

## The Future of More-Than-Human Design

### A Computing Practice in Crisis?

Barendregt, Wolmet; Bekker, Tilde; Berger, Arne; Dalsgaard, Peter; Eriksson, Eva; Frauenberger, Christopher; Friedman, Batya; Giaccardi, Elisa; Nicenboim, Iohanna; More Authors

**DOI**

[10.1145/3737609.3747092](https://doi.org/10.1145/3737609.3747092)

**Publication date**

2025

**Document Version**

Final published version

**Published in**

AAR Adjunct '25: Adjunct Proceedings of the Sixth Decennial Aarhus Conference: Computing X Crisis

**Citation (APA)**

Barendregt, W., Bekker, T., Berger, A., Dalsgaard, P., Eriksson, E., Frauenberger, C., Friedman, B., Giaccardi, E., Nicenboim, I., & More Authors (2025). The Future of More-Than-Human Design: A Computing Practice in Crisis? In *AAR Adjunct '25: Adjunct Proceedings of the Sixth Decennial Aarhus Conference: Computing X Crisis* Article 21 Association for Computing Machinery (ACM). <https://doi.org/10.1145/3737609.3747092>

**Important note**

To cite this publication, please use the final published version (if applicable).  
Please check the document version above.

**Copyright**

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

**Takedown policy**

Please contact us and provide details if you believe this document breaches copyrights.  
We will remove access to the work immediately and investigate your claim.



# The Future of More-Than-Human Design: A Computing Practice in Crisis?

Wolmet Barendregt

Faculty of Industrial Engineering &  
Innovation Sciences  
Eindhoven University of Technology  
Eindhoven, Netherlands  
w.barendregt@tue.nl

Peter Dalsgaard

Digital Creativity Lab  
Aarhus University  
Aarhus, Denmark  
dalsgaard@cavi.au.dk

Batya Friedman

The Information School, University of  
Washington  
Seattle, Washington, USA  
batya@uw.edu

Rikke Hagensby Jensen

Digital Design and Information  
Studies  
Aarhus University  
Aarhus, Denmark  
rhj@cc.au.dk

Iohanna Nicenboim

Industrial Design Engineering  
Delft University of Technology  
Delft, Netherlands  
i.nicenboim@tudelft.nl

Natalie Sontopski

Anhalt University of Applied Sciences  
Koethen, Germany  
natalie.sontopski@hs-anhalt.de

Tilde Bekker

Department of Industrial Design  
Eindhoven University of Technology  
Eindhoven, Netherlands  
m.m.bekker@tue.nl

Eva Eriksson

Aarhus University  
Aarhus, Denmark  
eva@cc.au.dk

Elisa Giaccardi

Politecnico di Milano  
Milan, Italy  
elisa.giaccardi@polimi.it

Ann Light

University of Sussex  
Brighton, United Kingdom  
ann.light@sussex.ac.uk

Elisabet M. Nilsson

School of Arts and Communication  
(K3)  
Malmö university  
Malmö, Sweden  
elisabet.nilsson@mau.se

Ron Wakkary

School of Interactive Arts and  
Technology  
Simon Fraser University  
Surrey, British Columbia, Canada  
Industrial Design  
Eindhoven University of Technology  
Eindhoven, Netherlands  
r.l.wakkary@tue.nl

Daisy Yoo

Industrial Design  
Eindhoven University of Technology  
Eindhoven, Netherlands  
d.yoo@tue.nl

Arne Berger

Computer Science and Languages  
Anhalt University of Applied Sciences  
Koethen, Germany  
arne.berger@hs-anhalt.de

Christopher Frauenberger

Interdisciplinary Transformation  
University, Austria  
Linz, Austria  
christopher.frauenberger@it-u.at

Anne-Marie Hansen

Malmö university  
Malmö, Sweden  
anne-marie.hansen@mau.se

Joseph Lindley

Lancaster University  
Lancaster, Lancashire, United  
Kingdom  
j.lindley@lancaster.ac.uk

Johan Redström

Umeå Institute of Design  
Umeå University  
Umeå, Sweden  
johan.redstrom@umu.se

Mikael Wiberg

Dept of Informatics, Umeå university  
Umeå, Sweden  
mwiberg@informatik.umu.se

## Abstract

Given the current ecological crisis, the HCI and design community is showing a growing interest in the adoption of more-than-human perspectives, challenging human-centric approaches. While this has sparked numerous research initiatives, many of them are still a far cry from providing practical solutions or transforming the industry. This also presents a hurdle for teaching more-than-human perspectives to design students, as they may feel powerless to practice those teachings in real-life industrial settings. To bring forth concrete examples of how more-than-human design practice can matter, we believe that it is now time to move beyond theorising about and advocating for the adoption of such perspectives and start a more-than-human design practice that transforms the industry. This workshop therefore aims to bring together educators, researchers, and designers to discuss and co-develop strategies for transitioning more-than-human perspectives from niche/speculation to mainstream/practice in HCI and design. The workshop also aims to develop ways to empower students to work with these perspectives to bring about this transformation of the industry.

## CCS Concepts

- Human-centered computing → HCI theory, concepts and models.

## Keywords

HCI, More-than-human, Design

### ACM Reference Format:

Wolmet Barendregt, Tilde Bekker, Arne Berger, Peter Dalsgaard, Eva Eriksson, Christopher Frauenberger, Batya Friedman, Elisa Giaccardi, Anne-Marie Hansen, Rikke Hagensby Jensen, Ann Light, Joseph Lindley, Iohanna Nicenboim, Elisabet M. Nilsson, Johan Redström, Natalie Sontopski, Ron Wakkary, Mikael Wiberg, and Daisy Yoo. 2025. The Future of More-Than-Human Design: A Computing Practice in Crisis?. In *Adjunct proceedings of the sixth decennial Aarhus conference: Computing X Crisis (AAR Adjunct 2025), August 18–22, 2025, Aarhus N, Denmark*. ACM, New York, NY, USA, 4 pages. <https://doi.org/10.1145/3737609.3747092>

## 1 Background

This workshop aims to explore the conceptual scope of different disciplines like science and technology studies (STS), computer science, anthropology or urban studies concerning their conceptualisations of more-than-human (design) in human-computer interaction (HCI). In an attempt to bridge different knowledge traditions on which HCI and design draw, we ask:

*- Going forward, what inspiration can we take from different disciplines, concepts and theories? What are the*

*contributions to science and practice that more-than-human design can make? How do we approach the territoriality that comes with research narratives centred on names that act almost like brands? And how can our notions of the more-than-human shape a lasting impact?*

The current ecological crisis facing our planet has led to attempts within the HCI and design research community to change course. While the first initiatives, dating roughly a dozen years ago, mainly focused on helping individuals change their behaviours [1, 5, 28], the Sustainable HCI movement [7, 22, 27] advocates for total system change. This has sparked an interest in more-than-human perspectives that aim to challenge and move beyond human-centrism in design [8, 12, 14–16, 29–31]. However, many more-than-human design-oriented activities are still of a theoretical or speculative nature. We also see some recent work advocating for more practice in more-than-human e.g. [19, 20, 23], although there remains a lack of clarity on how these ideas should be enacted in concrete design practices, and thereby become widespread and manifest as staples in professional design practice [19].

As Bardzell et al. state “reading theory in search of alternatives is one thing; actually transforming industrial production, distribution, and consumption is altogether different. Such a transformation will likely require years if not decades of experimentation with new models—all while still maintaining economies and quality of life” [1, p. 2]. Our first key question is thus:

*- What challenges do we face when going from theorising and speculating within more-than-human design to having a significant impact on industrial production, distribution and consumption? And how can we deal with those barriers?*

Tied to this question is the role that design education plays in this transformation. As Servant-Miklos [24, p. 67] states “[i]n response to the increasing visibility of environmental problems in the public sphere, education has instead been retooled to encourage bargaining and belief in technological salvation, because both psychological processes are required for capitalism to push beyond its physical limits. The main reason adults with full cognitive capacity passively watch the screws come off the machine without taking any steps to protect themselves from the coming implosion is because they were conditioned from the youngest age to believe that science and technology will come to the rescue”. In her work with students, Servant-Miklos indeed meets students who are so shocked after attending her classes about the planet’s state that they are unable to speak in class for weeks. However, we expect those same students to participate in shaping the future of the design industry through more-than-human perspectives as part of the necessary years-long transformation. Without proper ways to address their feelings of despair and without being able to give them inspiring examples from the industry itself, it is no wonder that we as teachers [18] are confronted with questions like: “How can I make use of the methods when I go out in the industry, which is at a completely different place?”, “Why should I learn these methods when they are not applicable in the ‘real world’?”, “Who am I to propose new approaches and challenge the current state when I’m a newcomer at a company?”. Our second key question is thus:



This work is licensed under a Creative Commons Attribution International 4.0 License.

- How can teachers, on the one hand, express the urgency of the situation and, on the other hand, provide students with the courage, knowledge, and tools to play a role in the industry’s transformation?

In addressing these questions, the workshop will explore what we can bring to the table to decentre the humanist conception of the human that is prevalent in computing and instead create space for more-than-human stories, actors and entanglements. We emphasise that the workshop is meant as a safe space for open discussions on the impact, challenges and chances of more-than-human perspectives for HCI and design. We also aspire to find a common motivation, means, and strategy to inspire the coming generations of designers and technologists to incorporate more-than-human approaches into their professional practices.

We invite researchers and practitioners from HCI, design research and other fields in which more-than-human entanglements are embedded in theory, concepts or practice (e.g., STS, urban studies, anthropology, participatory design) to reflect together on: i) how more-than-human looks like from their academic background (and has unfolded in projects or case studies in which they have been involved), ii) what academic input from which disciplines has connected participants to which notions of more-than-human, iii) how to bridge the gap of more-than-human theory and practice and map a more-than-human landscape. iv) make it actionable for a lasting positive impact of MTH in shaping the ways in which HCI and design is moving from an extractive to a more *wholesome* practice.

## 2 Workshop aims and themes

The aims of the workshop are as follows:

- to bring together educators, researchers and designers with an interest in more-than-human perspectives in HCI and design research, education and practice,
- to share what our more-than-human notion looks like; what can we each learn from each other’s engagement and experiments in the more-than-human space; how can the world at large benefit from our collective more-than-human efforts,
- to debate and co-develop ideas for how we can create conditions for more-than-human perspectives to really transform the industry and for how we can prepare our students to effectively play a role in this transformation.

The themes and underlying questions addressed in the workshop are as follows:

- What does “Designing-with” mean in the context of computing (considering our different practices and points of departure), and what is unique about it when comparing it to designing-with in other contexts (multispecies)?
- How could we articulate more-than-human design as an affirmative reorientation to human-centered design? What alignments and alliances can be achieved, and what shifts need to be made?
- How can we go from speculation to more-than-human practice in HCI?
- What can we learn from the previous paradigm shift towards human-centred design?

- What are current barriers in the industry for adopting more-than-human perspectives?
- How can economic factors be brought into more-than-human design approaches?
- What role do we see AI playing in this process of maturation?
- What broader movements, such as degrowth/post-growth [17, 25], circular economy and rebound effects [3, 4], climate justice [2, 9, 10], and decolonisation [13, 26] should we adopt?
- What other research and design fields, such as regenerative agriculture [11] and regenerative design [6], could we engage with to have a bigger impact?
- How to teach HCI and design students about more-than-human design?

## 3 Pre-Workshop Plans

A workshop call will be distributed through relevant networks. Before the workshop, participants will be asked to submit a 500-word motivation to join the workshop through a link provided by the organisers.

## 4 Workshop Structure

The workshop will consist of an introduction and two collaborative activities addressing the workshop themes. The participants will be divided into smaller groups and guided through a series of explorations based on the questions posed under each theme. These explorations will be facilitated by the workshop organisers. A first draft of the workshop timeline is developed, which will be further developed and adjusted to fit the context and the registered participants.

## 5 Post-Workshop Plans

The outcome of the workshop will be documented and shared with the participants. The participants will also be invited to a network of researchers, educators and practitioners to keep working towards the integration of more-than-human perspectives in both industry and education.

## 6 Organisers

The organisers have previously collaborated as organisers and/or participants in various related initiatives, such as a special interest group (SIG) at CHI’23 on “More-Than-Human Perspectives and Values in Human-Computer Interaction” [31], and a workshop at DIS’24 on “Teaching for More-than-human Perspectives in Design – A Pedagogical Pattern Mining Workshop” [21]. These similar events have had between 12-120 participants, so we feel confident that we can handle variously sized workshops.

## Acknowledgments

The research is co-funded by the Erasmus+ programme of the European Union, Grant number 2022-1-SE01-KA220-HED-000086664.

## References

- [1] Jeffrey Bardzell, Shaowen Bardzell, and Ann Light. 2021. Wanting To Live Here: Design After Anthropocentric Functionalism. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) (CHI ’21).

Association for Computing Machinery, New York, NY, USA, Article 293, 24 pages. doi:10.1145/3411764.3445167

[2] Oliver Bates, Vanessa Thomas, Christian Remy, Lisa P. Nathan, Samuel Mann, and Adrian Friday. 2018. The Future of HCI and Sustainability: Championing Environmental and Social Justice.. In *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems* (Montreal QC, Canada) (CHI EA '18). Association for Computing Machinery, New York, NY, USA, 1–4. doi:10.1145/3170427.3185365

[3] Laetitia Bornes, Catherine Letondal, and Rob Vingerhoeds. 2024. Systemic Sustainable HCI: Integrating Collaborative Modeling into a Design Process to Address Rebound Effects. In *Proceedings of the 2024 ACM Designing Interactive Systems Conference* (Copenhagen, Denmark) (DIS '24). Association for Computing Machinery, New York, NY, USA, 3046–3062. doi:10.1145/3643834.3661618

[4] Christina Bremer, Harshit Gujral, Michelle Lin, Lily Hinkers, Christoph Becker, and Vlad C. Coroama. 2023. How Viable are Energy Savings in Smart Homes? A Call to Embrace Rebound Effects in Sustainable HCI. *ACM J. Comput. Sustain. Soc.* 1, 1, Article 4 (Sept. 2023), 24 pages. doi:10.1145/3608115

[5] Hronn Brynjarsdottir, Maria Håkansson, James Pierce, Eric Baumer, Carl DiSalvo, and Phoebe Sengers. 2012. Sustainably unpersuaded: how persuasion narrows our vision of sustainability. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Austin, Texas, USA) (CHI '12). Association for Computing Machinery, New York, NY, USA, 947–956. doi:10.1145/2207676.2208539

[6] Raymond J. Cole. 2012. Transitioning from green to regenerative design. *Building Research & Information* 40, 1 (2012), 39–53. doi:10.1080/09613218.2011.610608 arXiv:https://doi.org/10.1080/09613218.2011.610608

[7] Rob Comber, Shaowen Bardzell, Jeffrey Bardzell, Mike Hazas, and Michael Muller. 2020. Announcing a new CHI subcommittee: critical and sustainable computing. *Interactions* 27, 4 (July 2020), 101–103. doi:10.1145/3407228

[8] Aykut Coskun, Nazli Cila, Iohanna Nicenboim, Christopher Frauenberger, Ron Wakkary, Marc Hassenzahl, Clara Mancini, Elisa Giaccardi, and Laura Forlano. 2022. More-than-Human Concepts, Methodologies, and Practices in HCI. In *Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems* (New Orleans, LA, USA) (CHI EA '22). Association for Computing Machinery, New York, NY, USA, Article 150, 5 pages. doi:10.1145/3491101.3516503

[9] Sasha Costanza-Chock. 2020. *Design Justice: Community-Led Practices to Build the Worlds We Need*. The MIT Press, Cambridge, Massachusetts. doi:10.7551/mitpress/12255.001.0001

[10] Olivia Doggett, Jen Liu, Ufuoma Ovienmhada, Samar Sabie, Sarah Gram, Laura J Perovich, Matt Ratto, and Robert Soden. 2023. Environmental and Climate Justice in Computing. In *Companion Publication of the 2023 Conference on Computer Supported Cooperative Work and Social Computing* (Minneapolis, MN, USA) (CSCW '23 Companion). Association for Computing Machinery, New York, NY, USA, 481–485. doi:10.1145/3584931.3611296

[11] EASAC. 2022. *Regenerative agriculture in Europe*. Retrieved March 3, 2025 from [https://easac.eu/fileadmin/PDF\\_s/reports\\_statements/Regenerative\\_Agriculture/EASAC\\_RegAgri\\_Web\\_290422.pdf](https://easac.eu/fileadmin/PDF_s/reports_statements/Regenerative_Agriculture/EASAC_RegAgri_Web_290422.pdf)

[12] Eva Eriksson, Daisy Yoo, Tilde Bekker, and Elisabet M. Nilsson. 2024. More-than-Human Perspectives in Human-Computer Interaction Research: A Scoping Review. In *Proceedings of the 13th Nordic Conference on Human-Computer Interaction* (Uppsala, Sweden) (NordiCHI '24). Association for Computing Machinery, New York, NY, USA, Article 72, 18 pages. doi:10.1145/3679318.3685408

[13] Arturo Escobar. 2015. Transiciones: a space for research and design for transitions to the pluriverse. *Design Philosophy Papers* 13, 1 (2015), 13–23. doi:10.1080/14487136.2015.1085690 arXiv:https://doi.org/10.1080/14487136.2015.1085690

[14] Verena Fuchsberger and Christopher Frauenberger. 2023. Doing responsibilities in entangled worlds. *Human–Computer Interaction* (Oct. 2023), 1–24. doi:10.1080/07370024.2023.2269934

[15] Elisa Giaccardi and Johan Redström. 2020. Technology and More-Than-Human Design. *Design Issues* 36, 4 (Sept. 2020), 33–44. doi:10.1162/desi\_a\_00612

[16] Elisa Giaccardi, Johan Redström, and Iohanna Nicenboim. 2024. The making(s) of more-than-human design: introduction to the special issue on more-than-human design and HCI. *Human–Computer Interaction* (May 2024), 1–16. doi:10.1080/07370024.2024.2353357

[17] Giorgos Kallis, Jason Hickel, Daniel W O'Neill, Tim Jackson, Peter A Victor, Kate Raworth, Juliet B Schor, Julia K Steinberger, and Diana Ürge Vorsatz. 2025. Post-growth: the science of wellbeing within planetary boundaries. *The Lancet Planetary Health* 9, 1 (Jan. 2025), e62–e78. doi:10.1016/s2542-5196(24)00310-3

[18] MOVA. n.d.. MOVA Teaching more-than-human perspectives in technology design – <https://mova.uni.mau.se/>. [Accessed 18-02-2025].

[19] Iohanna Nicenboim, Joseph Lindley, Cristina Zaga, Arne Berger, Laura Forlano, and Elisa Giaccardi. 2024. More-Than-Human Design in Practice. In *DRS2024: Boston (DRS2024)*. Design Research Society. doi:10.21606/drs.2024.114

[20] Iohanna Nicenboim, Doenja Oogjes, Heidi Biggs, and Seowoo Nam. 2023. Decentering Through Design: Bridging Posthuman Theory with More-than-Human Design Practices. *Human–Computer Interaction* 40, 1–4 (Nov. 2023), 195–220. doi:10.1080/07370024.2023.2283535

[21] Elisabet M. Nilsson, Anne-Marie Hansen, Daisy Yoo, Tilde Bekker, Rikke Hagensby Jensen, and Eva Eriksson. 2024. Teaching for More-than-human Perspectives in Design – A Pedagogical Pattern Mining Workshop. In *Companion Publication of the 2024 ACM Designing Interactive Systems Conference* (IT University of Copenhagen, Denmark) (DIS '24 Companion). Association for Computing Machinery, New York, NY, USA, 449–452. doi:10.1145/3656156.3658390

[22] James Pierce, Yolande Strengers, Phoebe Sengers, and Susanne Bødker. 2013. Introduction to the special issue on practice-oriented approaches to sustainable HCI. 8 pages.

[23] Anton Poikolainen Rosén, Antti Salovaara, Andrea Botero, and Marie Louise Juul Søndergaard (Eds.). 2024. *More-than-human design in practice*. Routledge, London, England.

[24] Ginie Servant-Miklos. 2024. *Pedagogies of Collapse: A Hopeful Education for The End of The World as We Know It* (1st ed.). Bloomsbury Academic, London. doi:10.5040/9781408100528

[25] Vishal Sharma, Neha Kumar, and Bonnie Nardi. 2023. Post-growth Human–Computer Interaction. *ACM Trans. Comput.-Hum. Interact.* 31, 1, Article 9 (nov 2023), 37 pages. doi:10.1145/3624981

[26] Rachel Charlotte Smith, Heike Winschiers-Theophilus, Daria Loi, Rogério Abreu de Paula, Asnath Paula Kambunga, Marly Muudeni Samuel, and Tariq Zaman. 2021. Decolonizing Design Practices: Towards Pluriversality. In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) (CHI EA '21). Association for Computing Machinery, New York, NY, USA, Article 83, 5 pages. doi:10.1145/3411763.3441334

[27] Robert Soden, Vishal Sharma, Matthew Louis Mauriello, and Nicola J. Bidwell. 2025. Climate for Change: New HCI Research for Climate Action. *Interactions* 32, 1 (Jan. 2025), 50–52. doi:10.1145/3704990

[28] Yolande A.A. Strengers. 2011. Designing eco-feedback systems for everyday life. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Vancouver, BC, Canada) (CHI '11). Association for Computing Machinery, New York, NY, USA, 2135–2144. doi:10.1145/1978942.1979252

[29] Ron Wakkary. 2020. Nomadic practices: A posthuman theory for knowing design. *International Journal of Design* 14, 3 (2020), 117.

[30] Alex Wilkie and Mike Michael. 2023. The aesthetics of more-than-human design: speculative energy briefs for the Cthulucene. *Human–Computer Interaction* (Nov. 2023), 1–13. doi:10.1080/07370024.2023.2276392

[31] Daisy Yoo, Tilde Bekker, Peter Dalsgaard, Eva Eriksson, Simon Skov Fougth, Christopher Frauenberger, Batya Friedman, Elisa Giaccardi, Anne-Marie Hansen, Ann Light, Elisabet M. Nilsson, Ron Wakkary, and Mikael Wiberg. 2023. More-Than-Human Perspectives and Values in Human-Computer Interaction. In *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg, Germany) (CHI EA '23). Association for Computing Machinery, New York, NY, USA, Article 516, 3 pages. doi:10.1145/3544549.3583174