOP 2012*, London: Springer,183-196

Cousins, K. C. and Varshney, U. (2009), “Designing ubiquitous computing environments to support work life balance”, *CACM*, Vol. 52, Issue 5

Hallnäs, L. and Redström, J. (2002), “From Use to Presence; On the Expressions and Aesthetics of Everyday Computational Things”, *ACM Transactions on Computer-Human Interaction* (ToCHI), Vol. 9, No. 2, June 2002, pp. 106-124. ACM Press.

Joseph, D. and Koh, C. (2012), “Work-Life conflict and job mobility intentions”, SIGMIS-CPR, *50th annual conference on computers and people research*

Lindley, S., Meek, S., Sellen, A., and Harper, R. (2012), “ ‘It’s simply integral to what I do’: Enquiries into how the web is weaved into everyday life”, in *Proceedings of the 2012 international conference on World Wide Web*, International World Wide Web Conference, April 2012

Massimi, M., Odom, W., Banks, R. and Kirk, D. (2011), “Matters of life and death: locating the end of life in lifespan-oriented HCI research”, in *Proceedings of the 2011 annual conference on Human factors in computing systems (CHI 2011)*, Association for Computing Machinery, Inc., 2011

McEwan, G., Gutwin, C., Mandryk, R., Nacke, L. (2012), ‘ “I'm Just Here to Play Games:” Social Dynamics and Sociability in an Online Game Site’, *The 2012 ACM Conference on Computer Supported Cooperative Work*, Seattle, Washington, USA. 549-558.

Orlikowski, W. (2007), "Sociomaterial Practices: Exploring Technology at Work," *Organization Studies* , 28, 2007: 1435-1448.

Peters, A., Dray, S. and Kaye, J. (2012), “SIG: Work life balance in HCI”, *CHI EA CHI ’12*, New York: ACM, pp. 1229-1232

Sadler, K., Robertson, T., Kan , M. and Hagen, P. (2006), “Balancing work, life and other concerns: a study of mobile technology use by Australian freelancers”, *Proceedings of NordiCHI* 2006.

Sengers P. 2011. "What I Learned on Change Islands: Reflections on IT and Pace of Life." *Interactions* XVIII: 40-48.

Taylor, A. S., Swan, L. and Durrant, A. (2007), “Designing family photo displays”, *Tenth European Conference on Computer-Supported Cooperative Work, ECSCW '07*, Springer-Verlag, Germany, pp. 79-98.

MoRoCo 2013: Models and their Role in Collaboration

Alexander Nolte[1], Michael Prilla[1], Peter Rittgen[2], Stefan Oppl[3]
[1]Department Information and Technology Management, University of Bochum, Germany
nolte@iaw.rub.de, prilla@iaw.rub.de
[2]School of Business and Informatics, University of Borås, Sweden
peter.rittgen@hb.se
[3]Department of Business Information Systems, Johannes Kepler University of Linz, Austria
stefan.oppl@jku.at

Abstract. Using visual representations of work or business processes can be considered a common practice in modern organizations. These models serve a large variety of different purposes such as documentation of current practices, or informing and planning change or software development. Given the nature of work and businesses they reflect it is reasonable to develop and use them collaboratively. There are, however, also many downsides to collaborative model usage and development in current practice. Among others, models are often not fully understood and are thus not used by people who work in the processes the models represent, resulting in limited impact of process redesign on everyday work. Furthermore, only a minority of people within organizations actually use models, even though they have been proven to be very useful especially for collaborative work. Given the increasing popularity of models in organizations, understanding and defining their role in collaboration is of vital interest for the CSCW community and therefore this workshop aims at bringing together researchers and practitioners and forming a community for research in this area.

Introduction

The usage of visual representations of static parts of an organization (e.g. diagrams depicting hierarchies in the organization's structure or a company's competences), dynamic aspects (e.g. work and business processes) or results of creative problem-solving sessions (e.g. brainstorming results) can be considered a common practice in modern organizations. These visual representations include process models, conceptual models and mind maps. They are used for multiple tasks such as software development, design and engineering, process optimization and reengineering as well as marketing and strategic development. Obviously, these models are hardly ever artifacts that are used and developed by single users for their own personal needs. They are rather developed for larger target groups throughout an organization to support them in sense making and creating a shared understanding about cooperative work and its interfaces. Consequently, they are both used by many people and developed collaboratively. However, the number of people that are affected by these representations is usually larger than the number of people who participate actively in their development. The need to create communicable and comprehensible models is thus evident.

Alongside the increasing usage and popularity of visual representations in organizations, there also is growing interest in their usage and development in the CSCW community. This comprises not only the usage and development by modeling experts, but explicitly takes users into account that are no experts in modeling, thus including factors that might motivate or hinder them to use models and actively participate in their development. The emerging importance of this new field of CSCW research is reflected by workshops (e.g. "TAProViz" at BPM 2012 and "CollabViz" at ECSCW 2011), tracks at international conferences (e.g. "Collaborative Modeling" at HICSS 2009, 2010, 2011 and 2012), papers at various CSCW related conferences (e.g. Baacke, Rohner, Winter & Fitterer, 2009; Brosch, Seidl, Wieland, Wimmer & Langer, 2009; Herrmann & Nolte, 2010; Klebl, Hackel & Lukosch, 2009; Nolte & Prilla, 2012), journal contributions (Heer, Bostock & Ogievetsky, 2010; Renger, Kolfschoten & De Vreede, 2008; Rittgen, 2010; Yuille & Macdonald, 2010) and journal special issues (Prilla, Nolte, Herrmann, Kolfschoten, & Lukosch, 2013; Rittgen, 2009, 2012). Additionally, there are various parallel approaches in related research communities such as Group Decision Support, Business Process Management and Group Support Systems.

However, despite the fact that modeling is a popular approach in practice and thus, many models exist in organizations, they are only used by a minority of the people. This consequently leads to them only playing a minor role in everyday work of the employees of an organization. This is quite surprising considering the fact that models have proven to be very useful for cooperative work, especially when planning it. Furthermore, the number of people creating models stands in stark contrast to the number of people that are actually affected by planning based

on these models. Even if they are created collaboratively by process stakeholders, they often have little impact on the people that are actually working in these processes (cf. Prilla, 2010) and thus do not transcend into work practice. The reasons for this are manifold. First, there are few insights on how to spread models and sustain their usage in organizations thus coupling them with activities and artifacts of everyday work. This explicitly includes a lack of knowledge about factors that might motivate or hinder model usage and development. Furthermore, up to now, little is known about how people interact with models that are no modeling experts. By interaction of these non-expert users, we not only refer to model creation, but also their usage in people's daily work for e.g. discussion, knowledge elicitation and creating a common understanding. Non-expert interaction with them however proves to be an issue, as people that are involved in processes usually are no modeling experts. Interaction in this context includes enabling people to use modeling languages and thus to directly contribute to model development, as well as providing other means such as textual or visual annotations to enable indirect contributions. This leads to the question of how models can be coupled with other artifacts of everyday work which might prove to be beneficial for their usage and ultimately increase their impact.

Besides the usage of models by non-experts, there is an additional research gap in the collaborative construction of visual representations. Usually, the creation and modification of models is restricted to collocated workshops and similar modes of interaction and collaboration, where experts are required to facilitate and support the modeling process. Despite their applicability and feasibility in many situations, these workshops simply do not fit the need to rapidly adjust processes to changing conditions inside and outside an organization. Given the distributed nature of many organizations, these workshops also do not sufficiently reflect the need to include expertise distributed across different locations. Therefore, finding ways to enable dislocated users to contribute actively to model creation and maintenance in a collaborative modeling process is necessary.

Given the increasing usage of visual representations in organizations, their collaborative and distributed use, creation and sustainment is of vital interest for the CSCW community, which has a long tradition of researching the usage of common artifacts, the influence on collaboration by artifacts and their collaborative creation. The workshop proposed therefore can be a starting point in forming a community for research in this area.

This workshop is a follow up to a workshop on "'Collaborative usage and development of models and visualization" which was held at ECSCW 2011 in Aarhus. Proceedings of which can be found online at http://ftp.informatik.rwth-aachen.de/Publications/CEUR-WS/Vol-777/. Selected papers from the workshop will also be published in the next few months in a special issue of the International Journal for eCollaboration (Prilla et al., 2013).

Goal of the workshop

The goal of this workshop is to bring together researchers, lecturers and practitioners from different fields, who are interested in the collaborative usage and development and sustainment of structured visual representations such as process models, conceptual models or mind maps. This includes experiences from empirical case studies, teaching and the introduction of models and modeling into organizations. Furthermore the workshop also welcomes contributions describing research upon understanding the way models are used in organizations, coupled with activities and artifacts of everyday work and their role in collaborative work.

During the course of the workshop we are planning to discuss and intertwine current research as well as practical approaches to the field such as descriptions of best practices. Furthermore we want to identify needs and potential solutions for collaborative interaction with models. The workshop therefore will consist of brief input from participants and interactive sessions to discuss current research and future directions.

The overall goal of the workshop is to build a large picture of research on the role that models play in collaborative work including their usage and sustainment as well as their development in order to set up a common research agenda among the participants. The topics of the workshop thus include but are not restricted to:

- The process of cooperative modeling: design cycles, model negotiation, view integration, roles of participants in modeling, team organization, etc.
- Sustaining model usage and maintenance in organizations
- Motivating involvement and active usage of models
- Involving non-experts in model development and usage
- Increasing the range of involvement: from core stakeholders to all stakeholders
- Coupling models with activities and entities of work
- Roles of models for collaboration e.g. guides / maps
- Models as instruments for consensus building
- The role of models in spanning inter or intra organizational boundaries
- Integrating visual modeling and model dialogues in natural language
- “Meta”-modeling: structuring the dialogue around models
- Access to models: Creating a model friendly cooperation environment
- Alignment of different understandings about collaborative work during modeling
- Empirical evidence for positive effects of modeling and model use

This workshop, however, does not aim at discussing the advantages and disadvantages of different modeling notations. It rather puts strong emphasis in the role of models in collaborative work including their collaborative development, collaborative interaction with them as well as intertwining them with activities and artifacts of everyday work.

Accepted papers

- Tom Gross and Christoph Beckmann. *Cooperation on Models and Models for Cooperation*
- Michael Prilla and Alexander Nolte. *Beyond Collaborative Model Usage and Development – A Model Lifecycle Approach for Lay User Modeling*
- Stijn Hoppenbrouwers, Rob Thijssen and Jan Vogels. *Operationalizing Dialogue Games for Collaborative Modeling*
- Erik Poppe, Jan Recker, Daniel Johnson and Ross Brown. *Using natural user-interfaces for collaborative process modelling in virtual environments*
- Stefan Oppl. *Towards Role-distributed Collaborative Business Process Elicitation*
- Wim van Stokkum, Paul Heiner, Stijn Hoppenbrouwers and Hans Mulder. *The Added Value of Collaborative Modeling for Legal Business Rule Management*
- Christian Bartelt, Martin Vogel and Tim Warnecke. *Collaborative Creativity: From Hand Drawn Sketches to Formal Domain Specific Models and Back Again*
- John Hutchinson, Jon Whittle and Mark Rouncefield. *Modeling and collaboration: perspectives from an empirical study*
- Thomas Herrmann. *Facilitating and Prompting of collaborative Reflection Process Models*

Workshop organizers

- Alexander Nolte, University of Bochum, Germany
- Michael Prilla, University of Bochum, Germany
- Peter Rittgen, University of Borås, Sweden
- Stefan Oppl, Johannes Kepler University of Linz, Austria

Program committee

- Christian Bartelt, Clausthal University of Technology, Germany
- Eike Bernhard, Queensland University of Technology, Australia
- Sebastian Döweling, SAP Research Darmstadt, Germany
- Benjamim Fonseca, UTAD / INESC TEC, Portugal
- Stijn Hoppenbrouwers, HAN University of Applied Sciences, Netherlands
- John Krogstie, Norwegian University of Science and Technology, Norway
- Stephan Lukosch, TU Delft, Netherlands
- Jan Mendling, Vienna University of Economics and Business, Austria
- Hajo Reijers, Eindhoven University of Technology, Netherlands
- Etiënne Rouwette, Radboud University Nijmegen, Netherlands
- Barbara Weber, University of Innsbruck, Austria

Participants

The workshop aims at researchers, practitioners and lecturers that:

- use models to depict, discuss and modify work / processes (vehicle for communication)
- use models as an alternative to textual documentation
- use models to capture knowledge
- use models to analyze (complex) relationships in real life
- create models in groups
- involve (lay) users in modeling

In order to allow for interactive work on the topic of the workshop the number of participants is limited to 30, but this number may be exceeded if necessary.

Background of the organizers

Alexander Nolte is a PhD student at the Information and Technology Management group headed by Thomas Herrmann at the University of Bochum. He holds a diploma in computer science with his diploma thesis being titled "Concept and prototype of a usability-oriented web-based editor for semi-structured modeling". Alexander has successfully organized multiple workshops at conferences such as ECSCW 2011 and the German conference for human computer interaction (Mensch und Computer 2010 and 2011). He has contributed to various conferences (BPMDS, CRIWG, ECIS, IS-EUD and PDC), journals (IJCSCW and IJeC) and books. His research interest includes the collaborative development of process models in different collaboration scenarios such as collocated workshops or dislocated asynchronous settings with special respect to web based modeling tools. Additionally he is interested in empowering non-expert modelers to directly contribute to modeling.

Michael Prilla is a senior researcher at the Information and Technology Management work group of the Institute of Applied Work Science at the University of Bochum and an interim professor for business and information systems engineering at the University of Siegen. His research interest is on support for cooperative work, including collaborative reflection at work and cooperative modeling with a special emphasis on lay user modeling. Michael has authored more than 80 papers published in journals (International Journal for Computer Supported Cooperative Work (IJCSCW), Journal of Software Maintenance and Evolution), international conferences (E/CSCW, CHI, GROUP, CSCL, PDC, COOP, CRIWG, CAISE and many more) and books. He is a member of the steering committee of the German CSCW association and serves in the committees of conferences such as GROUP, ECSCW, COOP and CRIWG. He also is a reviewer for several international journals and conferences, and he has co-organized workshops at ECSCW, ECTEL, BPM and others.

Peter Rittgen received a Master of Science in Computer Science and Computational Linguistics from University Koblenz-Landau, Germany, and a PhD in Economics and Business Administration from Frankfurt University, Germany. He is currently Full Professor at the School of Business and IT of the University of Borås, Sweden. He has been doing research on business processes and information systems development since 1997, especially in the areas Business and IT Co-design & Collaborative Modeling, Business Network Governance and Business Process Simulation & Improvement. Dr. Rittgen is the Vice-Chair of the AIS Special Interest Group on Modeling and Simulation, SIGMAS (www.ModellingAndSimulation.org) and an Associate Editor of the Informing Science Journal. He is also a PC member in several international conferences and serves on numerous review committees for international journals and conferences. He published over 100 works including 2 edited books, 3 edited journal issues, 18 book chapters and 16 journal articles. For further details refer to http://www.adm.hb.se/~PRI/.

Stefan Oppl is an assistant professor at the Department of Business Information Systems - Communications Engineering at the Johannes Kepler University of Linz, Austria. He is researching means to support non-expert users in performing collaborative work, knowledge externalization and alignment processes in organizational settings. A focus of his work is on how novel interaction techniques can facilitate negotiation and alignment processes in group settings. He has published his work at international conferences (such as TEI, EICS, INTERACT, ICKM), journals and in books. He also acts as a reviewer for several journals and conferences in the area of HCI and Knowledge Management.

References

Baacke, Rohner, Winter, and Fitterer, (2009): 'Component-Based Distributed Modeling of Collaborative Service Processes - A Methodology for the Identification of Reference Process Building Blocks.', *HICSS* pp. 1–10IEEE Computer Society. Retrieved from http://dblp.uni-trier.de/db/conf/hicss/hicss2009.html#BaackeRWF09

Brosch, Seidl, Wieland, Wimmer, and Langer, (2009): 'We can work it out: Collaborative Conflict Resolution in Model Versioning', *Proceedings of the 11th European Conference on Computer Supported Cooperative Work (ECSCW 2009)* pp. 207–214Springer.

Heer, Bostock, and Ogievetsky, (2010): 'A tour through the visualization zoo', *Commun. ACM*, *53* 6, pp. 59–67. doi:http://doi.acm.org/10.1145/1743546.1743567

Herrmann, and Nolte, (2010): 'The Integration of Collaborative Process Modeling and Electronic Brainstorming in Co-Located Meetings', In G. Kolfschoten, T. Herrmann, & S. Lukosch (Eds.), *CRIWG 2010, LNCS 6257* pp. 145–

160Springer-Verlag Berlin Heidelberg. Retrieved from http://www.sociotech-lit.de/HeNo10-IoC.pdf

Klebl, Hackel, and Lukosch, (2009): 'The Application of Design Patterns for the Adaptation of a Modeling Tool in Collaborative Engineering', In L. Carriço, N. Baloian, & B. Fonseca (Eds.), *Groupware: Design, Implementation, and Use*, Lecture Notes in Computer Science Vol. 5784, pp. 262–269Springer Berlin / Heidelberg.

Nolte, and Prilla, (2012): 'Normal users cooperating on process models: Is it possible at all?', *CRIWG 2012, LNCS 7493* pp. 57–72Berlin: Springer.

Prilla, (2010): *Wissensmanagement-Unterstützung für die Erzeugung und Nutzung von Prozessmodellen als wissensvermittelnde Artefakte*, Eul Verlag.

Prilla, Nolte, Herrmann, Kolfschoten, and Lukosch, (2013): 'Special Issue on Collaborative Usage and Development of Models', *International Journal of eCollaboration*.

Renger, Kolfschoten, and De Vreede, (2008): 'Challenges in collaborative modelling: a literature review and research agenda', *International Journal of Simulation and Process Modelling*, *4* 3, pp. 248–263.

Rittgen, (2009): 'Special Issue on Collaborative Business and Information Systems Design', *International Journal of eCollaboration*, *5* 4.

Rittgen, (2010): 'Collaborative Modeling: Roles, Activities and Team Organization', *International Journal of Information System Modeling and Design (IJISMD)*, *1* 3, pp. 1–19.

Rittgen, (2012): 'Special Issue on Collaborative Modelling', *International Journal of Organisational Design and Engineering*, *2* 1.

Yuille, and Macdonald, (2010): 'FEATURE The social life of visualization', *interactions*, *17* 1, pp. 28–31. doi:http://doi.acm.org/10.1145/1649475.1649482

Francophone Ergonomics and CSCW – a comparative analysis

Françoise Darses[1], Pascal Salembier[2], Kjeld Schmidt[3], Ina Wagner[4]
1) IRBA (Institut de Recherche Biomédicale des Armées), 2) Université de Technologie de Troyes, 3) Copenhagen Business School, 4) University of Oslo[4]
francoise.darses@irba.fr, *pascal.salembier@utt.fr*, *schmidt@cscw.dk*, *ina.wagner@tuwien.ac.at*

Abstract. The objective of the workshop is to start an in-depth discussion of Francophone ergonomics and its conceptual and methodological contributions to CSCW research. Themes for discussion will be: the distinction ''task – activity' and the notion of work practice; the role of artifacts in collaborative work and the different theoretical framings in both traditions; the importance of contextual and environmental factors for understanding work; the notion of fieldwork in both traditions, in particular the similarities and differences between ethnographic research and ergonomic analysis of work; the different theoretical traditions, in particular the notion of cognition and the interest in 'intentional and psychological explications' in Francophone Ergonomics; the relationship with design, the different understandings of design and the focus on working conditions.

Workshop activities and goals

In their introduction to a special issue of the journal *Activités* on 'Activités et action/cognition située' Salembier et al. (2006) raise a series of points for debate which we would like to take as a source of inspiration for a comparative discussion of Francophone Ergonomics and CSCW in this workshop. These key issues are:

- The distinction 'tâche – activité' (task – activity) and the notion of work practice in CSCW research;
- The role of artifacts in collaborative work and the different theoretical framings in both traditions;
- The importance of contextual and environmental factors (material, cognitive, organizational cultural, etc.) for understanding work;
- The notion of fieldwork in both traditions, in particular the similarities and differences between ethnographic research and ergonomic analysis of work;
- The different theoretical traditions, in particular the notion of cognition and the interest in 'intentional and psychological explications' in Francophone Ergonomics;
- The relationship with design, the different understandings of design and the focus on working conditions.

Background

Workshop theme

The Francophone tradition of work analysis, with its rich repertoire of field studies, various forms of analysis, and conceptual frameworks, provides a very interesting perspective on forms of work activity. Although this perspective has been present for many years in ECSCW conferences and in the CSCW Journal, it has remained relatively isolated from the mainstream discussion within CSCW. The objective of the proposed workshop is to start an in-depth discussion of Francophone ergonomics and its conceptual and methodological contributions to CSCW research.

Francophone ergonomics emerged in the late 1950's and was given further impetus by the founding of Société d'Ergonomie de Langue Française (SELF) in 1963. One of the first large empirical studies performed by researchers in collaboration with the trade unions focused on highly repetitive work and its effects on workers' health and on work accidents. From the beginning workers, in the emerging Francophone Ergonomics tradition, 'were seen to be at the centre of work, and, therefore, at the centre of work design'[1]. Researchers left the laboratory to study work, 'articulating physiology, psychology, and work activity analysis, observation 'en situation' and experimentation in the laboratory, research and intervention ... '[2]. The approach paid particular attention to field studies of work, to the observed differences between actual and prescribed work, and between task and activity. So there was a strong emphasis on the situated nature of activity, on working procedures and the ways operators carried out their work in specific spatio-temporal settings. While this work had a strong focus on actual worker conduct, over time more attention was paid to the operators' reasoning processes and to the influence of the workplace setting.

Francophone ergonomics has always advocated an integrative view of activity. The ergonomist is thus involved in designing an articulated ensemble (situation of activity) rather than solely a sum of disconnected 'objects' (technical artifacts, organizational features, physical environment, including arrangement of space, etc.) that may have different types of effects (cognitive, psychological, physiological, etc.).

Although largely focused on individual operators' understandings and activities, more explicit concerns with various forms of cooperative work and

---

[1] Laville, Antoine: 'Historical landmarks of french ergonomics', in: Comptes rendus du congress SELF-ACE 2001: Les transformations du travail, enjeux pour l'ergonomie / Proceedings of the SELF-ACE 2001 Conference: Ergonomics for Changing Work, vol. 1, 2001, pp. 1-6.

[2] Laville, Antoine, Bulletin de la Société d'Ergonomie de Langue Française (Juillet 2003), quoted after: Teiger, Cathérine et al. Quand les ergonomes sont sortis du laboratoire.... à propos du travail des femmes dans l'industrie électronique (1963 - 1973). Pistes, vol. 8, issue 2, 2006, 1-38

teamwork emerged and have become an important thread. The Francophone ergonomic tradition has produced an overwhelming body of field studies, reporting on studies of work in blast furnaces and steel mills, in aircraft cockpits and air traffic control centers, in operating theaters, and so on.

Ergonomics and CSCW share one point amongst others: they both are mobilize knowledge, concepts, and methods coming from several academic disciplinary fields in order to design and/or to inform the design of systems, artifacts, and organizations while at the same time, producing an original set of empirical and theoretical 'results'. One of the aims of this workshop is to arrive at an understanding of these 'results', their commonalities and differences.

Another point of debate is the ethical engagement of Francophone ergonomics and its focus on working conditions, which we believe provide a very useful addition to CSCW research. It has always been stressed that the ergonomist is committed to the transformation of activities and therefore she/he is responsible for the effects of her/his intervention in the field of work. Incidentally this point leads to the question of the assessment of the ergonomical intervention and on the appropriation dimension by the users/operators/workers, even though it has not necessarily been thematized this way in the tradition of francophone ergonomics (with the noticeable exception of the colleagues inspired by Activity Theory and soviet psychology).

Introducing Francophone Ergonomics - selected papers:

François Daniellou (2005). The French-speaking ergonomists' approach to work activity: cross-influences of field intervention and conceptual models, Theoretical Issues in Ergonomics Science, 6:5, 409-427

Véronique De Keyser (1991). Work analysis in French language ergonomics: origins and current research trends, Ergonomics, 34:6, 653-669

Maurice de Montmollin (1991). Analysis and Models of Operators Activities in Complex Natural Life Environments In Rasmussen, J., Andersen, H. B. & Bernsen, N. 0 (eds.) Human- Computer Interaction (Research Direction in Cognitive Science, European Perspective, vol. 3). Hove & London: Lawrence Erlbaum, pp. 95-112

Jacques Leplat (1994). Collective activity in work: some lines of research, Le Travail Humain, 57, 3, 209-226.

Workshop program

9:00-10:30	Françoise Darses and Pascal Salembier
	An introduction to Francophone Ergonomics
11:00- 12:00	Kari Kuutti, Carla Simone and Ilaria Redaelli
	Short presentations
13:00-14:00	Liam Bannon

	Crossing Boundaries: Taking Heterogeneity Seriously in CSCW
14:00-15:00	Identifying the main conceptual issues
15:30-17:00	Planning of follow-up activities

Organizers

Françoise Darses is a cognitive ergonomist. She is now the head of the unit 'Security and risk management' of the French Armed Forces Biomedical Research Institute. Her research is about collective decision making in operational military activities, as for instance submarine crew collaboration or war wounded management. In these situations, the issue of cooperation, either human-human or human(s)-machine(s), is at the core of the operators' performance and safety.

Françoise is full Professor in Paris Sud University. She was the head of the Master course of ergonomics and she previously taught in an engineering school (CNAM – Arts and Crafts National Conservatory). Her previous research aimed at investigating the cognitive processes underlying designers' activities in industrial settings and specifying either tools or methodologies that meet the designers' cognitive needs and increase the efficiency of the design process (mechanical engineering, architecture, information systems design).

These empirical studies, conducted in pluridisciplinary research teams, play a part in specifying work devices and especially computational tools for cooperative design.

Pascal Salembier is a tenured Professor of Cognitive Ergonomics & Interaction Design at the University of Technology of Troyes. He heads the TechCICO pluridisciplinary research team at the Charles Delaunay Institute (UMR 6249 CNRS).

Pascal Salembier was formerly trained as an experimental cognitive psychologist at the University Paris V Sorbonne. He received additional training in neurosciences and artificial intelligence. He obtained a PhD in ergonomics from the Conservatoire National des Arts et Métiers in Paris. He received an Habilitation degree at the University of Nancy 2 (France).

He is a member of the editorial advisory board of *Computer Supported Cooperative Work: The Journal of Collaborative Computing*. In 2003, he participated in the creation of the e-review *Activités* (http://www.activites.org). He is a member of the COOP conference steering committee.

He is one of the founding members of the EUSSET networked organizational forum (http://www.eusset.eu/). He is the co-editor of a volume on *European developments in collaborative design* published in 2010 in Springer CSCW Series.

His research interests lie primarily in the area of Computer Supported Cooperative Work, Human Computer Interaction, and Experience Design.

Pascal Salembier has worked in different work settings and studied various

activities from NPP supervision to air-traffic control and contemporary music composition. He also studied energy management strategies performed by families in domestic settings and collective interaction between visitors in the context of the (re)design of a natural history museum.

Kjeld Schmidt is Professor of Work, Organization, and Technology at Copenhagen Business School. He was in 2007 awarded the honorary title of *dr.scient.soc*. Schmidt is the Editor-in-Chief of *Computer Supported Cooperative Work: The Journal of Collaborative Computing* (since 1992).

Initially a software programmer (1965-72), Kjeld Schmidt studied sociology at the University of Copenhagen, Denmark, and obtained his MSc degree in sociology from the University of Lund, Sweden, in 1974. At that time his research focused on processes of socio-economic transformation, but in 1985 he decided to devote his efforts and energies to the — then emerging — area of Computer-Supported Cooperative Work (CSCW), initially working as a researcher in private industry but from 1989 at Risø National Laboratory. From 1998, he has held faculty positions at universities in the Copenhagen area.

His main scholarly contributions to the field of CSCW are centered on what can be termed its conceptual foundations. That is, he has contributed to making 'cooperative work' a researchable phenomenon, by delineating it as something that can be investigated systematically, as a category of work practice, distinct from organizational and socio-economic forms. This has opened a research strategy of focusing on coordinative practices, their methods and techniques (e.g., Schmidt and Bannon, 1992). These early contributions are widely cited and have played an important role in defining the field of CSCW. Kjeld Schmidt has later made recognized conceptual contributions to the development of technologies that will enable ordinary workers to express and execute coordinative protocols such as workflows and classification schemes in a fully distributed and flexible manner (e.g., Schmidt and Simone, 1996; Schmidt and Wagner, 2004). In pursuing these issues he has been working in an interdisciplinary fashion, bridging from sociology to computer science and encompassing activities as diverse as ethnographic studies, conceptual work, and development of demonstrator prototypes of CSCW applications and architectures of CSCW environments. He has recently published a book that argues for a re-conceptualization of CSCW (2011).

Ina Wagner has made a transition from physics (she holds a PhD in nuclear physics) to anchoring her research in CSCW (Computer Supported Cooperative Work) and PD (Participatory Design). Until September 2011 she was Head of the Institute for Technology Assessment and Design, Vienna University of Technology where she offered a variety of interdisciplinary courses for students of computer science. She currently holds an Adjunct Professor position at the University of Oslo and an Associate position at Sydney University of Technology. At the University of Technology in Vienna she has built up a unique

interdisciplinary research unit, bringing together expertise in sociology, ethnography, psychology, and computer science for the study of work practices and organizations, as well as the design of supporting technologies. She is a leading European academic in the field of work and technology. In 2011 she was awarded the Woman's Prize of the City of Vienna and in 2012 the 'Gabriele Possanner Staatspreis 2011′.

She was among the first to bring health care to the attention of CSCW research, with a monograph '*Das computerisierte Krankenhaus*' (1991), followed by a series of projects and peer reviewed journal papers on nursing and computer technologies (based on field studies in Austria and France); on time planning in a surgical clinic; on the introduction of PACS (digital imaging and archiving technologies) in radiology (with a focus on spatial relationships in work settings); and, more recently, on the variations of work practices and artefacts in several oncology clinics in Austria, with a view onto understanding the tensions between local work practices and global concerns. Ina Wagner has made salient contributions to the understanding of architectural practice, based on twelve years of fieldwork, where she studied architecture in 'real settings' (in contrast to the mostly cognitively oriented studies, based on lab experiments, in the field of 'design studies'), with a focus on collaborative practices and on artefacts, their persuasive nature, their materiality, as well as their representational and coordinative functions.

Designing Mobile Face-to-Face Group Interactions

Joel E. Fischer, Stuart Reeves, Chris Greenhalgh, and Steve Benford
The Mixed Reality Laboratory, University of Nottingham, United Kingdom
(jef, str, cmg, sdb)@cs.nott.ac.uk

Abstract. This workshop is concerned with understanding the nature of face-to-face group interactions in mobile, but collocated settings. It seeks to examine *group-sensitive design* examples, concepts and techniques, research methods and approaches to study group activities, and to learn how these social activities might be respected and supported by design. We aim to bring together researchers interested in the social organisation of face-to-face interaction, and designers of collaborative groupware and mobile, interactive experiences to explore opportunities and challenges for the design and study of experiences, apps and systems that support, augment or enable collocated activities.

Workshop aims and topics

While considerable work has been conducted in CSCW to support different combinations of collocated and distributed groups across a range of settings and tasks, we are particularly interested in design that *leverages existing social competencies as resources*. Thus, how might the social organisation of groups of friends, families, co-workers, learners, players, and visitors of museums or cities be supported in ways that do not disrupt the dynamic face-to-face group interactions that occur in these settings? For example, how do we design an interactive audio guide that does not isolate the members of a group from one another, and a location-based tour guide that does not redundantly notify every member of the group that a sight is nearby?

The goal of this workshop is to identify the concepts, techniques, approaches and methods to study, respect and support the ways in which groups of people sit-

uate the interactive experience in their ongoing face-to-face interactions in mobile settings. Accordingly, the workshop is both concerned with possible interactive designs, but also investigating situations where design can draw upon everyday social competencies that group members bring to bear on face-to-face circumstances. While there has been significant amounts of collaborative systems developed to smooth over the dichotomies of collocated and distributed teams, we wish to focus specifically on the challenges raised by highly mobile but collocated situations where subtle but concerted organisation between group members is fundamental to experiencing the setting. For instance, we refer to visitor groups to cultural spaces such as museums and galleries, where issues of coordination and collaboration are central to the visiting experience.

Themes and topics around the design and study of group experiences addressed in this workshop include, but are not limited to:

- Discussions or reviews of methods and tools to study and evaluate socio-technical systems with a focus on collocated settings;
- Examples and 'thick descriptions' of interaction and conversation analysis and ethnographic reports of studies of group activities;
- Approaches and examples of how studies of collocated interaction inform group-sensitive design;
- Techniques of sensing social context, e.g., collocation, conversation, and bodily orientation;
- Concepts of group-awareness and group-adaptivity: how might a system be made group-aware and adaptive to the context of the group?
- Ideas of group-sensitive design: how might systems be designed to respect collocated groups and support or enable group activities?
- Reviews and applications of existing design concepts to facilitate group-sensitive design;
- Studies and examples of mobile, interactive experiences, apps or systems for collocated groups;
- Designs and deployments of groupware and CSCW systems, in particular for collocated settings;
- Explorations of interaction techniques aimed at supporting collocated interaction.

Background

The design and study of collocated group experiences has become a challenging, yet major concern of various converging research areas.

Technology support of collocated collaborative work has featured in original and early research in CSCW. For example, Mark Weiser's pioneering research at PARC has investigated how pads, tabs and boards can be networked to support cooperative work (Weiser, 1999); and meeting rooms have been a favourite setting

to devise and study group support systems (e.g., Grudin, 1994). Moreover, what can we learn from key aspects of collaborative groupware that supports distributed groups, such as division of labour, sharing, group awareness and negotiation of roles, tasks, and common goals? The workshop seeks to explore whether some of these cooperative 'features' could also enrich interactive, mobile systems and experiences for collocated groups.

Whilst the technology platform is perhaps a secondary factor, the rapid advancement and spread of mobile technology has added spatial mobility as a particularly challenging factor to the design of group experiences (cf. Bergqvist et al., 1999). This development has contributed to a growing number of group experiences reaching beyond the domain of cooperative work. Interactive and mobile group experiences have been designed and studied in support of cultural visiting in museums (Flintham et al., 2011), cities (Brown et al., 2005), or theme parks (Durrant et al., 2011), and to support learning (Benford et al., 2005) and play (Bell et al., 2006). The workshop seeks to draw on insights from designing and studying such interactive experiences. For example, the trajectories design framework has been synthesized to capture and design the individual routes through interactive experiences that combine multiple roles, interfaces and spaces (Benford et al., 2009). It has been applied to design and analyse visitor groups experiences of an interactive museum installation (Flintham et al., 2011).

In the context of CSCW, studies of collocated activities around artefacts and technology-in-use have played a crucial role in shaping our socio-technical understanding of our area, in informing the design of new technologies, and in improving of existing ones. Methodologically, in particular interaction analysis (Heath et al., 2010) and ethnomethodologically-informed ethnography (Crabtree et al., 2006) have become staple approaches to gain an understanding of the practical accomplishment of action in socio-technical settings that include (but are not limited to) face-to-face interaction.

However, it appears that there is a disconnect between the current approaches to designing mobile group experiences and earlier pioneering considerations that unpack the 'implications for design' of social phenomena such as mobility (e.g., Luff and Heath, 1998) and face-to-face interaction (e.g., Luff and Jirotka, 1998). These considerations appear to be lacking from most interactive group experiences — for example, visitor experiences such as audio guides still isolate the members of a visiting party from one another. Notable exceptions that illustrate the kind of approach this workshop seeks to explore take into account the interactional resources of face-to-face interaction such as gaze, gestures, and bodily co-orientation both in the analysis of socio-technical interaction as well as how they might be exploited in design. Examples include a study of how environments afford or inhibit F-formations for face-to-face interaction (Marshall et al., 2011); considerations how insights from studies of visual conduct may be used to design more sociable robots that guide the gaze of museum visitors more naturally (Kuzuoka et al., 2008), or a study of collocated tabletop interaction that showed that mutual observability of action was an important factor for collaboration (Hornecker et al., 2008).

In summary, the aim of this workshop is to adopt a new perspective to address old challenges by bringing together researchers and designers with expertise and experience in studying and building socio-technical systems for collocated settings, such as CSCW and groupware, interactive mobile experience design, interaction and conversation analysis, and ethnography.

Accepted Papers

Watching the Watchers: Visibility and Mobility in Visitor Experiences

Patrick Brundell, Stefan Rennick-Egglestone and Paul Tennent

Abstract. Mobile devices are increasingly being used to enhance visitor experiences in museums, galleries and in other public spaces. We describe some of the strategies which parents used to manage their childrens experiences with a tablet application in a theme park and some problems that arose as a result. We argue that the same problems of visibility which face group visitors are similar to those experienced by researchers attempting to evaluate such systems in the wild. We offer some design solutions through the use of recording system states and events, and using them as a resource for visitors and researchers.

Experiences from a Real-Time Mobile Collaborative Writing System in an Art Gallery

Matthias Korn, Anna Maria Polli and Clemens Nylandsted Klokmose

Abstract. We present first experiences from Local Area Artworks, a system enabling collaborative art interpretation on-site, deployed during an exhibition in a local art gallery. Through the system, we explore ways to re-connect people to local places by making use of their personal mobile devices as interfaces to the shared physical space. With a collocated collaborative writing system in the semi-public space of a gallery, we encourage local art discussions and provide a platform for the public to actively participate in interpretations of individual artworks. In this paper, we focus on the experiences of small groups of strangers or acquaintances experiencing the exhibition together.

Supporting Collaborative Use of a Mobile Museum Guide for Small Groups of Visitors

Joel Lanir, Alan Wecker and Tsvi Kuflik

Abstract. Visitors often come to museums in small groups of family and friends, yet mobile museum guides are usually designed to support only a single visitor. We examine the use of mobile shared displays such as projectors and tablets to support small groups in the museum context. Our analysis is based on observations of actual museum visitors using both a single, shared display and individual devices to receive information on the museum exhibits. We discuss the possible alternatives and configurations of using different devices, and list the important points that stemmed from our observations.

Bursting the Mobile Bubble

Sus Lundgren and Olof Torgersson

Abstract. Bursting the Mobile Bubble is a design programme aiming at designing collaborative, co-located experiences using mobile devices. In our research we have chosen to explore this field via games and gameplay design, since games open up the design space and allow for design solutions that may seem unusual at first but soon become mainstream. The issues we have found to be interesting arise from combining several connected devices: the division of private vs. public information and interaction; how to design for a co-located awareness, and how to support the design for connected devices.

The Ethical Implications of the Technological Surveillance of Art

Norman Su

Abstract. Every night, traditional Irish musicians gather in sessions at pubs and other public spaces to play tunes together. Each public space has its own tradition and history: i.e., context, players, repertoire, styles, etc. Moreover this tradition is temporally situated; for examples, tunes go in and out of fashion. Yet, tunes themselves are mobile, they travel from session to session via recordings, players, and the Internet. Based on a 2-year long ethnography of Irish traditional musicians, I am developing TuneTracker, a system to record and track the tunes played in a session. In this position paper, I will ask of the ethical implications of surveilling tradition. I argue that focusing on the traditional, artistic genre demands a different set of questions regarding creativity, ethos, ownership, and power relations.

Ambient Awareness of Classroom Activities

Tarmo Toikkanen and Anna Keune

Abstract. Ambient information displays are backchannels that are designed to work in the periphery of attention. We present a prototype 'Ambire' that combined features from classroom management systems, screen sharing applications, and ambient information displays. Ambire is an open-source web-based tool for streaming the content of students 1:1 devices onto a large screen. All screens rotate slowly in Ambire. The rotation may be stopped, paused, forwarded or tracked back. We posit that a solution such as Ambire will provide qualitative benefits to classroom activities in terms of increased peer learning, sharing, collaboration, and community spirit, and be in stark contrast to ordinary teacher- controlled classroom management systems.

Activities and goals

The main goal of the workshop is to create an interactive and lively platform for researchers and designers to share their experiences, and to develop new perspectives of how collocated group activities can best be studied and supported by design. We scaffold this goal with a mix of presentation and interactive group work in three phases.

Phase 1: Mutual grounding

The initial phase of the workshop is aimed at developing common ground through presentation of position papers and an overview of key related work. The workshop organisers present an overview of relevant methods, techniques, concepts, approaches and key works concerned with collocated group experiences and their support through (mainly mobile) technologies. Participants present their position papers to fellow participants.

Phase 2: Charting the space

This phase is concerned with charting the design and study space for collocated group experiences. Through interactive group work we identify the emergent key themes and issues and then use these in order to categorise, compare and juxtapose the techniques, methods, approaches and concepts from the first phase.

Phase 3: Consolidation and synthesis

The final phase is aimed at synthesizing a repertoire of the key approaches, techniques, methods and concepts to address the key challenges in building and studying group experiences. The repertoire will provide workshop participants with a more

complete and versatile tool set to design and study group experiences in a more encompassing way.

Program Committee

Barry Brown, Mobile Life
Pat Brundell, University of Nottingham
Alan Chamberlain, University of Nottingham
Abigail Durrant, Newcastle University
Lesley Fosh, University of Nottingham
Giulio Jacucci, Helsinki Institute for Information Technology HIIT
Matt Jones, Swansea University
Boriana Koleva, University of Nottingham
Siân Lindley, Microsoft Research
Andrés Lucero, Nokia
James Norris, University of Nottingham
Stef Rennick-Egglestone, University of Nottingham
Simon Robinson, Swansea University
Duncan Rowland, University of Lincoln
Vicky Shipp, Horizon Digital Economy Research
Peter Tolmie, University of Nottingham

Acknowledgments

The organisers are grateful to be supported by EPSRC grants EP/I011587/1, EP/G065802/1 and EP/F03038X/1 .

References

Bell, M., M. Chalmers, L. Barkhuus, M. Hall, S. Sherwood, P. Tennent, B. Brown, D. Rowland, S. Benford, M. Capra, and A. Hampshire (2006): 'Interweaving mobile games with everyday life'. In: *Proceedings of the SIGCHI conference on Human Factors in computing systems*. New York, NY, USA, pp. 417–426, ACM.

Benford, S., G. Giannachi, B. Koleva, and T. Rodden (2009): 'From interaction to trajectories: designing coherent journeys through user experiences'. In: *Proceedings of the SIGCHI conference on Human factors in computing systems*. New York, NY, USA, pp. 709–718, ACM.

Benford, S., D. Rowland, M. Flintham, A. Drozd, R. Hull, J. Reid, J. Morrison, and K. Facer (2005): 'Life on the edge: supporting collaboration in location-based experiences'. In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. New York, NY, USA, pp. 721–730, ACM.

Bergqvist, J., P. Dahlberg, F. Ljungberg, and S. Kristoffersen (1999): 'Moving Out of the Meeting Room Exploring Support For mobile meetings'. In: *Proceedings of ECSCW '99*. pp. 12–16, Kluwer Academic Publishers.

Brown, B., M. Chalmers, M. Bell, M. Hall, I. MacColl, and P. Rudman (2005): 'Sharing the square: collaborative leisure in the city streets'. In: *Proceedings of the ninth conference on European Conference on Computer Supported Cooperative Work*. New York, NY, USA, pp. 427–447, Springer-Verlag New York, Inc.

Crabtree, A., S. Benford, C. Greenhalgh, P. Tennent, M. Chalmers, and B. Brown (2006): 'Supporting ethnographic studies of ubiquitous computing in the wild'. In: *Proceedings of the 6th conference on Designing Interactive systems*. New York, NY, USA, pp. 60–69, ACM.

Durrant, A., D. Rowland, D. S. Kirk, S. Benford, J. E. Fischer, and D. McAuley (2011): 'Automics: Souvenir generating photoware for theme parks'. In: *Proceedings of the SIGCHI conference on Human factors in computing systems*. New York, NY, USA, pp. 1767–1776, ACM.

Flintham, M., S. Reeves, P. Brundell, A. T. Glover, S. Benford, D. Rowland, B. Koleva, C. Greenhalgh, M. Adams, N. Tandavanitj, and J. Row-Farr (2011): 'Flypad: Designing Trajectories in a Large-Scale Permanent Augmented Reality Installation'. In: *ECSCW*. pp. 233–252.

Grudin, J. (1994): 'Computer-supported cooperative work: history and focus'. *Computer*, vol. 27, no. 5, pp. 19–26.

Heath, C., J. Hindmarsh, and P. Luff (2010): *Video in qualitative research*. Sage.

Hornecker, E., P. Marshall, N. S. Dalton, and Y. Rogers (2008): 'Collaboration and interference: awareness with mice or touch input'. In: *Proceedings of the 2008 ACM conference on Computer supported cooperative work*. New York, NY, USA, pp. 167–176, ACM.

Kuzuoka, H., K. Pitsch, Y. Suzuki, I. Kawaguchi, K. Yamazaki, A. Yamazaki, Y. Kuno, P. Luff, and C. Heath (2008): 'Effect of restarts and pauses on achieving a state of mutual orientation between a human and a robot'. In: *Proceedings of the 2008 ACM conference on Computer supported cooperative work*. New York, NY, USA, pp. 201–204, ACM.

Luff, P. and C. Heath (1998): 'Mobility in collaboration'. In: *Proceedings of the 1998 ACM conference on Computer supported cooperative work*. New York, NY, USA, pp. 305–314, ACM.

Luff, P. and M. Jirotka (1998): 'Interactional Resources for the Support of Collaborative Activities: Common Problems in the Design of Technologies to Support Groups and Communities'. In: *Community Computing and Support Systems, Social Interaction in Networked Communities*. London, UK, UK, pp. 249–266, Springer-Verlag.

Marshall, P., Y. Rogers, and N. Pantidi (2011): 'Using F-formations to analyse spatial patterns of interaction in physical environments'. In: *Proceedings of the ACM 2011 conference on Computer supported cooperative work*. New York, NY, USA, pp. 445–454, ACM.

Weiser, M. (1999): 'The computer for the 21st century'. *SIGMOBILE Mob. Comput. Commun. Rev.*, vol. 3, no. 3, pp. 3–11.

ECTEL meets ECSCW: Computer-Support for Integrated Working and Learning

Important: this workshop is held as a joint workshop for ECTEL 2013 and ECSCW 2013

Monica Divitini[1], Tobias Ley[2], Stefanie Lindstaedt[3,4], Viktoria Pammer[3,4]

[1]Norwegian University of Technology and Science, Trondheim, Norway; [2]University of Tallin, Estonia; [3]Know-Center, Graz, Austria; [4]Graz University of Technology, Austria

divitini@idi.ntnu.no, *tley@tlu.ee*, *slind@know-center.at*, *vpammer@know-center.at*

Abstract. With this workshop, we intend to bring together the European communities of technology-enhanced learning, which typically meets at the ECTEL, and of computer-supported cooperative work, which typically meets at the ECSCW. While the ECTEL community has traditionally focused on technology support for learning, be it in formal learning environments like schools, universities, etc. or in informal learning environments like workplaces, the ECSCW community has traditionally investigated how computers can and do mediate and influence collaborative work, in settings as diverse as the typical "gainful employment" situations, project work within university courses, volunteer settings in NGOs etc. Despite overlapping areas of concerns, the two communities are also exploiting different theories and methodological approaches. Within this workshop, we discuss issues that are relevant for both communities, and have the potential to contribute to a more lively communication between both communities. More information about the workshop program and follow up activities is available at http://know-center.tugraz.at/ectel-meets-ecscw-2013/

Workshop Proposal

With this workshop, we intend to bring together the European communities of technology-enhanced learning, which typically meets at the ECTEL, and of computer-supported cooperative work, which typically meets at the ECSCW. Clearly, the communities overlap in knowledge work settings, where informal learning is an integral part of (successful) work, and collaboration the typical modus operandi.

Despite overlapping areas of concerns, the two communities are also exploiting different theories, methodological approaches and technologies. For example, the ECSCW community has traditionally followed multilevel research paradigms that capture complexities of work situations in more holistic ways such as activity theory or distributed cognition (Halverson, 2002), and qualitative and ethnographic methodologies (Randall 2007, Schmidt 1999) have been of paramount importance. ECTEL has been traditionally drawing on approaches from more formal educational settings. Hence, pedagogical theorizing such as self-regulated learning or collaborative learning has heavily influenced design and application of technologies. Methodologically, paradigms rooting in experimental research have been employed that could exploit the more formal setup of the learning context. Technologies were highly influenced by the adaptive learning systems and user modeling research paradigms. Only recently has there been a shift towards more qualitative and observational paradigms that take the realities of workplaces into account (e.g. Lindstaedt et al. 2010; Kaschig et al. 2012).

Common perspectives in the two communities can be observed with more design oriented research strategies, as well as in a focus on data-driven approaches (such as Crowdsourcing or Learning Analytics) that exploit the traces of collaborative activity (e.g. through Social Network Analysis).

The explicit **goal of this workshop** is to bring together two communities and to act as a seed for further exchange of ideas and cross-community fertilization.

Topics and Format of Contributions

This workshop is a forum to discuss topics like

- (Collaborative and cooperative) workplace learning
- (Collaborative and cooperative) Knowledge work – which encompasses, following Kelloway & Barling (2001), the application, creation and transmission of knowledge
- Technology support for workplace learning and knowledge work
- Technologies that exploit traces of collaborative and cooperative activity in the workplace

When selecting the papers for discussion at the workshop we explicitly looked for contributions that

- Survey relevant developments in either of the addressed communities (ECTEL, ECSCW) and thus contribute to a mutual understanding between both communities.
- Describe original empirical or theoretical work that sheds light on the workshop topics
- Describe original technology design that is relevant for the workshop topics
- Discuss similarities and differences in theoretical and methodological approaches

Workshop Format

The workshop will be held on September 21st, as this will be the last day of ECTEL2013 and the first day of the ECSCW2013.
The morning will combine ice breaking activities and traditional presentations, putting emphasis on discussion. In the afternoon we will organize group activities to refine the overlap between the two communities and identify common challenges at the theoretical and methodological level. The organizers will proactively make sure that the workshop will be a highly interactive event with clear outcomes.

Organizers

Monica Divitini is professor of Cooperation Technologies at the Norwegian University of Science and Technology (NTNU). Her research interests lie primarily in the area of CSCW and mobile technology for collaborative learning, e.g. in the area of crisis management. She has consolidated experience with the collaborative organization of international workshops.

Tobias Ley is a professor of Digital Ecosystems at Tallinn University in Estonia. His research interests lie in the application of adaptive and social technologies in workplace learning and knowledge management. He has organized numerous international workshops at EC-TEL and I-Know conferences, and is acting as a programme chair of EC-TEL 2013.

Stefanie Lindstaedt is professor and head of institute of the Knowledge Management Institute at Graz University of Technology and is Scientific Director of the Know-Center in Graz (Austria). Her research focuses on context-aware knowledge services that combine the power of Web 2.0 approaches and machine

learning methods to augment semantic technologies in order to support individual, community, and organizational learning.

Viktoria Pammer is division manager in the area "Knowledge Services" at the Know-Center. Viktoria's research focus is to design mobile and context-aware technologies that support knowledge work and work-integrated learning. She is interested in observing users both in the physical and virtual world to create an added benefit for users in work and learning information technology systems.

Papers

The workshop will include presentation of 12 peer-reviewed papers that together allow addressing the workshop´s topics from different perspectives:

- Merja Bauters, John Cook, Jo Colley, Brenda Bannan, Andreas Schmidt and Teemu Leinonen. *Towards a Design Research Framework for Designing Support Informal Work-Based Learning*
- Martin Böckle, Svenja Schröder and Jasminko Novak. *Collaborative Visual Annotations For Knowledge Exchange in Practical Medical Training*
- Irene-Angelica Chounta, Christos Sintoris, Melpomeni Masoura, Nikoleta Yiannoutsou and Nikolaos Avouris. *The good, the bad and the neutral: an analysis of team-gaming activity*
- John Cook, Brenda Bannan and Patricia Santos. *Seeking and Scaling Model for Designing Technology that Supports Personal and Professional Learning Networks*
- Ines Di Loreto and Monica Divitini. *Games for learning cooperation at work: the case of crisis preparedness*
- Mojisola Erdt, Florian Jomrich, Katja Schüler and Christoph Rensing. *Investigating Crowdsourcing as an Evaluation Method for TEL Recommenders*
- Sean P. Goggins and Isa Jahnke. *Computer-Supported Collaborative Learning at Work: CSCL@Work goes TEL@Work*
- Birgit Krogstie and Monica Divitini. *Reflecting on emotion: Design challenges for cooperation technology*
- Michael Prilla and Thomas Herrmann. *Guiding Articulation for Learning at Work: A Case of Reflection*
- Inga Saatz and Andrea Kienle. *Mobile Support for ad-hoc learning Communities*
- Ivan Srba and Maria Bielikova. *Designing Learning Environments Based on Collaborative Content Creation*

- Vladimir Tomberg, Mohammad Al Smadi, Tamsin Treasure-Jones and Tobias Ley. *A Sensemaking Interface for Supporting Doctor's Learning at the Workplace – A Paper Prototype Study*

The papers will be available online. For more information see the workshop website at http://know-center.tugraz.at/ectel-meets-ecscw-2013/

References

Halverson, Christine. (2002). Activity Theory and Distributed Cognition: Or What Does CSCW Need to DO with Theories? *Computer Supported Cooperative Work* 11(1-2):243-267.

Kelloway, E. K., & Barling, J. (2000). Knowledge work as organizational behavior. *International Journal of Management Reviews*, *2*(3), 287–304.

Kaschig, A., Maier, R., Sandow, A., Brown, A., Ley, T., Magenheim, J., Mazarakis, A., et al. (2012). Technological and Organizational Arrangements Sparking Effects on Individual, Community and Organizational Learning. In A. Ravenscroft, S. Lindstaedt, C. Delgado Kloos, & D. Hernández-Leo (Eds.), *Proceedings of the 7th European Conference on Technology-enhanced Learning* (pp. 180–193). Heidelberg: Springer.

Lindstaedt, S., Kump, B., Beham, G., Pammer, V., Ley, T., Dotan, A., & De Hoog, R. (2010). Providing Varying Degrees of Guidance for Work-Integrated Learning. *Proceedings of the 5th European Conference on Technology Enhanced Learning, ECTEL 2010* (Vol. LNCS, pp. 213–228). Heidelberg: Springer.

Randall, D., Harper, R. and Rouncefield, M. (2007). Fieldwork for Design. Springer Verlag, London,UK.

Schmidt, K. (1999). The critical role of workplace studies in CSCW. In Christian Heath, Jon Hindmarsh, and Paul Luff (eds.): Workplace Studies: *Recovering Work Practice and Informing Design*, Cambridge University Press, Cambridge, UK.

Part III

Extended Abstracts of Demos and Videos

Social Media integrated into Groupware

Sebastian Franken, Sabine Kolvenbach, Wolfgang Prinz
RWTH Aachen, Fraunhofer FIT, Germany
sebastian.franken@rwth-aachen.de, sabine.kolvenbach@fit.fraunhofer.de, wolfgang.prinz@fit.fraunhofer.de

Abstract. This demonstration presents the evolution of a groupware system into a social networking and collaboration platform for the healthcare domain. At first we identify and compare important characteristics of groupware and social media. Then we describe the seamless integration of social media functions into an existing collaboration platform.

Groupware vs. Social Media

Groupware support is common in organizations for collaboration in distributed teams. Representatives are MS SharePoint (sharepoint.microsoft.com) or BSCW (www.bscw.de). Recently, external social media services are used in business collaboration; XING is popular for networking and Facebook for presentation of products or customer interaction. Because of this trend, employees demand the integrated use of new interaction forms in their cooperation processes.

The exploitation of the main concepts of groupware and social media exposes that groupware focuses on content whereas social media on people and their activity. The focus shifts from “What happened to the document?” to “What are the recent activities of the user?”. Traditional group concepts contrast with people networks. Information is protected by role concepts; however social media goes without strict access right policies and relies on social control. In groupware systems users manage and search information in folders, whereas social tagging categorizes contents and facilitates topic related search. Usually the basic communication is done via email, often outside of the groupware system; instead social media services provide lightweight communication means, e.g. microblogging.

Social Media Enhancements to classic Groupware

Our demonstration will present how BSCW, one of the first fully web-based groupware systems, demonstrated at ECSCW 1995, has evolved over years and extended towards a social media system enhancing collaboration by new interaction concepts, e.g. a Social Collaborative Workplace and Instant Content Preview.

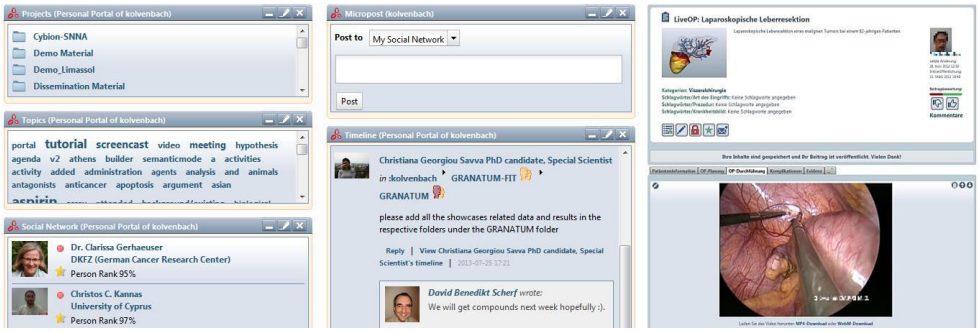


Figure 1. Social Collaborative Working Space (SCW) and Instant Content Preview (ICP)

As illustrated in Figure 1 the SCW offers collaboration and social media functions by widgets (Prinz, Kolvenbach, 2012). Users can access their Shared Projects by a click on the folder. The Topic Cloud facilitates search for topic related shared information. The user's Social Network lists all cooperation partners, the users' presence and rank in the community. The Micropost widget enables users to post either to the social network or a project. The user's Timeline shows the aggregation of all posts in the social network; it can be filtered for posts submitted in the context of a project. By a click on a person users visit their SCW; cooperation partners see more than others. Special containers offer ICP with instant preview of material, such as video, PDFs and comments (Franken, Jeners, 2012). The material can be published into a public content pool, which enables community-wide content sharing of videos with surgical tips & tricks.

Our demonstration will show the extensions to BSCW as well as their application in a work setting, such as the healthcare domain. The work has been done in the GRANATUM project, partially funded by the European Commission under the 7th Framework Programme, and in the SurgeryTube project, funded by the Federal Ministry of Education and Research and the European Social Fund.

References

Prinz, Wolfgang, and Kolvenbach, Sabine (2012): 'From Groupware to Social Media—Extending an Existing Shared Workplace System with Social Media Features', it-Information Technology 54.5 (2012): 228-234.

Franken, Sebastian, and Jeners, Nils (2012): 'SurgeryNet: Eine Kooperationsplattform zur individuellen Aus- und Weiterbildung in der Chirurgie', 11. Annual Meeting of the German Society for Computer- and Roboter Assisted Surgery, CURAC 2012, Düsseldorf.

CoLearn: Real Time Collaborative Learning Environment

G. Stylianakis, N. Moumoutzis, P. Arapi, S. Christodoulakis
Laboratory of Distributed Multimedia Information Systems and Applications, Technical University of Crete (TUC/MUSIC), 73100 Chania, Greece
{gstylianakis,nektar,xenia,stavros}@ced.tuc.gr

Abstract. We present a platform supporting authoring and execution of collaborative elearning processes. We employ modeling concepts from Business Process Modeling Notation to formalize collaboration scripts computationally described with IMS Learning Design. CoLearn supports group management and social interaction among participants.

Motivation

Computer Supported Collaborative Learning (CSCL) has become an important part of eLearning providing interactivity and accessibility to learning resources either synchronously or asynchronously among users. To develop a CSCL environment one should cope with learning content, communication/ collaboration facilities and run-time execution of the learning process. Collaboration scripts provide a flexible and effective way to specify the components of the learning process including collaboration/interaction patterns within groups of participants. However, despite the importance to model collaboration scripts, a formal language is still missing (Miao et al., 2005).

To provide a machine processable format for such scripts the IMS Learning Design (IMS LD) specification is proposed by several researchers. IMS LD can describe learning processes for a wide range of pedagogical approaches. Although several IMS LD compliant authoring tools exist, they lack a standard graphical notation (Karampiperis et. al, 2007) and hardly support complex learning flows.

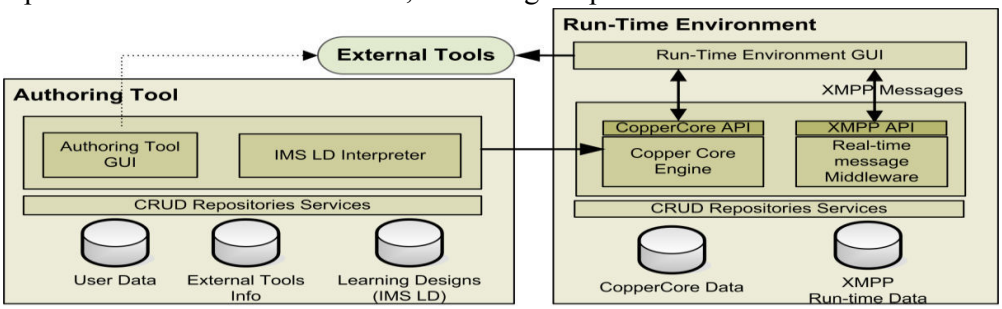
Communication/collaboration among participants is yet another important aspect of the learning process that should be supported in a CSCL. Although

several platforms provide run time execution of IMS LDs, they only partially support communication and collaboration (Hernández et. al, 2005).

CoLearn supports authoring and execution of real time Collaborative Learning processes. It is based on modeling concepts from the Business Process Modeling Notation (BPMN) to formalize collaboration scripts that are computationally described with IMS LD. Additionally; it supports group management and social interaction among participants exploiting the XMPP messaging protocol.

Architecture

The platform architecture is presented in the figure below. The CoLearn authoring tool uses BPMN as the representation notation for collaboration scripts. The IMS LD interpreter provides the mechanisms to automatically interpret the BPMN representation to IMS LD level C, according to specific rules.



The run time environment executes IMS LD learning scenarios. It integrates the CopperCore engine that provides coordination support for learning processes. CopperCore provides the persistent storage (LD instance, users/runs creation, role assignments etc.) and APIs that manage the administration/delivery of IMS LD. The Real time Message Middleware enables group management and social interaction among participants using the publish-subscribe pattern of the XMPP messaging protocol. The delivery of messages according to explicit subscriptions to specific channels allows organizing users into virtual groups; media sessions can be established and real time interactions (collaboration/ communication) can be supported. Finally, the launch of external learning tools defined in the educational scenario is supported with IMS Learning Tools Interoperability spec.

References

1. Miao, Y., Hoeksema, K., Hoppe, H.U., and A. Harrer (2005): 'CSCL scripts: modeling features and potential use'. Computer Support for Collaborative Learning Conference (CSCL2005).
2. Karampiperis, P. and D. Sampson (2007): 'Towards Interoperability of Learning Activities Design: Transforming BPEL Workflows to IMS Learning Design Level A Learning Flows'. 7th IEEE International Conference on Advanced Learning Technologies (ICALT 2007).
3. Hernández-Leo, D., Asensio-Pérez, J.I., Dimitriadis, Y., Bote-Lorenzo, M.L., Jorrín-Abellán, I.M., and E.D. Villasclaras-Fernández (2005): 'Reusing IMS-LD Formalized Best Practices in Collaborative Learning Structuring'. Advanced Technology for Learning. 2 (4) 223-232.

Collaborative discovery of biomedical knowledge: The Dicode platform

Nikos Karacapilidis[1], Georgia Tsiliki[2], Manolis Tzagarakis[1], Spyros Christodoulou[1], Natalja Friesen[3], Stefan Rueping[3]
[1] University of Patras and CTI, Greece
[2] Biomedical Research Foundation, Academy of Athens, Greece
[3] Knowledge Discovery Group, Fraunhofer Institute IAIS, Germany
nikos@mech.upatras.gr, gtsiliki@bioacademy.gr, tzagara@upatras.gr, shristod@cti.gr, natalja.friesen@iais.fraunhofer.de, stefan.rueping@iais.fraunhofer.de

Abstract. The Dicode platform builds on big data processing and mining technologies to enhance collaboration and decision making in data-intensive and cognitively-complex settings. The platform has been developed in the context of an FP7 EU research project. We demonstrate its applicability in complex biomedical settings.

Collaboration support technologies and platforms are crucial in today's biomedical research settings, where multidisciplinary communities need to assimilate clinico-genomic research information and scientific findings and explore diverse associated issues. At the same time, biomedical research is associated with large-scale amounts of multiple types of data, obtained from diverse and distributed sources.

This demo presents an innovative web-based collaboration support platform that aims to fully cover the diversity of requirements in contemporary biomedical research settings (Figure 1 - a short version of our demonstration video appears at http://dicodedev.cti.gr/screencast/screencast.html). Firstly, the platform provides advanced collaboration support functionalities through innovative virtual workspaces based on alternative data visualizations schemas. Secondly, it is able to meaningfully accommodate in a collaboration session the outcomes of data mining services, thus offering added value concerning recognition of biomedical data patterns. Thirdly, by supporting emergent semantics and the incremental formalization of argumentative collaboration, it augments individual and collective decision making.

When thinking about biomedical knowledge discovery based on data mining tools, it is important to set up a collaborative, interactive process, where users can easily decide about which data repositories should be considered, analyze the algorithmic results, discuss the weaknesses of the patterns that were identified, and set up a new iteration of the algorithm by defining other descriptive attributes or integrating other relevant data (Karacapilidis et al., 2012). The Dicode platform meaningfully integrates a series of collaboration, data mining, visualization and

decision making services to facilitate the above process. Specifically, the platform: (i) presents the discovery patterns to the users in a form that allows their use as one piece of knowledge in the overall discussion process; (ii) makes it easy for the users to give feedback to the data mining algorithms, e.g. by allowing them to specify undesired attributes, non-interesting subgroups, or controlling the complexity of the output; (iii) easily enables users to select and integrate data sets and attributes, both from external data sources as well as from the underlying discussion.

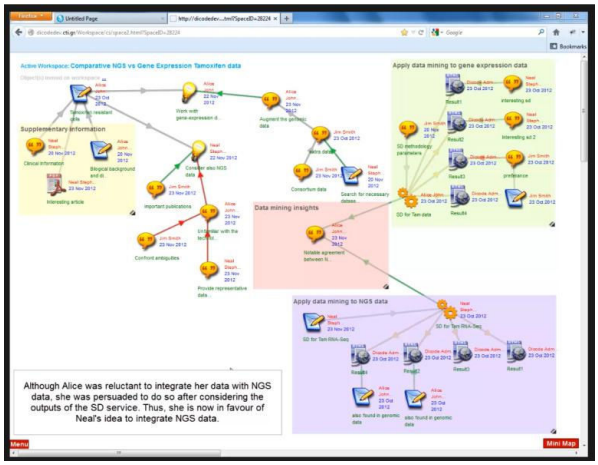


Figure 1. An instance of the data mining based collaboration in a biomedical setting.

The platform to be demonstrated has been developed in the context of an FP7 EU research project, namely Dicode (http://dicode-project.eu/), which exploits and builds on prominent high-performance computing paradigms and large data processing technologies to facilitate and augment collaboration and decision making in data-intensive and cognitively-complex settings. The platform has been thoroughly evaluated in diverse complex collaboration settings. Evaluation feedback has proved that it offers an innovative solution that reduces the overall complexity of real-life collaboration and decision making settings to a manageable level, thus permitting stakeholders to be more productive and concentrate on creative activities (Tsiliki et al., 2012).

Acknowledgements: This work is funded by the EC-FP7 project DICODE (grant number 257184).

References

G. Tsiliki, S. Kossida, N. Friesen, S. Rüping, M. Tzagarakis and N. Karacapilidis: Data mining based collaborative analysis of microarray data. In: *Proc. of ICTAI 2012,* Athens, Greece, November 7-9, 2012, pp. 682-689.

N. Karacapilidis, L. Lau, C. Lee and S. Rüping: Mastering data-intensive collaboration through the synergy of human and machine reasoning. In: *Proc. of CSCW 2012* - Companion Volume, Seattle, WA, USA, February 11-15, 2012, ACM Press, pp. 21-22.

Part IV

Doctoral Colloquium Papers

Supporting practice-oriented researchers with IT – from a praxeological perspective

Phd-project of Juri Dachtera, University of Siegen, Germany
Outline produced for doctoral consortium at ECSCW '13, Cyprus

1. Introduction and motivation for my research

Research practices change, as do many work practices. Partly, this is the result of changing agendas of funding agencies. Increasingly, funding agencies expect research projects to consist not only of researchers but to additionally include industry partners and end-users. Furthermore, these projects should address societal problems not only from the perspective of one particular discipline but should combine scientific knowledge with industrial and end-user-knowledge to solve these problems. According to the European Commission (2007), such joint research projects (the "cooperation programme") constitute the "core of FP7 and largest component by far", which "foster[s] collaborative research across Europe and other partner countries, according to several key thematic areas". The main share of EU research funding hence goes into joint research projects, which should eventually boost the European economy by fostering the production of innovations. Similar trends can be observed at the national levels of EU Member States, for example, the German one. The rationale behind these programs strongly builds on innovative effects of bringing together stakeholders with backgrounds from academia, industry and practice. Through the combination of their respective expertise in joint research projects, the actors are supposed to come up with innovative results, which should both solve a societal problem and boost the economy (cf. Bundesbericht Forschung, 2010).

These changes on the institutional level have strong effects on the working circumstances of individual researchers. Research funding is only provided to them if a constellation of researchers and other actors has agreed upfront to cooperate on a societally relevant issue. Moreover, the spatial distance between researchers tends to increase due to the pan-European (or at least national) scope of the programs. As a consequence, IT tools play a significant role for cooperation and coordination. Despite the increasing importance of such joint research constellations, empirical investigations into the negotiated and emergent nature of such projects have not become common (cf. Laudel, 1999; Hollaender, 2003). In my Masters thesis, I have therefore investigated how stakeholders cooperate within a German joint research project. On the one hand, I have identified a great number of learning possibilities, which arise from the different perspectives of the actors. These learning possibilities might eventually even result in an innovative product, as anticipated by the political funders. On the other hand, I found a number of obstacles, which might hamper successful collaboration. The situation was further complicated by the user-centered design-approach, which was applied throughout the project. While providing valuable in-depth knowledge about end-users' work practices, the approach was strongly opposed to the expectations of some of the industry partners and their work practices. This led to tensions and posed a challenge to the project management.

Given the political funders' focus on joint research projects, such heterogeneous constellations of actors will rather be the rule than the exception in the future.

Furthermore, my empirical results suggest the reasons for the tensions to be eventually rooted in the types of organizations and their work practices. Since these are not unusual types, my results might be to a certain extent generalizable – also beyond such projects. Adopting a CSCW perspective, the questions of how stakeholders with heterogeneous backgrounds cooperate and which role IT-tools play thereby, arise. In my thesis, I approach these questions by investigating the EUSSET community, a network of practice-oriented researchers and industry practitioners. The aim of my research is to arrive at a thorough understanding of the community's members and their work practices. In a second step, their cooperation should be supported by means of an internet platform. The following chapter outlines my project in more detail.

2. Outline of the PhD-project

By using the example of EUSSET ("European Society for Socially Embedded Technologies"), a community in applied Informatics, the PhD-project examines which opportunities for support arise from information technology for interdisciplinary, spatially distributed knowledge communities. At the moment, EUSSET is an international network of 40 people from the fields of science and industry, with focus on user-oriented and praxeological research, development and design methods. It is planned to establish a funding organization in Germany, as well as the chargeable membership status for people and orgaizations. The presence in the World Wide Web accounts for 33 founders, spread all over Europe; the adjective "European" in its name however, refers explicitly to an "intellectual" tradition, not to geographical delimitations. So, among the associated people are also representatives from the USA. Concerning the contents the community distance itself from purely technical approaches in informatics and postulates human activities, respectively the dealings with each other and with technical media, to build a basis of technology development instead. Six academic conferences are named in relation to the EUSSET community. The publications are provided in the digital library.

Similar to the aims of EUSSET, I also would like to uncover the practice of work and cooperation of the involved actors in my dissertation and then, afterwards support it by a technical platform, an internet portal. My approach follows the concept of integrated organization and technology development (OTE) (Wulf & Rohde, 1995; Wulf, 2009; Wulf et al., 2011).

In the **first step** of my project, I approach the working practices as well as the individual opinions of the participants by participatory observation and guided interviews. Already existing theoretical concepts herby have a "sensitizing" function. The leading research questions are what the EUSSET community represents in the view of individuals, what individual motivations for participating are or which approaches are used in cases of academic research and of creation and sharing of knowledge, respectively academic publications. Parallel, insights should be gained by participating in discussions at events of the community. The overall goal of these empirical methods is to find out which functionalities should a common portal have. By the participatory observation of discussions and also by different talks at a symposium of the community at the University of Siegen in February 2012, first indicators could have been identified.

The evaluation and analysis of the data should happen in a grounded theory-manner (cf. Strauss & Corbin, 2008). The grounded theory has the advantage that the data collection and evaluation are not understood as two separate processes but rather stimulate each other until the object of inquiry is completely captured. Moreover, there is the possibility to combine different data sources; so besides ethnographical notes and transcribed interviews, theoretical literature and automatically generated date can be used as well.

Whereas the first step devotes to the data collection, evaluation and analysis of participants, the **second step** of my project aims to the realization of the requirements identified in the first step. By the development of a common internet platform on the basis of the insights, especially the decentralized character of the community should be supported. It is important, that the web-portal should not be perceived as a mere repository, but its design should in contrast be based on the work practices of the prospective users (cf. Ackerman et al., 2003). Hereby, innovative publication and conference forms like so called "Liquid Publication" should be used as well (cf. Camussone et al., 2010; Casati et al., 2007). As the technical development is built up by cognitions that still have to be empirically gained, it cannot be anticipated completely at present.

The **third step** serves the purpose to evaluate the usage of the technical platform, as realized in the second step, and to set it into relation to the requirements identified in the first step. Beside the guided interviews, also automatically generated data can be gathered for the evaluation. The interview questions will help to find out if the intended support has actually been achieved. If this is not the case, the reasons have to be proved. By successful realization, the question arises if and how did the labour practices, identified in the first step, change. With regard to implemented innovative publication platforms its acceptance and adoption by the user has to be the object of investigation. In the end, this evaluation serves to identify chances of improvement on which basis a further developmental step of the technological platform could be carried out.

3. Current state of things

I am right now in the middle of my empirical studies and have begun to think about design possibilities for the web platform. The following steps have been performed during the last months:

- participation in a meeting of the community in Siegen (Feb. 2012): Observation of discussions, informal interviews, introduction to the community (presentation of my masters thesis), Collection of initial ideas for the design of the web platform
- three semi-structured interviews with senior members of the community. Analysis of their views of the community, their aims and motivation to establish EUSSET
- participant observations of the programme committee meetings of two central conferences of the community (CHI and ECSCW). Field notes of the argumentations for including or excluding papers. Informal interviews with participants
- Studies of EUSSET key actors' literature to find our about their theoretical positions.

- Participant observation of a book publishing process (ongoing) for a programmatic book of the community
- Literature study and co-authorship of a survey paper on CSCW's view of knowledge management and expertise sharing (JCSCW).

Furthermore, some design options are tried out at the moment internally at the chair for Information Systems and New Media. These include an expertise profiling function, which is based on an automated survey of user's documents, while at the same time respecting privacy needs of the users (cf. Reichling & Veith, 2005).

Literature

Ackerman, M., Pipek, V. & Wulf, V. (Hrsg.). (2003). *Sharing Expertise. Beyond Knowledge Management*. Cambridge, Massachusetts: MIT Press.

Bundesministerium für Bildung und Forschung. (2010). *Bundesbericht Forschung und Innovation 2010. Kurzfassung*. Online verfügbar unter: http://www.bmbf.de/pub/bufi_2010_kurzfassung.pdf. (zit. Bufi 2010).

Camussone, P. F., Cuel, R. & Ponte, D. (2010). *ICT and innovative review models. Implications for the publishing industry.* Online available http://www.almaweb.unibo.it/all/doc/upl/s1/pdf/WOAPAPERSITO/6/8.7.%20Camussone%20Cuel%20Ponte.pdf.

Casati, F., Giunchiglia, F. & Marchese, M. (2007). *Liquid Publications: Scientific Publications meet the Web. Changing the way scientific knowledge is produced, disseminated, evaluated and consumed*. Online available https://dev.liquidpub.org/svn/liquidpub/papers/deliverables/LiquidPub%20paper-latest.pdf.

European Commission. 2007. "The Seventh European Research Programme. Taking European Research at the Forefront." http://ec.europa.eu/research/fp7/pdf/fp7-brochure_en.pdf.

Hollaender, K. (2003). *Interdisziplinäre Forschung. Merkmale, Einflußfaktoren und Effekte.* Dissertation an der Universität zu Köln. Online verfügbar unter http://kups.ub.uni- koeln.de/1657/ (letzter Zugriff: 28.8.2011).

Laudel, G. (1999). *Interdisziplinäre Forschungskooperation. Erfolgsbedingungen der Institution „Sonderforschungsbereich"*. Berlin: Rainer Bohn Verlag.

Reichling, T. & Veith, M. (2005). Expertise sharing in a heterogeneous organizational environment. In: H. Gellersen et al. (Hrsg.). *ECSCW 2005: Proceedings oft the Ninth European Conference on Compuer Supported Cooperative Work*, Dordrecht: Springer, S. 325-345.

Strauss, A. & Corbin, J. (2008). *Basics of qualitative research. Techniques and procedures for developing grounded theory* (3. Auflage). Los Angeles: SAGE.

Wulf, V. & Rohde, M. (1995). Towards an integrated organization and technology development, In *Proceedings of the conference on Designing interactive systems: processes, practices, methods, & techniques*, 1995, ACM Press, New York, S. 55-64.

Wulf, V. (2009). Theorien sozialer Praktiken zur Fundierung der Wirtschaftsinformatik: Eine forschungsprogrammatische Perspektive. In: Becker, J.; Krcmar, H.; Niehaves, B. (Hrsg.) *Wissenschaftstheorie und Gestaltungsorientierte Wirtschaftsinformatik*, Springer/Physika 2009, S. 211 - 224.

Wulf, V., Rohde, M., Pipek, V. & Stevens, G. (2011). Engaging with Practices: Design Case Studies as a Research Framework in CSCW. In *Proceedings of the conference on Computer Supported Cooperative Work (CSCW)*, 2011, S. 505-512.

The Sequential Analysis of Physicians' Communicative Behaviour during Ward Rounds

Balázs Péter Hámornik
Budapest University of Technology and Economics, Department of Ergonomics and Psychology
hamornik@erg.bme.hu

As a focused summary of my PhD studies the goal of this paper is to describe the physicians' collaborative information handling and the usage of artefacts in order to enhance patient safety and collaboration among team members. The understanding of the physicians' information collection and sharing in the teams could support the implementation of artefacts facilitating effective and effortless information usage. In order to make the description of information flow more detailed, the scientific perspective of shared mental models is integrated with the field research practice of the distributed cognition literature. The sequential paths of the physicians' information handling is able to show the places where the technological support is needed the most and fitting in the best way.

Research Question

In my dissertation I study the characteristics of teamwork processes and their content (the shared knowledge) by the communication in the field of medical rehabilitation, which is a complex but non-acute field of medicine. The physical rehabilitation is the field of medical rehabilitation that helps the injured or disabled patients to regain their motional and physical skills that enables them to

live an autonomous life with or without prostheses or physical aids. During this process of therapy several experts at the same time, for example the physician, the physiotherapist, the nurse, and the psychologist, handle the patient. In the focal point of my dissertation there is an accentuated team-process: the communication. By the exchange of information the experts treating the patient gain a common knowledge about the patient's actual state, the next steps of therapy and the actual goals. The quality and quantity of communication – who communicates with whom and about what topic – determines the shared knowledge in the team around the patient that facilitates the successful care. According to my assumptions the communication about and with the patient can be affected by several factors, and these influencing factors can appear on individual, group or organisational levels. In order to study team communication scientifically I choose to analyse the ward round that is the discussion of the patient state and the future therapeutic steps by the team members with the inclusion of the patient.

The further aim of my study is to identify the ideal features of a team communication support process by simple artefacts or information technology. My results could help to understand the frictions in the teams and develop the tools that can help to get around and gain a more effortlessly useable solution fitting the information flow.

Heading towards the goals described above I have finished the unstructured field observations, the shadowing observations and the survey data collections. I have done the data analyses and interpreted my findings according to my assumptions. My dissertation is recently delivered. I am expecting to have my defence in November for what I am aiming to broaden the interpretation of my results with my future scientific perspective on artefact supported cooperative work.

The observation study

In the shadowing field study 161 patients were engaged in interaction with the three physicians observed. By this I am aiming to gain a more complete picture of the information processes and the complexity distributed among team members in such an expert team or ‘expert system’ (Hutchins, 1995).

This field observation method has that advantage that no conversations with the patients had to be recorded; only the agent type category and the direction of the communicative act are registered. This provides an ethically more clear and acceptable frame both for patients and care providers.

The design of the study summarised here is both based on my previous experiences and the results of Sørby and Nytrø (2010). The authors sequentially registered the inbound and outbound communicative behaviour, and the usage of human, paper-based and electronic agents of the physicians observed (Sørby & Nytrø, 2006, 2010). The communicative profile of the experts observed have been

drawn based on the registered communicative behavioural sequences, that helps to understand the reasons and needs behind the usage of information agents and tools (Sørby & Nytrø, 2010). In order to describe the communication of the ward rounds' teamwork I have modified and implemented the previously mentioned field research design to the field of physical rehabilitation. I have observed and registered online the inbound and outbound usage of human and artefactual communicative agents (paper-based, electronic and physical) used by the physician leading the ward round (see Table 1). The cooperation of human agents together with the usage of information containing artefacts contributes to the development of a common language, representation, and schemata of the team members around the patients. Artefacts of this case representing the information, that can be transferred from one team member to another both present around the patients' bed or even separated in time and space. Artefacts can be used personally (e.g. notes, or patient chars that can only be read by one team member at a time) or they can act as a part of the shared visual field of the team members around the patient (e.g. the prosthesis and the movements of the patients can be observed by the whole team at the same time).

Information agents	Abbr.	Category	Information agents	Abbr.	Category
Physicians	**P1** **P2** **P3**	Human agent type	Computer	**C**	Digital agent type
Physiotherapists	**PT**		Telephone	**T**	
Nurses	**N, NL**		X-Ray	**RTG**	
Occupational Therapist	**OT**		Movement	**M**	Physical agent type
Psychologist	**PS**		Body parts	**Bo**	
Social worker	**SOC**		Prosthesis	**Pr**	
Ergotherapist	**ERG**		Patient record	**Prec**	Paper agent type
Patients	**Pa**		Chart sheet	**Ch**	
Interns / clerks	**CP**		Other documents	**No, D**	
Unit secretary	**US**				

Table 1. The information agents observed organised into four agent types. The columns "Abbr." are indicating the abbreviations used for the agents of the network chart in Figure 1.

A lag sequential analysis was conducted in order to identify significant sequential patterns in the usage of information agents of the physicians' communicative behaviour during ward rounds (Hewes & Poole, 2012; O'Connor, 1999). I assume that there is a scenario appearing in all physicians' communicative behaviour as an overall significant sequential pattern. The expected sequential constraints may represent the knowledge sharing that coordinates the information exchange by building and containing the mutual

understanding of information in the team. The results of the sequential analysis the matrices of unidirectional kappa measures were used as an input for the network analysis software Cytoscape in order to visualise the significant connections. The visualisation of the results as networks helps to identify the most important connections and to interpret the findings (Kiekel, Cooke, Foltz, & Shope, 2001).

In this paper I only illustrate my work with the sequential analytic network result of the overall communication flow of the physicians' communicative behaviour on ward rounds (Figure 1.).

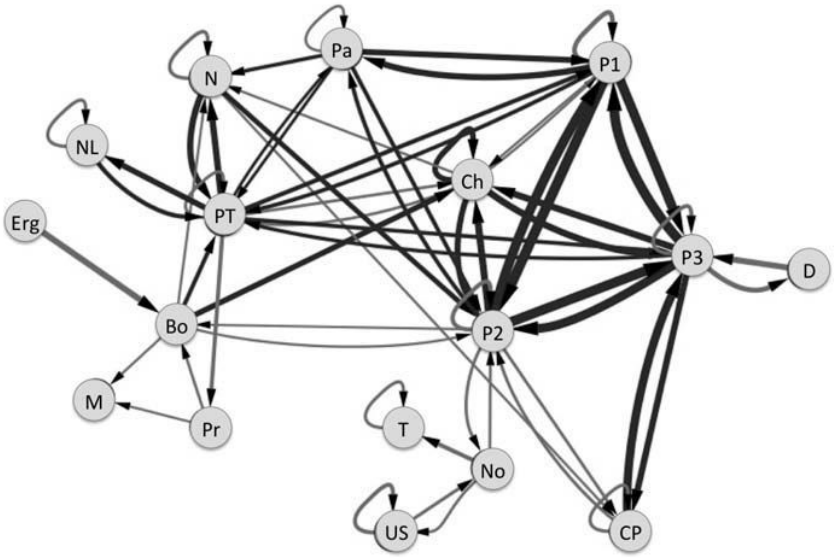


Figure 1. The network of the communicative behaviour of the physicians observed on ward rounds for lag 1 (Likelihood ratio $\chi 2$ (684) = 2317.0158, $p<0.05$). The nodes are representing the agents that have been accessed by the physicians (see the abbreviations in Table 1.). The directed edges are representing the significant shifts from an agent to another in the information usage flow of the physicians. The more probable is the shift from an agent to another the more stroked the edge is. The black edges are representing the negative sequential relationships when the two agents are probable to not appear after each other. The grey edges are representing the positive sequential relationships when the two agent linked are probable to appear after each other.

The overall fitting sequential model found on the physicians communicative behaviour during the ward round is a proof of existence of common features in the teamwork around the patients. As a key result in the communicative behavioural pattern the nurses (N) and the physiotherapists (PT) are not included in the same discussions. As it is shown on Figure 1. the strong negative sequential relationship between the two nodes means that they are probable to not appear after each other in the communication sequence of the physicians. These results are fitting the findings based on my previous field observations and social

network analyses that revealed a conflict between the nurses and the physiotherapists.

Conclusions

Summarising the findings of my doctoral research I can conclude that the teamwork observed in the physical rehabilitation ward is highly affected by the hierarchic healthcare organisational culture. The scenario of the ward round and the dominating role of the physicians represent this effect observed. However, the team-based patient care initiated in the institute is also noticeable. The effective cooperation of the physicians and the physiotherapists is counterbalanced by the lack of cooperation between the physiotherapists and the nurses. My observation-based research methodology completed with network analysis and lag sequential analysis connects the perspectives of teamwork research (Kiekel et al., 2001) and requirements engineering initiated computer supported cooperation research (Sørby & Nytrø, 2006, 2010). This strategy for studying teamwork on field is proven to be effective in describing the features of team communication in medical rehabilitation teams around patients and also it is capable to identify the key points of future development in order to support a safer and more effective functioning of patient care teams. The better understanding of the information usage of the physicians and the coordination of the team members could support the design of intelligent or artefactual systems that are more precisely fitting the teamwork and gaining more acceptance among team members in the future.

References

Hewes, D. E., & Poole, M. S. (2012). The Analysis of Group Interaction Processes. In A. Hollingshead & M. S. Poole (Eds.), *Research Methods for Studying Groups and Teams A Guide to Approaches, Tools, and Technologies* (pp. 358–385). New York: Routledge.

Hutchins, E. (1995). *Cognition in the Wild*. Cambridge MA: MIT Press. doi:10.1098/rsbl.2011.0352

Kiekel, P. A., Cooke, N. J., Foltz, P. W., & Shope, S. M. (2001). Automating Measurement of Team Cognition through Analysis of Communication Data. *Usability evaluation and interface design; cognitive engineering, intelligent agents and virtual reality* (pp. 1382–1386). Retrieved from http://ceri-ci.com/media%26pubs/documents/docs/ONRPaper7.pdf

O'Connor, B. P. (1999). Simple and flexible SAS and SPSS programs for analyzing lag-sequential categorical data. *Behavior Research Methods, Instruments, & Computers*, *31*(4), 718–726. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10633992

Sørby, I. D., & Nytrø, Ø. (2006). Does the EPR support the discharge process? A study on physicians' use of clinical information systems during discharge of patients with coronary heart disease. *The HIM Journal*, *34*(4), 112–119. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/18216415

Sørby, I. D., & Nytrø, Ø. (2010). Analysis of communicative behaviour: profiling roles and activities. *International journal of medical informatics*, *79*(6), e144–51. doi:10.1016/j.ijmedinf.2009.08.003

Integrating healthcare for complex and vulnerable clients in distributed environments

Elizabeth Hanley
University of Technology, Sydney, Australia
Elizabeth.hanley@student.uts.edu.au

Abstract. In exploring how healthcare reform strategies are translated into local practices, this research is situated in an Australian change initiative in primary health care known as HealthOne. It aims to provide integrated and multidisciplinary care for complex and vulnerable clients by linking clinicians, and other professionals to provide collaborative care. I explore how practices are being enacted in the midst of healthcare reforms, focusing on the practices for using patient information and how these produce new models of care. Ethnographic methods including observation, semi-structured interviews and document collection reveal that the work of HealthOne is complex and distributed. Actor-Network Theory makes visible the importance of relational effects, the impact of breaks in the network, and highlights the minute negotiations taking place at each link in the network. Concepts from the Computer Supported Cooperative Work field such as common information spaces, boundary negotiation and invisible work can inform theorizations of information use, integration and sharing in new models of primary health care, with particular attention to collaboration and negotiation amongst multidisciplinary health professionals in distributed environments and complex organisational structures.

In many countries health reform now necessitates a shift from the current focus on acute care toward coordinated and integrated care, prevention, self-care, and more consistent primary health care in order to improve quality of care and patient experience, and to reduce costs (Goodwin, Smith, Davies, Perry, Rosen, Dixon, Dixon and Ham, 2012; Strandberg-Larsen and Krasnik, 2009). The Australian National HealthCare Agreement's aims include an "integrated

approach to the promotion of healthy lifestyles, prevention of illness and injury, and diagnosis and treatment of illness across the continuum of care" (Council of Australian Governments, 2011).

This research is situated in an Australian change initiative in primary health care known as HealthOne. HealthOne aims to provide integrated and multidisciplinary care for complex and vulnerable clients by linking general practitioners, and other professionals in community, allied health and acute care to collaboratively manage the client's multifaceted needs. With integration as a "structural or system / service wide" strategy (Tieman, Mitchell, Shelby-James et al, 2006, 8), the underlying objectives of HealthOne are to reduce preventable hospitalisations, to minimise the impact of chronic and complex conditions, and to support client self-management of health (NSW Health (a) 2011; NSW Health (b) 2011).

The research is part of a larger Australian Research Council (ARC) Linkage research project, which is researching the redesign of health practices. The research setting is in metropolitan western Sydney, which is the location for the first Medicare Local in Sydney, the main delivery mechanism for the national primary health care strategy (Russell, 2012). The locality has a fertility rate of 2.26 compared with 1.8 for the whole of NSW. The population is culturally and linguistically diverse; 40% were born overseas, including recent immigrants from the Middle East, Africa, and Southern Asia, as well as refugees and asylum seekers. Health status is poor in this rapidly growing population and there are pockets of extreme socio-economic disadvantage (Auburn Council, 2013).

As an employee of a quality agency established through the national health reforms, I designed a framework and quality and safety measures for primary health care services. This gave me a broad understanding of the complex and fragmented nature of primary health care in Australia. It led me to question how primary healthcare services would use information derived from quality improvement processes, whether "useful practices" will be enacted (Orlikowski, 2002, 253), and how this would lead to quality of care, given that consultation revealed wide variability in, and concerns about, the maturity of information systems and processes.

Fitzpatrick and Ellingsen (2012, 44) have suggested "that issues of sharing information across settings, collaborative sensemaking without access to the local practices of others, the tensions between integration and standardization etc., will play out in even more complex ways in these new models of care". Hence my intention was to explore how practices in an innovative primary health care service were being enacted in the midst of healthcare reforms, with a particular focus on the practices for using patient information and how these produced new models of care. The research was founded on the premise that use and exchange of patient information is instrumental to any healthcare encounter, as well as continuity and coordination of care, and quality improvement.

My research questions currently are:

1) What is the role of patient information in primary health care?
2) What are the emerging practices for using patient information in primary health care?
3) How do these practices produce new models of primary health care?

In exploring how healthcare reform strategies are translated into local practices, my research takes an Actor-Network Theory (ANT) approach, using ethnographic methods including observation, semi-structured interviews and collection and analysis of documents. This is a multi-sited ethnography, where the actors have been dispersed in time and space. Data collection for the broader ARC project began in September 2011, and I conducted 12 semi-structured interviews with healthcare practitioners and managers, and observed a number of steering and implementation committee meetings. I commenced participant observation for my research in September 2012, completing approximately 140 hours of observation by April 2013, involving over 60 participants, including clinicians and patients, covering diverse locations such as hospitals, doctors' rooms, clinics, homes, offices, cars and tea-rooms. I collected over 150 policy and practice documents.

During this research, it became apparent that the work of HealthOne is organisationally complex and distributed; it has "become a multifaceted and intricate constellation of people, technologies, activities, entities, and relations: and the boundaries of the field site are less clear, even unbounded, involving extended spatial and temporal scope" (Blomberg and Karasti, 2013, 15, 33). Patients enrolled in HealthOne may attend dedicated clinics or have contact with a range of health practitioners and services, in the home, in hospital and in the community. In practice, HealthOne operates as a distributed network of activities traversing acute care, primary health care and community services. It has a small physical presence with offices in local community health centres or professional rooms. The clinical and operational base is community health, with linkages to practitioners and organisations in allied health, general practice, mental health, acute health care, disability services, Aboriginal health, refugee health, and social and support services across the public, private and non-government sectors.

The role of the GP Liaison Nurse (GPLN) is central to the enactment of the HealthOne approach. Rather than being responsible for case management, the GPLN liaises with the client's general practitioner and other service providers to coordinate planning and comprehensive care based on the client's needs, circumstances and health priorities. Since the ANT approach advocates exploring not the whys, but the hows (Law, 2007), shadowing the GPLN provided a tangible and constant point of connection in the midst of constant fluidity and instability in the HealthOne actor-network, as I sought to understand how clinicians and other professionals manage multidisciplinary collaborative care of complex and vulnerable patients in distributed environments. My first impression

that the patients were invisible was challenged after a few days of observation when I realised that I was hearing about many patients, through conversations, and discussions. From my observation, I have constructed many anonymised patient stories, which grew over time as I heard updates and observed case conferences.

After re-reading the observation notes, and my log of the enquiry, I have completed some preliminary data analysis. I favour a close absorption in the data, being open to what I might find, rather than a very structured static categorization and coding of data based on expectation about what I should find. Besides using ANT as a methodology to follow the actors, trace new associations or connections between actors, and identify the "links between unstable and shifting frames of reference" (Latour, 2005, 12, 11, 24), I am exploring ANT as a theory to give attention to relational effects, the impact of breaks at a link in the HealthOne actor-network, and the minute negotiations taking place at every link. Thus it is the relations that are being made visible, with the patient at the centre of an actor-network of practitioners and organisations. I have found that there is a multiplicity of actor-networks within HealthOne, which emerge depending on the needs of each patient (largely as articulated through the case conference between practitioners). These actor-networks fluctuate as needs and priorities change as they inevitably do with precarious health conditions, which are maintained at best, and degenerate at worst. Or an actor-network disappears when the patient disengages by refusing to participate, or stabilises, momentarily, with no demand for services.

I also have begun to explore how concepts from the Computer Supported Cooperative Work (CSCW) field can inform theorizations of information use, integration and sharing in new models of primary health care, with particular attention to collaboration and negotiation amongst multidisciplinary health professionals in distributed environments and complex organisational structures. Concepts of particular interest include invisible work, common information spaces, boundary objects, and boundary negotiation (Lee, 2007). Although technology is ubiquitous, it is the practices that it does not yet enable which are troubling. Rather than a design agenda, I am keen to contribute to ANT and CSCW theorisations by further developing notions of information integration which attend to a range of actors, aims and practices as a "dynamic process of negotiation" where multiple actors accomplish integration collectively (Ellingsen and Roed, 2010, 559, 560).

Acknowledgments

This research was funded by the Australian Research Council Linkage Program and the NSW Ministry of Health. I am grateful to participants for their generous sharing of their expertise and insights into current and future practices.

References

Auburn Council, (2013): *Auburn Community Profile* (Accessed 8 June 2013 from http://profile.id.com.au/auburn/seifa-disadvantage).

Blomberg, J., and Karasti, H. (2013): 'Reflections on 25 years of ethnography in CSCW', *Computer Supported Cooperative Work (CSCW),* pp. 1-51.

Council of Australian Governments. (2011): *National health reform agreement,* (Accessed 9 May 2012 at http://www.yourhealth.gov.au/internet/yourhealth/publishing.nsf/Content/nhra-agreement/$F).

Ellingsen, G., and Røed, K. (2010): 'The role of integration in health-based information infrastructures', *Computer Supported Cooperative Work (CSCW),* vol. 19, no. 6, pp. 557-584.

Fitzpatrick, G., and Ellingsen, G. (2012): 'A review of 25 years of CSCW research in healthcare: contributions, challenges and future agendas', *Computer Supported Cooperative Work (CSCW),* pp. 1-57.

Goodwin, N., Smith, J., Davies, A., Perry, C., Rosen, R., Dixon, A., Dixon, J. and Ham, C., (2012): *Integrated care for patients and populations: Improving outcomes by working together*, The King's Fund, Nuffield Trust, London.

Latour, B. (2005): *Reassembling the Social: An Introduction to Actor-Network-Theory,* Oxford University Press, New York.

Law, J., (2007): *Actor Network Theory and Material Semiotics,* (accessed on 18 May 2007 from http://www.heterogeneities.net/publications/Law2007 ANTandMaterialSemiotics.pdf).

Lee, C.P. (2007): 'Boundary negotiating artifacts: unbinding the routine of boundary objects and embracing chaos in collaborative work', *Computer Supported Cooperative Work (CSCW)*, vol. 16, no. 3, pp. 307-339.

NSW Health (a) (2011): *HealthOne Guidelines*. (accessed 25 September 2011 from http://www.health.nsw.gov.au/pubs/2011/pdf/healthone_guidelines.pdf).

NSW Health (b) (2011): *What is HealthOne NSW?* (accessed 4 January 2012 from http://www.health.nsw.gov.au/initiatives/healthoneNSW/whatis.asp).

Orlikowski, W.J., (2002): 'Knowing in practice: enacting a collective capability in distributed organising', *Organisation Science,* vol. 13, no. 3, pp. 249-273.

Russell, L. (2012): *Primary care and general practice in Australia 1990-2012: A Chronology of Federal Government strategies, policies, programs and funding*. Australian National University, Canberra.

Strandberg-Larsen, M., and Krasnik, A. (2009): 'Measurement of integrated healthcare delivery: a systematic review of methods and future research directions', *International Journal of Integrated Care*, vol. 9.

Tieman, J., Mitchell, G., Shelby-James, T., Currow, D., Fazekas, B., O'Doherty, L.J., Hegarty, M., Eriksson, L., Brown, R., Reid-Orr, D. (2006): *Integration, coordination and multidisciplinary approaches in primary care: A systematic investigation of the literature*, Australian Primary Health Care Institute and Flinders University Department of Palliative and Supportive Services.

‘Seeing what they say’: mapping the characteristics of effective remote feedback

Martin Johnson
Cambridge Assessment/University of Cambridge, UK
mj415@cam.ac.uk

Abstract. This study looks to build on a research tradition that uses naturalistic methods to evidence the tacit practices that exist in workplace social interaction practices. Using the community of practice metaphor, this project explores some of the characteristics of learning that take place when a group of professional examiners engage in remote joint-work activity. Professional examiners are all subject experts and the essence of their work, reinforced by the hierarchic structures that organise their working relationships, mean that examiner ‘learning’ involves the convergence of understandings of less senior examiners with those of other more senior examiners around key concepts. This project looks at how more senior examiners help to induct other examiners into ways of thinking within a professional community. It also looks at the role of boundary objects, such as mark schemes and exam scripts, which help to coordinate different perspectives within the community. Focusing specifically on the feedback that senior examiners give to less senior examiners in their team, this study uses a mixture of video and direct observation methods, interview, and text analysis techniques to look at how shared meanings can be built through social interaction in an applied work situation.

Introduction

Inter-examiner marking reliability is one important indicator that an assessment system is functioning validly. One precondition of good levels of reliability is that different sets of examiners are able to apply assessment criteria to performances in a consistent manner. In turn, this consistency rests on examiners being able to interpret such assessment criteria in ways that are both consistent with themselves (over time) and consistent with other examiners who are assessing performances in the same unit of learning.

One way that awarding bodies in the UK[1] facilitate the consistent application of assessment criteria is through developing clearly articulated marking criteria. Despite this, there is literature to suggest that this is not in itself an adequate measure since ‘no criterion, no matter how precisely phrased, admits of an

[1] Awarding bodies are organizations that have the power to award qualifications in England, Wales and Northern Ireland

unambiguous interpretation' (Wiliam, 1993, p.341). Another way that awarding bodies seek to maximise inter-examiner reliability is through the use of a hierarchic marking and examiner standardisation model.

In the context of this study, the particular awarding body's quality assurance framework has two principal phases. Before being allowed to mark candidates' examination scripts, examiners are required in the first quality assurance phase to demonstrate that they can mark to an acceptable standard. This involves examiners marking and submitting practice and standardisation scripts for evaluation by a more senior team leader. Once these scripts are reviewed and an examiner is cleared to mark, the second quality assurance phase involves team leaders monitoring the on-going marking of a group of examiners in their team. Feedback from the team leader on examiners' marking is a key feature within both of these quality assurance phases, with the intention of feedback being to support examiners in their ability to interpret and to apply the mark scheme as though they were the most senior examiner.

This study looks at the feedback interactions of team leaders and examiners, seeking to identify the processes by which the participants share understandings and co-construct meanings of assessment criteria. The context of this study presents two principal areas of challenge, which have led to this area of study being traditionally under-researched.

The first area of challenge is a practical one. Examiners develop their mark scheme understanding through on-going interactions with a supervising team leader via computer-mediated email communication (CMC) or telephone conversations whilst jointly viewing common examination scripts online. This flexible communication structure requires a method to systematically capture evidence of distributed and virtual communications so that the processes through which shared understandings of assessment criteria are built can become less opaque.

The second challenge is both conceptual and methodological. Lave & Wenger's (1991) representation of 'learning through participation within a community of practice' suggests that learning is a function of individuals' increasing social engagement within task-oriented communities. In the current study context, feedback can be conceptualised as a support for examiner learning as it is a primary tool for helping their thinking to converge towards that of their team leader. As a consequence, learning is heavily context-specific and responsive to the particular perspectives of the two participants at a given time. A key challenge therefore is to develop a method that can gather situated data without influencing the process it seeks to understand.

Methodological framework

A sociocultural framework is appropriate for studying interaction at an interpersonal level since this perspective suggests that interaction between individuals is instrumental to the way that individual expertise is developed. Expertise at an individual level is conceptualised as being contingent on an individual being inducted into recognised and respected ways of thinking within specific social communities. Language has a particularly important function as its semiotic capacity places it at the heart of social interaction and the development of ideas. The works of Vygotsky (1978) and Bakhtin (1981) suggest that individual meaning construction relies on a social process where an individual's thinking draws on resources that are made available through participation with 'more expert others'. This concept has been further adapted to look at the characteristics of the types of discourse through which development is advanced. Mercer (2004) has used Sociocultural Discourse Analysis (SDA) methods to map the characteristics of different talk types, and to consider the ways that participants use language structures to ensure that discourse builds a basis for shared common knowledge.

The challenge for technology appears to be around how to provide environments that are media-rich enough to allow discourse participants adequate levels of information by which to recognise and satisfy each other's learning needs. It has been argued that this process also utilises 'exploratory talk' that makes individual reasoning explicit through dialogic interaction structures (Mercer, 2000). This explicit reasoning is an important factor in building a framework for shared meaning as it allows participants in discourse insight into the perspectives of others. This perspective has some overlaps with feedback theory. The findings of a large-scale review of effective feedback highlights that the process of providing feedback to individuals involves both 'giving and receiving', with the provision of feedback being 'only a part of the equation' (Hattie & Timperley, 2007, p.103). As a result, a number of studies have suggested the need to build more opportunities for assessment dialogue within the feedback process (e.g. Orsmond & Merry, 2011; Dowden, Pittaway, Yost, & McCarthy, 2013).

There is a growing body of academic research that builds on the naturalistic traditions of the Chicago School of Sociology and which focuses on applied practices (Heath, Knoblauch, & Luff, 2000). Studies using naturalistic methods have provided insights into otherwise difficult to evidence tacit practices that emerge through social interaction processes. Heath & Hindmarsh (2002) report that such methods have allowed evidence to be gathered about the language-based routines, strategies, practices, and procedures that take place within and through social interaction, and the tools, objects, texts, technologies that these often rely on.

Swales (1990) has characterised the situation specific characteristics of the registers of language use as 'genres'. In terms of methods, Swales' work has provided a framework for genre analysis. This is possible because genres are conceptualised as having context-specific characteristics that are often evident in the particular linguistic and syntactic structures used by discourse participants. In the context of learning interactions, discourse analysis techniques can gather evidence of how co-occurrences of specific words appear to signal the existence of particular types of talk that function in certain ways.

This project is aiming to draw on techniques that have been used to explore effective developmental discourse in talk environments and to extend them to distributed and virtual feedback discourse situations. As such, the approach to data collection and analysis seeks to reflect the way that meaning making is unavoidably situated, both physically and temporally, and carried out through communication structures that have observable characteristics. One specific ambition is to use analytical methods to investigate whether exploratory talk is present in distributed and virtual feedback, since this is conceptualised as being a potential indicator of effective feedback.

Method

Overall, my exploration incorporates four phases involving Advanced level General Certificate of Education (GCE)[2] team leaders and examiners. The first pilot phase, which is now complete, used an SDA approach to attempt to isolate characteristics of a team leader virtual feedback genre with four examiners.

The pilot findings characterised some of the complexities of feedback interaction. Analyses were able to present general evidence about the 'what', 'who' and 'how' of feedback interactions, as well as generating deeper insights into the nuances of language and how it was used to structure meaning. There appears to be a significant influence of hierarchy and accountability on the shape of discourse patterning, with feedback discourse generally being initiated by the team leader. This discourse also has an asymmetrical balance, with the team leader generally taking a dominant role in the discussion. When the content of discourse is considered, there is a clear focus on issues of misalignment, with problematic issues being a motive for interaction. It is possible that these discourse features help to define an examiner feedback 'genre' (e.g. Swales, 1990; Vološinov, 1973), which is characterised by vertical, formal influences. When considered in the context of the high-stakes examination system in which the discourse takes place, such defining features are understandable. At the same time, the characterization of feedback performing an inductive function through a

---

2 GCE courses are widely recognised in England, Wales and Northern Ireland as being the standard entry qualification for assessing the suitability of applicants for academic courses in UK Universities.

vertical transmission of information is potentially over simplistic. Despite this characterisation of hierarchically structured feedback discourse there was also space for a lateral, dialogic dimension within feedback interactions. Some feedback discourse possessed symmetrical features, suggesting that it was facilitating joint meaning construction rather than purely transmitting a singular, dominant perspective. This mirrors a 'transfer on a level' process reported by McArdle & Ackland (2007).

The next project phase will scale up the investigation to gather in depth audio-visual observational data of three team leaders each giving feedback to examiners across different subject areas. These data will allow a stimulated recall interview to be conducted to consider the team leaders' feedback intentions, through facilitating processes of cognitive reflection. Evidence about the effectiveness of team leader feedback will be gathered through individual semi-structured interviews with recipient examiners. The examiners will be able to give evidence about the perceived impact of feedback interactions on their marking practice. Analysis of the qualitative stimulated recall and interview data will be carried out to facilitate the identification of key themes.

The third phase of the study will use an SDA approach, in conjunction with data gathered through literature review, to generate a taxonomy of feedback characteristics. The categorisation of feedback into characteristics will allow tests of effectiveness to be measured in the final study phase. This final phase of the study will apply the feedback taxonomy to a larger corpus of data that incorporates the feedback given by six team leaders to 36 examiners across three different subject areas. These data will then be analysed to explore whether there are any statistical relationships between feedback categories and marking outcomes through comparisons of examiners' pre- and post-feedback script marks with their team leader's marks for the same scripts.

Implications

This study presents a new approach to studying the learning function of feedback within a well-established, large scale assessment system. Adopting a discourse analytical approach to the problem enables a new framework for understanding examiner interactions to be conceptualised, with a potential for mapping the characteristics of a genre of examiner feedback. This new conceptualisation is potentially important as it then allows exploration of the influence of technological communication mode on the genre.

A study of the ways that team leaders and examiners co-construct meaning via virtual communication processes could have a number of wider implications. Identifying the ways that members of a distributed community construct shared meanings would allow guidelines for team leaders to be developed about effective strategies for supporting consistent judgement making across examiners. The

study could also inform team leader training so that effective feedback strategies could be promoted further.

This study could provide an important practical contribution to research in a problematic, yet crucial, area of applied practice. There are significant concerns that the process of research can itself influence the behaviours of examiners who are making high stakes judgements, which potentially affect the life chances of those being assessed. As a consequence, such crucial practices remain largely opaque. A study which could develop a viable methodology for capturing meaning making processes in such a dynamic and applied context would therefore provide a useful framework for on-going capacity building in an awarding body. Taken in their entirety, the study outcomes should lead to positive effects on examiner reliability.

References

Bakhtin, M. M. (1981): *The dialogic imagination: four essays*, (M. Holquist, Ed.) (Vol. no. 1), University of Texas Press, Austin.

Dowden, T., Pittaway, S., Yost, H., & McCarthy, R. (2013): 'Students' perceptions of written feedback in teacher education: ideally feedback is a continuing two-way communication that encourages progress', *Assessment & Evaluation in Higher Education*, vol. 38, no. 3, August 2010, pp. 349–362. doi:10.1080/02602938.2011.632676

Hattie, J., & Timperley, H. (2007): 'The Power of Feedback', *Review of Educational Research*, vol. 77, no. 1, March 2007, pp. 81–112. doi:10.3102/003465430298487

Heath, C., & Hindmarsh, J. (2002): 'Analysing interaction: Video, ethnography and situated conduct', in T. May (ed.): *Qualitative Research in Practice,* SAGE, London, 2002, pp. 99–121.

Heath, C., Knoblauch, H., & Luff, P. (2000): 'Technology and Social Interaction: The Emergence of "Workplace Studies"', *The British Journal of Sociology*, vol. 51, no. 2, June 2000, pp. 299–320. doi:10.1111/j.1468-4446.2000.00299.x

Lave, J., & Wenger, E. (1991): *Situated Learning: Legitimate Peripheral Participation*, Cambridge University Press, Cambridge.

McArdle, K., & Ackland, A. (2007): 'The demands of the double shift: communities of practice in continuing professional development', *Journal of Vocational Education and Training*, vol. 59, no. 1, February 2007, pp. 107–120. doi:10.1080/13636820601145739

Mercer, N. (2000): *Words and Minds: How We Use Language to Think Together and Get Things Done,* Routledge, London.

Mercer, N. (2004): 'Sociocultural discourse analysis: analysing classroom talk as a social mode of thinking', *Journal of Applied Linguistics*, vol. 1, no. 2, pp. 137–168. doi:10.1558/japl.v1i2.137

Nicol, D. (2009): 'Assessment for learner self-regulation: enhancing achievement in the first year using learning technologies', *Assessment & Evaluation in Higher Education*, vol. 34, no. 3, April 2009, pp. 335–352. doi:10.1080/02602930802255139

Orsmond, P., & Merry, S. (2011): 'Feedback alignment: effective and ineffective links between tutors' and students' understanding of coursework feedback', *Assessment & Evaluation in Higher Education*, vol. 36, no. 2, February 2010, pp. 125–136. doi:10.1080/02602930903201651

Swales, J. (1990): *Genre Analysis: English in Academic and Research Settings*, Cambridge University Press, Cambridge.

Vološinov, V. N. (1973): *Marxism and the Philosophy of Language,* Seminar Press Inc., New York, NY.

Vygotsky, L. S. (1978): *Mind in Society: The Development of Higher Psychological Processes,* Harvard University Press, Cambridge, Mass.

Wiliam, D. (1993): 'Validity, dependability and reliability in National Curriculum assessment', *Curriculum Journal*, vol. 4, no. 3, pp. 335–350. doi:10.1080/0958517930040303

Improve critical ability visiting museum

Teresa Macchia
University of Trento
teresa.macchia@unitn.it

Abstract. The introduction of new technologies and the increased adoption by museum visitors of social media tools to share their museum experience, are changing museums themselves. Meanwhile, curators are called to be flexible and to engage more and more demanding visitors. Considering the peculiarity of current museums, and following the educational and inclusive principles of *Europe 2020*, the research project described in this article proposes a way to actively engage the visitors during their museum visit.

Enhancing museum experience

Nowadays, museums are called to encourage the ability of their audience to interpret and share knowledge, to stimulate an active visit, to enhance visitors' skill to *endorse* their experience in the museum. Following this perspective, the question is how and whether curators influence and encourage an active and *critical* people's experience visiting an exhibition.
The *critical approach* considers a specific vision of education: knowledge is contextualized, it is the result of a process of *self-learning* (**?**), and prefers an active reflection and contextualized experience than a de-contextualized, abstract and indoor education. According to the critical approach, museum is *the place* for contextualization and *physical experience*. In museums, the visitors' active behavior is stimulated by many different inputs, recently including also smart devices, such as tablet PCs with mobile applications, touch boards or interactive desks, and other technologies, like kiosks, which provide further information about the exhibit (**?**).
There are several examples related to the new experience of interactive activities [1]

[1] A good interactive museum experience could be the one at the Eye Museum in Amsterdam

combining different instruments and actions to lead visitors to a new experience: with the introduction of interaction supporting tools, the museum space improves and expands, and the visitors' perception and feeling increase as well. Following this changes, we are called to understand how the introduction of technological tools can increase the dialogue between visitors each other and/or curators.

As this research project is in a very early stage and sketches the image of the *phenomenon of museums*, the theoretical starting point focuses on the concepts of dialogue and looks at the methods of Participatory Design (PD), with the aim to encourage talks and debate among visitors of the museum and with institutional actors too. With this project we emphasize the concept of *dialogue* combining the use of Participatory Design method, because, according with **?**, the *dialogue* includes many actions, like informing or discussing, and, in the context of participatory design, the same concept has a central meaning of integrate and combine competences.

Acting in the museum

A critical aspect in this research project is related to the number of actors orbiting the museum experience, which can be roughly divided into two main groups: those people who represent the institution, and those who take educational and personal advantage from the museum activities and exhibitions.
To understand who is part of the museum, first, we need to shape what a museum is. The *World Museum Community*[2] defines the museum as a permanent and non-profit institution with the social aim of promoting education and enjoyment. In addition we can find many different kinds of museums. For example, along the Cromwell Rd in London, there are three museums with different subjects: the Victoria & Albert Museum - a museum of art and design in London - the Natural History Museum, and the London Science Museum. Any museum has different needs and engage visitors through different ways and techniques: for example, the initiative of Portal to the Public, promoted by the Pacific Science Centre, in Seattle (US), had the aim to engage both visitors and researchers, translating current scientific and specific researches for the non-professional audience of the museum (**?**).

Talking about visitors A multitude of different people visits museums, and it is far to be easy to understand who they are. People can be classified according to their age, or to the number of exhibitions visited during a year. Again, they could be grouped by the kind of museum visited, or by their nationality. And, what about families or classes of students?
As it rapidly comes out in a few lines, there is a wide variety of people who visit museums, and every museum has its audience, which can be stimulated and engaged by the activity proposed by the museum.

[2] Further information about this network can be found in *www.icom.museum*

Institutional actors As far as we can observe and group the audience, we can consider (we have to consider) the institutional actors who run the activities of museum: in the "Portal to the Public" project mentioned above, researchers were trained by educators, who orchestrate the museum with the support of guides, guardians, and curators too. Every actor has specific tasks. For example, curators plan the exhibitions knowing what they want to tell to their audience.
As the general picture of museum changed during the recent years, also the role of curators is changing; curators are becoming more independent and unstructured then before (**?**). As a consequence and as a cause of this change, the introduction of new technologies modified the way curators design the exhibition: using multimedia tools, curators can enrich visitor's learning experience during and after their visit.

A path to enhance visitors experience

As far as the introduction of new technologies changed visitors' museum experience and modified the role of curators, who design the exhibition, the challenge is to use new form of technologies to increase the critical ability and the active behavior of visitors. Behind this challenge there are the aforementioned actors, even though the role of curator is crucial in encouraging and increasing the critical ability of visitors. To investigate the curator practices, an ethnographic observation is proposed to understand and experience the field, and *how*, *when*, *what* of designing a new exhibition. This observation can be as long as the period a curator needs to design a temporary exhibition. Then, to go deeply in designing an exhibition, through the use of PD, we propose to deconstruct and re-construct the exhibition to indicate different perspectives about the same exhibition.

From deconstruction to reconstruction The aim of the second step of this research project is to disassemble the curator's exhibition, in order to underline and discover new possible paths to follow, creating additional purposes. With the participation of the actors engaged in this project and of those who are active in designing the exhibition, the participatory design process includes and integrates different disciplines and points of view.
Usually, curators design a specific path for an exhibition, even though many of the pieces exposed, hold hidden meanings. Following the hidden meanings, the idea of the project is to encourage visitors to create their own path, to be active and creative in understanding the exhibition. Curators, suggesting and elaborating new connections between the objects of the exhibition, have the role to drive the visitor in a reasoned tour of what to follow in the exhibition.

A mobile *app* to orient the visit

During the *re-construction* the curator is called to point out the main features of the exposed objects in order to develop a semantic and conceptual network of the object

exposed. The *semantic* network re-proposes the exhibition following different concepts, in order to encourage a critical visits. Using a mobile application developed *ad hoc* for the semantic network, visitors can explore new connection among the objects activating a personal exhibition tour based on their intuitions.

Enhancing the intuitions The application proposes a proximity-social-experience between those people who are in the museum and are having similar experience. In addition, to stimulate a critical observation, the mobile app encourages a dialogue between curators and other institutional actors involved in the exhibition.
With the simultaneous dialogue between actors, this application emphasizes the *present*, the *space*, the *environment* and the *architecture*, to connect to the theoretical approach of situated knowledge, introduced in the beginning.

Beyond the app

Spurring visitors to follow their own paths, this project can describe where the designer of the exhibition is and how the designer's competences and skills work and influence the perception of exhibition. In addition, this research underline the relation between dialogue, interactive activities and interaction between objects, people and smart devices.
Finally, this research extends the debate about museum phenomenon integrating two different research flows, the use of new technologies inside the museum, and how PD can be part of museum by integrating new dialogue and technological tools.

References

Angus, J. (2012): 'Innovations in Practice'. *Journal of Museum Education*, no. 2.

Krippendorff, K. (2006): 'Maeaning, Participation, and Dialogue'. In: *Participatory Design Conference*.

Proctor, N. (2010): 'Digital: Museum as Platform, Curator as Champion, in the Age of Social Media'. *Curator: The Museum Journal*, vol. 53, no. 1.

Selvakumar, M. and M. Storksdieck (2013): 'Portal to the Public: Museum Educators Collaborating with Scientists to Engage Museum Visitors with Current Science'. *Curator: The Museum Journal*, vol. 56, no. 1.

Willmot, H. (1997): 'Critical Management Learning'. In: J. Burgoyne and M. Reynolds (eds.): *Management Learning: Integrating Perspective in Theory and Practice*. London: Sage.

The Role and Work Practices of the Core Senior IT Developers in Global Software Development

Stina Matthiesen
The IT University of Copenhagen, Denmark
matthiesen@itu.dk

Abstract. This paper presents the early stages of my doctoral research in the NexGSD research project on next generation technologies and processes for global software development (GSD). With an outset in a preliminary study of three key themes of interest to CSCW: coordination, knowledge management, and awareness are discussed when moving towards presenting the research questions. Finally, a short comment on method and level of advancement is offered followed by the expected contributions.

Introduction

The employment of virtual teams engaging in global software development (GSD) has become increasingly common, as it is possible for companies, with concerns for costs, to augment the pool of skilled labor (Herbsleb, 2007), or to assemble experts inter-organizationally or from around the globe in enhancing product development (Malhotra, Majchrzak et al., 2001). GSD is characterized by collaboration between IT developers with different national and organizational cultures located in different geographic locations and across time zones using various traditional and IT-enabled means to collaborate (Hossain, Bannerman et al., 2011, p. 88). However, pointed out by Avram, Bannon et al. (2009) GSD is not to be understood as the opposite of local software development but rather software development with additional complexities in handling the extra effort of

articulation work, which must be present to reach the global objective. Companies determined to reap the benefits of GSD, meet challenges of working remotely across e.g. temporal, spatial, and cultural difference, which impact the work practiced at the different local company sites. Key themes and issues of interest to the CSCW community such as *coordination* (e.g. Gerson, 2008), *knowledge management* (e.g. Boden, Avram et al., 2009) and *awareness* (e.g. Herbsleb, Mockus et al., 2000) are crucial enablers for GSD, however very difficult to achieve in practice.

In a preliminary study by Matthiesen, Bjørn et al. (in progress) on work practices in an outsourcing GSD setup between a Danish IT company (the client) and an Indian IT vendor, the concrete work of the IT developers from the client side vastly changed when moving from co-located IT development to IT development in an inter-organizational geographically distributed collaboration. Core senior IT developers with solid domain knowledge and many years of experience, now had to hand over many of their actual coding tasks and instead spend more time on structuring code, communicating and coordinating development tasks with remote colleagues. However, these additional activities of articulation work were not grasped as "real" work by the client IT developers, which created tension toward the global collaboration and influenced the remote colleagues' work. The majority of client IT developers had no relationship with their remote colleagues, leaving the work conducted in the global setup and the progress of tasks being solved in India opaque for those not closely engaged with the work of the GSD setup.

Research Questions

The preliminary study showed that the qualifications of the client IT developers were to be changed remarkably, as an expatriated employee in India articulated; in concern of the client IT developers' future employment, they should "*figure out how to code with the hands of others*". Using this claim as an outset for my research, I wish to unveil what it implies in more detail - in concrete work practices of an IT developer. Furthermore, three themes were revealed in the study; coordination, knowledge management, and awareness, which impacted the local work of the client IT developers. I will attend to each in turn and present my research questions.

Seamlessly integrated in a collaboration practice is both work and articulation work (Schmidt and Bannon, 1992), and what counts as work or articulation work depends on the professional identity of the employee. The work of the client IT developers was regarded to include system architecture and programming, based on their highly complex technical knowledge. Articulation work was understood as all the extra work that concerned formal processes and development methods, and to some extent perceived as constraining the actual work to be accomplished. While **coordination** may be used as a strategy to handle the extra effort of

articulation work (Gerson, 2008) and the complexities it entails in GSD (Avram, Bannon et al., 2009), I wonder; *How can the coordination of work be better realized in concrete work practices of IT developers engaged in outsourcing GSD setups in such way that these practices are accepted as part of an IT developers qualification?*

The distribution of domain and task experts challenged the **management and exchange of knowledge** (Gumienny, Gericke et al., 2013). Knowledge mainly resided at the client site, and usually exchanged in face-to-face encounters of office visits, coffee breaks, and meetings. Along with the engagement in GSD, a rise in e.g. instant messaging inquiries from the remote colleagues emerged, which to some of the IT developers were experienced as highly interruptive. Though instant messaging has been found useful for supporting knowledge work in GSD, the human factors are critical for success (Avram, 2007) and sophisticated technologies for communication are only as helpful as the people's willingness to cooperate with a remote group (Metiu, 2006). I therefore wonder if the new required skills for an IT developer in GSD entail an understanding of the evident need of knowledge exchange in global collaboration, and thus put communication with remote colleagues on e.g. instant messaging on par with colleagues visiting one's office. I then wonder; *How do we grow the qualifications of IT developers in skills and willingness to excel in collaboration and exchange of knowledge in outsourcing GSD setups, while being attentive to the developers' identity and status?*

Finally, due to the spatial arrangements and the relatively little context shared across sites (Herbsleb, 2007) a lack of **awareness** of the remote colleagues work, hampered the client IT developers' level of commitment and incentive to engage in the global collaborative work. The opacity in the global work and environment fostered suspicions towards the task progression and deliverables of the remote colleagues (Metiu, 2006), and therefore the creation of translucence, enhancing the visibility of the work for others to monitor to create accountability and provide better support, became essential (Bjørn and Ngwenyama, 2009). Additionally, the awareness practices of software developers rely further on the proper identification of whom exactly to raise awareness for as well as whose actions to monitor (Souza and Redmiles, 2007). In the effort of raising awareness in a GSD setup, I seek to identify and test small adjustments of the IT developers' displaying and monitoring of work, wondering; *How can we raise proper awareness and create translucence in the IT developers' concrete work practices to support a closely coupled collaboration in GSD?*

Method

Focusing on the collaborative work practices I will conduct work place studies (Luff, Hindmarsh et al., 2000) and apply ethnographical approaches (Randall,

Harper et al., 2010) when following one or more GSD projects from multiple locations (Prikladnicki, Boden et al., 2013). Various ethnographic data gathering techniques will be applied e.g. observations of different global collaborative work activities, interviews with project participants from operational level to management, and analysis of various company document and artifacts. Moreover, the study will seek to produce practical knowledge that responds to the organization's local and practical concerns, by applying action research approaches that invite the practitioners into the research process (Bjørn and Boulus, 2011).

Level of Advancement

Being in the early stages of my doctoral research, I have, however, already collected preliminary ethnographic fieldwork data on collaborative work in GSD at multiple locations, which generated ideas for my further research and a co-authored paper submitted for the next CSCW conference. Additionally, within the next year I am conducting more fieldwork, in Denmark, India, and Poland. With a background in software development I am able to study work practices within software development from various angles when seeking to understand the complexities in cooperative work that CSCW aim to address. I strongly believe that I already have interesting material for discussion within the CSCW community.

The results already achieved in the preliminary study point toward several interesting themes for further exploration, briefly touching upon a few here. Firstly, the many changes that emerge along with the global work engagement, overlooked by the client organization, pose critical issues and tensions in the collaboration. At the client organization the core IT developers experienced an increase in "extra work". That is the preparation and creation of system documentation, and the increased computer mediated communication with remote colleagues, which requires different types of competences than expertise in programming. Secondly, the data showed that the nature of the development tasks being outsourced was decided by process of elimination based on e.g. what development tasks were found least critical for the business. In our data the development of the graphical user interface was the type of development tasks outsourced, which may also be interesting in the light of participatory design and usability, as the end-users in most cases will be Danish. Finally, the conducts of cross-cultural ethnographic field studies as well as the presentation of the results deserve methodological and ethical considerations to be further discussed.

Expected Contributions

While methods for assuring the quality of software engineering processes and end product have tended to steal the focus, the actual concrete practices have attracted less attention. Echoing the call for "*empirical studies of software development teams using extensive field study methods*" (Avram, Bannon et al., 2009, p. 480), this research project will contribute to the body of knowledge on work practices within global software development in CSCW. The expected contributions will be an identification of the current challenges for achieving support and commitment by core expert IT developers when engaged in outsourcing GSD setups. Moreover, I expect to expand and inform previous findings within GSD on themes of awareness, coordination, and knowledge management. Based on the empirical studies, using various field study methods and the evaluations of the activities continuously tested in the field, concrete work practices and skills will be pointed out seeking answers to "*how to code with the hands of others*". Finally, these answers may suggest a redefinition of the role, qualification, and work practices of the core senior IT developers engaged in outsourcing global software development setups.

References

Avram, G. (2007). 'Knowledge Work Practices in Global Software Development'. *The Electronic Journal of Knowledge Management* vol. 5, no. 4, pp. 347-356.

Avram, G., L. Bannon, J. Bowers, A. Sheehan and D. Sullivan (2009). 'Bridging, Patching and Keeping the Work Flowing: Defect Resolution in Distributed Software Development'. *Computer Supported Cooperative Work (CSCW)* vol. 18, no. 5-6, 2009/12/01, pp. 477-507.

Bjørn, P. and N. Boulus (2011). 'Dissenting in reflective conversations: Critical components of doing action research'. *Action Research* vol. 9, no. 3, September 1, 2011, pp. 282-302.

Bjørn, P. and O. Ngwenyama (2009). 'Virtual team collaboration: building shared meaning, resolving breakdowns and creating translucence'. *Information Systems Journal* vol. 19, no. 3, pp. 227-253.

Boden, A., G. Avram, L. Bannon and V. Wulf (2009). 'Knowledge Management in Distributed Software Development Teams - Does Culture Matter?'. *Proceedings of the 2009 Fourth IEEE International Conference on Global Software Engineering*IEEE Computer Society, pp. 18-27.

Gerson, E. M. (2008). Reach, Bracket, and the Limits of Rationalized Coordination: Some Challenges for CSCW. Resources, Co-Evolution and Artifacts, Springer London**:** 193-220.

Gumienny, R., L. Gericke, M. Wenzel and C. Meinel (2013). 'Supporting creative collaboration in globally distributed companies'. *Proceedings of the 2013 conference on Computer supported cooperative work*, San Antonio, Texas, USA, ACM, pp. 995-1007.

Herbsleb, J. D. (2007). Global Software Engineering: The Future of Socio-technical Coordination. 2007 Future of Software Engineering, IEEE Computer Society**:** 188-198.

Herbsleb, J. D., A. Mockus, T. A. Finholt and R. E. Grinter (2000). 'Distance, dependencies, and delay in a global collaboration'. *Proceedings of the 2000 ACM conference on Computer supported cooperative work*, Philadelphia, Pennsylvania, USA, ACM, pp. 319-328.

Hossain, E., P. L. Bannerman and D. R. Jeffery (2011). 'Scrum practices in global software development: a research framework'. *Proceedings of the 12th international conference on Product-focused software process improvement*, Torre Canne, Italy, Springer-Verlag, pp. 88-102.

Luff, P., J. Hindmarsh and C. Heath (2000). *Workplace Studies: Recovering Work Practice and Informing System Design*. Cambridge University Press, Place,

Malhotra, A., A. Majchrzak, R. Carman and V. Lott (2001). 'Radical innovation without collocation: a case study at Boeing-Rocketdyne'. *MIS Q*. vol. 25, no. 2, pp. 229-249.

Metiu, A. (2006). '"Owning the Code: Status Closure in Distributed Groups"'. *Organization Science* vol. 17, no. 4, May, pp. 418–435.

Prikladnicki, R., A. Boden, G. Avram, C. B. Souza and V. Wulf (2013). 'Data collection in global software engineering research: learning from past experience'. *Empirical Software Engineering*, 2013/01/16, pp. 1-35.

Randall, D., R. Harper and M. Rouncefield (2010). *Fieldwork for Design: Theory and Practice*. Springer, Place,

Schmidt, K. and L. Bannon (1992). 'Taking CSCW seriously'. *Computer Supported Cooperative Work (CSCW)* vol. 1, no. 1-2, 1992/03/01, pp. 7-40.

Souza, C. B. and D. Redmiles (2007). The Awareness Network: To Whom Should I Display My Actions? And, Whose Actions Should I Monitor? ECSCW 2007. L. Bannon, I. Wagner, C. Gutwin, R. R. Harper and K. Schmidt, Springer London**:** 99-117.

Research overview: Citizens doing automated tax

Guri Verne
Department of Informatics
University of Oslo
guribv@ifi.uio.no

Abstract. My PhD research takes as a starting point the governmental ambitions of an information society for all. What will be the implications for the design of a public service for absolutely all citizens if we take this ambition literally? As an example of a public service I have chosen to study tax. By co-listening at the call center I have listened to the questions from the citizens, who are seen as non-users of the online services. I have studied how the agency respond to and record the questions, as well as how the tax advisors support the autonomy of the citizens. One result is that many issues that are reported by the callers are silenced in the records.

Introduction and research questions

My PhD research takes as a starting point the governmental ambitions of an information society for all. Public agencies are expected to provide electronic information and services to all citizens, and these should be developed so that they are accessible and useful for everyone (FAD 2007). What will be the implications for the design of a public service for absolutely all citizens if we take this ambition literally?

As an example of a public service I have chosen to study tax. All citizens have a relationship to the tax agency[1]. Doing tax is understood as a collaborative effort between the tax agency and the citizens, mediated by web sites and computer calculations. Knowing your tax is a democratic issue, both on a societal level and on a personal level. Our democracy is based on responsible choices made by citizens with competence and interest in the development of the society. On a personal level tax is related to citizen autonomy. Everybody has a right to understand the basis for their tax payments - at least so that they can argue and complain if they think something is wrong.

[1] All citizens who have an income, have a fortune or are married to someone who has, in practice most citizens over the age of 17, have a relationship with the tax agency.

Tax in Norway is now fully automated, along with the civic obligation to submit the tax return form. Once a year the citizens are required to submit the tax return form and this can be done by default by doing nothing. The tax agency encourages the citizens to use the online self services to handle their tax when necessary: to check, correct and submit the tax return form or order a tax card.

These changes have changed the relationship between the tax agency and the citizens. The citizens get little practice in doing tax as a background for handling any issues that may arise. My initial research question was to design better support for various kinds of citizen autonomy in light of the automated tax services – so that citizens can practice and know their tax issues even when tax is completely automated.

> $RQ_{initial}$: to design better support for citizen autonomy based on automated tax

As a basis for design I needed to learn more about how "doing tax" was experienced by the citizens. So the first research question was to gain insight into what citizens find difficult about "doing tax":

> RQ_1: What makes doing tax difficult for the citizens?

To get an understanding of how tax is difficult for the citizens I have co-listened to the telephone calls to the tax agency call centre. Co-listening introduced me to a fascinating world of telephone calls, tax advisors, talking citizens, tax issues, tax rules and regulations, online services and large agency databases. I also studied the work practices of the advisors that answer the telephones from the citizens in order to understand how they helped the citizens and supported their autonomy in various ways.

> RQ_2: How does the tax agency support the citizens' autonomy, understood as their space for action?

Many of the callers reported problems with using the online electronic services, problems that were not recorded in the question log, and a further research question is:

> RQ_3: What can we learn from the phone calls about the use or non-use of online tax services?

I position my research within the critical research paradigm (Myers and Klein 2011). My perspective is close to the citizen and the work practices of the advisor, and my aim is to understand some aspects of how automated tax functions for the

citizens with the purpose of supporting citizen's autonomy in tax affairs. Critical research aims to critique status quo and uncover taken-for-granted assumptions "through the exposure of what are believed to be deep-seated, structural contradictions within social systems" ((Orlikowski and Baroudi 1991), cited in (Myers and Klein 2011)). Critical research is based on the belief that humans can change their life conditions, and aim to transform "alienating and restrictive social conditions" to the better (ibid, p19). My analyses aim to uncover how automated tax becomes difficult for some citizens and to function as a basis for design of better services for supporting autonomy for all citizens.

I have collected and analysed data from co-listening, observation, interviews and document studies. My work is ethnography-like in that I have been present in the ongoing work practices of the tax advisers and co-listened to the conversations of the calls as they unfold naturally. I have listened to 474 phone calls and interviewed 14 people working with answering the phone, tax websites or tax IT. In addition I have interviewed one person from a tax NGO. I have also done document studies of annual reports and steering documents.

Due to privacy reasons I have not been able to record the conversations. I have taken notes with pen and paper and have had to simplify the conversations on-the-fly, both being open to the conversation but also looking for something based on analytic concepts. I have been working both top-down and bottom-up in the analysis of the data. I will describe more of my work in the next section.

My research is part of the "Automation and Autonomy project" at the UiO where an overarching ambition is to study how automated public services of various kinds influence human autonomy, and how better service and technology design can improve it.

Level of advancement

I started the PhD work in January 2010 working part time the first two years. My financing ends in the spring of 2014. The timing of ecscw 2013 is therefore perfect for my work with the thesis as the wholeness of my work is starting to take shape. My PhD thesis will be a collection of papers and a summary. At the moment I have two papers in print for the Scandinavian Journal of Information Systems (Bratteteig & Verne 2012a, 2012b) and three papers in various stages of development. One of these will be presented in August at IRIS 36 (Verne 2013b) and one will be revised and resubmitted also in August (Verne 2013c). Starting this fall I plan to work with the summary, where I will need to make the papers fit together as a whole.

At the time of the ECSCW doctoral colloquium I will have one paper to be developed (Verne 2013d) and the summary left to write. Figure 1 gives the timeline of my PhD work.

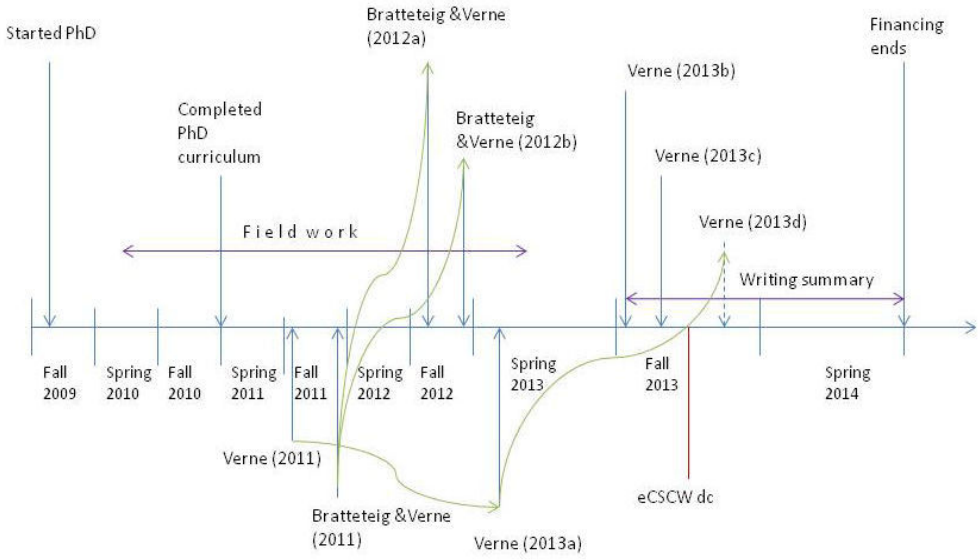


Figure 1. The timeline shows the progress of my PhD work. Papers that will be part of the thesis are above the line, and rejected papers, or papers to be developed, are below. The curved green line between two papers indicates that material and ideas from the rejected or unfinished paper is developed into a new paper. The dotted line represents the last, unfinished paper of the paper collection.

When I started co-listening my attention was fast brought to how the phone calls were represented in the internal log records. I was told that the advisors logged what the question was about, but my impression was that the categorization missed a lot. In the first paper I wrote I used theory of classification (Bowker and Star 1999) for analyzing the recording of the calls and how this log record was used in the TICC and the wider Tax Agency (Verne 2011). I have developed this paper and presented it at the Scandinavian Workshop on eGovernment in February 2013 (Verne 2013a) and plan to develop it further as a cscw paper (Verne 2013d). By analyzing the categories for representing the calls and how they are used I aim to show that the tax agency has an introvert attitude and silences aspects of the citizens' reports of problems they have. I suggest to discern two kinds of silencing. When a call can fit into more than one category of the log records, and the advisor has to choose one, I suggest the notion of "priority silencing". When there is no category to represent important aspects of the call I suggest the notion "ontological silencing". If the tax agency changed their categories for recording calls they could capture more of the citizens' concerns and adapt their information and online services correspondingly. I will focus the discussion in the doctoral colloquium on this paper and the summary.

By seeing the callers as non-users of the online services I argue that the advisors provide different kinds of autonomy support for the citizens (Verne 2013c). In the two papers with my supervisor we use theory of sociomateriality

and see tax as a sociomaterial entanglement. We suggest a notion of "disentangling" to explain how the tax advisors help the callers. The tax advisor disentangles the question to make a space for action where the caller can take steps to solve the issue within the sociomaterial entanglement (Bratteteig and Verne 2012a). In Bratteteig and Verne (2012b) we elaborate on and discuss our view on disentangling, entanglements and imbrications.

In August I will present a paper at IRIS 36 where I analyse the questions to the TICC according to the three levels of communication used by Star and Ruhleder (1996). I argue that because of cross-level difficulties and double-binds for the citizen the online self-services might be unsatisfactory for some citizens and challenge their autonomy unless they are helped by a human advisor (Verne 2013).

Starting this fall I will write the summary of the papers. CSCW was the starting point for my PhD work, and in the process I have meandered through other fields like sociomaterial theory, eGovernment and feminist theory as well. I also want CSCW to close the thesis.

Expected contributions

My research aims at both practical and theoretical contributions:

- A description of work practice, with an explanation of why it is different from what the plans and strategies presuppose. This can be a basis for a better design of the online services.
- A theoretical discussion of sociomateriality as an analytical framework and the notion of "disentangling" for creating a space for action within the entanglement.
- A discussion of different kinds of autonomy for the citizens doing automated tax.
- Methodological contribution of co-listening to phone calls to understand the issues of the non-users of an online service.
- A theoretical discussion of silencing and the suggestion of two kinds of silencing: priority silencing and ontological silencing

References

Bowker, G. C. and S. L. Star (1999). Sorting Things Out: Classification and Its Consequences. Cambridge, Massachussets, Massachussets Institute of Technology.

Bratteteig, T. and G. Verne (2011). OPENING THE MANGLE: ON THE SOCIOMATERIALITY OF DIGITAL TECHNOLOGY. Unpublished paper.

Bratteteig, T. and G. Verne (2012a). "Conditions for Autonomy in the Information Society: Disentangling as a public service." Scandinavian Journal of Information Systems **24**(2).

Bratteteig, T. and G. Verne (2012b). "Creating a space for action within sociomaterial entanglements." Scandianavian Journal of Information Systems **2**.

FAD (2007). Eit informasjonssamfunn for alle (An Information Society for All, in Norwegian). M. o. G. A. a. Reform. Oslo. **2006-2007**.

Myers, M. D. and H. K. Klein (2011). "A set of principles for conducting critical research in information systems." MISQ **35**(1): 17-36.

Orlikowski, W. J. and J. J. Baroudi (1991). " Studying Information Technology in Organizations: Research Approaches and Assumptions." Information Systems Research **2**: 1-28.

Star, S. L. and K. Ruhleder (1996). "Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces." Information Systems Research **7**(1): 111-134.

Verne, G. (2011). Between the Citizens and the Web Pages is the Classification. IRIS 34, Turku, Finland, TUCS Lecture Notes.

Verne, G. (2013b). Phone or Web? Conditions for self-service and autonomy when doing tax. IRIS 2013, August, . Sanner Hotell.

Verne, G. (2013c). Two faces of autonomy. Learning from non-users of an e-service. . Paper submitted to the journal 'Systems, Signs and Actions'.

Verne, G. (2013a). What's in a category? Telephone log as a record of citizens' questions. Scandinavian Workshop on eGovernment, Feb 5.-6., Oslo.

Part V

Keynote Abstracts

Timeframe, scopeframe . . . dataframe & theory framed – the news that longitudinal multisite studies might hold for CsCw

Sampsa Hyysalo
Aalto School of Arts, Design and Architecture, Helsinki, Finland
sampsa.hyysalo@aalto.fi

Abstract. The appropriate ways to engage with new technology depend on our understanding of technological change and its implications for work and organization. Unfortunately, the commonest ideas of how development and utilization of new technology relate have three key shortcomings. (1) Skipping over the typically drawn-out circulation of people, ideas, and technical efforts that goes into factually achieving a match between design and desire. As a part of this, (2) masking the often dramatic changes taking place in developer organizations in the course of development work. (3) Failing to address how new technology enters practices laden with existing instrumentation, routines, and visions of the future, and misrepresent what is involved in attempts to change the technical mediation in such relatively durable social formations. Sociotechnical approaches hold promise to remedy these, yet their yield may remain compromised insofar as they are deployed in compartmentalized fashion and resort to a mode of "patch-up theory building". This concern arose in the course of now 15 year long research avenue currently called "biographies of artifacts and practices approach". This approach means research set-ups that span both development and uses of the same technology and studies them on multiple sites and scales of analysis, from minute interactions to decades of development. In conducting research within this approach it occurred, time and again, that temporal and spatial framing of a given substudy offered results that closely matched those that other studies with similar spatio-temporal framing had produced. These happy results, were, however, in all cases questioned as soon as the research engagement was kept going through time, there was change in the study site, or the granularity of our research efforts was expanded or narrowed. In short, these studies suggested that spatio-temporal framing, a seemingly innocent and practical research matter, had profound consequences for the kind and type of findings that emerge and for the implications they held. In studies related to technology, work and organization, the spatio-temporal framing effect may be even stronger the often

rehearsed issues of methodology and theory choice issues.

I will lay out this argument by walking through some our the research journeys in new Health ICTs (Hyysalo, 2010), in Social Media (Johnson & Hyysalo, 2012) and in Enterprise systems (Johnson et al, forthcoming; Pollock & Hyysalo, forthcoming). I then outline the guideposts for conducting sociotechnical analysis that the biographies approach suggest. In doing so, I outline some of the novel findings that emerge from our studies. These findings throw new light to questions of agency, learning and designer-user relations in socio-technical change; how these evolve and change shape in the course of the drawn out circulation between developers and users. Both sets of findings question theorizing based on spatially and temporally limited "snap-shot" studies as the only or even core mode of theorizing about sociotechnical systems. Some alternatives and balancing ideas are suggested.

Bio

Sampsa Hyysalo is Associate professor in co-design at the Aalto School of Arts, Design and Architecture and a Senior Researcher at the Aalto University School of Economics, Helsinki Finland. Sampsa's research and teaching focus on user involvement in innovation and the co-evolution of technologies, practices and organizations. He received his Ph.d in Behavioral Sciences in the University of Helsinki and holds a Docentship in information systems, specialising in user-centered design. In INUSE he is in charge of and works in all subprojects. His most recent books are "Health Technology development and use: From practice-bound imagination to evolving impacts" (Routledge, 2010, New York) and Käyttäjä tuotekehityksessä– Tieto, tutkimus, menetelmät. (Taideteollinen korkeakoulu, 2009, Helsinki). (User in product development–Knowledge, research, methods). Sampsa was awarded Academy of Finland 2010 price for Social Impact of Research.

References

Hyysalo, S. (2010): *Health Technology Development and Use: From Practice Bound Imagination to Evolving Impacts*. London: Routledge.

Johnson, M. and S. Hyysalo (2012): 'Lessons for participatory designers of social media: long-term user involvement strategies in industry'. In: *Proceedings of the 12th Participatory Design Conference*. New York, pp. 71–80, ACM Press.

Johnson, M., H. Mozaffar, G. Campagnolo, S. Hyysalo, N. Pollock, and R. Williams (forthcoming): 'The managed prosumer: Evolving knowledge strategies in the design of information infrastructures'. *Information, Communication and Society*.

Pollock, N. and S. Hyysalo (forthcoming): 'The Business of Being a User: The Role of the Reference Actor in Shaping Packaged Enterprise System Acquisition and Development'. *MIS Quarterly*.

Envisioning the collaborative work of the future: spaces, tools, experiences

From user observation to design strategies

Marco Susani
Koz Susani Design, Chicago IL, USA
marco@susani.com

Abstract. The work environment seems to have lost its ability to innovate. Most of the innovation introduced in work practices in the last 10 years were actually developed, launched and tested in the consumer environment. Mobile devices, operating systems, and interaction paradigms were born in the consumer space and only later have 'invaded' the work place. New social practices like grassroot collaboration and social networking also developed in the 'everyday life' and are now pervading the work environment.

The work environment, the tools used, even the architectural space of the office, didn't change as much as it was expected, in spite of the large amount of ethnographic analysis, and of qualitative and quantitative research that revealed major transformations in the work practices.

It may be worth questioning why the 'circle of seduction', the virtuous cycle that links new desires with new solution to fulfill them, has worked so well in the consumer space and struggles to show results in the work market.

An answer can come from understanding better some of the most effective models of innovation, and recognizing the importance of developing future visions and scenarios to anticipate solutions, prototype them, and test them.

I will present examples of potential opportunities of innovation related to the collaborative work-place, in three different domains: 1. The space of collaboration, a hybrid physical/digital space that catalyses collaboration; 2. Tools for collaboration, a multiplicity of interactions to manage both artifacts and relationships; 3. Experiences, high level ecosystems to support the 'collaborative organism' in all its aspects, from memory to knowledge sharing to future planning.

Bio

Marco Susani is a design consultant based in Chicago. He is co-founder and partner of Koz Susani Design, where he is responsible of the disciplines of Experience Design, Interaction Design and Strategic Design. Among his recent projects are a concept for the office space of the future, an Experience Vision for Allstate, second largest insurance company in USA, the Experience Design of NextTV, and a 'cloud-TV' tablet app with MIT MediaLab in USA. His main interest is in combining high technology with emotional design, aesthetic sensibility with strategic thinking, and to use his design vision to drive toward a more human future. He designed for companies like Motorola, Philips, Panasonic, Seiko, Olivetti, 3M, NTT Japan, Zumtobel, Nissan, Mitsubishi, Tokyo Gas, Toshiba, Apple, Logitech, Nestle', Unilever, Telecom Italia, Mediaset, bTicino, Fontana Arte. Prior to Koz Susani Design he has been VicePresident of Experience Design and Director of Advanced Concepts in Motorola, he pioneered Interaction Design research at DARC studio (Domus Academy Research Center), head of Industrial Design at Sottsass Associati, and designer at Olivetti. He established the Interaction Design course at Domus Academy in Milan, has been on the advisory board of Domus Academy, of the Interaction Design Institute in Ivrea, Italy, and of the New School of Design in San Diego, has been Visiting Professor and External Examiner at the Royal College of Art in London, and Professor of New Media at the University of Siena's Department of Communication Science. He co-authored the books "Auras of Knowledge" (Liguori Edizioni), "Interface Design" (Domus Academy Edizioni), "Seamless Media" (NTT Japan), "The Solid Side" (Philips Design), "Service Design" (Koeln University), "Presence, New Media for Older People" (Netherlands Design Institute), and wrote articles for the magazines Domus, Interni, ICC Japan, Axis Japan, and FP Japan. He gave keynote speeches, lectures and seminars at "COOP 2012" (Marseille), "Alldesign" (Istanbul), "Doors of Perception" (Amsterdam), "Ars Electronica" (Linz), "Mobile HCI" (Salzburg), "Scope" (Wien), Les Atelier (Paris), Institute of Contemporary Arts (London), RMIT Melbourne (Australia), Hochschule der Kunst (Berlin), RCA (London), "Designing Futures" (Australia), MIT MediaLab (Cambridge), AIGA (Boston), and Center for Creative Studies (Detroit).

Author Index