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# Sustainable Human-Work Interaction Designs

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**Abstract.** Sustainability is a multidimensional concept with dimensions intertwined. The field of sustainable HCI explores ways to design interactive systems in a more sustainable way and to make user behavior more sustainable. In addition, social justice and equity aspects became emergent domains in HCI during the last decade. To develop interactive systems for the workplace, research on Human Work Interaction Design integrated work analysis and interaction design methods from HCI. As little HWID research has so far addressed environmental, economic, and social dimensions of sustainability, this workshop is an opportunity to start a discussion on the subject. This workshop on sustainable human-work interaction designs aims to (a) investigate processes and methods for creating sustainable designs and workplaces, (b) collect case studies that analyze experiences with introducing and learning from sustainability at work, and (c) formulate a research agenda for future work on sustainable human-work interaction designs. The target audience for the workshop is researchers and practitioners working on topics related to work analysis, interaction design, green IT, digital transformation, slow design, craft design, system-organization fit, organizational implementation, benefits realization, and in-the-wild evaluation.

**Keywords:** Sustainable HCI · Human Work Interaction Design.

## 1 Introduction

Human Work Interaction Design (HWID) focuses on establishing relationships between work analysis and interaction design from Human-Computer Interaction (HCI) domain to design and develop interactive systems for work environments.

While contributions in this domain cover smart and pervasive workplaces, UX, ergonomic and motivating workplaces [11] at work, sustainability in the workplace could also benefit from HWID design methods and techniques. Sustainability can be viewed as *“a matter of what resources – natural resources, quality of the environment, and capital – we bequeath to coming generations”* [13]. Sustainable HCI (SHCI) is concerned with adding environmental issues to the design of interactive systems, whether in their manufacture or use [14]. Strategies proposed in this field deals with unsustainability of current interactive products or relies on persuasive technologies or ambient awareness in order to support a behavior change toward a more environmental one [7]. This latter strategy may have the aim to reinforce and measure users connectedness to nature [3] to make them more cognitively and emotionally connected to the environment. Another way to address the environmental issue is to rethink the economic processes of manufacturing. Favouring artisanal production, local resources or respect biodiversity are part of these sustainable economic processes. In addition, social justice in HCI that proposes to take more account of under-served populations and marginalised identities [2] can be viewed as contributing to sustainability strategies in HCI.

Then, building on the history of work analysis and empirical work-domain studies, the aim of this workshop is to investigate and discuss how HWID design methods can contribute to the implementation of shared environmental practices in the workplace, sustainable manufacturing processes, or socially fair systems and processes. To support this objective, participants can share their work on processes, methods as well as results of these to support digital sobriety, sustainable digitalization, users’ experience in sustainable environment, or users’ engagement in environmental behavior. Possible contributions are not limited to this list.

## 2 Workshop Objectives

The workshop on sustainable human-work interaction design has three main objectives:

1. To investigate processes and methods for creating sustainable designs and workplaces.
2. To collect case studies that analyze experiences – good and bad – with introducing and learning from sustainability at work.
3. To formulate a research agenda for future work on sustainable human-work interaction designs.

## 3 Designing for sustainability at Work

Despite being discussed [13], sustainability is a multidimensional concept with three intertwined dimensions: social, economic, and environmental [10].

1. Environmental dimension: it deals with the relationship between humans and nature. Then, initiatives that address sustainable development (meeting current needs without compromising those of future generations) fall under this dimension.
2. Economic dimension: it deals with conflicting relationships between the survival of companies (profitability, productivity, and financial performance) and social and sustainability issues; for example slow design that enables sustainable production [9], or craft design that contributes to the circular economy [16].
3. Social dimension: it deals with social equity, such as social justice, distributive justice and equality of conditions, and social responsibility.

In the workplace, individual conduct toward sustainable behavior can be interpreted in terms of three dimensions: eco-initiatives (e.g., reusing paper), eco-civic engagement (e.g., participating in the organization's environmental events), and eco-helping (e.g., encouraging colleagues to adopt environmental behavior) [15]. To support such behavior, eco-feedback strategies have been proposed in Sustainable HCI (SHCI). Focusing on system usage, eco-feedback strategies that sense users' activities (e.g., driving to work) and feed related information back (e.g., resources consumed, waste produced, or resource status) [8] have been proposed. Several contributions have been proposed for the workplace to reduce energy consumption [12], focusing on reducing lighting consumption [5], reducing transport through hybrid work [1], or implementing an energy displacement strategy [6]. However, eco-feedback strategies have been criticized for being too individual-centered, for not designing with and for communities, and for not taking into account the complexity of context [4]. Then, the recent direction of the SHCI field is to move beyond individual behavior to community practices and reach decision makers [4]. From SHCI perspectives, Mankoff et al. [14] distinguish two approaches in order to tackle sustainability issues:

1. Sustainability *through* Design: This approach aims to influence users' decision-making and thereby foster more sustainable lifestyles.
2. Sustainability *in* Design: This approach mitigates software and hardware's material effects on the environment both directly and indirectly (in line with GreenIT approaches) and aims to reduce rapid product obsolescence cycles.

Focusing on this last dimension and from an economic point of view, slow design [9] proposes to take into account the heritage and history of communities, to feature biodiversity, and to transfer traditional techniques in the manufacture of products. This way, slow design seeks to reduce natural resources consumption and to connect products with producers and end users [9]. In addition, craft design [16] that requires manual skills and human energy can be a way to reconnect people with nature. From a social perspective, digital technologies can play a role by facilitating whistleblowing and allowing journalists to report human rights violations or by providing virtual meeting places for community action [2] for example.

As little HWID research has hitherto addressed the three dimensions of sustainability, this workshop is an opportunity to start a reflection on the subject.

By focusing on one or more of the dimensions of sustainability and sustainability issues, we propose to address the challenges and suggestions emerging from the integration of work analysis methods and sustainable HCI.

## 4 Expected Outcomes

The workshop will produce a research agenda for studying sustainable human-work interaction designs and how best to conceive, develop, and evaluate them. The aim of this research agenda is to stimulate further research interest and provide direction for HCI research that supports sustainability at work. At the workshop, the organizers will invite the workshop participants to co-author a journal paper that presents the research agenda and discusses it on the basis of the cases and insights contributed by the participants.

## 5 Target Audience

The target audience for the workshop on sustainable human-work interaction designs includes researchers and practitioners working on topics related to work analysis, interaction design, green IT, digital transformation, slow design, craft design, system-organization fit, organizational implementation, benefits realization, and in-the-wild evaluation. Participation in the workshop requires the submission and acceptance of a position paper, which is limited to a maximum of four pages. Early-stage researchers and PhD students are encouraged to submit papers describing work in progress.

## 6 Organizing Committee

The workshop is organized by IFIP TC13 WG6 - Human Work Interaction Design (<https://hwid.unibs.it/>).

The organizers are:

*Elodie Bouzekri*: Post-doctoral fellow at University of Bordeaux, ESTIA Institute of technology, France. Her research area, Human-Computer Interaction, focuses on analysis and design of interaction, with a particular interest in interactive automated systems.

*Barbara Rita Barricelli*: Associate Professor at the Department of Information Engineering of Università degli Studi di Brescia, Italy. Her research interests lie in the field of Human-Computer Interaction, and specifically: Human Work Interaction Design and End-User Development. She is Chair of the IFIP working group WG13.6 on Human Work Interaction Design.

*Torkil Clemmensen*: Professor at the Department of Digitalization, Copenhagen Business School, Denmark. His research interest is in psychology as a

science of design. His research focuses on cultural and psychological perspectives on usability, user experience, and the digitalization of work. He contributes to Human-Computer Interaction, Design, and Information Systems. He is a co-founder of IFIP TC13 WG6.

*Morten Hertzum*: Professor of Digital Technologies and Welfare at Roskilde University, Denmark. His overall research interest concerns how information technology supports, and otherwise affects, human activity. He pursues this interest within human-computer interaction, computer-supported collaborative work, health informatics, and implementation studies.

*Masood Masoodian*: Professor of Visual Communication Design at Aalto University, Finland. He leads the Aalto Visual Communication Design (AVCD) research group. His research interests includes the design of interactive visualizations in health, energy, and sustainability areas. He is a co-founder and Chair of IFIP TC13 WG10: Human-Centred Technology for Sustainability.

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## Workshop Organisation

In order to anticipate a possible deterioration of sanitary conditions and to allow more participants to join the workshop, we plan a hybrid format with both physically present and online participants. The HWID workshop on sustainable human-work interaction designs is a full day workshop. In the morning, the main activities will be presentation and discussion of the accepted position papers. Then, afternoon activities will be dedicated to group work on a sustainable human-work interaction designs research agenda. We will propose a gallery presentation of posters produced during the group work activity. The resulting posters can be shared at the main conference. The organizers will propose to interested participants to co-author a journal paper on the pooling of the work done forming a research agenda. The workshop program looks as follows:

1. Welcome: introduction to the workshop topic and program and presentation of the TC13 Working Group 6 on Human Work Interaction Design.
2. Presentation and discussion of position papers: we will request presentations followed by a Q&A time. The position papers will be made available to all participants ahead of the workshop.
3. Lunch break.
4. Group work on theorizing sustainable human-work interaction designs to formulate a research agenda: discussions on human-work interaction designs coupled with sustainability concepts. Each groups will produce a poster that can be shared at the main conference.
5. Plenum discussion and gallery presentation of posters – the groups report the results of their work and formulate a shared research agenda resulting from ideas highlighted by the participants’ posters.
6. Closing – including the initial planning of post-workshop activities. The main post-workshop activity is that the organizers will invite the workshop participants to co-author a paper about the resulting research agenda on sustainable human-work interaction designs of the workshop.

The call for papers for the workshop will be announced on a dedicated workshop minisite hosted by the HWID website (<https://hwid.unibs.it/>). In addition, we will post the call for papers on the HWID mailing list and on other HCI-related mailing lists. The organizers will also contact candidate participants – researchers as well as practitioners – in their network by mailing them directly to raise their awareness of the workshop. Participation in the workshop requires the submission of a four-page position paper in the INTERACT proceedings format (<https://www.springer.com/gp/computer-science/lncs/conference-proceedings-guidelines>). Each submission will be reviewed by two reviewers from the larger HWID community. On the basis of the reviews, the organizers will make an accept or reject decision. We will reject submissions that are not about sustainable human-work interaction designs, but we will be inclusive in terms of submission whether it is a work in progress or completed research. During the group work, both produced posters and plenum discussion will contribute to the formulation of a research agenda on human-work interaction designs, with the participants’ permission. Finally, participants will be invited by organizers to co-author a journal paper about the resulting research agenda for human-work interaction designs.