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Citation (APA)
Muravyov, D., Guerrero, J. V., Onat, G., Bogdanova, K., Kudina, O., & Cila, N. (2026). Broken design and maintenance of technology: Thinking of repair as a world-making practice through design and philosophy. In *Proceedings NordiCHI '26* Association for Computing Machinery (ACM). https://doi.org/10.1145/3821402.3830212

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Broken design and maintenance of technology: Thinking of repair as a world-making practice through design and philosophy

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Abstract

Everyday technological life is marked by breakdowns, failures, frictions, and ongoing practices of maintenance and repair. Within HCI research, such moments have increasingly been approached not merely as technical problems to eliminate, but as productive opportunities for reflection on the social, institutional, ecological, and political conditions through which technologies are designed and sustained. This workshop brings philosophical perspectives on breakdown and repair into dialogue with participatory and reflective approaches to HCI research and design practice. Through a series of conceptual provocations and collaborative activities, participants will examine breakdowns within their own projects and map the hidden relations, infrastructures, dependencies, and forms of care that become visible through disruption. The workshop further explores repair not simply as restoring functionality, but as a situated and world-making practice concerned with what kinds of technological and social futures are sustained, transformed, or reimagined through design.

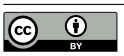
CCS Concepts

• **Human-centered computing**; • **Human computer interaction (HCI)**; • **HCI theory, concepts and models**;

Keywords

technological breakdown, repair, maintenance, philosophy, failure

ACM Reference Format:
Dmitry Muravyov, Jordi Viader Guerrero, Gül Onat, Karin Bogdanova, Olya Kudina, and Nazli Cila. 2026. Broken design and maintenance of technology: Thinking of repair as a world-making practice through design and philosophy. In *Adjunct Proceedings of the 14th Nordic Conference on Human-Computer Interaction (NordiCHI '26 Adjunct), October 03–07, 2026, Vaasa, Finland*. ACM, New York, NY, USA, 4 pages. https://doi.org/10.1145/3821402.3830212



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NordiCHI '26 Adjunct, Vaasa, Finland
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ACM ISBN 979-8-4007-2798-6/2026/10
https://doi.org/10.1145/3821402.3830212

1 WORKSHOP MOTIVATION

Technological systems rarely remain seamless for long. Devices fail, infrastructures deteriorate, interfaces frustrate, AI hallucinate, data disappears, and people develop workarounds to keep systems functioning. Behind even the most polished technological experiences lie ongoing practices of maintenance, interpretation, adaptation, and repair. Rather than exceptional interruptions to otherwise stable systems, breakdowns are recurring conditions through which the limits, dependencies, and vulnerabilities of sociotechnical worlds become perceptible.

Such questions have long occupied philosophy of technology and related fields, where breakdown has frequently been treated as a productive moment for understanding how technologies shape human experience and social relations. In postphenomenology, for example, breakdown describes moments in which technologies that normally recede into the background of experience become suddenly perceptible. Heidegger's [9] well-known example of the broken hammer illustrates how a malfunction redirects attention from smooth use toward the tool itself and the broader network of relations in which it operates. Scholars examined how technological disruptions, from fuel shortages [12] to frozen computers [25] and malfunctioning interfaces [19], interrupt habitual engagement and reveal the dependencies and infrastructures that sustain technological systems. Related arguments also appear in STS, where, for instance, Latour [17] describes breakdowns as moments in which seemingly "black-boxed" systems become analytically visible, exposing the heterogeneous actors and forms of labor that support them. Across these traditions, breakdown is approached as a revealing condition through which technologies become available for critical inquiry.

These philosophical perspectives resonate strongly with ongoing conversations in HCI research, where breakdown has increasingly served as a productive site for reflection, critique, and experimentation. Scholars have approached frictions, interruptions, and failures

as epistemic events that can surface assumptions and embedded values within sociotechnical systems (e.g. [1, 3, 22, 23]). In some cases, researchers have suggested purposefully creating certain breakdowns to elicit ethical and social possibilities that would otherwise be invisible in the seamlessly functioning artifacts (e.g. [4, 7, 13]). Others have challenged how failure itself is defined and recognized within design projects. Rather than understanding failure as a self-evident outcome, researchers have shown how distinctions between 'success' and 'failure' are shaped by institutional norms, methodological assumptions, and professional expectations (e.g. [5, 11, 24]). Such work foregrounds the material, organizational, and relational conditions through which breakdowns are produced, experienced, and interpreted, repositioning failure not as an isolated event to be fixed, but as a situated outcome of the political, disciplinary, and methodological economies in which design research is embedded [18].

At the same time, contemporary HCI contexts also extend and complicate philosophical understandings of breakdowns and repair. Computational infrastructures, AI systems, platform technologies, and participatory design processes reveal forms of fragility and dependency that exceed classical understandings of tools and users alone. Within HCI, repair has therefore increasingly been understood as more than restoring technological functionality. Research on maintenance, care, and repair cultures highlights how repair practices involve negotiation, improvisation, participation, and ongoing decisions about what should be sustained, altered, or allowed to disappear (e.g. [10, 13, 15]). Related work in participatory design (e.g. [6, 8]), critical technical practice (e.g. [14, 20]), and post-growth HCI (e.g. [16, 21]) has further questioned who is expected to maintain, repair, or adapt technological systems when they fail, and whose perspectives are included in shaping those responses. Repair, in this sense, is not simply a reactive response to failure, but an active process of shaping technological and social relations. Decisions about how systems are repaired (and for whom) also shape what kinds of futures, infrastructures, and forms of collective life become possible. Repair therefore becomes a world-making practice.

Recent NordiCHI workshops [2] and [22] have foregrounded friction and failure as productive concerns for HCI research and design practice. Building on this emerging conversation within the NordiCHI community, our workshop focuses specifically on the relationship between breakdown and repair. We aim to bring philosophical inquiry and HCI research into dialogue through participatory reflection on design practice itself. Rather than positioning philosophy as external critique or abstract theoretical background, the workshop approaches philosophical perspectives on breakdown as reflective tools for examining how technologies are designed, maintained, experienced, and repaired in practice. At the same time, participants' own research and design projects serve as situated sites through which philosophical questions about fragility, dependency, care, and repair can be explored collaboratively through practice. Through a series of conceptual provocations and participatory activities centered on participants' own experiences, the workshop creates a space for collectively examining what breakdowns reveal, how repair practices shape technological worlds, and what alternative social, institutional, ecological, and design futures such practices might help make possible.

2 WORKSHOP DESCRIPTION

This workshop invites participants to explore the questions of breakdown, maintenance, and repair through a combination of conceptual provocations and participatory activities. While participants will be encouraged to draw primarily on their own research and design projects, the workshop also welcomes reflections on broader technological failures and everyday experiences of breakdown. Centrally, the workshop aims to (1) encourage reflexivity in HCI research around the relationship between breakdown and repair; (2) extend academic discussions in the HCI research community on breakdown, maintenance, and repair through participatory, experimental formats; and (3) practice and promote collaborative forms of knowledge-making between HCI research and philosophy.

The half-day, in-person session is structured around four propositions that frame breakdown and repair as conceptual, methodological, and political concerns within design practice:

- Technologies are already broken, and this is a good thing.
- A technological breakdown is a surface sign of a deeper societal breakdown.
- Breakdowns can be generative for HCI design/research, but we must ask for whom and in what ways.
- A breakdown is always a breakdown for someone to repair.

The planned workshop structure can be seen in Table 1. After the introduction of the first two propositions (10 mins), participants will engage in the first participatory activity (60 mins). Using a structured template containing prompts and reflective questions, participants will examine moments of breakdown within their own projects, methods, or technological systems. Inspired by philosophical accounts of breakdown in postphenomenology and STS, the activity asks participants to reflect on how technological relations shift through disruption. To do so, participants will create a Latour-inspired "black-box opening" of their project or system by visually mapping (e.g. folding paper, using layered sticky notes) hidden actors, invisible labor, dependencies, infrastructures, maintenance relations, institutional pressures, and ecological conditions that the breakdown exposed. The activity encourages participants to consider how breakdowns emerge through material, ecological, institutional, and social conditions, and what such moments reveal or obscure about design processes and artifacts.

After a short collective discussion (10 mins), the workshop convenors will introduce the remaining two propositions (10 mins), followed by the second participatory activity (60 mins). This activity uses the metaphor of 'repair toolkit,' offering participants an opportunity to assemble their own means of repair for the breakdowns identified in the earlier exercise. Importantly, the toolkit is intentionally expanded beyond technical instruments alone. Participants may include methods, concepts, communities, policies, infrastructures, organizations, design competencies, or practices of care as possible means of repair. By broadening what counts as a repair tool, the activity reframes repair as a situated and world-making design practice. We will close the session by discussing not only on how technologies might be fixed, but also on what kinds of relations, values, and futures different forms of repair help sustain (15 mins).

Following the workshop, we plan to compile workshop outputs (i.e., visual mappings, repair toolkits, participant reflections, and

Table 1: Planned workshop activities

Activity	Duration
Introduction and overview of workshop, ice breaker	10 mins
Introduction of Propositions 1 and 2	10 mins
Black-box opening	60 mins
Discussion of the templates	10 mins
Break	30 mins
Introduction of Propositions 3 and 4	10 mins
Building a repair kit	60 mins
Discussion of the repair kits	20 mins

emerging conceptual themes) into the workshop webpage and potential collaborative publication, such as a pictorial or article. We also hope the workshop will contribute to building an interdisciplinary network of researchers interested in breakdown, maintenance, repair, and world-making practices across HCI, design research, philosophy of technology, and related fields.

3 WORKSHOP PROMOTION AND RECRUITMENT

The workshop is intended for researchers who have encountered moments of failure, friction, or incompleteness within their own projects and wish to reflect on what such moments reveal about design practice and technological systems. We welcome participants working across HCI, interaction design, design research, participatory design, sustainable HCI, infrastructure studies, critical AI, philosophy of technology, and related fields. We aim to host approx. 20 participants, although the workshop format can accommodate both smaller and larger groups.

Prospective participants will be asked to make submission about a "case of breakdown" drawn from their own practice. This may include a project, artifact, system, method, interaction, or research process that they consider broken, fragile, unfinished, difficult to maintain, or in need of repair. Submissions may take the form of a traditional position paper (2 pages). However, in line with the workshop's experimental and reflective orientation, we also welcome alternative formats such as pictorials, annotated portfolios, audio or video reflections, or other creative formats that engage with themes of breakdown and repair. Submitted cases will serve as starting points for discussion during the workshop.

The workshop will be promoted through the organizers' international networks in HCI, design research, philosophy of technology, and STS, including dissemination through academic mailing lists, personal communication, and social media channels associated with SIGCHI, Society for Philosophy of Technology (SPT), and European Association for the Study of Science and Technology (EASST). The call for participation will also be shared through institutional channels, including the TU Delft AI Initiative website. We additionally plan to engage relevant special-interest communities focused on sustainable HCI, participatory design, critical computing, repair cultures, and philosophy of technology to encourage interdisciplinary participation and dialogue.

4 ORGANIZERS' BACKGROUNDS

Dmitry Muravyov is a PhD candidate at Ethics/Philosophy of Technology section of TU Delft whose research explores failures, errors, and technology breakdowns in a multidisciplinary manner. **Jordi Viader Guerrero** is a PhD candidate at the same section working across philosophy of technology, media theory, and design research. His work explores alternative and activist design practices as a model to understand the democratization of technology. **Gül Onat** is a PhD candidate in the Department of Human-Centered Design (TU Delft). Using research-through-design and speculative approaches, she investigates design as a critical and generative space for (re)imagining alternative democratic public AI systems. **Karin Bogdanova** is a PhD candidate at the same department, working on the responsible development of AI systems for mental healthcare. **Olya Kudina** is an Associate Professor in Ethics/Philosophy of Technology (TU Delft), exploring the dynamic interaction between values and technologies, with a recent focus on AI and democracy. **Nazli Cila** is an Associate Professor at Department of Human-Centered Design (TU Delft). Her research focuses on developing frameworks to critically engage with AI through design.

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