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*João Barroso, Luís Fonseca, Bernardo Marques, Paulo Dias, Beatriz Sousa Santos(2020): Remote Collaboration using Mixed Reality: Exploring a shared model approach through different interaction methods. In: Proceedings of the 18th European Conference on Computer-Supported Cooperative Work: The International Venue on Practice-centred Computing on the Design of Cooperation Technologies - Exploratory Papers, Reports of the European Society for Socially Embedded Technologies (ISSN 2510-2591), DOI:10.18420/ecscw2020\_p01*

# Remote Collaboration using Mixed Reality: Exploring a shared model approach through different interaction methods

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**Abstract.** In many situations, performing maintenance procedures can be facilitated by providing on-site professionals with the possibility to request assistance from remote experts, thus performing the task collaboratively. Since remote experts don't have access to the local environment, they need additional mechanisms to provide instructions and guidance in such context. In this ongoing work, we present a Mixed Reality (MR) platform that explores the use of a shared model approach for collaboration scenarios. The platform uses predefined 3D models, which can be accessed by remote experts using Virtual Reality (VR) and by on-site users through Augmented Reality (AR). In addition, the remote expert can manipulate virtual models using different interaction methods and devices, as a mouse and a keyboard (computer), an interactive projector (touch) and controllers (Head Mounted Display). Our goal was to enrich his experience and improve collaborative awareness. We conducted a preliminary user study to evaluate collaboration, and different interaction methods, using as case study the assembly of Lego blocks.

# Introduction

In remote collaboration systems, users are in different physical locations. Mixed Reality (MR) systems can be applied to industry in order to help maintenance and training functions and guide on assembly tasks. In this scenario, the local user, has access to real physical objects and needs instructions from the remote expert (typically a qualified technician) to complete the task successfully. (Kim et al., 2018; Ens et al., 2019). Literature reports some examples of solutions for this kind of situation. In (Masoni et al., 2017), the authors describe a system where remote experts create annotations (text and sketch) in an image sent by the local user. Then, instructions are sent and shown through AR to the local user.

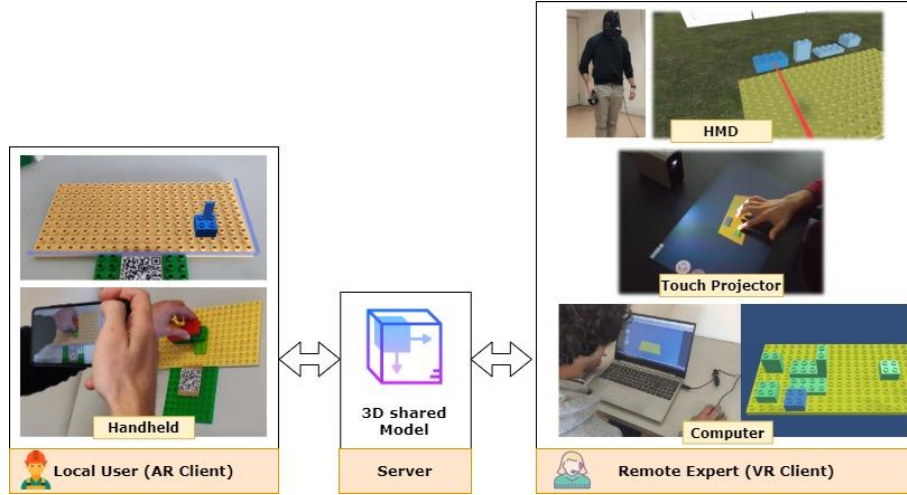
Some authors explored other techniques, like 3D shared virtual objects for interaction with the remote technician. This approach allows major accuracy in the instructions location, since it has one more dimension in relation to traditional 2D approaches (image-based). In (Ferrise et al., 2013) the remote expert interacts with a 3D virtual model of a washing machine through a multimodal system. This system allows the remote technician to train another operator who sees the instructions about how the operations should be correctly performed, which are superimposed onto the real product (AR). Another solution for guiding a local user was proposed by (Oda et al., 2015), allowing to assist with placing the top of an aircraft combustion engine. The remote expert has access to a virtual replica of the physical object, that they can manipulate to give instructions to the local user.

In this paper, we describe an Mixed Reality-based platform for remote collaboration, inspired by the above mentioned examples, which explores a shared-model approach. We also present the results of a preliminary user study to evaluate usability, and obtain insights on the features of the framework.

## Exploratory Platform for Remote Collaboration

This section describes an initial effort towards the creation of MR platform for remote collaboration (Figure 1). This platform is based on a 3D shared model approach and client-server architecture, focusing on simplicity and scalability.

The server side contains information about all shared objects, which clients (local user and remote expert) can access and change. The remote expert can manipulate and change 3D shared models through VR using three different types of interaction. An interaction based on 2D approaches: mouse and keyboard (computer) and touch (projector); 3D approach using controllers (Head Mounted Display - HMD) was implemented. This diversity of ways of interaction allows the remote expert to select the most appropriate one, based on the context (being the long goal of this on-going research the comparison of such methods). The remote expert has the possibility to send instructions, to add and remove different types of virtual objects with 6DoF. The local user can use a handheld device to visualize the instructions through augmented reality in real-time. A scenario of Lego Blocks assembling was selected as case study to get some insights on the platform.



**Figure 1. Overview of the MR platform. The Local user can visualize the shared instructions in an AR setting. The Remote expert can provide instructions using three different VR methods.**

## User Study and Preliminary Results

A preliminary user study was performed with 1 pilot, plus 5 participants (3 female) to assess usability, and understand if the platform was robust to be used as a collaborative tool in a real remote setting.

Participants were professionals in UI & UX, AR & VR, as well as people without any knowledge in the area, in order to obtain more relevant feedback to improve our platform. Participants performed the tasks as remote (i.e. provided a set of instructions using different interaction methods sequentially) and on-site (i.e. follow instructions from remote user to perform an assembly with real Lego blocks) users, while an experimenter was the counter part. Both collaborators were back-to-back one the same room, separated by a panel. We used a within-subjects design. Lego arrangements were completely different between all methods, but were the same for all participants.

Participants were instructed about the experimental setup, the task and gave their informed consent. Afterwards, the task was completed, while being observed by the experimenter, who assisted them if they asked for help and made annotations using a standard form. Immediately after finishing, participants answered a post-task questionnaire. The data collection was conducted under the guidelines of the Declaration of Helsinki.

All participants were able to use the platform and finish the assembly task collaboratively. On average, each participant took 10 minutes to complete the tasks. On the local side, the major difficulty felt was distinguishing between the instructions to add/remove pieces. On the remote side, participants found it difficult to perceive when instructions were completed, especially using interaction through controllers (HMD).

## Concluding Remarks and Future Work

Mixed-Reality technologies have the potential to improve remote collaboration between distributed team-members. The platform presented in this paper explores a shared model approach, allowing a remote expert to guide an on-site user in assembly tasks using three VR interaction methods. Initial results show that the platform can be used to assist in assembly scenarios and that participants in the role of remote user preferred the use of particular devices according to the task. According to the questionnaire, users found easier to use the mouse and keyboard to correctly position the pieces. However, to control the camera perspective, it was easier with controllers interaction. This reinforces the initial motivation to explore different interaction methods, which can be used based on the context of the remote user.

In addition, this study is being expanded to support scenarios in which multiple remote users can interact at the same time, using ownership mechanisms. Thus, ensuring the on-site user knows who gave instructions. Furthermore, we also intend to perform user study to compare the different interaction methods to be used in different types of tasks.

## Acknowledgments

To all participants involved in the case studies at Altice Labs, thanks for collaborating in providing essential data and relevant feedback. This work was developed in the scope of the Smart Green Homes Project [POCI-01-0247-FEDER-007678], and was also supported by IEETA, in the context of the project [UID/CEC/00127/2019].

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# Pre-Beginnings in Human-Robot Encounters: Dealing with time delay

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**Abstract.** Based on a video corpus and logfiles of HRI in a museum guide scenario the paper investigates a model of a stepwise process for opening a focused encounter. Towards developing an autonomous system, a Wizard of Oz set-up is used to investigate strategies for dealing with a system's time delay in the 'pre-beginning'. Initial Analysis shows that the wizard orients to the visitor's head orientation for proceeding to next steps.

## 1. Introduction

If we wanted to deploy robotic systems in everyday settings and collaborative tasks with human users, the technical systems need to be endowed with 'social' skills: users should be able to deal in an intuitive manner with the technical system making use of natural means of communication. To get in contact with a human and to open a focused encounter constitutes a central task and challenge for the robotic system: Not only do the potential participants have to signal to each other whether they are willing to engage in a focused encounter and what the nature of their exchange may be, but also they have to explore this in situ through fine-grained interactional coordination (e.g. Gehle et al., 2017). Particularly important is the moment before the first verbal greeting is exchanged (called 'pre-beginnings') during which the participants monitor each other with regard to the other's focus of (visual) attention,

body orientation and behavior in space. Therefore, we investigate such ‘pre-beginnings’ of 1:1 human-robot-interactions in the scenario of a museum guide robot. Towards modeling the opening strategy for an autonomous system, a laboratory study has been conducted with a humanoid robot (Nao, v4) making use of a human wizard to decide about the timing and choice of the robot’s next actions.

Previous studies (Gehle et al., 2017) have pointed to interactional trouble caused by the robot’s misdetection of faces and found that human wizards use creative strategies based on the robot’s limited interactional resources to deal with them. In this paper, we focus on the phenomenon of time delay (2 seconds) occurring after the initial establishment of mutual gaze and investigate the following question: How do wizards attempt to deal with time delays within the ‘pre-beginning’ phase? – Analysis leads, in the long run, to considerations about pre-planned actions and the unpredictability and contingency of social interaction (Schegloff, 1996).

## 2. Design of the Robot’s Opening Strategies

To explore ways of enabling a robot system to get in contact with a user and to engage in a focused encounter, an initial model for an opening strategy focusing on the ‘pre-beginning’ in a museum guide scenario has been developed (Fig. 1, see also Gehle et al., 2017). It uses a limited set of communicational resources based on the restricted possibilities of the current robot and was implemented as a finite state machine and linked to the robot’s visual perception. In this study, it was realized as a Wizard-of-Oz approach: The human wizard assumed the role of deciding about the appropriate next move and its precise timing based on the robot’s visual perception and the states in the model. This allows to gain information to further tailor the model for the autonomous system. It consists of the stages:

- (a) **‘Look around’**: To increase the robot’s limited field of view ( $60^\circ$ ) to detect a potential interaction partner and to display availability, the robot’s idle strategy was designed as a ‘look around’ behavior. The robot moved its head continuously from one side of the room to the other ( $160^\circ$ ), attentive to detect faces and to wait for the wizard’s decision about *when* to look at the visitor.
- (b) **‘Look at’**: When the wizard – using the robot’s camera view – decides to look at the visitor and presses the button on the GUI (Fig. 1a), the robot autonomously adjusts its head towards a detected face. As the face detection is realized by the robot’s algorithms, misdetections might occur (s. also Gehle et al., 2017).
- (c) **‘Talk to’ vs. ‘Look away’**: While the robot is in the state of looking at a (sometimes: presumably) detected face, the wizard has the choice to either make the robot produce a verbal greeting ‘Hello, I am Nao’ (i.e. ‘talk to’ on the GUI) or to make the robot lower its head orientation (i.e. ‘look away’ on the GUI) (Fig. 1c). Sometimes, these options appear with a delay of about 2 seconds – the GUI displaying “Anything to do” (Fig. 1b).

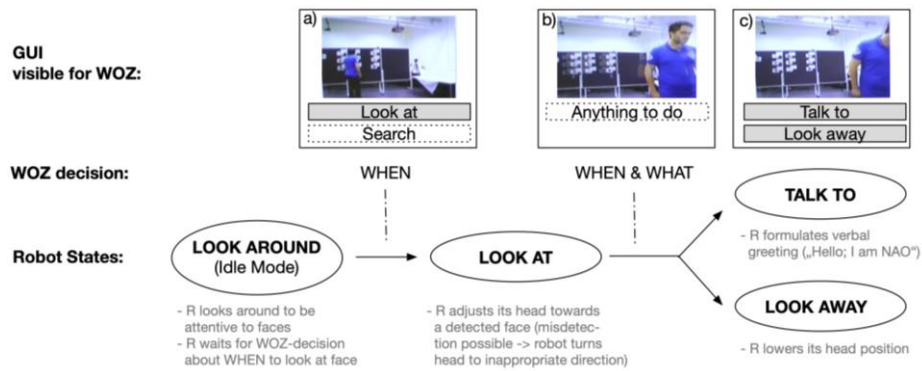


Figure 1. Model of opening strategy with corresponding GUI and decisions of the human Wizard.

### 3. Study, Data and Analytical Method

A Nao robot was set up to act as museum guide offering information about three areas of a museum exhibition which was recreated in the laboratory. The wizard (in total: 3 wizards) was placed behind a wall in the same room to have at his/her disposal (i) auditory information, and (ii) the robot's internal vision of scene which was transmitted online to the wizard's GUI with a delay of about 3 to 5 ms. The data corpus is comprised of 38 (34 complete) recordings from 4 external HD video cameras, the robot's internal VGA camera, logfiles of the dialogue states and recordings of the visitors' spatial conduct by an independent Kinect camera. In 10 cases, we also video-taped the wizard manipulating the mouse when pressing the buttons which allows insights e.g. into the wizard's *preparation* for pressing a button (analyzed here). Analysis is based on Conversation Analysis (EM/CA).

### 4. Case Analysis: Time delay in moment of transition

The case analysis (VP-31) will show that (i) a time delay occurs after the 'look at' stage due to technical reasons. (ii) This is dealt with by the wizard through a constant orientation to the features 'mutual gaze' and 'head orientation in face-to-face position' for passing to the next stage in the model.

**(a) Establishing mutual gaze with visitor:** The visitor V enters the room (Fig. 2a). The wizard's (W) GUI shows the option 'look at'. At #00:01:44 W presses 'look at'. V's body and head orientation is mainly directed toward exhibits. W starts the pre-beginning when mutual gaze between Nao and V is achieved (Fig. 2b).

**(b) System's time delay after wizard choice of 'look at' leads to visitor reorienting to exhibit:** After pressing 'look at' Nao's system causes a two second time delay, visible on the GUI as 'anything to do'. With the lack of a verbal utterance produced by the robot, the visitor smiles and turns his upper body to the nearest exhibit (Fig. 1, Fig. 2c).

**(c) Wizard anticipating visitor to reappear in face-to-face-position:** The system's time delay is also an *interaction time delay*, i.e. to verbally continue. W waits with the cursor on the 'talk to'-button to greet V (Fig. 2d). W anticipates V to show availability to Nao at the transition from one exhibit to the next or Nao.

**(d) Wizard pressing button 'talk to' when visitor reappears face-to-face to the robot:** In transition from exhibit to Nao, V reappears in face-to-face position. W presses 'talk to' at #00:01:53, reacting to the mutual gaze (Fig. 2e).

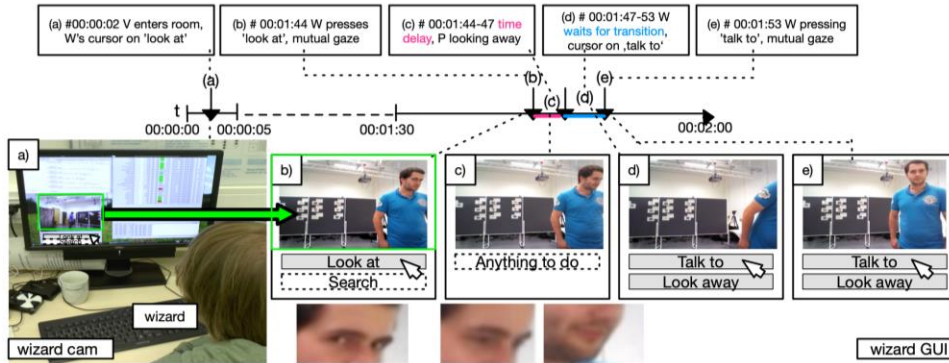


Figure 2: Timeline of wizard's and visitor's activities building up to pre-beginning and opening

## 5. Conclusion

The opening model suggests a stepwise process in which the succession of the stages 'look at' and 'talk to' might lead to a technology-based time delay. This causes a particular opening situation of 'time stretching' and requires further forms of micro-coordination (e.g. to deal with unexpectedness). Analysis has shown that the wizard strongly orients to the visitor's gaze direction and head orientation for activating next steps. Future work will extend analysis and design considerations.

## 6. Acknowledgement

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# Work of the ‘Unemployed’: A Design Fiction

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**Abstract.** This paper presents a design fiction: a research prototype of a platform for unemployed individuals trading their personal data. The design fiction questions the ramifications of an understanding of data as individual property by showing a near-future speculative scenario of what government-driven job placement could look like. Which are the kinds of accountability and agency that could be leveraged in the context of job placement if data of unemployed individuals are considered property that can be traded with the public sector in return for support? An algorithm classifies the performance of unemployed individuals based on the data they upload. This way the algorithm becomes the central mechanism for accountability and control instead of the caseworker, who acts as an arbitrator between the individual citizen and algorithm. Our purpose with this paper, and the speculative research prototype, is to create a space for reflection on dilemmas in relation to data property, accountability, and agency in public services.

## Unemployed Individuals of Digitalization

Platform technologies are becoming a key concern for Computer-Supported Cooperative Work (CSCW), including in relation to public services. Scholars now ask how to meaningfully account for the perspective of the individual (Le Dantec 2016), considering the commodification of data in government-citizen interaction

(Shklovski et al. 2015) and platform economy as point of departure for transformations of society more broadly (Light & Seravalli 2019). Computational systems for legal decision-making in public services integrate with platforms designed for interaction with the individual (Borchorst & Bødker 2011), and increasingly algorithms come into this mix.

Individuals no longer live *with* digital media and platforms but *in* digital media and platforms—in other words, we live digital lives (Lupton, 2016 *following* Deuze, 2011). Digital applications, platforms, and devices are designed to support and endorse people to self-track and monitor their lives by generating personal data about themselves (Neff & Nafus 2016). In the pursuit of profit, commercial operations use new types of data collection and prediction, but so do governments, as they search for new ways to use data of individuals to promote their version of the public good (Møller, Fitzpatrick & Le Dantec 2019).

As governments and technology designers at large increasingly turn to new uses of data and algorithmic decision-making systems, it seems equally important that we as CSCW scholars critically reflect on and develop *alternative* research prototypes of citizen-government interaction. Taking inspiration from prior research on the commodification of data and the dilemmas that arise from an understanding of data as individual property, we use a speculative and participatory approach (e.g. Baumer et al. 2018).

## A Fictional Platform: “jobnettrace”

The design fiction that we provide aims to be provocative whilst at the same time familiar and recognizable. Following Auger, “in the domains where these fictions ply their wares and meet their audiences, it is preferable for the concept to pass as real”, almost as a fact – a design *faction* (Auger 2013: 19-20”).

The public sector increasingly follows an economic logic similar to that of commercial operations, Light and Seravalli argue (2019). We are interested in dilemmas in relation to data property, accountability, and agency in public services: Thus, which are the kinds of accountability and agency that could be leveraged in the context of job placement if data of unemployed individuals are considered as property that can be traded with the public sector in return for support?

In our speculative scenario, Jobnet.dk<sup>1</sup> is no longer the platform for caseworker and citizen interaction. Instead it is the platform “jobnettrace”. Prior to the introduction of “jobnettrace” the caseworkers focused both on the support and control of the job placement of individuals; making decisions on whether an individual is eligible for the kinds of support offered as part of job placement. An unemployed citizen still has to meet legal criteria such as the 225-hour rule (a cap on unemployment benefits). According to this rule, the citizen has to work at least

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<sup>1</sup> <https://job.jobnet.dk/CV/frontpage>

225 hours per year to earn the right to full financial support (Law on Employment and Labour).

Now imagine the new platform—“jobnettrace” (Fig. 1)—a further development of jobnet.dk with self-tracking elements. On this platform, individuals can apply for particular services and job placement “offers”. Instead of a caseworker making decisions on eligibility, support is earned as the unemployed individual uploads self-tracking data (e.g. smartphone, web search logs, smart watches, etc.). The data are assessed by an algorithm that makes decisions on eligibility. In this near-future speculative scenario, data gathering and the application for job placement is the “work” of the unemployed individual, thus releasing more time for the caseworker to act as a support person.

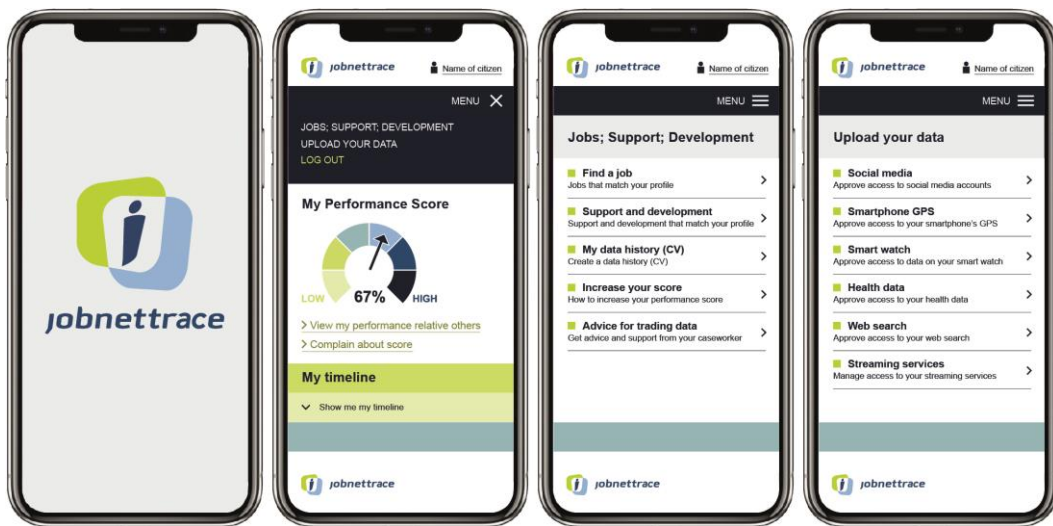


Figure 1. jobnettrace

The algorithm that we assume in the speculative scenario is similar to one already used for classifying data from different forms of tracking of employees’ performance using data on social media, location, movement, etc. (Mirjafari et al. 2019). In “jobnettrace,” unemployed “working” individuals similarly can provide their data from tracking of location, movement, etc. and in this way the platform enables new forms of accountability and agency in job placement. The algorithm assesses if the uploaded data 1) corresponds to the value of support and development, *or* 2) data confirm the individual’s job search performance in accordance with the legal criteria for eligibility. The algorithm also allows the individual to see their statistical performance score relative to others (Fig. 1).

Since the launch of “jobnettrace,” caseworkers have been acting as arbitrators, resolving the legality of decisions made by the algorithm on performance score. The caseworker still serves a critical role, ensuring citizens understand the legality of making a decision based on the performance score and their access to appeal – but also what may be the shortcoming of the algorithmic “scoring” as caseworkers observe trends across individual’s cases. A fictive unemployed individual reflects:

"I have uploaded my location data like the caseworker told me... I thought this would give me full financial support but it didn't as it turned out. The caseworker failed to explain to me how I can be sure that my location data are counted in the performance score. I mean, I know others like me that do not meet the 225h rule... their location was taken as evidence that they were undergoing treatment in that period. One even goes to the same clinic as me. So why is the algorithm scoring me differently...?"

This paper contributes a provocation and research prototype of a possible near-future speculative scenario: a platform for unemployed individuals "working" to make themselves accountable as part of job placement. The context we write in is Danish job placement, and the purpose of this design fiction is to question the ramifications of an understanding of data as individual property. The proposed fictive research prototype raises a number of questions: 1) What are the consequences of an understanding of data as individual property in public services? 2) What consequences arise from an alternative understanding of data as relational<sup>2</sup>? 3) What kinds of accountability and agency would arise from the different understandings of data as relational or individual property?

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<sup>2</sup> For example, a relational understanding of data can be understood in parallel to the donation of DNA that we can identify and point to as belonging to an individual but still it discloses information on an individual's relatives, which makes the right to trade or donate this data questionable.



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# Cardiopulmonary Resuscitation (CPR): Collaboration in Medical Team Work

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**Abstract.** This paper investigates how situations of medical emergency (CPR) are organized as collaborative practice. Whilst studies have assessed CPR mainly with regard to timing of medical actions, we suggest that interactional micro-coordination between the participants and their involvement in multiple activities may contribute to such timing.

## Introduction: Medical Emergencies & Team Work

To deal with situations of medical emergency requires collaboration in professional teams, as in Cardiopulmonary Resuscitation (CPR) after a cardiac arrest. A team of medical personnel attempts to re-establish spontaneous blood circulation by oxygenating the brain, performing chest compressions, giving medications, and using defibrillation (ERC 2015, 2). The standardized guidelines need to be practiced for improving the patients' survival rate. From 700.000 persons affected by sudden cardiac arrests in Europe every year, only 10% survive (ERC 2015, 82). The success of CPR highly depends on timing, e.g. starting chest compressions early (Hunziker et al. 2010), keeping no-flow time (no compression) low (Fernandez Castela et al. 2013), and a certain rhythm of chest compressions/oxygen ventilations (Marsch et al. 2004). Yet, little is known about the collaborative

practices which allow a team to achieve such timing. Therefore, we investigate: How do participants coordinate with time pressure and multiple parallel actions?

## Cardiopulmonary Resuscitation Protocol

CPR guidelines are provided by the American Heart Association (AHA) and the European Resuscitation Council (ERC). They both stress the importance of keeping a low no-flow time, maintaining a certain depth of chest compressions, and sustaining a relation of 30 chest compression to 2 ventilations. They differ e.g. in starting either by compressions/ventilations or by use of the defibrillator. Our study participants are trained with the ERC (ERC 2015), which consist of several building blocks with the aim of establishing a return of spontaneous circulation (ROSC):

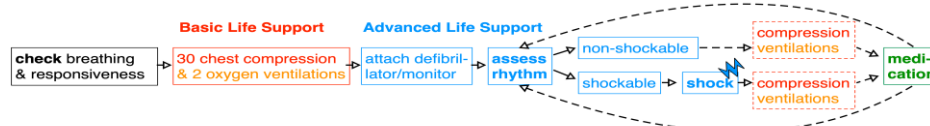


Figure 1. The Cardiopulmonary Resuscitation Protocol according to the ERC 2015.

Usually, these tasks are carried out by a team of several medical professionals. Some activities are carried out collaboratively by two persons (e.g. chest compression/oxygen ventilation) and, at the same time, are in parallel to other actions (e.g. attaching the defibrillator). Since the teams are often established ad hoc without predefined roles/tasks (Kolbe et al. 2014), one member needs to coordinate the team's actions. Studies show that CPR of teams with a declared leader result more often in a return of spontaneous circulation than teams without leadership (Marsch et al. 2004). Team leaders can positively affect their team's hands-on-times, which leads to early CPR (Hunziker et al. 2010). A team leader's efficiency reduces when s/he not only focuses on managing the activities, but also engages in medical measures her/himself (Fernandez Castela et al. 2013). Whilst these studies point to central issues of collaboration and team leadership, little is known about the interactional practices involved in such team work and their 'risks and side effects'.

## Study & Data

In early 2020, we carried out a pilot study in which two cases of authentic CPR trainings were recorded in German language (10' each). An ad hoc team of four physicians was asked to deal with a sudden cardiac arrest. One team member was assigned the role of team leader (TML) before the recording; no further instructions were given. The setting was recorded with four 4k video, two GoPro and one 360° camera, four wireless microphones and four mobile eye-tracking glasses (Tobii Pro, v2). Participants wore Aruco markers (with K. Essig & A. Krause, HSRW).

(A) **Timing of Actions.** Central differences can be measured in the teams' performances: (a) The Basic Life Support has been started 24'' (team 1) vs. 52'' (team 2) after the Call for Help. (b) The assessment of the heart rate rhythm has been established after 1'48'' (team 1) vs. 2'20'' (team 2). (c) Team 1 establishes a rhythm of compression/ventilation which – while not fully realizing the ideal of 30 to 2 – provides a stable basis. Team 2 fails to establish a regular and coordinated rhythm of compression/ventilation with initially frequent individual ventilations and following long stretches of no-ventilation. The question arises whether and how these differences might relate to issues of interaction and collaboration?

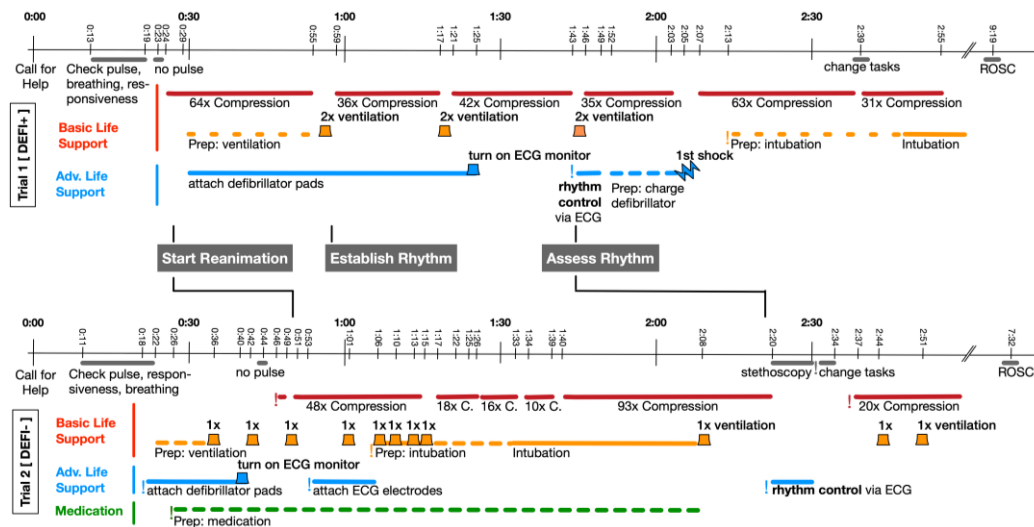


Figure 2. Timeline-based Overview of Activities in comparison of Team 1 and Team 2.

**(B) Interactional Coordination. (a) Implications of spatial configurations:** When entering the room, the team members position themselves around the bed/patient. While the team-leader in team 1 (TML-1) stands in second row at the side, the team-leader in team 2 (TML-2) positions herself at the patient's head. As the head-position is linked to the task 'oxygen ventilation', this spatial position creates a situation of engagement in multiple activities, i.e. to coordinate the team's actions, *and* to perform the ventilation. **(b) Coordinating Multiple Activities (team 2):** In the following example from team 2 (at 1'05''), TML has to provide two ventilations after physician A has produced 30 compressions ("|"). A counts aloud up to 30 (l. 01-02). In parallel, TML asks physician B to prepare the tube (l. 01-02) and bends her upper-body sideways to directly address B (01:07.24). At the end of her request, TML regains her regular posture and produces one ventilation (l. 02: X) while A's count, however, is only at 28. Once A has reached 30, TML's hand is not touching the 'ball' (01:12.00) – A continues compressing suggesting

that another ventilation might not be projectable immediately. TML then rushes to ventilate once (01:13.68), realizes that A is still compressing, tells her to stop compressing, ventilates once (l. 03), and reorients to B (01:16.80). This instance shows that the involvement in the ‘double duty’ of actions renders interactional coordination complex, which can lead to situations of trouble in carrying out (otherwise well-known) medical tasks and lead to flaws in team performance.

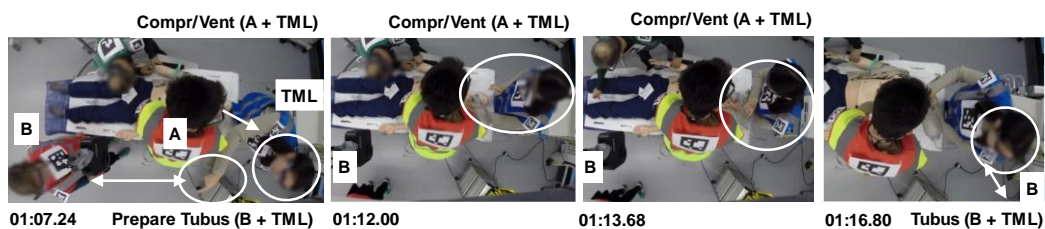
```

01 A      (.) [twenty-six      twenty-seven,]
    A-Compr | | | | |
    TML      could you please [insert uh the tube, ]

02 A      (.) [twenty-eight] thi- twenty-nine, thirty;
    A-Compr | | | | |
    TML      in [there, ]
    TML-Ven      X

03 TML      [just stop, ] continue,
    A-Compr | | | | |
    TML-Ven X
    B      what kind of [tube do you want,] X

```



## Summary & Future Work

Whilst studies so far have assessed situations of CPR mainly with regard to timing of medical actions, this initial exploratory analysis suggests that interactional micro-coordination may contribute to such timing. In future, we will enlarge the database, establish a multi-sensorial corpus, extend analysis and conceptualization.

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# 'Triage' in Mass Casualty as Situated Interaction. Algorithm and Participation

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**Abstract.** This paper investigates how the pre-clinical 'triage' in field trainings of mass casualty incidents is realized as a collaborative, situated practice. Whilst triage algorithms are mainly presented as an individualistic decision process, we show – using video data – how the professionals' practices are based on mutual monitoring and interactional coordination and thus provide for reflecting on decisions and preparing for next actions.

## Introduction: 'Triage' as a Collaborative Practice?

In the case of mass casualty incidents (MCI), the situation of emergency is characterized by shortage of personnel and equipment in relation to the number of victims and injured persons. To deal with such circumstances, an overview of the situation needs to be established quickly so that appropriate rescue measures can be mobilized. In this process, the 'triage' constitutes a central element: the number of victims needs to be established, their respective medical conditions assessed and categorized. To ensure efficiency and comparability a pre-defined 'algorithm' exists (Kanz et al. 2006). In Germany, the triage is generally carried out by a physician in close collaboration with a paramedic who act on the basis of

different institutional logics. As the algorithm – described as an individualistic decision process – does not provide any information about its use within collaborative scenarios, and the ‘triage’ teams are constituted spontaneously, the nature and details of the inter-professional collaboration need to be established in situ. Whilst some general guidelines exist (e.g. physician and paramedic should work ‘hand-in-hand’), the actual practices show great diversity. Novel technologies to support the triage appear to influence established practices/responsibilities (Ellebrecht & Kaufmann 2014). The organizations rely on reflecting their trainings, yet little is known about the micro-level of their interactional practices. Addressing this void, we aim at providing a basis both for debriefing and for technological development. In this paper, we investigate: (1) How do physician and paramedic organize their interaction during the triage? (2) How is this dyadic activity situated within the larger participation framework?

## Triage: mStart Algorithm

To support the medical decision and documentation process, a pre-clinic triage algorithm – here: mStart (Kanz et al. 2006) – has been established which suggests to examine victims with regard to the following criteria: (i) Patient able to walk? (ii) Fatal injury? (iii) Lack of respiration? (iv) Respiratory rate greater than 30 per minute? (v) Radial pulse absent? (vi) Unable to follow simple commands? – Depending on their state, victims are classified into different categories: acute danger for life (red), severe injury (yellow), minor/no injury (green), deceased (black), and – typically not used in civil situations – no or small change of survival (blue). This check is expected to take around 90 seconds per victim. Over time, victims can also shift between categories. The algorithm is generally presented as a flow chart and described as an individualistic decision process.

## Study & Data

Starting in 2017, we have established a video-based corpus of five field training situations of MCI, in which 100+ participants from different emergency services (fire brigade, medical doctors, paramedics, aid organizations, police) collaborate to provide aid in the case of an alleged emergency. To capture both the complexity of the setting, the simultaneity of ongoing actions and the micro-details of interaction, we have documented these MCI with time-synchronized recordings of multiple (up to 14) video cameras, (up to 4) mobile eye-tracking glasses, a drone camera, and radio communication circuits. Among others, one focus has been given to the inter-professional team responsible for ‘triaging’. Here, initial analysis is based on data from one training (MCI-2, 50:50-52:05).

## Case Analysis: Triage – Organization within the Team

The triage team organizes their actions in a way that the physician (PH) examines the victim and establishes the diagnose, and the paramedic (PA) documents the results in the Patient Registry Card (PRC). In most cases, PH is first to arrive at the patient's and starts to examine with PA joining later. After the categorization, PH leaves to the next victim while PA attaches the PRC to the victim (who becomes a registered 'patient'). This process is embedded within the larger framework of the patient being rescued, cared for and transported to the hospital.

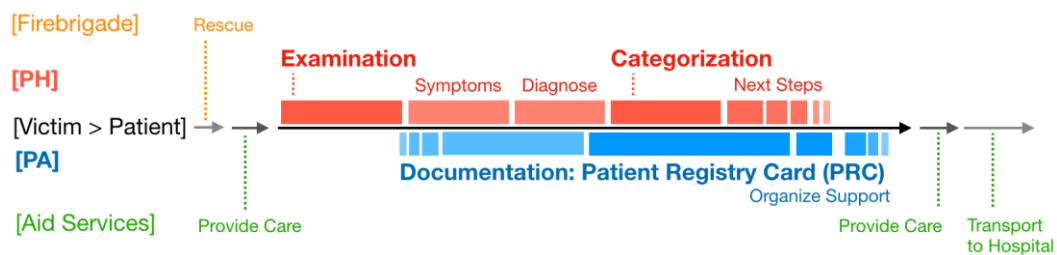


Figure 1. Organization of activities during the triage between physician and paramedic in MCI-2.

## Case Analysis: Triage – Monitoring & Participation

After the physician (PH) has begun to examine the victim (VI), the paramedic (PA) is about to join them. **(1) Co-establishing the Category:** PH realizes PA's arrival, shifts from examining to reporting the symptoms to PA (l. 01-02), PA acknowledges (l. 03) and readies the PRC (51:20.66). As it will turn out (51:22.68), at this early stage, PA starts to already grab the 'red' card. Thus, even before PH continues to explicate her diagnose (l. 04-05) and classification (l. 06), PA has implicitly *co-established* the category. This reveals a constant monitoring which, in rare cases of doubt, leads to explicit short negotiation of categories.

```

01 PH:      Okay; it- (1.3) |OKAY; (.) sie ist- (.)
   PH-gaz: @VI                @PA      >>>>>>>>>>>
   VI:      | (caughs)
02 PH:      sie sagt sie hat euh- STARKE SCHMERZEN, im BAUCH,
   PH-gaz: @VI ...            @PA ...
03 PA:      JA::,
04 PH:      dann |würde ich jetzt mal davon ausgehen dass sie
   PA-act:    |grabs red card
05 PH:      vielleicht ja: n stumpfes bauchtrauma hat,
06 PH:      dann würde sie euh- ROT bekommen,
  
```

**(2) Monitoring & Projecting Next Actions:** When PH formulates the implications of the status 'red' (l. 07f.), members of the 'Transport Organization'

successively join the group (TR-1 in l. 07, TR-2 in l. 11). This stepwise reconfiguration of the participation framework is oriented to by PH: she gazes at them and reformulates the diagnose (l. 10, timecode 51:32.72) and the category (l. 12, 51:38.42). This reveals that the triage is closely monitored by other participants who project relevant next actions. The physician orients to this constantly shifting participation framework and provides precisely tailored pieces of information.

07 PH: und könnte dann in absprache |mit dem LNA vielleicht  
 TR-1: | (arrives)  
 08 PH: gleich relativ zügig ins euh- ins eh zielkrankenhaus-  
 09 PH: möglicherweie KLIInikum gebracht werden;  
 10 PH: mit verdacht auf stumpfes bauchtrauma  
 PH-gaz: @ TR-1 ...  
 11 PA: JA; (-) |  
 VI: (breathes/moanes loudly)  
 PH: |O:kay; |NO PROblem;  
 TR-2: |arrives  
 12 PH: sie ist ROT,  
 PH-gaz: @TR-2 ...



## Summary & Discussion

Analysis has shown that this triage team's collaboration involves a slight offset in their time with the patient. This requires *reporting* of the diagnosis, which creates an ecology for making decisions transparent/discussible and for allowing to project next actions. Compared to other practices, their implications/risks transpire.

## Acknowledgments

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*Michael Chromik (2020): reSHAPE: A Framework for Interactive Explanations in XAI Based on SHAP. In: Proceedings of the 18th European Conference on Computer-Supported Cooperative Work: The International Venue on Practice-centred Computing on the Design of Cooperation Technologies - Exploratory Papers, Reports of the European Society for Socially Embedded Technologies (ISSN 2510-2591), DOI: 10.18420/ecscw2020\_p06*

# reSHAPE: A Framework for Interactive Explanations in XAI Based on SHAP

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**Abstract.** The interdisciplinary field of explainable artificial intelligence (XAI) aims to foster human understanding of black-box machine learning models through explanation-generating methods. In this paper, we describe the need for interactive explanation facilities for end-users in XAI. We believe that interactive explanation facilities that provide multiple layers of customizable explanations offer promising directions for empowering humans to practically understand model behavior and limitations. We outline a web-based UI framework for developing interactive explanations based on SHAP.

## Introduction

We have witnessed the widespread adoption of intelligent systems into many contexts of our lives. The perception of intelligence often results from their black-box behavior, which may manifest itself in two ways: either from complex machine learning (ML) architectures, as with deep neural networks, or from proprietary models that may intrinsically be white-boxes, but are out of the user's control (Rudin, 2019). As such black-box systems are introduced into more sensitive

contexts, there is a growing call by society that they need to be capable of explaining their behavior in human-understandable terms.

Much research is conducted in the growing fields of *interpretable machine learning (IML)* and *explainable artificial intelligence (XAI)* to foster human understanding. IML often refers to research on models and algorithms that are considered as inherently interpretable while XAI typically refers to the generation of (*post-hoc*) explanations for black-box models to make those systems comprehensible (Rudin, 2019; Biran and Cotton, 2017). Current XAI research mostly focuses on the cognitive process of explanation, i.e., identifying likely root causes of a particular event (Miller, 2018). As a result of this cognitive process, some notions of explanation, such as texts, annotations, or super-pixels, are generated that approximate the model’s underlying prediction process.

We believe that an important aspect required to address the call for “*usable, practical and effective transparency that works for and benefits people*” (Abdul et al., 2018) is currently not sufficiently studied: providing users of XAI methods and systems with means of interaction that go beyond a single explanation.

## Explanation as an Interactive Dialogue

XAI research often implicitly assumes that there is a single message to be conveyed through an explanation (Abdul et al., 2018). However, in decision-making situations that demand explainability, it is unlikely that a single explanation can address all concerns and questions of a user. This resonates with the social science perspective that considers explanation to be a social process between the *explainer* (sender of an explanation) and the *explainee* (receiver of an explanation) forming a multi-step dialogue between both parties (Miller, 2018). Especially, in situations where people may be held accountable for a particular decision, a user may have multiple follow-up questions before feeling comfortable to trust a system prediction. To model the notion of social explanation between an explanation-generating XAI system and a human decision-maker, we need means of interactivity. Related machine learning approaches, such as explanatory debugging (Kulesza et al., 2015) or interactive machine learning (Dudley and Kristensson, 2018), leverage explanations, interactivity, and human inputs to correct bugs or to improve model performance, respectively.

In our opinion, the social perspective of explanation is currently not sufficiently reflected in current XAI research that addresses decision-making situations. Weld et al. propose seven different follow-up and drill-down operations (Weld and Bansal, 2019). Olah et al. (2018) explore the design space of interpretability interfaces for neural networks and describe possible interaction operations. Recent tools, such as *Google’s What-If*, focus primarily on developers and enable them to interactively inspect a ML model with minimal coding. However, they do not provide interactive explanations to end-users of XAI systems.

# reSHAPe: Interactive SHAP Explanations

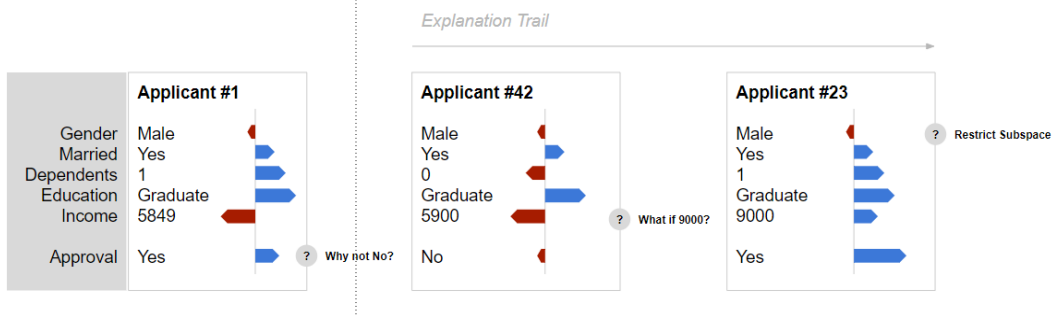


Figure 1. Schematic UI prototype of interactive explanation trail in reSHAPe: The outcome of each observation is explained through SHAP’s feature attribution method (red=negative influence on outcome, blue=positive influence). Starting from an initial observation of interest, the user can select one follow-up question from a set of interaction options to validate their hypotheses. Each query returns an illustrative observation and adds it to the explanation trail.

We propose a web-based UI framework that enables developers to provide interactive explanations for end-users. We leverage existing model-agnostic post-hoc explanation-generating methods and integrate them into an interaction concept for navigating between the methods from a human-centered perspective. We build upon the methods provided by the SHAP framework (Lundberg and Lee, 2017). *SHAP* (*SHapley Additive exPlanations*) is a promising starting point as it unifies existing feature attribution methods (such as *LIME* and *DeepLIFT*) and connects them to additive Shapley values. Furthermore, it allows the generation of *local* and *global* explanations that are consistent with each other as they both use Shapley values as atomic units. This makes them suitable for guiding users through multi-stepped explanations following one line of thought.

However, prior research indicates that even experienced ML engineers have difficulties to use current visualizations of SHAP to effectively verify their hypotheses about an examined ML model (Kaur et al., 2020). Thus, with our framework we address the need for interactive exploration and verification of hypotheses. In a first step, we implement the follow-up operations proposed by Weld and Bansal (2019) for tabular data. From an initial triple of (*input*, *prediction*, *explanation*) provided by an XAI system the user can either:

- **Change the foil:** Contrast the triple with nearest-neighbour triples that resulted in a particularly different prediction to understand “*Why not prediction B?*”.

- **Restrict the subspace:** Request other triples that share the same value for one or more *input* features to understand “*How were similar inputs handled?*”.
- **Sensitivity analysis:** Request the minimal changes required to one or more *input* features that result in a different *prediction* and *explanation* to understand “*How stable is the prediction?*”.
- **Explorative perturbation:** Change the values of one or more *input* features of an observation to explore the effects on the *prediction* and its *explanation* and to understand “*What if?*”.
- **Global roll-up:** Contrast the triple’s *local explanation* with the *global explanation* of the entire model to understand “*How representative is the observation?*”.

An XAI system with interactive explanations may derive additional information about the user’s mental model and preferences from the trail of follow-up interactions. This additional information may be used to establish common ground and potentially improve the overall human-AI system performance. With our framework we aim to support developers with the front-end development of XAI systems for domain experts. We consider domain experts as end-users with a high level of expertise in a particular domain but typically limited expertise in ML, such as lawyers or accountants. We focus on decision-making situations where the domain expert may have concrete or vague hypotheses about the decision problem that guides their explanation needs and interaction.

## Future Work

Upcoming research will investigate the potentials of interactive explanations and their evaluation with users in an application context. We collaborate with German chancelleries, lawyers, and a leading software vendor in the sensitive legal domain. We follow a human-centered design process to derive requirements and user needs. Based on these, we iteratively explore design opportunities for usable interactive explanations using prototypes and user studies. We plan to integrate our insights and artifacts in a modular toolkit for creating interactive explanation interfaces for tabular and textual data.

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*Prof. Dr. Christian Kruse, Dr. Daniela Becks, Sebastian Venhuis (2020): FlexIA - A toolkit for the participatory information analysis in small and medium-sized companies. In: Proceedings of the 18th European Conference on Computer-Supported Cooperative Work: The International Venue on Practice-centred Computing on the Design of Cooperation Technologies - Posters, Reports of the European Society for Socially Embedded Technologies (ISSN 2510-2591), DOI: 10.18420/ecscw2020\_p07*

# FlexIA - A toolkit for the participatory information analysis in small and medium-sized companies

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**Abstract.** In times of industry 4.0 work processes are getting more and more complex. Thus, new technologies and digital tools are needed to assist small and medium-sized companies. The FlexDeMo project focuses on this challenge. One main project goal is to develop a toolkit consisting of different digital assistants to support companies in participatory assembly planning and simulation. In this paper one of these tools, the FlexIA (flexible information analysis) toolkit, is presented and first practical experiences are discussed.

## Introduction

In times of industry 4.0 small and medium-sized companies (SMC) have to cope with multiple aspects of digitization. The increasing complexity of work processes necessitates the use of advanced technologies. Hence, the work context of employees changes rapidly and substantial technological knowledge is needed to manage the daily work routines. How to deal with this challenge is a central

question within the 3-year project FlexDeMo<sup>1</sup>. One main project goal is to develop a toolkit consisting of digital assistants to support companies in participatory assembly planning and simulation. One of these tools is FlexIA, that may be used for analyzing the flow of information as well as knowledge sources of SMC's. Incorporating ideas of the participatory design approach by Björgvinsson et al. (2012) and the framework of design case study presented in Wulf et al. (2011) this paper describes the motivation and the functionality of the FlexIA toolkit. In addition, preliminary practical experiences and possible future improvements are discussed.

## The FlexIA toolkit - idea and methodology

The basic motivation of performing a comprehensive information analysis with FlexIA is to provide the user with relevant information, at the correct time and place while spending as little effort as possible. This requires the development of a digital assistant that is able to analyze and satisfy the information needs from the users' perspective referring to cross-functional business processes rather than just isolated information units. On the other hand, it should be possible to intuitively use the tool by different users without much training. Thus, the FlexIA toolkit has been developed following a user-centered design as e.g. presented in Schwab and Wack (2019). Furthermore, the approach is based on the idea of the participatory design of work systems (Latos et al., 2017). Accordingly, employee participation is a key concept when performing an information analysis with FlexIA.

The toolkit developed consists of five core components including a self assessment survey, an information supply matrix and a customized flow diagram. Depending on the goal and work environment of the planned analysis these may be flexibly used and extended by further methods such as semi-structured interviews. Typically, an information analysis with FlexIA is performed in four steps: acquisition of general data, detailed examination, analysis and validation. In the next section these are discussed in more detail.

## Using the FlexIA toolkit - first practical experiences

To get an impression of the functionality and possible restrictions of the toolkit it has been prototypically tested in one medium-sized company in the domain of mechanical engineering, thereby performing the above mentioned four steps.

First, value stream mapping (Erlach, 2010) has been used to identify five company processes that need to be analyzed on a micro-level. In parallel, the current digital state of the company was analyzed with the help of a self

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assessment survey. However, the data gained from the survey has been too abstract to derive specific recommendations on an operation level.

In the second step, moderated workshops with affiliated employees were conducted to examine the five identified processes in more detail. The discussion was guided by the moderators and quickly revealed critical points due to the fact that the participants were actively involved in the analysis. The participatory approach also led the employees to reflect the current state of the processes as well as their work spaces.

During these workshops the moderators documented information objects and resources as well as knowledge sources of the processes within a matrix, which was created by adapting elements of the Japanese Makigami (Wagner and Lindner, 2013) methodology. Additionally, the general information flow was sketched graphically in a flow diagram. According to O'Shea et al. (2013) this can be done using e.g. UML. The authors designed a simplified approach based upon BPMN 2.0 (Rücker and Freund, 2019) and UML (Oestereich, 2014) because the flow diagram is supposed to be used by experts as well as novice users and it should consider loops and events. Beside some difficulties regarding the clearness of the flow diagram, this worked quite well.

In the next step the data collected was analyzed both quantitatively and qualitatively. Special emphasis was paid to interfaces, process abnormalities and waste, particularly in the form of unnecessary editing of information. Sometimes, this proved to be difficult because of missing comparative data.

Finally, the results were presented in workshops and discussed with the company's staff to validate the correctness and consistency of the issues found. Nearly all of the problems identified proved to be correct and could be validated. The feedback to this workshop has been very positive and the participatory development of ideas and solutions has been very effective. As stated by Meyer et al. (2018) we also experienced, that information aware users show a higher degree of information literacy and behaviour and also use information more creatively.

## Summary and outlook

This paper presented FlexIA, a prototypical tool for the participatory analysis of SMC's information processes developed within the FlexDeMo project. One of the main tasks within the FlexDeMo research project is to offer a digital toolkit to SMCs to optimize their production and assembly planning. A special characteristic of this project is the inherently user-centered approach, which means that the focus is set on the users, who are actively involved in each relevant step. This strategy has already been proved to be very effective during the first tests with FlexIA.

A revision of single methodological components was necessary to resolve encountered problems. Concretely, the information supply matrix and flow diagram were simplified and the self assessment survey was overhauled. Each

component still needs to be transferred into a digital version to allow a more comfortable usage and testing by an extended user community.

Until now, information analysis with the help of FlexIA has only been performed within one medium-sized company in the domain of mechanical engineering. Hence, it is not possible for the authors to draw any conclusions towards the general use of the tool. Further investigations will be necessary in the future to ensure that it can also be used in the context of other domains as well as smaller companies. In this context, the authors already started the evaluation of further tools and methods including work shadowing, as this may provide additional and different analysis data than conventional qualitative research approaches (McDonald, 2005).

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# Novel Collocated Social Interactions To Inspire Video Conferencing Design

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**Abstract.** It is common to speak of video conferencing as opening “windows” between locations. But this neglects how various kinds of “walls” also impact on these connections. This poster offers an initial exploration of these twin qualities of video calls via reflecting on unusual interaction designs. Inspecting digital-bodily play, facilitation stunts, museum events, and social icebreaking installations can spark new ideas to improve video calls.

## Aiming to Link and Bond Can Separate and Dislocate

Latour called doors “a miracle of technology” (1992) for their hybrid quality of combining walls and holes. Although more commonly referred to as windows, video conferencing systems are also “wall holes”. They offer much utility as a means of connection, but they can also amplify feelings of separation. And this “dislocation” is not a digital matter but has material qualities that bring opportunities and challenges for design investigations (Smit, 2019).

In “Beyond Being There”, Hollan and Stornetta (1992) challenged computer-mediated communication research to aim higher than merely replicating face-to-face conversation. In a similar vein, I am exploring how unusual collocated social experiences might provoke new ideas for video calling. To better understanding these hybrid qualities, I have been reflecting upon a range of attempts to design for improved interpersonal awareness and appreciation. In light of Latour, I have been re-analysing diverse experimentation from my interaction design research and creative practice. These designs sought to connect people. So it is refreshing for me to consider the counter perspective of how they also exemplify or foster qualities of separation. Below, a few examples of such possible interpersonal “wall holes” are briefly presented.

## Spinning Physical Barriers that (Re)Connect Through Separation

*Blender* was a public gallery installation consisting of a very large revolving door surrounded by a circle of immobile chairs. I designed the plywood door panels so that their upper portions overlapped the chairs and thus passed closely over the knees of seated visitors.

To walk through the space, visitors needed to push and pull the door panels, and in doing so, they would continually enter and exit very brief encounters with those sitting down (Figure 1). Both the people standing and sitting could have some influence on the duration of the encounter, but because frequently many different people were simultaneously attempting to manipulate the speed and direction of the door's rotations, rarely could a single person take control of the duration of an encounter between a seated and standing person (2009a).



**Figure 1. Visitors collaborate to steer and pace the movements of the large wooden panels**

I facilitated an impromptu participatory demonstration of the physical *Blender* at an HCI symposium. The venue featured a central column and I improvised a circle of seats (orange shapes in figure 2), but no wooden doors. Instead, the wooden panels were “role played” (or mimed) by the male delegates. They lined up in four rows, one row for each panel of the original *Blender*. I instructed them to revolve in unison in response to being pushed. The female delegates undertook the role of art gallery visitors who apprehended the original wooden *Blender* at an exhibition launch reception. They were encouraged to push male delegates whenever they wished in order to navigate their way across this simulation of the wooden structure (Mitchell and Raudaskoski, 2013).



**Figure 2. Male delegates improvised being the panel of a revolving door whilst female delegates attempted to navigate this obstruction.**

## Electrifying Intersubjectivity – Interdependency

I have experimented with various voice-controlled human tele-actors. These microphone and camera wearing people performed in social situations through being a form of physical avatar that relays the voices and attempts to fulfil the actions of non-located others (2009b, 2011). This includes students acting as walking, talking, remote-controlled surrogates for overseas guest lecturers (Raudaskoski & Mitchell 2013). Related to this are several other audiovisual playful experiences that I contributed to developing. For instance, *Blind Running* headset wearers were prevented from directly seeing the world exterior to their helmet, but a camera on the outside of one helmet transmits live video of the environment for viewing by a screen on the interior of their partner's helmet (2015). Also reliant on video feeds from cameras worn by other people were participants in *Channel Surfers*. In this participatory exhibition event, museum and festival visitors experienced rapid and dynamic 3-way perspective-changing that can make it uncertain for users whether or not their feeds are manipulated, and if they are viewing themselves or another (Sypniewski et al. 2018, Mitchell & Sypniewski 2019). With colleagues, I have also explored simpler blindfold games as a means for fostering social play, for instance adding sensors and additional sounds to a collaborative chasing game (Finnegan et al. 2014). And also interfering with people's ability to use their ears to sense the direction of other players as a game mechanic for novel playground games (Tiab et al. 2015).

## Dynamic, Gradual, Distorted, Emergent Hole Walls for Video Calls

When I compare these designs with notions of windows and doorways that are commonly associated with conceptualising video conferencing, I see several promising themes for rethinking "holes and walls". The moving walls of the physical *Blender* suggest exploring how group video calls might be more dynamic in their composition and offer more gradients of participation, and control. The wooden revolving door creates brief but secluded spaces and a need for collaboration. This inspires ideas that video conferencing software features such as breakout rooms might be co-created by users through ongoing and emergent behaviours.

The *Human Blender* draws attention to how third parties may act simultaneously as both holes and walls in any multi-party video call - even when they are trying their best to be interpersonal connectors. The digital-physical play experiences suggest experimenting with video calling in which the "holes" connecting people take many different forms. Rather than simply striving for highly transparent and stable digital "windows" between two locations, designing for social communication might be boosted by conceiving of "holes" as dynamic filters and unusual mirrors. The restricted perceptual channels in these games suggest the

potential of unconventional “walls” and “holes” for video calls that heighten interpersonal experiences through incorporating alternative sensory modalities.

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# Studying Technical Mechanisms for Supporting Sharing Communities

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**Abstract.** Enabled by technical platforms, sharing economies have been studied with regard to their economic, legal and social effects, as well as with regard to their possible influences on CSCW topics such as work, collaboration and trust. While a lot of research is ongoing around the sharing economy and related communities, there is little work addressing the phenomenon from a socio-technical point of view. In particular, there is little work in CSCW looking at the technology behind existing platforms, why it was defined this way, what are its impacts, and what would it mean to offer technology that would support local sharing economies in their cooperative activities. Our workshop is meant to address this gap. The aim is to identify research themes and gaps in the related work, and work towards a better understanding of core mechanisms and trade-offs in the design of future and inclusive platforms for the sharing economy.

## Introduction and background

The labels “Sharing Economy” and “Collaborative Economy” have been widely used in recent years to refer to a variety of initiatives, business models and forms of work, from commercial platforms to makerspaces and urban gardens. Botsman (2013), one of the first to address this phenomenon, described the “sharing economy” as “[a] diverse field of innovation, which can be loosely defined as an Internet-mediated economic model based on sharing, swapping, trading, or renting products and services, enabling access over ownership.” Nesta (2014) acknowledge that the sharing economy has become “[a] popular term to describe a range of various business models, activities and organisations”, however they recommend seeing the concept *as a zoom lens*, in order to get a new perspective on the social, environmental, and economic value that can be created from a number of assets and skills in innovative ways and at an unprecedented scale.

Two different narratives on the collaborative economy tend to dominate the current discourse. One revolves around the emergence of market-focused digital innovation that is able to disrupt existing business models and generate economic activity. Potential social and environmental benefits are presented as the main incentives. This perspective has been widely criticised for exploiting legislation loopholes and undermining labour rights. The second group of focuses on social innovation, aiming at creating a more sustainable economic and environmental model, where sharing access to goods and services allows for a more efficient and sustainable utilisation of resources. Early proponents of the collaborative economy maintained that peer-to-peer exchange has the capacity to fundamentally change how we relate to one another and the environment (Balaram, 2016).

Recently, there has been a strong interest in challenges and opportunities surrounding sharing economy communities. Enabled by technical platforms, particularly in the context of the social web, sharing economies have been studied with regard to their economic, legal and social effects (Kenney and Zysman, 2015), as well as with regard to their possible influences on CSCW topics such as work, collaboration and trust (Lampinen et al., 2016). Initiatives such as housing cooperatives, community gardens, food coops, tool libraries, skill swapping arrangements and other citizen initiatives use digital technologies for collaboration, communication and coordination purposes, and are included under the same umbrella of the collaborative economy. In the latter cases, reuse, recycling, mobilisation of existing resources and initiatives have a real impact on the local economy.

The emergence of the collaborative economy has been enabled by the technical infrastructures relying on web and mobile technologies, the availability of unutilised or underutilised goods and resources, as well as socio-economic drivers to capitalize on such resources and experiment with new labour opportunities. Collaborative economy offers considerable potential for supporting new modes of (peer-to-peer) exchange by fostering trust among strangers with the help of technologies, such as reputation and payment systems (Ikkala and Lampinen,



2015; McGregor et al., 2015; Teodoro et al., 2014). One potential innovation of platforms is the capability to potentially reallocate wealth across the value chain, specifically away from middlemen and towards small producers and consumers (Schor and Fitzmaurice, 2015) Schor and Fitzmaurice (2015). This somewhat optimistic view of connected consumption is in stark contrast with calls for more equitable forms of organizing platform labour, such as cooperatives and other social enterprises (Scholz, 2014), and critiques of the emotional labour, body labour, and temporal labour that work under platform capitalism involves (Casilli and Posada, 2019; Raval and Dourish, 2016).

Existing research on the collaborative economy from a socio-technical perspective has mainly examined specific platforms or subdomains, such as food sharing (Ganglbauer et al., 2014; Malmberg et al., 2015), time banking (Bellotti et al., 2014; Seyfang and Smith, 2002), and local online exchange (Lampinen et al., 2016; (Suhonen et al., 2010), as well as network hospitality (Bialski, 2012; Ikkala and Lampinen, 2015; Molz, 2012), on-demand labour (Teodoro et al., 2014) Teodoro et al. (2014) and crowdfunding (Bellotti et al., 2015; Gerber and Hui, 2013).

## Themes and topic areas

While there is a lot of research ongoing around the sharing economy and related communities, there is surprisingly little work addressing the collaborative economy phenomenon from a socio-technical point of view. In particular, there is little work in HCI or CSCW looking at the technology behind existing platforms, why it was defined this way, what are its impacts, and what would it mean to offer technology that would support local sharing economies in their cooperative activities.

Adopting a socio-technical point of view allows to study both the social processes and set of governance mechanisms and the technological architecture constituted of software modules, interfaces, and infrastructure. Following Orlikowski and Iacono (2001), we claim that as CSCW researchers, we have the opportunity and responsibility to influence what future is enacted with the technological architecture on which platforms are based. We must then engage with this technological architecture. Our interest in this technological infrastructure is based on the five premises offered by Orlikowski and Iacono (2000) to carefully engage with technological artifacts: (1) IT is not neutral or universal; IT is shaped by a variety of communities of developers, investors, users, etc. (2) IT is embedded in some time, place, discourse, community; (3) IT is made up of a multiplicity of components that require bridging, integration and articulation to work together. (4) IT emerges from practice, it can be used in different ways, adapted, expanded to accommodate different and evolving interests. (5) IT is dynamic; materials evolve, functions fail, standards are defined. In order to investigate the technological infrastructure, we need to invest in theorizing the nature and the impact of this infrastructure and to work towards richer conceptualizations of IT (Tilson et al., 2010).

Our workshop is meant to address this gap and get together researchers that are interested in research on socio-technical aspects of sharing economy platforms. The aim is to identify research themes and gaps in the related work, and work towards a better understanding of core mechanisms and trade-offs in the design of future and inclusive platforms for the sharing economy. By ‘mechanisms’, we mean technological mechanisms that play a role in enabling, ordering, structuring, hindering, shaping and have various other impact or effects on practice within sharing communities. Tentatively, technological mechanisms can be identified at different levels, e.g. features of a system, interface elements, software modules, infrastructure, data management, and even the interfaces between different systems.

We recognise that there is no causal effect between how a community uses a platform or how activities unfold and then technical mechanisms, however, we believe that it is possible to identify and discuss common use patterns, effects and probable relations between one or more technological mechanisms and sharing and caring practices. Hence, our workshop is intended to focus on the technical features and infrastructures that support the collaborative practices and community aggregation, in relation to their effects on collaboration and economic relations. We think in particular that technical features should be studied not only from the perspective of the support they provide for collaboration, but also regarding constraints and limitations that these features impose, observing how people practically overcome such limitations. We propose the following themes as possible topics for submissions.

## Platform taxonomies

As platforms become the primary way we interact across communities in/and outside work, researching and analysing platforms from a more technical perspective become a common strategy – people compare platforms when considering which to adopt and/or champion specific platforms for technical features or adoption or success stories, and we see that many of the specific features, e.g. webshops, communication fora, community membership portals, knowledge sharing, event management etc. are implemented again and again. Still, there are very few surveys of platforms and their features and we see an opportunity for developing different analytical taxonomies in studying platforms in the sharing economy. For well-known genres of platforms, e.g. wiki engines<sup>1</sup> or CMS-systems<sup>2</sup>, we frequently see comparisons between different options made to offer comparison along mostly technical dimensions, like programming language, licensing model, support and whether they are open source or not. When examining platforms and ecologies of systems within the collaborative economy, common socio-technical criteria and grounds for comparison would be welcome for researchers and practitioners alike. Different taxonomies and analytical lenses

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<sup>1</sup> [https://en.wikipedia.org/wiki/Comparison\\_of\\_wiki\\_software](https://en.wikipedia.org/wiki/Comparison_of_wiki_software)

<sup>2</sup> [https://en.wikipedia.org/wiki/List\\_of\\_content\\_management\\_systems](https://en.wikipedia.org/wiki/List_of_content_management_systems)

that merge technical, interface and usage criteria could also help inform designs and more modular approaches.

## Ideals and conflict

Developing from understandings that technology embodies values and plays a formative role in communities (Bødker et al., 2016), we see conflicts arising between community ideals and then the tools they use. A lot of sharing communities are driven by values, e.g. resource sharing, sustainable practices, and often employ inclusive and democratic organisation model. Commercial platforms or software appropriated as the community platform may embody potential conflicting ideas about the activities at hand, data, membership, hosting etc. than those discussed in the community. These ideals are rarely reflected into the decisions and design of the platforms and the codified elements are rarely apparent from the get go and tensions arise down the line (Bødker et al., 2016). E.g. a community may use a social media platform early in their work and then realise that the ownership of data or lack of good archiving is a problem. Or a community may bolster ideals on environmentalism or localism and then later realise the impact of cloud computing and remote hosting.

## (Un)intended dark designs

Commercial platforms apply strategies to lure users into oversharing information or spend more time on the platform. These have been collected and described as dark design patterns<sup>3</sup>; Similarly, high level economic analysis and studies of commercial platforms have revealed some systemic effects, e.g. how ride-sharing affects congestion (Li et al., 2016) or house-sharing affects property value (Sheppard et al., 2016). When communities and local stakeholders pick or appropriate existing tools, or develop new open versions inspired by commercial platforms applying their (dark) designs, there is a risk that although driven by community ideals, unintended effects and implications are introduced. Or, perhaps the unintended implications introduced by platforms and interactive tools might look completely different when considering sharing economy initiatives and community-oriented platforms?

## Organising on and around platforms

When appropriating a platform for a sharing initiative, the platform itself often comes with an internal organization model or imposes constraints on the initiative and how activities are organised. Platforms seldom support all activities or groups within a community and they rarely ‘fit’ the community governance model. Communities often use a plethora of tools, some agreed upon and others

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<sup>3</sup> <https://www.darkpatterns.org/>

appropriated on the spot, and need ways to organise and integrate across multiple platforms and tools, e.g. to handle payment, social media, newsletters etc.

## Goals and activities

The aim of this workshop is to map and explore a list of opportunities and challenges for HCI and CSCW to engage with socio-technical perspectives on platforms and support tools within the sharing and collaborative economy from the perspective of researchers and practitioners. We are also aiming at helping practitioners that are interested in participating and starting sharing economies to get a better understanding of the possibilities of the tools that already exist, as well as inform design researchers about possible gaps and room for improvement. The opportunities and challenges will be organised under four main aims:

- Collecting research on socio-technical aspects of sharing economy platforms. Here we emphasise perspectives and discussions aimed at connecting the two – the social and the technical – in discussing platforms and their underlying technologies.
- Identifying research themes, gaps, related work, in particular topics that are relevant to CSCW. This includes rethinking earlier trends in CSCW on groupware systems from a sharing platform perspective.
- Working towards a better understanding of core mechanisms and trade-offs in the design of platforms for the sharing economy, as well as implications in adopting and appropriating commercial solutions and platforms invented to support different kinds of work and collaboration.
- Discuss and outline various abstractions across identified platforms, e.g. design patterns for community platforms, catalogues of proven mechanisms and enabling features.

Depending on the outcome of the workshop's discussions and on the interest of the participants, we may explore further publication outlets for the workshop papers. The contributions will be made available on the workshop website, given participant consent.

## Activities and structure

We propose a one-day, 8 hour workshop. In the workshop, we will combine discussion of position papers with the themes and aims. Some activities will be group-based centred around generating contributions within the four aims of the workshop.

**Preparation before the workshop** We will circulate the accepted position papers and ask participants to read these and reflect on these based on the themes proposed. Depending on the scope and focus of the contributions, we will consider proposing a few guiding questions.

**Morning: Introductions and short presentations** The workshop will start with short presentations of the position papers. Depending on the clustering around the themes, this can happen in plenum or in two steps where they are grouped around themes and then synthesised into a group presentation by the participants.

**Afternoon (1) Generative group work:** The afternoon will start with group work examining the themes with the aim of generating input to the four main aims. This will involve mapping potential taxonomies, speculative research design, in relation to Ideals and conflicts and design implications (dark designs) within the sharing economy.

**Afternoon (2) Synthesis** As the final step, participants will engage in a collective exercise with the task of synthesising the workshop and discussions into key directions for future research under the heading “*What has CSCW to offer to the sharing economy?*”

## Organisers

*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 background, her research currently focuses on the implications of the collaborative economy on urban communities, with an emphasis on DIY, civic engagement and cultural heritage. She is the Chair of the COST Action Sharing & Caring.

*Alexander Boden* is post-doc researcher at the Fraunhofer Institute for Applied Information Technology FIT. His work focuses on developing interactive tools in the domain of environmental and consumer informatics in a broad range of application domains ranging from smart factories to private households, as well as on ethical and social implications of technology. Alexander publishes in research communities such as CSCW, HCI and Software Engineering.

*Susanne Bødker* is Professor of Human-Computer Interaction at the Department of Computer Science, Aarhus University. She works with activity theoretical HCI, Participatory Design and Computer Supported Cooperative Work. She is currently working on her ERC Advanced research project Common Interactive Objects, that takes a new theoretical focus on how we collaborate and make sense of the interactive objects in our everyday lives. Susanne is a scientific advisor for the COST action Sharing & Caring.

*Henrik Korsgaard* is a post-doc researcher at the Department of Computer Science at Aarhus University. He works with activity theoretical HCI, CSCW and place-centric computing. He mixes empirical work on how communities adopt and

appropriate technologies with constructing and deploying prototypes primarily focusing on supporting intrinsic development of local applications and services.

*Myriam Lewkowicz* is Full Professor of Informatics at Troyes University of Technology (France), where she heads the teaching program “Accompaniment of the Digital Transformation”, and the pluridisciplinary research group Tech-CICO. Her interdisciplinary research involves defining digital technologies to support existing collective practices or to design new collective activities. In 2017, she was elected the next chair of the European Society for Socially Embedded Technologies (EUSSET). She is vice-chair of the COST Action Sharing & Caring, and the co-chair of the working group focusing technical platforms in this action.

## Maximum number of participants expected

We expect to bring together a maximum of 20 participants. Our intended audience is primarily researchers who are actively engaged in studies of sharing economy contexts, but also active members of such communities. We will encourage a mix of practitioners, graduate students, new faculty, and established researchers to participate.

## Means of recruiting and selecting participants

The call for papers will be disseminated via CSCW-related mailing lists (e.g. EUSSET, CSCW). We will also publish the call via social media and community mailing lists of our COST Action in order to target a broader audience, especially active members of sharing communities. We will establish a webpage that we will use throughout the process to advertise and collect information, a tentative reader on the sharing economy and subsequently publish the position papers and insights from the workshop, with participant consent.

In order to attract practitioners, we will contact organizations involved in designing platforms, with whom we already interacted in the framework of the COST action: E.g. Platform Design Toolkit (Simone Cicero) and Collaboriamo (Elisa Saturno).

Prospective participants are invited to submit short papers (4-6 pages) on their research using the ECSCW Exploratory Paper template. Submitted papers should relate to the research questions outlined in the call. We are especially interested in empirical studies of sharing economy platforms and their socio-technical implications. Both reports of research in progress and completed studies will be accepted. We are also inviting practitioners to submit experience reports about existing technologies.

The workshop organisers will select the position papers based primarily on their ability to generate fruitful discussion of important issues and also to provide examples of practice related, high quality case studies. At least one author of each

accepted paper must attend the workshop. The accepted papers will be made available to the participants in advance and discussants will be assigned to each paper.

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# Doing CSCW Research in Small and Medium Enterprises: Experiences, Options and Challenges

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**Abstract.** This ECSCW workshop draws attention to research and development projects (R&D) that deal with cooperative and collaborative practices in small and medium enterprises (SMEs). European companies are for the most part SMEs: nine out of every ten companies can be defined as an SME (Eurostat 2015). They cover a huge variety of branches and fields, including diverse examples such as manufacturing, construction or IT start-ups, and meanwhile, there is again a growing sphere of CSCW projects that recognize the importance of this field. The empirical methods applied in such SME centered projects include qualitative methods with participant observation, interviewing or conducting co-design workshops, but also quantitative methods like the use of questionnaires or eye-tracking systems. In the workshop, we open up for sharing and reflecting experiences of doing research in SMEs and for discussing the characteristics and challenges of this (old and new) field in CSCW.

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## Introduction

Why is it interesting for the CSCW research community to study cooperative and collaborative practices in SMEs right now? Referring to pure statistics, it is striking that European companies are for the most part SMEs: There were approximately 25.1 million SMEs in 2018 (European Commission, 2018) or: nine out of every ten companies. They cover very different sectors or branches such as logistics, transportation, industry, production, trade, tourism, financial service providers, banks, estate agencies, IT companies, media enterprises, private health services and agriculture. Despite their burgeoning importance, SMEs are considered different from large organisations, particularly in relation to their peculiar features and limited capabilities (Thong & Yap, 1995). For instance, organisational structures in SMEs are rather simpler when compared to large organisations, the strategic decision making is usually in the hand of owner-manager or fewer decisionmakers (Thong & Yap, 1995; Smith, 2007), and the size of the company significantly influences the awareness, interest and readiness towards modern technology principles and related investments (Sommer, 2015).

Moreover, SMEs are considered disadvantageous when it comes to certain capabilities vis-à-vis large organisations and social perception, e.g. reputation or image. However, they are oftentimes able to capitalize on their core strengths expertise, innovation, supply-chain embeddedness to gain a competitive position in the market (May, 2009: 120). Many of the so-called “hidden champions” (Simon, 1996) are very successful, especially in niche markets, not just on a national level, but also on a global scale and are important due to their extensive economic and innovation performance (Rieckmann et al., 2018; Ludwig et al., 2018; European Commission, 2015).

Besides, SMEs are fascinating as a research and development field as they have to deal with socio-economic and socio-technological challenges, most of all: retaining their key asset, the employees and their working capacity (Ludwig et al., 2018). That includes the preservation of expert knowledge of elderly employees who are about to retire, finding trainees to step into their shoes, supporting the further qualification of the staff with respect to new requirements or to care of their health and working conditions. The need for further qualification often goes along with another challenge: the processes of digitalization, understood as complex, long-term transformations on a technological, economic and social level (e. g. Rogers, 2016; Bockshecker et al., 2018).

These processes are not entirely novel, but nowadays, SMEs are being more confronted with the increasing digitalization in supply, production and sales because of increasing dependency due to international markets and these dependencies have a different impact on SMEs than on large enterprises. Customer requirements, certifications and implementation of standards must always be considered in the light of limited financial, human and timely resources. Their typically limited (time, staff, expertise) resources for instance make SMEs all the more vulnerable to cyber-attacks

(Saleem et al., 2017) and other crises scenarios. Furthermore, their special business requires specific tool support for the particular, often non-standard work practices in rather weekly structured processes. These are only two of the multiple topics that track attention in the again growing sphere of CSCW projects that recognize the importance of this field. Additional challenges are: information transfer, internal and external communication against the backdrop of data security and privacy (use of ICT by the employees, etc.), dealing with fallouts, emergency preparedness and crisis prevention, business continuity management (BCM) plans and many more (see also Ludwig et al., 2018).

The *empirical methods* applied in SME centered projects prefer for the most part quantitative methods like the use of questionnaires, simulations or eye-tracking systems, etc., but projects that are more co-development- or participatory design (PD) oriented, favour also qualitative methods with participant observation, interviewing or conducting co-design workshops (Blomberg & Karasti, 2013; Bratteteig & Wagner, 2014; Flick, 2018). We argue that the use of qualitative methods is often more appropriate to the specific characteristics of SMEs and can highlight their particularities, for instance the smaller number of employees who are familiar with each other over a long time, the skepticism towards “outsiders”, informal practices, etc. (e.g. Gilmore & Carson, 2000; Razmerita & Kirchner, 2011). Nevertheless, the triangulation of different qualitative and quantitative methods seems the most promising way to deal with the complexities of this special field of research and development.

The goal of the workshop is to provide a space to share and reflect experiences with doing research in SMEs and to discuss the characteristics and challenges of this special (old and new) field in CSCW research (e. g. Schmidt, 1991, 2011; Neureiter et al., 2016). But one of many is working with different stakeholders in a setting with well-established hierarchies and with limited time resources – the latter often occurs in lower layers of the hierarchy, e.g. the workers or shift leaders. More generally, we address collaborative and cooperative practices in at least three ways: (1) between the stakeholders within the field (SMEs), (2) between the researchers, developers and the stakeholders in the field and (3) within the research and development teams.

## Topics and participation

For contributions, we invite 2-4 page submissions (including references) from researchers, developers or practitioners who are working in and with SMEs until **3 April, 2020**. In order to create a productive setting in the workshop right away, we would like to ask you to include the following aspects in your submission:

- 1) outline of the field of research or/and development you are working in
- 2) short description of the respective SME context
- 3) methods applied in the project (empirical, development and technological)
- 4) personal background (study, training, etc.) and
- 5) open questions, experiences or problems that you are facing.

Please submit following the provided template (available as [MS Word](#), [RTF](#) or [LaTeX](#)) at <https://ecscw.eusset.eu/2020/index.php/workshops/>.

We welcome submission from different PhD and PostDoc stages and particularly encourage people from the practical field to hand in a short statement paper and to take up the opportunity to discuss their experiences with us. According to the variety of empirical methods applied in SME research, interesting topics might be (but are not limited to the following): experiences with

- standardized questionnaires
- simulations
- the use of eye-tracking systems
- participant observation
- dealing with long-term, well-established hierarchies in SMEs
- interviewing in SMEs (informal, semi-structured or structured interviews)
- expert workshops
- participatory design workshops: designing for or/and designing with?

Some more concrete questions for the workshop might be (but without limitation):

- How can a time-consuming ethnographic approach be conducted with little irritation of the daily SME business?
- How can researchers and developers operate in these settings, especially when there are no legal constraints as in a formal research project?
- How can the cooperation, goals etc. be negotiated between the researchers, developers and stakeholders from the field?
- How can researchers keep track of what is going on in the company in their absence?
- How can SMEs with no or little IT knowledge use and improve prototypes developed in such projects use persistently?

The participants will be recruited following the distribution of our call via the key mailing lists of the ECSCW and CSCW, HCI and adjacent communities, the website of the workshop (<https://ecscw2020methods.yolasite.com/>), on different social media platforms as well as through the organisers themselves and their networks. The position papers of the applicants will be reviewed by the organisers.

We would like to limit the number of participants to a maximum of 15 in order to provide a setting with an appropriate time frame for presentations, collaborative work and group discussion.

## Goals and schedule

The temporary schedule of our one-day workshop will be as follows (will be modified based on the number of contributions):

- (1) *Welcome and introduction* (approx. 30min)  
The organisers give an overview of the key intentions and goals of the workshop, outline the schedule, methods applied in the workshop and open up for the introduction round of all participants.
- (2) *First session: Getting to “work”*  
Based on the position papers, all participants shortly present their work, motivation and expectations for the workshop (5min each). The organisers are going to give a *Pecha Kucha* presentation with examples of field work in SMEs and open questions that they would like to address in the workshop; a short break is included in that session.
- (3) – lunch break –
- (4) *Second session: Group work (number depending on the number of participants)*  
In order to allow enough time for intense exchange, we’ll have a group discussion session. In reference to our overall topic, we are going to work on the “methodological toolbox” for doing projects in SMEs and collaboratively collect best practices.
- (5) – coffee & cake break –
- (6) *Plenary session*  
Getting together after the group work; reporting shortly about the different discussions and outcomes in the groups.
- (7) *Closing and “take-away” session*  
Summing up the topics discussed, recapitulate interesting take-away-insights and suggest options for further collaboration amongst the participants and organisers.

We are going to close the day with dinner and drinks in an informal gathering of the group (for interested participants) in one of Siegen’s nice restaurants in the historic part of the town. This is another chance to continue the day’s discussions and networking in an informal way.

The materials from the workshop will be published on the website of the workshop – given the permission of the participants and with taken into account data protection law. The organisers will also discuss the option for a joined publication with the participants in order to address the lack of literature about the outlined topic for the CSCW community.

## Organisers

**Marén Schorch (corresponding chair)** is a Postdoctoral researcher and leader of the BMBF junior research group KONTIKAT at the University of Siegen. She holds a PhD in Sociology from the University of Trier, is specialized in qualitative research methods and experienced in mixed methods. She has been involved in multiple projects at the University of Siegen. Her current research deals with emergency preparedness, continuity and (digital, social, economic) change. She has published a wide range of articles, co-organised a number of CSCW-related workshops such as on ECSCW 2011, CSCW 2014 and CSCW 2017, COOP 2016 and GROUP 2016, held two master classes at ECSCW 2019 and also regularly reviews for ECSCW, CSCW, GROUP, CHI etc..

**Fabienne Seifert** is a PhD student and member of the BMBF junior research group KONTIKAT at the University of Siegen. She studied Sociology in Magdeburg, Bielefeld (Germany) and Vienna (Austria). Her dissertation deals with the perspective of emergency forces in crisis situations by the means of qualitative methods of social research (interviewing and participatory observation). Her thesis empirically carries out the attainment of routines in various crisis situations. In addition to the use of technical devices during operations, which is particularly relevant for CSCW research, the everyday work of firefighters is in focus.

**Hussain A. Syed** is a Ph.D. researcher in the BMBF junior research group KONTIKAT at the University of Siegen. He is a computer scientist with a specialization in software technology and data science. His interests include HCI, CSCW, model driven software development (MDSD) and machine learning (ML). His current research focus is to tailor and adapt the disaster resilience practices of big enterprises like BCM to the context of SMEs. He works in close liaison with the enterprises employing the qualitative and quantitative research methods to generate steady requirements for sustainable crisis technology.

**Christoph Kotthaus** is a research associate and PhD candidate at the chair of Computer Supported Cooperative Work and Social Media at the University of Siegen. He graduated in information science and completed his thesis in an SME. He worked in SMEs for more than ten years. At the University, he worked in and (partly) lead projects regarding crisis management and real-time production scheduling and is currently involved in the participatory design of shop floor tools to support various activities within the SME 4.0 competence center Siegen. He was co-organiser of the conference Wirtschaftsinformatik 2019.

**Volkmar Pipek** is Professor of Computer Supported Cooperative Work and Social Media at the University of Siegen, Germany and has widely published books and articles in the field of CSCW, with a specific interest in infrastructuring. He is also the co-leader of the project “INF-Infrastructural Concepts for Research in Cooperative

Media” at the Collaborative Research Center 1187: Media of Cooperation and mentor of the BMBF junior research group KONTIKAT at the University of Siegen.

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*Sarah Rüller, Konstantin Aal, Marios Mouratidis, Dave Randall, Volker Wulf: (Coping with) Messiness in Ethnography – Methods, Ethics and Participation in ethnographic Field Work in the non-Western World. In: Proceedings of the 18th European Conference on Computer-Supported Cooperative Work: The International Venue on Practice-centred Computing on the Design of Cooperation Technologies - Workshop, Reports of the European Society for Socially Embedded Technologies (ISSN 2510-2591), DOI: 10.18420/ecscw2020\_ws03*

# (Coping with) Messiness in Ethnography – Methods, Ethics and Participation in ethnographic Field Work in the non- Western World

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**Abstract.** There are several frameworks and approaches, addressing how to conduct ethnographic and qualitative field work in various settings. However, going by the book might not be an option when conducting research in politically charged, unstable or simply non-western regions. Politics, social pressure and even someone's personal safety might

be necessary to consider. Another important area to consider are research ethics. Privacy policies might do their work with regard to existing laws which differ from each country and should ensure no harm for all involved parties, but how can this be guaranteed and does it also cover all aspects of ethics? Including stakeholders as a basis for user-centered work and design is common. But what does participation mean in such contexts? The questions are: What is important to consider when conducting ethnographic field work in such settings? How can we foster different degrees of genuine participation? How can we ensure, that the work we do is ethically correct without endangering the research outcome? In this workshop, we invite researchers and practitioners to rethink existing methods and approaches and start working on guidelines, that better serves the needs of such specific and to some extent critical circumstances.

## Introduction

*Ethnography is a deliberately „messy“ methodology, putting its faith in the interpretative competence of the researcher when immersed in a social milieu in all its complexity. Rather than seeking the security of pre-conceived analytic categories, ethnographers typically steer a far more inductive course by cultivating an openness to the multiple and overlapping phenomenological worlds of their subjects. (Nimmo 2011, p. 113)*

Approaches of ethnography have started to be integrated into HCI and CSCW research more than 30 years ago (Falzon 2016). In terms of method, it involves the situational combination of field techniques (notes, audio/video recordings, interviews, study of local literature, observation and the like) based on the ideal of participant observation (“*It seeks to present a portrait of life as seen and understood by those who live and work within the domain concerned*” (Randall and Rouncefield 2005, p. 2) ), which is also based on trust and the interaction between researchers and those researched. Basically, ethnography expects the researcher to stay in a field for a relatively long term to gain ‘thick’ and rich data and field descriptions (involving social relations, experiences, networks, practices, etc.).

In the last years the workshop authors conducted field work in different areas of the world such as Morocco, Botswana, Palestine, Iran and others. Here they planned their activities in advance and prepared themselves and the necessary requirements (for workshops, Ethical approval by the Institutional Review Board (IRB)) for the needs of the target group. But on the ground, the planned activities couldn’t go by the books and had to be adapted to the changing situations.

An example to illustrate this: *The initial intention (which was worked out by us and our partners, a local NGO) was to establish a computer club in the High Atlas and observe how the residents will appropriate the space. For this reason, we took a lot of technology (e.g. laptops, cameras, GPS devices, audio recorder) with us to*

*the village and we conducted training workshops with the local tutors, who would be in charge of the computer club in the future. The various workshops included how to use the provided technology (cameras, audio recorders). The first workshop was dedicated to familiarizing with the cameras and photo editing tools as our partners and tutors expressed the wish to conduct photo and video workshops with children. Soon in the session, it was clear that all the planning was useless, since the assumptions we previously made were false, the tutors never used a laptop before and we therefore had to start with the basics first. how a laptop is used (e.g. how to boot up, what is a left click, a right click). In addition, we couldn't even start with observing the future users, since we as the experts were in charge of the upcoming sessions with the participants.*

Being in the field and finding the right methods in order to gain thick data can be rather challenging. The corps of potential methods is massive and conducting fieldwork requires ad hoc modulation, depending on the in-situ circumstances. In the same breath however, conducting scientific data requires liability, correctness and some kind of verifiable factors that verify our doing and our interpretation.

## Background

The following chapters address three areas when conducting research in the non-Western world. The questions we raise are not necessarily new, but still relevant as we weren't yet able to answer them satisfyingly for our own cases. While we don't want to limit the workshop to these three, we think they play and will play a major role in past, current and future research.

### Empirical Field Work on the Ground

*"Where more conventional sociologists may adopt a rhetoric of prescriptive scientism which hides their personal involvements behind an impersonal and passive mode of speech, the ethnographer has an avowedly personal engagement with his research. Indeed, part of the evaluation of such work turns on what the ethnographer tells us about himself in order that we may assess his credibility as a witness." (Dingwall 1980, p. 880)*

As already pointed out in the introduction, ethnography offers a wide range of different approaches and techniques for conducting research in a given field. But not all methods are suitable for every field and often have to be adapted or even dismissed. In many cases, researchers are here on their own in the process of

altering the way they engage with their participants, the community and the field in general.

A summary of different experiences (many in non-Western countries) is presented by Ann Light et al. (2010). In their paper they provide insights in their studies, which methods they used along their research journey and also the limitations as well as the findings. Above all, they emphasized that the process takes time if it is a different culture than the native one. Here the authors used different methods to gain trust and access first, but all of them were very time-consuming (e.g. short visits before longer field visits, maintaining contact). Despite intensive preparations, the methodologies had to be adapted to the requirements on site: *“We made various institutional and methodological innovations while engaging in the field;”* (Light et al. 2010, p. 9)

Our questions remain: How do we cope with choosing methods from the various existing corpses? How do we manage to keep on pace with our research endeavor if there's constant adaption and modification of our approaches required? Challenges and surprising incidents are the nourishing source of our studies. But how can profound research be carried out if research methods require massive changes in order to work in a specific context?

## Ethics

*“The concept of ‘negotiation’ is not unproblematic as a basis for the identification and addressing of ethical issues in ethnography however. One reason for this is that, given the emphasis in ethnography on cultural difference, the call for negotiation begs the question of the extent to which the meaning of what is being negotiated can in fact be established prior to the completion of the research. This is an important methodological consideration, for if the purpose of negotiation between the researcher and the researched is to reach agreement about what is to constitute ethical research practice [...]”* (Parker 2007, p. 2253)

Conducting ethical research is a very open, loose and fuzzy endeavor. For some, it implies being transparent with their research output, collecting signatures under agreements and relying on the existing laws in specific countries. Letting people check boxes and put their signatures under a document might give one a legal right to conduct a study. But is it ethical? When it comes to language barriers, power imbalances and dependencies, built on hope to get an advantage, ethics should be an addressed topic. While many Western universities provide help through ethical boards to support the research endeavor and also highlight ethical issues, this is quite uncommon in the Global South or the MENA region. Here research is often conducted without thinking about ethical issues. Therefore, how can we make sure

that research is conducted with an ethical perspective, when being in the field? When it comes to language barriers, power imbalances and dependencies, built on hope to get an advantage, ethics should be an addressed topic. How can be ensured that people know what they are signing? How can be ensured that everyone involved is aware of the impact the study might have and can deliberately agree or disagree to participate?

## Participation

*“Participation is a process through which stakeholders influence and share control over development initiatives and the decisions and resources which affect them. There is significant evidence that participation can, in many circumstances improve the quality, effectiveness and sustainability of projects, and strengthen ownership and commitment of government and stakeholders.” (The World Bank 1994)*

*“In some instances, community participation is not a genuine attempt to empower communities to choose development options freely, but is rather an attempt to sell preconceived proposals. Participation processes often begin only after projects have already been designed. The process is not an attempt to ascertain the outcome and priorities, but rather to gain acceptance for an already assembled package.” (Botes 2000, p. 43)*

Research on Human Computer Interaction is in its nature focusing on the human a design is made for – be it Human-Centered-Design (B.-N.Sanders 2002), Participatory Design (Winschiers 2006) or Grounded Design (Rohde et al. 2017). The amount of involvement of users or stakeholders from the field may vary drastically from project to project, hence the term participation should be used carefully (Ho et al. 2009). So, what does participation actually mean in contexts that are framed by political instability, skepticism against “the West” and power imbalances? Methodologies are usually established in the western hemisphere and root in potentially different socio-cultural contexts of the global south. There is strong critique on usage and also implementation of “participatory” approaches, going as far as denouncing participation as “tyranny”, as power relations between researcher from the west and researched from the global south are skewed (Kothari 2001). It therefore needs to be reflected if data gained in such constellations can be valid and true or might be influenced by those power relations. Moreover, the question of how to guarantee genuine participation, needs to be considered as well.

Restrictive politics, peer-pressure and cultural tensions can complicate research endeavors even more.

We understand participation in ethnographic fieldwork as non-trivial, as informants need to be involved in actual design and decision-making processes as well as being equivalent companions who take an active part in the ethnographic process and not simply function as gatekeepers, translators or sources of wisdom and expertise.

## Workshop Goal

Together, we want to rethink existing approaches and start working on guidelines, that better serves the needs of such specific circumstances. As approaches, experiences and challenges differ, we aim to find a common ground, based on the shared experiences from the field. In addition to guidelines we aim to formulate during the workshop, we want to give participants the opportunity to connect and collaboratively work further on the discussed topics.

## Organizers

Sarah Rüller (main contact) is a PhD student and research associate at the Institute for Information Systems and New Media, University of Siegen. Her current research focuses on Computer Clubs and computer-supported project-based learning with Imazighen (indigenous inhabitants of Morocco) in the High Atlas.

Konstantin Aal is a PhD student and a research associate at the Institute for Information Systems and New Media, University of Siegen. He is part of come\_IN, a research project which founded several computer clubs for children and their relatives including refugees. His current research focuses on technology appropriation by local communities in the Global South.

Marios Mouratidis is a PhD student and a research associate at the chair of Computers-supported Cooperative Work and Social Media, University of Siegen. His research focuses on participation, maker methodologies, digital fabrication and innovation in Germany and Palestine.

Dave Randall is a senior professor at the Institute for Information Systems and New Media at the University of Siegen. His research interests center on the use of ethnographic methods in technology-related fields, mainly for design and evaluation purposes. He has published extensively in this area. A specific interest lies in understanding the uses of new technology by less-well understood groups and communities and he has supported the work of researchers in areas like Colombia, Brazil, Bosnia-Herzegovina, Palestine and North Africa. He is the author of seven books and over 100 peer reviewed papers.

Volker Wulf is a computer scientist with an interest in the area of IT system design in real-world contexts, this includes the development of innovative applications from the areas of cooperation systems, knowledge management and community support. One special focus lies on flexible software architecture which can be adapted by end-users. Further research focuses on methods of user-oriented software development and introduction processes. He is head of the Institute for Information Systems and New Media at the University of Siegen.

Nina Boulus-Rødje is an Associate Professor in the Sustainable Digitalization Research Group at Roskilde University (Denmark). Throughout her career, she has carried out qualitative research, studying digitalization processes across various organizations and sectors. This includes, case handling systems in employment agencies in Denmark, e-voting technologies in Denmark, as well as electronic patient records in Canada and in Norway. She is also interested in the potentials of information technologies in conflict and post-conflict context. In the past seven years, she has carried out research in Palestine, focusing on the tech-entrepreneurial scene. With a strong interest in studying technologies and work practice, she is equally interested in methodologies used for studying these. She has written several articles about various forms of engaged scholarship and interventionist research.

Bryan Semaan is an Assistant Professor in the School of Information Studies at Syracuse University, where he is a founding member of the Behavior, Information, Technology, and Society (BITS) Laboratory. The overarching goal of his research is to examine the role of Information and Communication Technologies (ICTs) in enabling resilience amongst people immersed in challenging contexts (e.g. LGBTQ-identifying individuals “coming out”, veterans seeking mental health care, and people forming a political identity).

Each of the organizers has a long history of conducting ethnographic work in the Western and non-Western world, and in particular has experienced challenges and struggles in applying Western methods to non-Western contexts. Through the exchange of these experiences between the various co-organizers, this workshop was initiated. Every organizer will present his or her own position about the Western/non-Western dichotomy during the introduction of the workshop to start the discussion and open the floor for the participants.

## Pre-Workshop Plans

The workshop will be promoted through a new website that will communicate the aims and structure of the upcoming event, and subsequently present its outcomes. By spreading the websites through a broad variety of mailing lists as well as personal contacts, the workshop will reach researchers, activists and practitioners. Candidates will be required to submit a position paper discussing their current, previous or planned work. These papers can be in immediate relation to ethnography, participation or methodological approaches in the non-Western world

or they can be an example of work which was challenging with regard to the mentioned topics. We envisage a maximum of 10 participants (without the organizers), who will be selected based on the relevance and potential contribution of their position paper to the workshop topic and activities. The quite small number of participants will ensure a relaxed and safe environment to talk about sensitive topics.

## Workshop Plan

We plan to hold an interactive workshop, during which the participants will mostly work on different tasks and questions instead of just presenting their previous and current work. The workshop will begin with an ice-breaker and short introductions before the morning coffee break. Following the morning coffee and lunch breaks, participants will work in small groups, formed based on their position papers and research interests. The aim is to share experiences and identify common aspects and workarounds of messiness in ethnographic work. Participants are invited to critique and rethink current concepts, methods and frameworks of ethnographic fieldwork that do not serve research in the non-Western world. The outcome from the group sessions will be shared in a plenary after the afternoon coffee break, with a view to formulating more viable and practical guidelines for ethnographic fieldwork with a focus on participation and ethics. The workshop will conclude with a plenary discussion of future plans for a collaboration on the further development of these guidelines.

### Timetable

|             |  |
|-------------|--|
| 09:00-09:15 | Welcome  |
| 09:15-10:00 | Icebreaker and short presentation of participants  |
| 10:00-10:30 | Coffee break   |
| 10:30-12:00 | Identifying and discussing issues of methodological approaches, ethics and participation in small groups |
| 12:00-13:30 | Lunch  |
| 13:30-15:00 | Formulating practical guidelines in small groups   |
| 15:00-15:30 | Coffee break   |
| 15:30-17:00 | Presentation and discussion of the formulated approaches/guidelines                                      |
| 17:00-17.15 | Closing of the day and future plans  |



## Post-Workshop Plan

All the notes, documentation and other materials that are created during the discussions will be shared amongst the workshop participants and revised, prior to being uploaded to the workshop website. For further discussions on the topic, a journal special issue will be prepared, which will present the outcomes of the workshop and provide the opportunity for others to join the discussion (the journal is not yet specified). Follow-up workshops on other conferences will help this newly formed collaboration to continue, through discussions and new initiatives, thereby encouraging more researchers to reflect upon their own challenges they come across when conducting ethnographic field work. In addition, the workshop participants should become part of an exchange group which should serve as a support line when help is needed dealing with an uncommon situation.

## Call for Participation

This one-day workshop aims to provide a forum for researchers as well as practitioners and activists to discuss challenges in conducting ethnographic fieldwork by the book(s) and to start working on guidelines that are more practical and viable to adapt in non-Western contexts. The topics include but are not limited to research and design ethics and genuine participation of ‘users’ as partners in conducting research, designing and implementing interventions (be it social, cultural or technical). This will be used to inform new guidelines and approaches to ethnographic fieldwork that could prove more beneficial in politically charged, infrastructural challenged and underfunded regions.

We invite anyone interested in participating to submit a two to four-page position paper. Papers should critically reflect upon the authors’ experiences from the field or research area related to challenges they face when conducting ethnographic field work. Authors’ prior experience does not have to be specifically concerned with these challenges, but the position papers will be expected to demonstrate how their experience is relevant to the workshop’s topic and can be applied within the workshops’ context.

Submissions should be sent to [sarah.rueller@uni-siegen.de](mailto:sarah.rueller@uni-siegen.de) in .pdf format. Position papers will be reviewed based on relevance and potential for contribution to the workshop. At least one co-author of each accepted paper must register to the ECSCW 2020 conference to attend the workshop.

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# Learning for life: Designing for sustainability of tech-learning networks of older adults

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**Abstract.** In today's complex society we need to learn on a daily basis during our whole life, especially when it comes to new digital tools on which our lives are increasingly more dependent. However, the way digital tools are designed is not well adjusted to learning how to use these tools in the later part of life. As a result, many older adults struggle with the integration of digital tools into their daily lives. Recently, older adults started to be involved in design through sustainable participatory approaches. However, this group is very heterogeneous and characterised by varied needs that have to be addressed with a fitting approach that is currently missing in E/CSCW and participatory design. In this workshop we therefore want to bring together different disciplines to develop new approaches that will help us to design for sustainable tech-learning networks of older adults.

## Background

*“Non scholae, sed vitae discendum est”*

Annaeus Seneca, Lucius. Epistulae morales ad Lucilium, CVI.

We must learn not for school but for life: an old latin proverb points to the importance of gaining knowledge which we should use not only within the given educational context but mainly during our regular daily life. Learning for life or life-learning can be described as any learning taking place through daily living. Life-learning is more than training or continuing education (Fischer, 2000). It differs from formal learning, which is organized in specific educational institutions, and non-formal learning, where learning is organized outside of formal educational organizations (Findsen & Formosa, 2011). As Lave and Wenger (1991) have pointed out, life-learning is rather about developing the ability to participate in activities connected to a specific community of practice. People within such a community learn by mutually interacting with each other as well as with the given socio-material environment, the tools and the resources that the community uses (Lave, 1991). This view on learning however considers only people and hence communities which are quite homogenous. Fischer (2001) suggests that learning also takes place when people from different communities of practice get involved in common activities. Furthermore, people can also learn not only when being connected by deeper connections as they might be within communities of practice or interests but even by weaker connections within networks (Brown & Duguid, 2017). However, these kinds of connections are more difficult to sustain than in traditional communities of practice. The "group" of older adults is initially held together only by age and is extremely heterogeneous, e.g. in terms of social class, education or technical skills. Therefore, we consider the activities of life-learning of older adults as such a network of older adults. Networks from which communities (of practices or interests) can grow.

## Older adults' technology appropriation

Life-learning during the whole life becomes especially essential today, when the daily life in global society is becoming highly complex, and in turn also requires its members to continually adapt on a daily basis. This is especially true in relation to new digital tools on which our lives are increasingly more dependent. Digital tools hold promising benefits for increasing the quality of life of older adults (Kolland 2014). However, many barriers exist for a successful appropriation of technology, such as usability problems and lacking understanding of needs and preferences of this group (Czaja & Lee 2007). For digital tools to become everyday means to support the wellbeing of older people, it is necessary to open the discussion and research on usage barriers beyond the description of failures in the design of IT products and in requirement analysis. Many older adults struggle with the appropriation of digital tools that could or should support their daily lives. Successful appropriation is influenced by a number of factors, starting with the motivation to engage with technology, the actual use of technology or possibility to get support by relevant stakeholders.

Older adults are not averse to the use of technology per se, but rather to the claim that technology automatically generates a meaningful added value for their lives. Older adults tend to be critical of technology if they do not see the importance of technology in their everyday lives. However, if they see concrete possibilities for its use, their attitude can change and can become motivated to use technology to support their everyday lives (Bengs et al., 2018). Language barriers due to technical and/or English terms can make it difficult to use digital tools. This presents hurdles, especially for people with little technical experience or who do not speak English (Müller et al., 2015). Concerns and fears also inhibit trial and error learning, such as lack of trust and the fear of undesirable costs caused by the use of digital tools and related support services (Müller et al., 2015).

## Older adults in practice-based and PD approaches

These circumstances are already being addressed by E/CSCW, practice-based and participatory design approaches. By including concrete usage contexts and involving potential older users in the design process, the aim is to achieve a better fit of digital tools, increased usability and better appropriation (Wulf et al., 2015). Design studies have shown that the low-threshold examination of commercially available technology, which is oriented towards the everyday practices of the older participants, can create common spaces for imagination, where possible uses can then be imagined (Müller & Wan, 2018).

That the appropriation of digital tools and participation and influence in learning processes can be mutually dependent has already been demonstrated in design contexts by Joshi and Bratteteig (2016). If a person feels comfortable using a technical tool and can apply it effortlessly, it enables her to understand and master technical proposals and decisions in participatory design contexts. Understanding and learning in PD projects are important for the successful participation of older people in addition to the appropriation of digital tools. Appropriation of digital devices creates a basis for participation and influence in decision-making. The

successful mastery of processes, in turn, opens up an expanded scope of design that supports the appropriation of technology (Joshi & Bratteteig, 2016).

Applied to the conception of learning spaces for the appropriation of technology, this means that not only the appropriation of technology, but also the ownership of learning processes or the possibility of influencing the learning setting must be considered in order to support the appropriation of digital tools. This results in a demand for novel and participative learning arrangements that not only support older people in the appropriation but also involve them in the design of the learning space. However, this requires not only digital literacy, but also a form of learning process literacy to be addressed.

### Interdisciplinary approach to older adults' technology appropriation

As mentioned before, the group of older adults is not homogenous; on the contrary, older adults have very different (not only learning) needs. Hence, supporting learning for life of older adults is a multifaceted challenge that cannot be solved by one discipline only. For researching questions on how to support older adults' quality of life with and without digital technologies, it is worthwhile to bring together scholars from disciplines such as gerontology, anthropology, sociology of later life, special education, social work, care sciences and user-oriented IT research (e.g. in the field of "ambient assisted living"). Fostering interdisciplinary approaches for developing concepts and methods which aim at designing sustainable and meaningful learning spaces for older adults thus seems to be a helpful solution in order to overcome a preoccupation which is predominantly top-down and technology-centric. Recent literature in Science and Technology Studies, but also in CSCW and HCI is criticizing the majority of IT research approaches in the ageing domain for neglecting interpersonal and everyday social aspects in technology-mediated relationships (Toombs et al. 2018). Social and critical gerontology provides important knowledge in regard to e.g. images of age and ageing, of how the heterogeneity of the ageing population may be better addressed when designing interventions (Wahl & Oswald 2016; Wanka & Gallistl 2018). Special education provides perspectives on the specificities of later life learning (Korjonen-Kuusipuro et al. 2019) and qualitative sociology and STS provide knowledge on how to understand interactions with digital technology against the background of a diversity of older adults' life worlds (Kolland 2014). Also, it is worthwhile to consult approaches in care sciences, especially community-based research, especially in regard to "caring communities". Here the cooperation and interaction processes of different local actor groups (the older adults, their social networks, informal and formal care providers, communal actors and others) are of interest and solutions are being sought for on a local level to develop new models of care and for ageing and wellbeing at home. The role which technology may play or not is also an important question which is under investigation and by this, the question of how to support long-term community-based caring and learning relationships among the different actors (Müller et al. 2019).

Recent research on digital tools appropriation by older adults emphasizes that digital tools uptake and appropriation are spanned up in different discourses and tensions between micro- and macro levels (Thimm, 2013). Many of the above

presented studies focus only on the local, interactional level such as an older adult teaching another older adult how to use a specific digital tool. However, the problem of supporting learning for life of older adults is impacted not only by the local level, but also by a meso level (how communities and networks are organized) or even the macro level (national policies, funding strategies, surveys, etc.). To be able to solve the problem of supporting life-learning of older adults in tech-learning networks, we need to attend this problem on all these levels.

Hence, we want to draw on the sustainable participatory approach and complement it by approaches from various disciplines to understand the problem of older adults' life-learning on these three different levels. In this workshop, we are therefore interested in how we can understand supporting learning for life of older adults in tech-learning networks as an interdisciplinary problem that requires a sustainable participatory approach. Our workshop is another step in our continuous work focusing on the issue of aging and life-learning from various disciplinary approaches. This is already a 3rd workshop but this time we want to open up and go more in the direction of the relationships between socio-technical environments, caring communities/networks of practices and life-long learning.

## Workshop Goals and Activities

ECSCW and related participatory design approaches have a long history of collaboration with different disciplines. Our workshop hence addresses the issues of how we can better understand and support learning for life of tech-communities of older adults from an interdisciplinary perspective in the context of sustainable participatory design. The workshop participants will therefore have an opportunity to learn about the challenges and opportunities related to learning for life of tech-communities of older adults in the context of sustainable participatory design as well as to reflect over their own disciplinary position in relation to this topic.

Our goal is to discuss the following questions:

- How can we develop theoretical grounds of PD when in interdisciplinary discussion in relation to supporting learning of older adults?
  - Are there concepts from other disciplines that we could adopt?
  - Are there PD concepts that could be extended by other disciplinary approaches?
  - Is it possible to synthesize some of the concepts?
- What is to be done on micro-meso-macro level to support life learning of older adults?
  - A lot of work has been done on the micro level in ECSCW, who is in charge of the meso-macro level?
  - How to create support of older adults' life learning in a sustainable way?
  - How to tackle the tensions between the different levels?
- How do we attend the learning needs of such a heterogeneous group?



- How can these needs be approached through an interdisciplinary effort?
- Which approaches do we need that can attend the individual needs of older adults?
- How can we think more specifically of provision of adequate learning support & infrastructure for people with various needs and/or in relation to concepts of “caring communities”

The workshop is planned as a one day workshop. Prior to the workshop, the position papers will be distributed among the participants and they will be prompted to read them. In addition, an online document will be shared among the workshop participants, with the updated structure of the workshop. This document will be also used during the workshop to collect written insights or pictures. The workshop is planned to be highly interactive, so that the workshop participants can fully engage in discussion with each other.

First, the organizers of the workshop will introduce the theme of the workshop and themselves. Second, each position paper will be introduced in a short pitch. The purpose of this section is to remind the workshop participants of the papers’ content as well as familiarize themselves with the other workshop participants. In the next step, we will divide the workshop participants into three groups. Each group will start at a table assigned to one level (micro-meso-macro), where they will discuss the particular level. The participants will document the results of each discussion in the form of bullet points written on post-it notes. After a specific time, the groups will rotate, ensuring that each group is able to discuss each of the topics. After the lunch, the organizers will collect the post-it notes with bullet points and place them on a wall. We will then discuss the main workshop questions in relation to the results from the world coffee discussion. The discussion will be documented by one of the organizers by writing notes in the shared document.

| Time                               | Activity  |
|------------------------------------|---|
| 9:00 - 09:10                       | Introduction to the workshop  |
| 9:10 - 10:30                       | Short pitches of each participant’s position paper  |
| 10:30 - 12:00<br>(including break) | Theme generation as a world coffee<br>We will collaboratively generate a range of themes in relation to the three levels we want to understand.<br>During this activity, the participants will be divided into three groups. Each group will start at a table assigned to one level (micro-meso-macro). After a certain time, the groups will rotate. |
| 12:00 - 13:00                      | Lunch break   |

|                                    |  |
|------------------------------------|--|
| 13:00 - 15:00<br>(including break) | Synthesis<br>During this activity we will try to answer our questions based on the generated themes. |
| 15:00 - 16:00                      | Future plans<br>During this activity we will summarize our workshop and discuss what the next steps. |

## Submission details

To be able to participate in the workshop, participants will be asked to submit a position paper. The position paper should be max 5 pages including references. We encourage the authors to address the workshop themes in their position papers and enrich the discussion by introducing new theoretical or philosophical frameworks and perspectives, empirical examples or methodological reflections. The position papers will be submitted through email. The review process will be shared by the workshop organizers. The submissions will be reviewed and selected based on their quality, match with the workshop theme and the different disciplinary background.

Upon acceptance of the proposal, we will share a call for the workshop contributions on the 15<sup>th</sup> February 2020. The following deadlines are envisaged:

- 3<sup>rd</sup> April 2020: Submission of position papers;
- 20<sup>th</sup> April 2020: Notification of acceptance;
- 4<sup>h</sup> May 2020: Camera-ready

Notification of acceptance will be sent in time to allow participants to organise travel to the conference and to avail of early registration rates. The submissions will be reviewed by the organisers.

Concerning publication plans, we will arrange a publication of the position papers in an issue of the International Reports of Social-Informatics (IIRSI) series from the International Institute of Socio-Informatics (IISI) in Bonn, Germany. After the workshop, we plan to initiate a joint text based on the results of the workshop together with the participants who wish to participate.

## Organisers' Short Bio

**Katerina Cerna, PhD**, is a postdoctoral researcher in ACCESS project (<http://access.wineme.fb5.uni-siegen.de/>). She has an interdisciplinary background in sociology, educational sciences, and design-oriented disciplines. Her research interest concerns how to design digital tools and environments so that they support learning and how professional knowing changes in the context of design and use of such tools.

**Martin Dickel** (M.A. in Social Science) is a member of the Collaborative Research Centre “Media of Cooperation” at the University of Siegen (<https://www.mediacoop.uni-siegen.de/en/>). As a research assistant in the CRC subproject "The Cooperative Creation of User Autonomy in the Context of the Ageing Society" he is interested in the question of how, on the basis of a community-based participatory design approach, older adults can be involved in technology development and how sustainable appropriation infrastructures can be created.

**Claudia Müller, PhD**, is an Assistant Professor for “IT for the Ageing Society” in the Institute of Information Systems and New Media at the University of Siegen and Professor at Careum University Health, Zurich. She follows a praxeological and participatory design approach for assistive technologies for older people ([www.inclusive-ageing.com](http://www.inclusive-ageing.com)). Her projects aim at the support and enhancement of social inclusion, mobility and autonomy of elderly people in order to strengthen quality of life and health status in higher age. She is a collaborator in the Siegen PraxLabs approach ([www.praxlabs.de](http://www.praxlabs.de)), which is based on a praxeological and participatory research paradigm. She is also deputy chairwoman of the expert commission of the Eighth Senior Citizens' Report (Altenbericht) of the German Federal Government, a member of the working group “Alter & Technik” (Age & Technology) of the German Society of Gerontology and Geriatrics e.V. as well as the Interdisciplinary Gerontological Research Network (GeNeSi) of the Research Center “FoKos” at the University of Siegen (<https://www.uni-siegen.de/fokos/>).

**Eija Kärnä, PhD**, works as a professor in Special Education in the Faculty of Philosophy, School of Educational Sciences and Psychology, University of Eastern Finland. During her career she conducted several multidisciplinary research with researchers from several fields of science (e.g. linguistics, psychology, nursing science, computer science). Her research interests have been particularly in communication and interaction of individuals with severe developmental disabilities and autism spectrum disorders and technology for individuals with special needs.

**Vera Gallistl**, (M.A. in Sociology) is a university assistant and PhD student in the Department of Sociology at the University of Vienna. She is a PhD fellow at the COST-Action ROSEnet - Reducing Old Age Social Exclusion: Collaboration in Research and Policy and a student member of the international research network Aging + Communication + Technologies (ACT). National and international research projects she is involved in at the moment focus on older artists, old-age social exclusion, living arrangements and the digitalization of later life.

**Verena Reuter**, (M.A. in Sociology) has been a research assistant at the Institute for Gerontology at the TU Dortmund University since 2012. Her work focuses on, among other things, counselling and care services for people with dementia and their caring relatives, participative research approaches in the development of

(technical) services and support structures appropriate for the elderly, ethical and social aspects of human-technology interaction in care.

**Franz Kolland, PhD**, is an expert in elderly education, culture of old age and use of new technologies. Ao. Univ.-Prof. Dr. Franz Kolland researches and teaches at the Institute of Sociology of the University of Vienna. He wrote numerous publications (monographs, contributions in commemorative publications or in scientific journals) in the field of education of older people. He is an honorary professor of Gerontology at the Karl Landsteiner University in Krems, Austria, and head of the research unit “Gerontology and Health Research”.

**Roberta Bevilacqua, PhD**, Scientific Direction, IRCCS-INRCA, Ancona, Italy. She has been working at INRCA since 2008, for several European projects. She has worked as also at the Università Politecnica delle Marche from 2012 to 2016, during which she has participated in the national project “Design for All”.

**Heidi Kaspar, PhD**, is a social and health geographer and has been working in the research department of Careum School of Health, Kalaidos University of Applied Sciences since 2016 in the fields of aging and transnational health care. Heidi Kaspar's research interests include patient mobility, care work, socio-techno-material interactions and feminist theory.

**Ulrich Otto, PhD**, was Head of Careum Research from 2014-2019 (since 2019 Careum University of Applied Sciences Health, Research Division). Since 2014 he has been developing the Ageing at Home research programme. His main areas of research: Co-production in the welfare mix, ageing research (social gerontology), social network and support research, innovative forms of residential care, communal forms of housing, interaction of social and technical assistance for older people.

**Gerhard Naegele, PhD**, received professional training as an industrial manager in Berlin. He has a background in business studies and education, and he earned his PhD from the University of Cologne. He was University Professor (Chair) for Social Gerontology (1992–2013) and Director of the Institute of Gerontology (1992-2016) at the TU/Technical University of Dortmund, Germany. Since January 2017, Gerhard Naegele has been doing freelance work as an independent researcher and policy advisor.

## Recruitment and participants selection

To be able to engage with a range of different disciplines, we expect to involve a maximum of 10 papers and 15 participants, excluding the organizers. To recruit participants we will send a call for position papers to all relevant email lists, such as CSCW and HCI, but also more interdisciplinary mailing lists, such as feminist geography, Ageing in Europe, a+ (aging Network in Switzerland), Health

Geography, Participative Health Research (PartNet), STS, Medical Anthropology (Switzerland), and Research Network “Ageing in Europe” of the European Sociological Association. In addition, we will also use the website of the Research Committee on Ageing of the International Sociological Association to spread information about our workshop. Furthermore, we will share the call with partners involved in the EU projects as recruiting means to also involve partners from different disciplines. In addition, we will create a website (<http://bit.ly/39a2RP9>) and use it to inform possible participants through our other networks. We will select our participants if their interests presented in a position paper overlap with our interests presented in this text. In addition, we will try choosing participants across different disciplines to ensure an interdisciplinary approach.

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The project “ACCESS – Supporting digital literacy and appropriation of ICT by older people” is funded by the “Joint Programming Initiative “More Years, Better Lives – The Potential and Challenges of Demographic Change” (JPI MYBL). JPI MYBL is supported by J-Age II. J-Age II is funded by Horizon 2020, the EU Framework Programme for Research and Innovation.

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# Datafication and cultural heritage: provocations, threats, and design opportunities.

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**Abstract.** Increasing digitization and the emergence of new data sharing practices are likely to change how our understanding of history is negotiated. The curation of data is always culturally and ideologically inflected. Accordingly, archiving practices are not only fundamental for our understanding of the past but vital in navigating the present. We have to pay particular attention to the consequences of the interfaces that curate history, especially in relation to big data.

Crowdsourcing, social media, linked open data, and other participatory and open science practices challenge the archiving practices in cultural heritage institutions due to the character of the networked publics involved and the established structures between and within institutions. However, they also open up new opportunities and practices when it comes to understanding and defining our shared culture.

In this workshop we will bring together researchers who have studied these issues or are working to develop critical perspectives on archiving practices.

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## Background

The digitization of cultural heritage, increased datafication in all areas of society, and new infrastructures for sharing data within research and with the wider public are likely to change our views of the production of history. Participatory practices such as citizen science are, for example, enabled and further developed in projects that includes a broad public in crowdsourcing projects (Borowiecki, Forbes, & Fresa, 2016; Cameron, Kenderdine, 2007; Cerratto Pargman, Joshi and Wehn, 2019; Manzo, Kaufman, Punjasthitkul, & Flanagan, 2015). Digitization entails an increased datafication and development of data-driven practices in diverse societal sectors, which results in more and more human activities being monitored, analyzed, quantified, archived, classified, and linked to other data (Boyd & Crawford, 2012; Lyon, 2014).

Easier access to large-scale and linked datasets have opened up new possibilities to explore and create value from data and have enabled the development of more evidence-based quantitative scientific practices. This quantitative turn has influenced new research fields such as digital humanities, digital social science, e-learning, e-business, learning analytics, etc., where access, storage, and analysis of data drives the development of new infrastructures and methodologies. This creates changes not only at the level of data techniques and methods but also for researchers' practices. For instance, some of these changes include increased standardization, development of shared infrastructures, and direct publication of research data, which changes the preconditions for research not only in the natural sciences but also in the humanities (Borgman et al., 2012; Carusi & Jirotko, 2009; De La Flor et al., 2010; Ribes & Lee, 2010; Schroeder, 2008).

Increasing datafication of research practices and their infrastructure create opportunities to nurture an open research culture, enabling researchers to share their results through open access (Kidwell et al., 2016; Nosek et al., 2015; Roche et al., 2014).

Datafication and increased measurement practices are also reflected in areas such as education (Biesta, 2015), journalism (Coddington, 2015), and politics (Milan & Velden, 2016). Such practices are not only possible through the access, storage, and analysis of people's data but via the tools for gathering and analyzing data. The proliferation of results is democratized through easily accessible infrastructures of people, survey tools, opinion polls and petitions, visualization, and dissemination to the public. This scientification, in which research methods are increasingly developed and integrated with everyday working practices, also creates expanded demands for a digital literacy. Not only is it necessary to understand how information is created and disseminated (boyd, 2011), but it is also necessary to foster deeper insights into research methodologies and archiving processes.

The critics of datafication claim that the belief in quantification poses dangers. For example, transparency decreases (it is often unclear on what grounds the data have been curated) (Andrejevic, 2014; Boyd, 2012; Bunnik et al., 2016; Driscoll & Walker, 2014), important values are lost if they are not easy to compile as numbers, and threats to personal integrity increase as data collections are disseminated, linked, and combined (Schradié, 2011).

Efforts to generate, collect, identify, and classify data and data collections risk obscuring the multifaced work practices around history production, including reward structures, authority structures, formalization of knowledge, interdependencies among groups, trust mechanisms, and the transitional quality of data collections (Borgman, 2012). Datafication can also be seen as an increased commodification of various aspects of human practices, especially due to the datafication of our life-worlds. People's opportunities to express themselves and organize themselves through the use of social media also contributes to new forms of surveillance and sources for consumer research (Hansson et al., 2018).

In the context of the humanities, there are critics who think that the qualitatively founded criticality that is at the core of contemporary research in the humanities is threatened and downplayed by, for example, politically controlled funding (Belfiore & Upchurch, 2013). Also, the majority of crowdsourcing and open science projects are within the realm of the natural sciences and areas where data is easy to quantify (Burke, 2012; De León, 2015). In the humanities, scientific processes are often different, and they demand other considerations. Research in the humanities is more about creating heterogeneity and differences than collaborating around one shared common goal (Anderson & Blanke, 2015).

Furthermore, critics have pointed out that when archiving practices are distributed and maintained broadly over diverse sectors and groups in society, enabling a multifaced and fragmented notion of history, cultural heritage institutions might need to reevaluated their role in society (Fredheim, 2018).

However, the developers of infrastructure and the critics rarely meet. Few academic studies or commercial design processes take criticism seriously by developing practices and tools that combine qualitative and quantitative approaches in a self-reflexive way.

Furthermore, while areas such as e-research, cyberinfrastructure, and crowdsourcing, are generally well covered by the ECSCW community, the intersection between these areas and the increasing digitalization processes and datafication in the humanities is less explored.

In this workshop we bring together researchers from HCI and CSCW who have studied these issues or are working to develop critical perspectives on technology, design, and research practices. We particularly welcome empirically-based

research that looks into digitizing and digitalization processes in cultural heritage institutions. We also welcome theoretical contributions that put research practice into a philosophical and historical context while also questioning established norms of what constitutes cultural heritage.

## Suggested topics and inquiries for the workshop

In this workshop we are inviting 10–15 researchers to discuss common issues. Topics and inquiries for the workshop can for example be:

*The transformation of cultural heritage institutions in the age of datafication:*

- How do we make sense of the complex network of systems, information, people, values, theories, histories, ideologies, and aesthetics underlying various types of archiving practices? What are the design challenges?
- What happens when data structures become central for how a cultural heritage institution operates? What are the unintended consequences?
- How are critical archiving practices supported in cultural heritage institutions?
  - What are the cultural and ideological aspects of data curation?
  - How do we adopt intersectional perspectives in classification systems?

*Quantification of research practices:*

- What are the crucial design decisions when developing sharing platforms for research in the humanities? What are the opportunities and new practices in relation to understanding and sharing culture?
- How do we navigate infrastructures, rewards structures, and social structures when designing systems that help preserve and share the cultural heritage?
- What are the consequences and opportunities when using crowdsourcing, usually developed for micro tasks, in more qualitative research practices?

*Participation in archiving practices:*

- How is participation constructed and enacted in citizen science and crowdsourcing practices? How is participation constrained, for example, by infrastructural arrangements, technological affordances and social norms?
- What are the implications for transparency, surveillance, and trust when designing for participation in the development of the cultural heritage sector?
- What are the coping strategies and resistance to or appropriation of datafication?

- What are the tactics, structures and normative foundations necessary for supporting participatory metadata practices? What are the challenges? How do we negotiate standardization versus complexity when developing metadata practices?
- What are the implications of the (lack of) transparency and accountability of data practices in different sectors? What are the challenges this poses for users' data literacy?
- What are the new asymmetries and power relations that data practices may bring between memory institutions and audiences, or between different segments of audiences?

We are especially interested in bringing together researchers and practitioners working with digitizing and digitalization processes.

## Description of the workshop activities

This one-day workshop will explore the topics through prototyping and brainstorming sessions. The workshop is divided into two sessions. The first half consists of participant presentations of their research topics. The second half will be a brainstorming session where the topics of the workshop are further explored through collaborative prototyping.

In human-computer interaction (HCI) design we are used to co-design methods such as sketches, prototypes, cases and scenarios to achieve a more informed design, grounded in the reality of potential users. Artistic techniques are also used to involve participants as informants and co-designers such as probes, scenarios, and role-playing. However, unlike most problem-focused design research, the aim with this workshop is not to use these methods to achieve a more informed design. Instead, we use the design process as a method to collaboratively materialize our own understanding of our research.

Information on the workshop will be disseminated through our website (<https://dataficationandculturalheritage.blogs.dsv.su.se>) and via emailing lists relevant for the ECSCW community as well as a broader interdisciplinary research community. Accepted papers will be circulated beforehand to prepare attendees for discussions at the workshop. Beyond the themes highlighted here by the workshop organizers, other themes for the workshop that emerge from the position papers will be posted on the website. A key discussant, identified among the workshop attendees, will be assigned to each position paper to facilitate interaction and engagement in the workshop. The participants will prepare a 5-minute presentation to be delivered in the introduction of the workshop, but focus will be on developing our ideas through collaborative prototyping.

We will take the workshop as an opportunity to explore future collaboration (e.g., a mailing list and/or collaborative research projects). The results from the workshop may be developed further for a special issue or anthology.

## Organization

The workshop is organized by an interdisciplinary group of researchers from the fields of Human Computer Interaction and Digital Humanities.

**Karin Hansson**, Associate Professor in Computer and Systems Sciences at Stockholm University, has written extensively about technology-based participation from a design perspective. She is currently part of a research project on the development of #MeToo activism in Sweden, and part of the “Metadata culture” research group at Stockholm University.

She has previously organized workshops on CSCW themes such as: The Morphing Organization – Rethinking Groupwork Systems in the Era of Crowdsourcing at ACM GROUP 2014, Sanibel Island, USA; Examining the Essence of the Crowds: Motivations, Roles and Identities at ECSCW 2015, Oslo, Norway; Toward a Typology of Participation in Crowdsourcing at ACM CSCW 2016, San Francisco, USA; Crowd Dynamics: Exploring Conflicts and Contradictions in Crowdsourcing at ACM CHI 2016, San Jose, CA, USA; Ting: Making Publics Through Provocation, Conflict and Appropriation, The 14th Participatory Design Conference 2016, Aarhus, Denmark.

Together with Thomas Ludwig, she recently edited the Special issue: Crowd Dynamics: Conflicts, Contradictions, and Cooperation, The Journal of Collaborative Computing and Work Practices (JCSCW), Volume 28, September 2019. This SI started in a previous workshop at CHI. Right now she is co-editor together with Shaowen Bardzell, Malin Sveningsson, and Teresa Cerratto Pargman on another SI of JCSCW called “Materializing Activism”, which is a result of a workshop with the same title at ECSCW 2019.

**Teresa Cerratto Pargman**, Associate Professor in Human-Computer Interaction (HCI) at the Department of Computer and Systems Sciences at Stockholm University. Her work contributes to the study of how digital technologies and applications reflect and configure socio-material practices and how emerging practices shape the development and design of digital technologies. In particular, she has published on design and appropriation of emerging technologies in the educational sector and on the epistemic, value-laden and social infrastructures, such technologies make possible but also disrupt. She coordinates the research area of Technology-enhanced learning and leads the Critical Computing group at the Department of Computer and Systems Sciences at Stockholm University.

**Anna Dahlgren**, professor of Art History at the Department of Culture and Aesthetics at Stockholm University, has published on different aspects of photography and vernacular visual culture including the digital turn, print culture and archives and museum practices. Right now she is managing the research project Metadata Culture (<http://metadataculture.se>) at Stockholm University, an interdisciplinary research project that investigates and develop methods for obtaining qualified and extensive metadata for images in digitalized cultural heritage collections.

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## Why Do CSCW Insights Lose Out to Management Intuitions?

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**Abstract.** Workplaces in all sectors are experiencing digitalization spurred primarily by increasing access to data and AI. Many initiatives are failing to produce expected outcomes, and are even producing negative outcomes on workplace wellbeing. The insights generated by CSCW researchers seem to have failed to reach their targets: the challenges and opportunities for successful appropriation of technology have rarely been adopted by managers, or they were not articulated in a way that facilitated follow-on success. A failure of academic research to impact the world is a known problem – information systems research is abundant with analysis of the managerial challenges that have not been noted by managers themselves – it has been less discussed among CSCW researchers. In this workshop, we wish to gather researchers and practitioners interested



in identifying ways to better transfer findings ‘from the field’ to the managerial level (as well as to employees and their representatives).

## Theme of the workshop

Three decades ago, Grudin (1988) asked ‘Why CSCW Applications Fail’. He identified three interconnected causes, one of which was the lack of management intuition for CSCW applications:

“a manager with good intuition may quickly get a feel for the user’s experience with a word processor, spreadsheet, or so forth. But a typical CSCW application will be used by a range of user types – people with different backgrounds and job descriptions, all of whom may have to participate in one way or another for the application to succeed. The decision-maker’s intuition will fail when an appreciation of the intricate dynamics of such a situation is missing.” (p. 87)

The main thrust of Grudin’s argument – Grudin’s paradox – is that CSCW applications in work settings tend to redistribute labour in ways the management does not naturally intuit. Their intuitive focus may be on the benefits for one group, and this can lead them failing to understand the increased burden for another. Managers may also fail to recognise the additional work some new systems may imply for them. More generally, Grudin points to the overall complexity of understanding and evaluating CSCW applications.

Researchers in the field of computer supported cooperative work have a long tradition of conducting research in various workplaces, having experienced both the challenges and opportunities for successful adaptations and appropriations of technology and have thus been exploring the intuitive knowledge Grudin writes about. Their research shows that in many respects his observations are right, but need supplementing - failures in delivering expected impact are rarely caused by a lack of intuition on the part of managers alone, but are combined with other concerns. In fact, CSCW research has shown that technology development and implementation require a radically comprehensive approach that includes ethnographic and other forms of in-depth workplace studies in which an enriched ‘intuitive understanding’ is just a part of it (Schmidt & Bannon, 2012).

Since the beginning of CSCW 30 years ago, both technology and organisations have become more complex and intertwined. Furthermore, as cooperative systems have come into play, these relations have become dynamic and flux-like. Indeed, Schmidt (1994) wrote about the open endedness of cooperative work and the contingent and porous organizational boundaries that might result. His insight is clearly right.

Besides, while Rossitto and Lampinen (2018) note that “CSCW research has a history of contending with the problems of managerial structures and the digitalization of the workplace” the bulk of these works concern themselves with systems before what has come to be known as the ‘third wave’ (Harrison et al., 2011; Rogers, 2012). Indeed, the emergence in continental Europe of the term

Industry 4.0 points towards yet further change in the kinds of technology affecting change in organisational contexts (c.f. Ludwig et al., 2018; Wurhofer et al., 2015).

All the more surprising then, that indeed, the field of workplace studies that might have examined the changing landscape of technology and change in industry has been rather neglected in CSCW over the last fifteen years (Lewkowicz and Liron, 2019; Meneweger et al., 2018).

Taken as a whole, these changes underline the challenge for CSCW researchers to both understand the changing workplaces and aim to improve technology “while attending to and perhaps improving the conditions for work” (Holten Møller et al., 2017). This is all the more critical given “the remarkably enduring importance of workplace stress [...] and the role of [information systems] in contributing to that”, as emphasized by Tarafdar et al. (2017, p. 27).

Although there has always been a debate surrounding methodological approaches in CSCW, as well as insights into the specific challenges posed by large-scale systems, it is clear that much of the recent wave of papers is united in a call for new research approaches, summarised by Wulf et al. (2015) as that the “agenda we support here is one which moves us away from the ‘small scale’.” In a similar vein, Monteiro et al. (2013) see a need to move from what they consider localist studies towards large scale infrastructures, and in doing so re-conceptualizing the role and nature of design. Jackson et al. (2014) argue that “better attention to the mutually constitutive relations between design, practice and policy can expand the reach, depth, and impact of CSCW scholarship.” Similarly, Fitzpatrick and Ellingsen (2012) suggest that CSCW researchers should broaden their research and “increasingly pay attention to the formative stages of the technology – when and where the policies are made as well as the procurement processes”.

Here, we wish to focus on one particular aspect of this wider scope, namely the managers. We paraphrase Wulf et al. (2015) and suggest that we see management as being a relevant backdrop to our concerns. Work should remain in the foreground for CSCW but at the same time we must also acknowledge the challenges facing organisations in general and management in particular. An important body of research converges around the concept of paradox; “*the* phenomena for complex times” as summarised by Fairhurst et al. (2016). In short, they understand paradoxes as persistent contradictory elements, impervious to solution. One example is as an organisation’s need to balance both exploitation and exploration, a capability often defined as ambidexterity. Within paradox studies, Fairhurst et al. (2016) note a number of themes, including tensions, dynamics, power and multiplicity. In addition to this, there is the recent influx of “data-driven” mechanisms in management that tightly couple past forms of managerial intuition with more computational forms of analysis (c.f. Lee et al., 2015).

Many researchers have voiced concerns relating to a gap between the research community and organisational stakeholders, Wulf et al. (2015, p. 2) state that: “We

have an incomplete understanding of the real-world problems entailed in marrying academic and organisational interests.” Indeed, this issue is so complex that it is emerging as a “multi-faceted and ambiguous research field” in its own, according to Skute et al. (2019). Narrowing down on ICT, Schubert et al. (2015) have studied industry collaborations in the field of information systems, and identified a number of archetypes for successful collaboration that can help researchers reflect on their own work.

In particular – with a nod to Grudin’s 1988 notion of management intuition – we wish to address the state of “management intuition” for CSCW today, and how we, as researchers, can strengthen this “intuition”. As has been noted (Lewkowicz and Liron, 2019) researchers may have turned to practice, but this is a turn that in many cases still needs to be taken by the industry as well. Put in a different way by Fitzpatrick and Ellingsen (2012, p. 649):

“we need to find out how our findings are listened to by users, managers, vendors and policy makers. We consider this as quite a practical matter, where we want the different stakeholders to pay attention to our findings and incorporate them in their design, procurement and implementation strategies”.

The importance of leadership and top management support is well established (c.f. Liang et al., 2007). Here, we are more interested in what might be conceived of as how management make sense of technology (c.f. Bansler & Havn, 2006), while acknowledging that this sensemaking is occurring within highly dynamic and fast evolving work settings – sometimes within a single organisation or team. Thus, as pointed out by Lüscher & Lewis (2008), sensemaking is also important for middle managers, as they negotiate the implementation of organisational change.

This discussion on how to reach management has already started in the ECSCW conference, in particular during panels in 2018 in Nancy (“CSCW in Manufacturing Environments: Towards a European Research Agenda”), and in 2019 in Salzburg (“Envisioning Futures of Practice-Centred Computing”), and is also taking place in EUSSET, which shares this goal of finding ways for practice-focused research to reach the top and middle management of organizations and institutions.

In this workshop, we wish to bring together researchers interested in experiences from the field and identify ways to better reach users, managers, vendors and policy makers.

The topics dealt with in this workshop include but are not limited to:

- Theoretical
  - Theorizing management in CSCW – ambidexterity and appropriation?
  - Which concepts and theories defined by the CSCW community can be illustrated as useful for managers / policy makers?
  - Do we need a new conceptual framework to address the new wave of digitization of organizations, and facing the rise of AI?
- Methodological

- How do we get different stakeholders to pay attention to our findings and incorporate them in their design, procurement and implementation strategies?
- Can we formulate Implications for managers in manager's terms?
- Practical
  - Positive experiences from collaborations involving researchers and management
  - Worst experiences: failures in reaching the management

## Workshop activities and goals

**Pre-workshop plan:** The accepted papers will be circulated to prepare the attendees for discussions at the workshop. Beyond the themes highlighted here by the workshop organizers, other themes for the workshop emerging from the position papers will be posted on the website. A key discussant, identified among the workshop attendees, will be assigned to each position paper to facilitate interaction and engagement in the workshop. The participants will prepare a 10-minute presentation to be delivered at the first half of the workshop.

**Post workshop plan:** We plan to consider extended versions of selected contributions for a special issue in the CSCW journal. We also plan to extract practical documents to support the communication and lobbying activities of EUSSET.

## Duration of the workshop

The workshop is planned as a full day event divided into two sessions and will involve additional online activities organized both before and after the workshop. In the first half of the workshop (morning session), participants will briefly present their research on the topics and the discussant will initiate a short discussion by asking 2-3 questions. The second half of the workshop (afternoon) will consist of a brainstorming session where the topics of the workshop are further explored according to the post workshop plan.

## Workshop Organizers

**Lars Rune Christensen** is Associate Professor at the IT University of Copenhagen and has published extensively on the relationships between humans, their practices, and information technology. His ongoing research is on digitalisation in

government and on digital humanitarian efforts directed at increasing access to healthcare for the Rohingya refugees in Bangladesh.

**Ingrid Erickson** is Assistant Professor at the School of Information Studies at Syracuse University. Her research focuses on the future of work, both in the way that mobile devices and ubiquitous digital infrastructures encourage the development of new sociotechnical practices and the adoption of artificial intelligence in enterprise contexts affect workers' autonomy and skill development.

**Richard Harper** has written numerous books on all aspects of the digital and its role in society, including in organisational change. He has worked in Xerox and Microsoft Research and is now director of the Institute for Social Futures at Lancaster University.

**Myriam Lewkowicz** is Full Professor of Informatics at Troyes University of Technology (France), where she heads the teaching program “Management of Information Systems”, and the pluridisciplinary research team Tech-CICO. Her interdisciplinary research involves defining digital technologies to support existing collective practices or to design new collective activities. In 2017, she was elected the next chair of the European Society for Socially Embedded Technologies (EUSSET).

**Gerolf Nauwerck** is a long term IT-strategist and business analyst now on a leave of absence to pursue a PhD in HCI at Uppsala University. His focus is the impact of the digital transformation on employees in the public sector in Sweden.

## Maximum number of participants expected

15

## Means of recruiting and selecting participants

Participants will be recruited through:

- EUSSET mailing list
- CSCW mailing list
- IS mailing lists
- Announcements on twitter and similar channels
- Workshop website

A workshop website will be created and updated until the closing of the workshop.

Participants will be selected based on their position paper submissions (up to 4 pages in length using the ECSCW Exploratory paper format). The selection will be made by the workshops' organizers on the basis of their interest, compliance with the workshop themes, and the extent (and diversity) of their backgrounds.

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# Fostering Accessibility at the Workplace through Community-based Participatory Research

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**Abstract.** This workshop sets out to provide a forum for discussing the potential of community-based participatory research (CBPR) to foster accessibility at the workplace. It aims at opening a space to engage people with and without disability in a discussion about how this approach can contribute to bring employees, employers, developers and researchers together for the elaboration of a sensitisation concept to make people aware

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of the relevance of developing and adopting highly accessible digital solutions for the workplace. In particular, it focuses on the potential of the approach to engage people with disability in research, development and, most importantly, in the job market. Ultimately, the workshop seeks to advance the discussion of how this type of research can contribute towards the inclusion of people with disability in society and to highlight the benefits of that. The workshop is based on the European CSCW tradition of using in-depth qualitative methodologies for workplace studies and practice-based computing. It addresses issues of cooperation and collaboration between research actors, in the pursuit of a deep understanding of work contexts and the design of socio-technical systems that respond to their emerging needs.

## Introduction

Accessible information and communication technologies (ICTs) can play a very important role in progressive and far-reaching inclusion of people with disability in society. ICTs with a high degree of accessibility not only allow people with disability to socially connect and interact, but also make it possible for them to have access to a variety of services, ranging from education to entertainment (Foley & Ferri, 2012). In 2010, the World Health Organization (WHO) estimated that over 1 billion people around the world experienced some sort of disability (WHO, 2011). Just as an example, recent studies suggest that the German population has more than 145,000 blind and circa 500,000 visually impaired people (Winkelmann & Beyer, 2019). Therefore, we argue that research on the design, development and adoption of highly accessible ICTs is a timely topic with substantial social relevance.

Providing the trend towards digitalisation of work processes and the rise of the so-called “Industry 4.0”, it is expected that ICTs will keep dominating the work scene (Kagermann et al., 2013; Monostori, 2014). It is therefore of high relevance to focus on the design and development of highly accessible ICTs, so that people with disability can avail of the opportunity to use such technologies as effectively as people without disability. Here we stress that people with disability should not be excluded from the job market. On the contrary, as current governmental worldwide initiatives have been preaching, it is extremely important to include this group of people in the job market, not only because we have been experiencing a shortage of skilled workers, due to demographic changes, but above all because people with disability can be as productive as their counterparts without disability (WHO, 2011). However, past and current research has shown that there are still barriers to be overcome, especially in regard to making people aware of the potential that people with disability have and the importance that digital technology may have in unleashing it (Blanck et al., 2007). These studies recurrently highlight the high unemployment rate for people with disability;

Grussenmeyer et al. (2017), for example, draw attention to the fact that about 70% of people with visual disability were unemployed in the USA by the time of their study. Therefore, it is of particular relevance to sensitise different sectors of the society of the importance to invest in the design and development of highly accessible digital solutions for the workplace.

Although there are already well-established human-centred methodologies and frameworks for the design and development of digital technologies – as for example User-centred Design (UCD) (ISO, 2018; Sharp et al., 2006), Participatory Design (PD) (Muller & Kuhn, 1993), Usability Engineering (Mayhew, 1998; Nielsen, 1993) and Design Case Study (DCS) (Wulf et al., 2015) –, little can be found on how to successfully implement and use them in disability contexts. There is, we argue, a lack in research on what specific challenges are involved in the use of such methodologies for accessibility research. From our perspective, there is much to be done at the micro, meso and macro level of the design for and with people with disability. At the *micro level*, the adaptation of methods for context analysis under specific conditions with people with disabilities is still necessary (Frauenberger, 2015; Iwarsson & Ståhl, 2003; Mankoff et al., 2010). At the *meso level*, there is a visible need to sensitise companies, managers and employees of the relevance of including people with disabilities at the job market and the important role that accessible digital solution can play on it (WHO, 2011). At the *macro level*, there is still the need of stimulating the work culture in the sense of designing inclusive workplaces and opportunities. There is also the need to generally raise social awareness for the promotion of inclusive workplaces for people with disability (Mankoff et al., 2010; WHO, 2011).

Furthermore, despite the existence of manifold human-centred (participatory design) projects in the field of disability studies, these studies usually address highly specific applications for individuals with very specific needs, or focus on single perspectives. For instance, Golub (2006) has carried a study exploring the factors for a successful work experience of employees with visual disability from the perspective of the employers. On the other hand, Branham and Kane (2015) carried out a study from the perspective of blind employees, that focused on their strategies to manage accessibility at the workplace. The authors draw attention to the fact that only designing accessible ICTs is not enough to guarantee accessibility at the workplace. In particular, the findings suggest that the work in a sighted office environment would often hinder the autonomy employees with visual disability. Hence, it can be argued that there is still a need for approaches that can systemise smaller-scale research projects, which are often aimed at individuals or very small groups, to more broadly reflect on ‘sensitisation concepts’ that make an impact in the society. It is of special relevance to think of approaches that can support bringing different actors – with and without disabilities – together, as for example employees, employers, developers and

researchers, for the elaboration of these concepts. A socio-informatic lenses may be very helpful to achieve this goal. In particular, the use of well-established socio-informatics frameworks, as for example DSC (Wulf et al., 2015), in conjunction with community-oriented Action Research approaches, as for example CBPR (Holkup et al., 2009), can be instrumental.

Socio-informatics is a research approach that adopts a practice-centred perspective for the design, development and evaluation of computer systems and computer-aided processes (Wulf et al., 2018). The approach is oriented towards people's practices with the aim of: understanding the user contexts; identifying design possibilities; and investigating changes in social practices that result from the appropriation of new and innovative technologies (Müller, 2018). In addition to its focus on practices, socio-informatics also addresses institutional arrangements and technological infrastructures. Socio-informatics approaches seek to understand how innovative ICTs become part of socio-technical infrastructures that enable and shape a wide variety of different forms of social activities (Wulf et al., 2015). They consider the quality of designed systems as something that goes beyond its technical features and spans the interaction between the designed artefacts and the social systems in which they are deployed. In so doing, socio-informatics draws heavily on in-depth qualitative data collection and data analysis methods, which can eventually be complemented by quantitative methods (Rohde et al., 2017).

This workshop sets out to address how CBPR (Finley, 2008; Holkup et al., 2009) can support unravelling the actual needs of people with disability from a socio-informatics perspective, so to develop a concept to sensitise society to the relevance of investing in the development and adoption of highly accessible solutions for the inclusion of people with disability at the workplace. It targets contributions showing how this and other approaches have been used in current and past accessibility research and aims at reflecting on the lessons learned from them. In particular, it aims at generating an understanding of how CBPR can be better used for future accessibility research. The workshop pays special attention to work contexts, seeking contributions that demonstrate the relevance of the approach for research on the design and development of accessible digital solutions for the workplace.

## Workshop Goals and Activities

In this one-day workshop, we will provide a forum for researchers, practitioners and potential co-researchers interested in accessibility at the workplace to discuss the methodological advantages and potential challenges of CBPR. During the workshop, conversations between the participants will be facilitated by moving away from traditional presentations. Participants who wish to provide material to foster the discussions at the workshop – henceforth referred to as *workshop*

*contributors* – will be invited to contribute to the workshop with either posters illustrating their ideas, samples of data collected during fieldwork, or demos/prototypes elaborated as a result of their research and/or development initiatives. Naturally the participation of people who are not in the position or do not want to bring any discussion material to the workshop is also encouraged.

Materials provided by workshop contributors will be the main subject of the workshop discussions. Presentation sessions will be followed by more focused short discussions on specific questions/issues, and practical brainstorming exercises to highlight new methodological directions concerning CBPR for accessibility research at the workplace.

Interdisciplinary participation from people with and without disabilities including, amongst others, designers, developers, psychologists, ethnographers, employers and employees is mostly appreciated. Therefore, the workshop will provide an important opportunity for (co-)researchers from academia, industry and other sectors of the society to share ideas and possibly coordinate their efforts. In this way, it will be possible to gain insights that would otherwise be beyond reach. Workshop contributors will have the opportunity to share their experiences with the other participants by means of short presentations. This will help construct a productive discussion on how CBPR can be used in its full potential for future research initiatives. The workshop will be an opportunity to learn about approaches for accessibility design research and to contribute towards devising innovative ways to engage in them. This will be an opportunity to reflect on the various trade-offs concerning the cooperation between researchers and co-researchers and to identify potential bottlenecks that may be avoided during the research project.

## Contribution to ECSCW 2020

ECSCW is well-known for valuing in-depth qualitative methodologies for workplace studies and practice-based computing. The workshop addresses issues of cooperation and collaboration between research actors, in the pursuit of a deep understanding of work contexts and the design of socio-technical systems that respond to their emerging needs. It will therefore offer the conference participants the opportunity to learn about a very relevant approach to the European CSCW community as well as about results from workplace studies and the design and evaluation of digital technologies for the workplace.

## Types of Submission

Workshop contributors will be asked to submit a position paper (max 5 pages, including references) introducing the material, ideas or artefacts they would like

to address in the workshop. The submission must contain a brief overview of the key ideas and arguments of their contribution. Additionally, contributors can submit videos, links or any other relevant artefacts of systems that they would like to demonstrate during the workshop. Participants who desire to contribute with the discussions without presenting any material are not required to submit a position paper.

## Workshop Themes

Contributors may address a range of issues, including, but not restricted to:

- The adoption of CBPR to investigate and foster accessibility at the workplace;
- The use of alternative methodologies to bring different stakeholders, as for example, people with disability, companies, service providers, researchers and policy makers together in changing organisational, technological and personal circumstances;
- Methodological innovations in the study of accessibility at the workplace;
- Accounts of accessibility initiatives as emerging from novel spatial and organisational contexts;
- The range of organisational aspects, motivational factors, personal values and expectations underling the investment in accessible solutions for the workplace;
- An examination of how we might identify those forces, contexts and dynamics that hinder, resist or work against the momentum of accessibility at the workplace;
- The role of assistive technologies in empowering people with disability, but also in creating a potential range of problems/issues to be dealt with;
- The role of accessible technology as discourse in socially, culturally and ideologically shaping an ‘accessibility culture’;
- The technological, cultural, political and economic rationalities that underpin and legitimise contemporary enactments of accessibility research and foster the establishment of an accessibility culture;
- Explorations of what present and future accessibility culture might look like, and of the challenges and issues we will be addressing for the next ten years.

## Important Dates

- 5<sup>th</sup> April 2020: Submission of position papers;

- 24<sup>th</sup> April 2020: Notification of acceptance;
- 10<sup>th</sup> May 2020: Camera-ready
- 14<sup>th</sup> June 2020: Workshop day

**Important note:** Notification of acceptance will be sent in time to allow participants to organise travel to the conference and to avail of early registration rates. The submissions will be reviewed by the organisers.

## Submission and Review Process

The submission and the review process will be managed over e-mail. Workshop contributors must submit their position papers to [cbprar@googlegroups.com](mailto:cbprar@googlegroups.com) by the submission deadline. Submissions will be reviewed by the workshop organisers and selected on the basis of their quality, compliance with the workshop themes, and the extent (and diversity) of their field of application.

## Workshop Structure

The workshop is planned as a full day event divided into four sessions, as seen in Table I. It will also involve additional online activities organised both before and after the workshop.

Table I. Tentative Agenda

| Time  | Activity  |
|-------|---|
| 09:00 | Welcome and introduction to the workshop and participants     |
| 09:15 | Introduction to exhibition materials by workshop contributors |
| 10:30 | <i>Mid-morning break</i>                                      |
| 11:00 | Workshop exhibition   |
| 12:30 | <i>Lunch break</i>  |
| 14:00 | Brainstorming session in smaller groups                       |
| 15:30 | <i>Mid-afternoon break</i>                                    |
| 16:00 | Wrap-up and future plans                                      |
| 17:30 | End of Workshop   |

Overall, participants will briefly introduce themselves in the first session. After the introduction round, workshop contributors will provide a brief overview of the material they brought to the discussion. Participants will be oriented to take notes of the potential questions they have and to wait until the next session to clarify them. Naturally, very urgent questions will be allowed in this round. In the second

session, contributors will exhibit the material they brought and engage in more personal exchanges with the other workshop participants. This will be the moment for participants to ask the questions they noted during the first session. In the third session, participants will undergo a brainstorming, drawing on the presentations and exchanges performed in the two previous rounds. Finally, in the last session, participants will together summarise the lessons learned during the workshop.

## Number of participants

In order to assure a more focused discussion and to enhance the possibility of producing relevant results a maximum of 10 position papers and 15 participants – excluding the organisers – will be accepted for the workshop.

## Publication plans

The organisers will arrange a publication of the camera-ready version of the position papers in an issue of the International Reports of Social-Informatics (IIRSI) series from the International Institute of Socio-Informatics (IISI) in Bonn, Germany. After the workshop the organisers, together with the participants who wish to participate, will actively seek to publish a dissemination piece in the ‘Interactions’ magazine with the results of the workshop. We also plan to edit a special issue on a selected journal as eventual workshop outcome, thus encouraging participants to join and subsequently submit a contribution for review towards the publication.

## Marketing Strategy

A call for contributions is being sent to the main CSCW and HCI-related distribution lists such as EUSSET, CHI Announcements, CSCW-SIG and to national lists such as the German and the British HCI mailing lists. The organisers are also directly contacting communities as, for example, colleagues involved in EUSSET, and relevant social media outlets (e.g. CSCW Facebook group, etc.). People with experience in the industry and interest in accessibility of digital technology at the workplace are also being contacted through distribution lists and personal contacts. Distribution lists dedicated to people with disabilities has also been addressed. All information on the workshop, including the workshop themes, submission process and important deadlines are available in the workshop website available at: <https://cbprar.wordpress.com>.

## Organisers' Short Bio

*Aparecido Fabiano Pinatti de Carvalho, PhD*, is an Associate Researcher at the Institute of Information Systems and New Media of the University of Siegen (Germany). He holds a B.Sc. and a M.Sc. in Computer Science from the Federal University of São Carlos, São Paulo, Brazil, and a Multidisciplinary PhD developed within a joint project between the Interaction Design Centre of the Department of Computer Science and Information Systems, University of Limerick, Ireland, and the Department of Sociology at the same university. His interests span Human-Computer Interaction, Interaction Design, Digital Technology Accessibility, Computer Supported Cooperative Work, Ubiquitous and Mobile Computing, Cyber-Physical Systems, Mobile and Nomadic Work and Informatics in Education. The focus of his research is on technologically-mediated human practices. He has published several articles on topics related to these fields of research in prestigious international conferences.

*Sven Bittenbinder* is a research assistant at the Chair for Business Information Systems, especially for “IT for ageing society” at the University of Siegen. After completing his studies, the graduate business computer scientist worked as a product manager in software development and since 2014 has headed the “Real Estate Software” area at Buhl Data Service GmbH, Germany's largest owner-managed software company. During this activity, he has already dealt with the topics of participative software and solution development and now brings his diverse experience from an economic and scientific perspective into the preservation and creation of accessible IT and accessible IT jobs in the iDES KMU project.

*Claudia Müller, PhD*, is Assistant Professor for “IT for the Ageing Society” in the Institute of Information Systems and New Media at University of Siegen and Professor at Careum Hochschule Gesundheit, Zürich. She follows a praxeological and participatory design approach for assistive technologies for older people ([www.inclusive-ageing.com](http://www.inclusive-ageing.com)). Her projects aim at the support and enhancement of social inclusion, mobility and autonomy of elderly people in order to strengthen quality of life and health status in higher age. She is collaborator in the Siegen PraxLabs approach ([www.praxlabs.de](http://www.praxlabs.de)), which is based on a praxeological and participatory research paradigm. She is vice chair of the national German expert commission for the 8. Ageing Report “Digitalisation & Ageing” and also a member of the working group “Alter & Technik” (Age & Technology) of the German Society of Gerontology and Geriatrics e.V. as well as of the Interdisciplinary Gerontological Research Network (GeNeSi) of the Research Center “FoKos” at University of Siegen (<https://www.uni-siegen.de/fokos/>).



*Nadia David* is a specialist in training solutions. She worked in adult education and as a freelance lecturer for IT application programs and customer-oriented communication for various clients until she started her own business. Since then, her work has focused on IT and communication training as well as specialist editing of scientific work in the areas of business psychology and corporate communication. Since 2018 she has also been at the Education Centre for the Blind and Visually Impaired (BZBS) in Hamburg working in the field of IT training amongst others. In the iDES KMU project, Nadia David is responsible for the entire area of training development and implementation.

*Bente Hansen* has been working in press and public relations for 10 years. Among other things, she has built up the corporate communication of a SME in the health sector and was responsible for all associated tasks, including texts for various formats, website development, online marketing, press contact and project development for an umbrella brand. In the iDES KMU project she assumes press and public relations as well as project assistant.

*Volker Wulf, PhD*, holds the Chair of Information Systems and New Media at the University of Siegen. He is also the Managing Director of the School of Media and Information (iSchool) at the University of Siegen. In addition, he heads the business field of User-oriented Software Engineering (USE) at the Fraunhofer Institute for Applied Information Technology (FhG-FIT) in Sankt Augustin. After completing a double degree in Computer Science and Business Administration at the RWTH Aachen and the University of Paris VI, he gained his PhD at Dortmund University. This was followed by a number of visiting and deputy professorships at the Universities of Hamburg and Freiburg. The completion of habilitation (from the Faculty of Computer Science, University of Hamburg) was followed by a research stay at Massachusetts Institute of Technology (MIT). As a Fulbright Scholar, he spent a sabbatical semester at the University of Michigan, Ann Arbor and Stanford University, Palo Alto in 2006/7. From 2011 to 2019 he officiated as Dean of Faculty III (School of Economic Disciplines) at the University of Siegen. Since 2018 he is a member of the ACM CHI Academy.

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