Bringing Sustainability through, in, and of HCI into Conversation

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ABSTRACT

Sustainability has never been more critical for DIS researchers. Within the DIS and HCI community, the term has multiple meanings: In sustainable HCI, it frequently refers to ecologically sustainable lifestyles through the design of interactive systems and to sustainability in HCI practice itself. Conversely, community-based HCI speaks of the sustainability of HCI, referring to the longevity of our socio-technical interventions. This workshop seeks to bring together these seemingly diferent conceptions of sustainability to explore their commonalities. Arguably, longevity is important for sustainable HCI, as is ecological impact for community-based HCI. We invite participants from diverse felds, such as sustainable HCI, HCI4D, Community-Based Participatory Design, and Digital Civics to refect on past and current work, develop best practice recommendations, and design sustainability roadmaps to help researchers and designers to conceive, run, and evaluate future projects with sustainability through, in, and of HCI in mind.

CCS CONCEPTS

• **Human-centered computing → HCI theory, concepts and models**; • **Social and professional topics**;

KEYWORDS

sustainability, sustainable HCI, community-based participatory design, refection

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1 BACKGROUND AND MOTIVATION

Sustainability is an important issue for HCI that continues to spur an abundance of research and debates. However, the term itself remains contested, with multiple defnitions used within DIS and HCI. This workshop seeks to bring into conversation two communities who use "sustainability" in diferent ways. First, sustainable HCI, which is foremost concerned with how HCI can contribute to sustainable developments (e.g., reduction in carbon emissions) through the design of interactive systems, and how interactive systems themselves can be more sustainable, for example by using less energy or producing less e-waste (sustainability in HCI) [2, 12, 27]. The second group is more frmly rooted in community-based HCI, where researchers have been grappling with the sustainability of socio-technical innovations, infrastructures, skills, and practices. A core concern is to explore how HCI interventions can be maintained long-term, particularly once the research project has ended [4, 10, 11, 18].

While early sustainable HCI research tended to understand sustainability narrowly as an environmental issue, later work has increasingly broadened our understanding of sustainability and included social and — to a lesser extent — economic aspects, slowly adopting the now common Triple Bottom Line (TBL) model of sustainability [27]. As part of this opening, the sustainable HCI research agenda has seen several shifts:

- From prescriptive (solutionist, behaviour change) to speculative work [3, 28]
- From changing individuals to supporting activists and communities [19] as well policy-makers [2]
- From simplistic solutions to system thinking, connecting sustainability with other concepts, such democracy [22] and social justice [9]
- From human-centred perspective to non-anthropocentric thinking, fattening the social and environmental domains of the TBL [14, 20]

- From an implicit acceptance of a capitalist economy as an unquestioned fact to understanding it as a design space [7, 27], opening opportunities to design for diverse economics [6, 23]
- From assuming positive impact to a difcult search for new sustainability metrics [25, 26] and for responsible innovation [1]

However, recognising the limits of computing and academic research to efect societal transformation as well as the urgency of the climate catastrophe, some authors have asked the HCI community to refocus their eforts on climate change over other sustainability topics [2, 17].

In parallel, community-based PD [15, 21] and socially engaged HCI research, such as Digital Civics [10, 11], have grappled with the phenomenon that interactive systems designed for and with communities can remain short-lived. Sustainability in this context usually means that interventions or innovations are maintained, scaled, replicated, or evolving [15]. However, once researchers retreat (e.g., at the end of a project), there are many cases of 'users' stopping to engage, knowledge getting lost, or technology breaking [29]. The research agenda of sustainability of HCI is thus concerned with:

- Recognising the importance of building and maintaining relationships with and among stakeholders [5]
- Sharing control over the entire research process (incl. project conception, data analysis and results dissemination) to ensure an intervention actually addresses an issue of concern (which is not defned by researchers) [4]
- Research approaches and methods that value community knowledge and are sensitive to historic design injustices [4, 13]
- Iterating and adapting responses to evolving needs, while recognising the burden this puts on community partners [8, 10]
- Training and capacity building among community partners as a core part of design [4]
- Use of accessible materials and tools and low-barrier and open-source technology [10, 29]
- Continuous funding and income generation [10]
- New metrics that measure above goals [4]

The two conceptions of sustainability outlined above may appear quite diferent at frst. However, both ultimately ask: How can the interactive systems we design be socially relevant in the long term? And further: How can we know they are relevant, i.e., how can we measure impact over time? We therefore believe that there is much that sustainability *through* and *in* HCI and sustainability *of* HCI can learn from each other. If we want to contribute to sustainability through HCI, the sustainability of an HCI intervention itself is important in order to have long-term and wide-spread impact. An eco-feedback app is worth little if there is no-one to use, maintain, or update it. And in turn, if we want to increase the sustainability of HCI, drawing on sustainable HCI to consider its environmental and social impact is essential.

To facilitate a conversation between these two communities, in this workshop we will explore what we mean when we say "sustainability". Drawing on existing frameworks of sustainability, such as the Triple Bottom Line [27], Circles of Sustainability [16], Doughnut Economics [24], or the UN Sustainable Development Goals [30]. We will interrogate how these frameworks translate into HCI practice, spanning ecological, social, economic, political, and cultural dimensions of sustainability. We will use the various dimensions and specifc emphases of these frameworks as guiding questions and prompts to refect on the sustainability of our own work, collect challenges and opportunities for sustainability, and develop refective roadmaps to assist HCI researchers asking holistic yet specifc questions as they conceive, run, and evaluate their research.

2 WORKSHOP THEMES

The workshop invites researchers and practitioners from diverse felds in DIS, HCI and PD who are interested in and have worked on questions on sustainability (in any meaning of the term). Specifcally, we are interested in exploring the following themes:

2.1 Sustainability Frameworks

We invite participants to refect on diverse sustainability conceptions and frameworks and how they are applied within HCI, PD, and HCI4D, including Triple Bottom Line, Circles of Sustainability, Doughnut Economics, the UN Sustainable Development Goals, or specifc philosophies, such as permaculture. We welcome discussions on tensions between broad and narrow defnitions of sustainability and how they shape research agendas and the development of specifc IT interventions or solutions, including environmental, ecological, social, economic, technological, political, cultural, spiritual, and emotional dimensions. Furthermore, we are interested in concepts intersecting sustainability debates, including the more-than-human, diverse economies, democracy, social justice, resilience, and responsible innovation.

2.2 Participation, Power, and Knowledge

Understanding sustainability as an interdisciplinary and collaborative efort within and beyond HCI, we are interested in the complexities that emerge out of this work. What is the role of equity and how is power shared between researchers and participants during research conception, design processes, governance, data collection, analysis, communication, and research translation? We understand participants and users not just as consumers, but also as producers, businesses, communities, activists, and policy makers. How are community, indigenous, and traditional knowledge systems recognised in the design process? What is the role of consensus (prescription) versus contestation (speculation) in sustainability eforts?

2.3 Longevity, Learning, and Impact

Long-term use, iteration, adaptation, and impact of socio-technical systems is essential for their sustainability. How are these systems maintained, scaled, replicated, and how do they evolve? There is a tension between training and capacity building for communities and continuous research involvement through infrastructuring. What sustainable funding or income sources make socio-technical systems fnancially viable? Questioning longevity, we also invite

discussions of valuable dissolutions, ends, and transformations of research into something else. Finally, how do we measure impact and what are the limits of metrics?

3 WORKSHOP GOALS AND ACTIVITIES

In this 1-day hybrid workshop, we hope to bring together a diverse group of researchers and practitioners to move forward debates on sustainability. Specifcally, the workshop will provide the opportunity to:

- Refect on participants' own experiences with "sustainability" in their work
- Discuss diferent conceptions and frameworks of sustainability developed and used within and outside of HCI
- Relate discourses on sustainability of HCI research with sustainability through and in HCI research
- Gather best practice recommendations to improve the sustainability of HCI projects (understood in holistic and diverse ways)
- Develop a sustainability 'roadmap' as a refective tool for HCI researchers

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REFERENCES

[1] Oliver Bates, Christian Remy, Callum Nash, and Ben Kirman. 2019. The future of techno-disruption in gig economy workforces: challenging the dialogue with fctional abstracts. In *Proceedings of the Halfway to the Future Symposium 2019*. ACM, New York, NY, USA, 1–4. https://doi.org/10.1145/3363384.3363476

[2] Christina Bremer, Bran Knowles, and Adrian Friday. 2022. Have We Taken On Too Much?: A Critical Review of the Sustainable HCI Landscape. In *CHI Conference on Human Factors in Computing Systems*. ACM, New York, NY, USA, 1–11. https://doi.org/10.1145/3491102.3517609

[3] Simran Chopra, Rachel E. Clarke, Adrian K. Clear, Sara Heitlinger, Ozge Dilaver, and Christina Vasiliou. 2022. Negotiating sustainable futures in communities through participatory speculative design and experiments in living. In *CHI Conference on Human Factors in Computing Systems*. ACM, New York, NY, USA, 1–17. https://doi.org/10.1145/3491102.3501929

[4] Ned Cooper, Tifanie Horne, Gillian R. Hayes, Courtney Heldreth, Michal Lahav, Jess Holbrook, and Lauren Wilcox. 2022. A Systematic Review and Thematic Analysis of Community-Collaborative Approaches to Computing Research. In *CHI Conference on Human Factors in Computing Systems*. ACM, New York, NY, USA, 1–18. https://doi.org/10.1145/3491102.3517716

[5] Christian Dindler and Ole Sejer Iversen. 2014. Relational expertise in participatory design. In *Proceedings of the 13th Participatory Design Conference on Research Papers - PDC '14*. ACM Press, New York, New York, USA, 41–50. https://doi.org/10.1145/2661435.2661452

[6] Carl DiSalvo and Tom Jenkins. 2017. Fruit are heavy: A prototype public IoT system to support urban foraging. In *Proceedings of the 2017 Conference on Designing Interactive Systems - DIS '17*. ACM Press, New York, NY, 541–553. https://doi.org/10.1145/3064663.3064748

[7] Paul Dourish. 2010. HCI and environmental sustainability: The Politics of Design and the Design of Politics. In *Proceedings of the 8th ACM Conference on Designing Interactive Systems - DIS '10*. ACM Press, New York, New York, USA, 1. https://doi.org/10.1145/1858171.1858173

[8] Paul Dourish, Christopher Lawrence, Tuck Wah Leong, and Greg Wadley. 2020. On Being Iterated: The Afective Demands of Design Participation. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. ACM, New York, NY, USA, 1–11. https://doi.org/10.1145/3313831.3376545

[9] Sarah Fox, Mariam Asad, Katherine Lo, Jill P. Dimond, Lynn S. Dombrowski, and Shaowen Bardzell. 2016. Exploring Social Justice, Design, and HCI. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems - CHI EA '16*. ACM Press, New York, New York, USA, 3293–3300. https://doi.org/10.1145/2851581.2856465

[10] Andrea Hamm, Yuya Shibuya, Stefan Ullrich, and Teresa Cerratto Cerratto Pargman. 2021. What Makes Civic Tech Initiatives To Last Over Time? Dissecting Two Global Cases. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. ACM, New York, 1–17. https://doi.org/10.1145/3411764.3445667

[11] Nicolai Brodersen Hansen, Gwen Klerks, Maria Menendez Blanco, Laura Maye, Angelika Strohmayer, Martijn de Waal, and Ben Schouten. 2020. Making Civic Initiatives Last. In *Companion Publication of the 2020 ACM Designing Interactive Systems Conference*. ACM, New York, NY, USA, 433–436. https://doi.org/10.1145/3393914.3395921

[12] Lon Åke Erni Johannes Hansson, Teresa Cerratto Pargman, and Daniel Sapiens Pargman. 2021. A Decade of Sustainable HCI: Connecting SHCI to the Sustainable Development Goals. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. ACM, New York, NY, USA, 1–19. https://doi.org/10.1145/3411764.3445069

[13] Christina N. Harrington, Sheena Erete, and Anne Marie Piper. 2019. Deconstructing community-based collaborative design: Towards more equitable participatory design engagements. *Proceedings of the ACM on Human-Computer Interaction* 3, CSCW (nov 2019), 1–25. https://doi.org/10.1145/3359318

[14] Sara Heitlinger, Nick Bryan-Kinns, and Rob Comber. 2019. The right to the sustainable smart city. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. ACM, New York, NY, USA, 1–13. https://doi.org/10.1145/3290605.3300517

[15] Ole Sejer Iversen and Christian Dindler. 2014. Sustaining participatory design initiatives. *CoDesign* 10, 3-4 (jul 2014), 153–170. https://doi.org/10.1080/15710882.2014.963124

[16] Paul James. 2015. *Urban Sustainability in Theory and Practice: Circles of Sustainability*. Routledge, Oxon. 282 pages.

[17] Bran Knowles, Oliver Bates, and Maria Håkansson. 2018. This Changes Sustainable HCI. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, New York, 1–12. https://doi.org/10.1145/3173574.3174045

[18] Max Krüger, Anne Weibert, Debora De Castro Leal, Dave Randall, and Volker Wulf. 2021. It Takes More Than One Hand to Clap: On the Role of 'Care' in Maintaining Design Results.. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. ACM, New York, NY, USA, 1–14. https://doi.org/10.1145/3411764.3445389

[19] Marvin Landwehr, Philip Engelbutzeder, and Volker Wulf. 2021. Community Supported Agriculture: The Concept of Solidarity in Mitigating Between Harvests and Needs. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. ACM, New York, NY, USA, 1–13. https://doi.org/10.1145/3411764.3445268

[20] Szu-Yu (Cyn) Liu, Shaowen Bardzell, and Jefrey Bardzell. 2018. Out of control: Reframing sustainable HCI using permaculture. In *ACM International Conference Proceeding Series*. Association for Computing Machinery, New York, NY, USA, 1–8. https://doi.org/10.1145/3232617.3232625

[21] Giacomo Poderi and Yvonne Dittrich. 2018. Participatory design and sustainability–a literature review of PDC Proceedings. In *Proceedings of the 15th Participatory Design Conference: Short Papers, Situated Actions, Workshops and Tutorial - Volume 2*. ACM, New York, NY, USA, 1–5. https://doi.org/10.1145/3210604.3210624

[22] Sebastian Prost, Clara Crivellaro, Andy Haddon, and Rob Comber. 2018. Food democracy in the making: designing with local food networks. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems - CHI '18*, Vol. 2018-April. ACM Press, New York, NY, 1–14. https://doi.org/10.1145/3173574.3173907

[23] Sebastian Prost, Irina Pavlovskaya, Kahina Meziant, Vasilis Vlachokyriakos, and Clara Crivellaro. 2021. Contact Zones: Designing for More-than-Human Food Relations. *Proceedings of the ACM on Human-Computer Interaction* 5, CSCW1 (apr 2021), 1–24. https://doi.org/10.1145/3449121

[24] Kate Raworth. 2017. A Doughnut for the Anthropocene: humanity's compass in the 21st century. *The Lancet Planetary Health* 1, 2 (2017), e48–e49. https://doi.org/10.1016/S2542-5196(17)30028-1

[25] Christian Remy, Oliver Bates, Alan Dix, Vanessa Thomas, Mike Hazas, Adrian Friday, and Elaine M Huang. 2018. Evaluation Beyond Usability: Validating Sustainable HCI Research. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, New York, NY, USA, 1–14. https://doi.org/10.1145/3173574.3173790

[26] Christian Remy, Oliver Bates, Vanessa Thomas, and Elaine M Huang. 2017. The Limits of Evaluating Sustainability. In *Proceedings of the 2017 Workshop on Computing Within Limits*, Vol. 17. ACM, New York, NY, USA, 103–110. https://doi.org/10.1145/3080556.3080567

[27] Sabrina Scuri, Marta Ferreira, Nuno Jardim Nunes, Valentina Nisi, and Cathy Mulligan. 2022. Hitting the Triple Bottom Line. In *CHI Conference on Human Factors in Computing Systems*. ACM, New York, NY, USA, 1–19. https://doi.org/10.1145/3491102.3517518

[28] Robert Soden, Pradnaya Pathak, and Olivia Doggett. 2021. What We Speculate About When We Speculate About Sustainable HCI. In *ACM SIGCAS Conference on Computing and Sustainable Societies (COMPASS)*. ACM, New York, NY, USA, 188–198. https://doi.org/10.1145/3460112.3471956

[29] Nick Taylor, Keith Cheverst, Peter Wright, and Patrick Olivier. 2013. Leaving the wild. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems - CHI '13*. ACM Press, New York, New York, USA, 1549. https://doi.org/10.1145/2470654.2466206

[30] United Nations. 2021. United Nations Sustainable Development – 17 Goals to Transform Our World. https://www.un.org/sustainabledevelopment/