Engaging Human and Non-Human Perspectives in Crisis Resilience: Designing AI-Supported Immersive Technologies for Inclusive Decision-Making

Adrian Wong
Design Lab
Sydney School of Architecture, Design and Planning
Sydney, NSW, Australia
adrian.w@sydney.edu.au

Tram Thi Minh Tran
Design Lab
Sydney School of Architecture, Design and Planning
Sydney, NSW, Australia
tram.tran@sydney.edu.au

Callum Parker
Design Lab
Sydney School of Architecture, Design and Planning
Sydney, NSW, Australia
callum.parker@sydney.edu.au

Marius Hoggenmueller
Design Lab
Sydney School of Architecture, Design and Planning
Sydney, NSW, Australia
marius.hoggenmueller@sydney.edu.au

Nate Zettna
Business School
University of Sydney
Sydney, NSW, Australia
nate.zettna@sydney.edu.au

Carlos Alfredo Tirado Cortes
Sydney School of Architecture, Design and Planning
University of Sydney
Sydney, NSW, Australia
carlos.tiradocortes@sydney.edu.au

Soojeong Yoo
Sydney School of Architecture, Design and Planning
University of Sydney
Sydney, NSW, Australia
soojeong.yoo@sydney.edu.au

Joel Fredericks
Sydney School of Architecture, Design and Planning
University of Sydney
Sydney, NSW, Australia
joel.fredericks@sydney.edu.au

Abstract

Crisis events such as natural disasters, habitat loss, and ecological degradation demand new ways of engaging communities in decision-making. Traditional approaches to engagement often exclude the voices of those most affected, particularly non-human species and ecological systems. Human-computer interaction research has begun to explore how immersive technologies and AI-supported tools can offer more inclusive, interactive, and situated forms of engagement. This workshop aims to advance this conversation by bringing together researchers and practitioners to examine how human and non-human perspectives might be integrated into participatory planning for crisis resilience. The workshop will focus on designing immersive and AI-supported tools that foster inclusive deliberation, multispecies ethics, and ecological awareness. Through a facilitated framing discussion, collaborative mapping, and speculative design activities, participants will critically examine current engagement and design practices and co-develop new interaction concepts that support just, inclusive, and adaptive responses to crisis events.

ACM ISBN 979-8-4007-2016-1/25/11
https://doi.org/10.1145/3764687.3767277

CCS Concepts

• **Human-centered computing → Interaction design theory, concepts and paradigms**.

Keywords

participatory design, more-than-human, crisis resilience, immersive technologies, artificial intelligence, speculative design, multispecies engagement

ACM Reference Format:
Adrian Wong, Tram Thi Minh Tran, Callum Parker, Marius Hoggenmueller, Nate Zettna, Carlos Alfredo Tirado Cortes, Soojeong Yoo, and Joel Fredericks. 2025. Engaging Human and Non-Human Perspectives in Crisis Resilience: Designing AI-Supported Immersive Technologies for Inclusive Decision-Making. In *37th Australian Conference on Human-Computer Interaction (HCI) (OZCHI '25), November 29–December 03, 2025, Sydney, Australia.* ACM, New York, NY, USA, 5 pages. https://doi.org/10.1145/3764687.3767277

1 Introduction

Environmental crises, whether arising from natural disasters, habitat loss, or environmental degradation, are becoming more frequent and severe. Urban environments face compounding pressures from rapid urbanisation, biodiversity collapse, and extreme weather events. These crises demand new forms of engagement that move beyond static consultation, siloed expertise, and anthropocentric assumptions.

In response, the Human-Computer Interaction (HCI) community has explored how participatory and human-centred approaches can support inclusive planning and engagement. Human-centred design has long been a cornerstone of interaction design, focusing on people's needs, behaviours, and experiences [7]. However, as researchers increasingly question the boundaries of who and what counts in participatory processes, more-than-human design has emerged to consider the needs and roles of non-human actors such as animals, plants, ecosystems, and technological systems [3, 5, 14]. Although more-than-human design highlights the ecological interdependencies often overlooked in traditional approaches, its practical integration into community engagement and decision-making remains limited.

Recent advances in AI (e.g., generative, predictive, or conversational tools) and immersive technologies (e.g., augmented/virtual reality) introduce new methods of participatory engagement, particularly in crisis and environmental contexts. AI and big data systems are widely used in disaster response and environmental modelling by governments, industry, and research agencies [8, 15]. In climate and disaster contexts, interactive visualisations and civic platforms have been developed to help people make sense of big data and to support participation in planning, policy, and resilience-building efforts [2]. However, many of these systems serve top-down objectives and lack participatory or speculative modes of use. AI-supported tools have been used to automate planning processes or analyse social media feeds [9], but few studies have explored how such systems might facilitate collaborative, scenario-based engagement that includes both human and non-human perspectives (see Figure 1).

This workshop addresses this gap by investigating **how immersive and AI-supported technologies can support inclusive, speculative, and multispecies-informed engagement** in the context of crisis resilience. We invite HCI researchers, designers, and practitioners to critically reflect on current approaches to crisis resilience and co-develop new concepts that challenge human exceptionalism, centre ecological relations, and leverage emerging technologies for adaptive, participatory planning. Through a combination of provocations, participatory mapping, and speculative design activities, the workshop will explore design considerations, provocations, and potential collaborations for future research.

Figure 1: Conceptual illustration of a speculative planning scenario involving immersive technology and more-than-human stakeholders.

2 Importance and Relevance to the Conference Theme

This workshop responds to two important research directions in HCI: (1) more-than-human design and (2) the role of immersive and AI-supported technologies. It brings these strands together within the context of community engagement and crisis resilience planning.

In doing so, it builds on recent discourse in HCI that explores the incorporation of non-human actors into participatory design [13] and decision-making [12], post-growth perspectives in HCI [10], and reflections on the paradoxes and tensions of de-centring the human [1]. The workshop also contributes to broader discussions on the use of emerging technologies in crisis contexts. For example, VR has been applied to simulate extreme wildfire behaviours to support situational awareness and decision-making for firefighters [11], and to enable shared spatial scientific sense-making in the context of wildfire evacuation planning [6].

This year's OzCHI conference theme, *Generative Intelligences, Planetary Futures*, highlights the evolving role of intelligent technologies in shaping more sustainable, inclusive, and anticipatory responses to global challenges. This workshop engages with the theme by examining how immersive and AI-supported technologies can be applied to support participatory engagement practices that incorporate both human and non-human perspectives within the context of crisis resilience and environmental planning.

3 Workshop Goal & Activity

This workshop aims to explore how immersive and AI-supported technologies may support inclusive, speculative, and multispecies-informed approaches to participatory planning for crisis resilience. The workshop will be guided by the following questions:

- **What are the potential benefits of immersive and AI-supported technologies in crisis resilience planning and community engagement?**
  Spatial and embodied sensemaking have been suggested as possible benefits [4], but how might these technologies enhance participation in planning processes related to environmental crises? What other advantages might they offer for diverse communities and stakeholders?
- **What design strategies or future-oriented concepts could help realise the potential of these technologies in participatory engagement?**
  How might speculative approaches be used to explore new tools, systems, or methods that support more inclusive and multispecies-informed planning?
- **What challenges may arise in practical implementation?**
  What are the limitations of immersive tools, and how might concerns around trust, inclusivity, or interpretation affect the use of AI in these settings?

4 Workshop Overview

This half-day workshop is open to participants from diverse backgrounds, including design, HCI, AI and immersive technologies, planning, and related fields. It is intended for researchers, practitioners, and students interested in the use of technology to support inclusive and multispecies-informed participatory processes. The workshop will accommodate approximately 15 to 20 participants (excluding the organisers).

This workshop is designed to be highly interactive and exploratory. It will include a pre-workshop engagement activity, followed by hands-on group activities during the session. These activities are intended to elicit diverse perspectives on how immersive and AI-supported technologies can be designed and applied to support more inclusive engagement with environmental crises.

4.1 Pre-Workshop Plan

Website: A dedicated website for the workshop has been created at morethanhuman.me/workshop to provide participants with key information. The site includes the workshop overview, registration details, and key activities or any preparatory materials.

Call for participation: The workshop call will be shared through social media platforms such as LinkedIn, Bluesky, and Instagram, following the opening of OzCHI 2025 registration. Organisers will also distribute the call through academic mailing lists, institutional channels, and relevant professional networks.

Visual poster: Participants will not be required to submit a position paper. However, in preparation for the workshop, they will be invited to create a visual poster that introduces one non-human entity they believe should be considered in crisis-related participatory planning and a short description explaining why. This can be produced using AI-generated imagery, hand-drawn sketches, or any preferred format (see Figure 2). Posters will be used as conversation starters during the workshop and may also be shared on the workshop website.

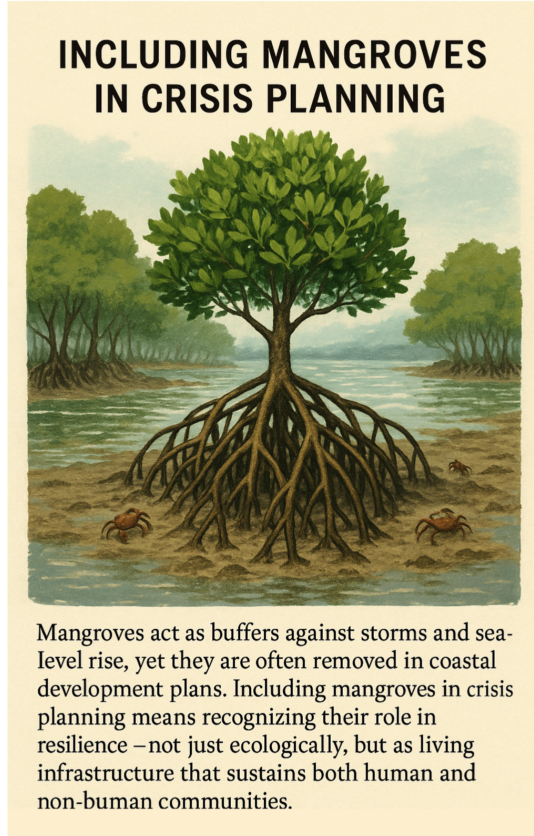

Figure 2: Example visual poster generated by ChatGPT4o, with the prompt *'a mangrove forest at low tide, with visible root systems, small crabs, and rising water levels in the background'.*

4.2 Workshop Schedule

Table 1: Key activities and estimated durations.

Time	Duration	Activity
13:30 – 13:40	10 min	Workshop Welcome and Introduction
13:40 – 13:55	15 min	Keynote Speaker: Prof. Marcus Foth
13:55 – 14:35	40 min	**Networking and Framing Discussion**
14:35 – 15:15	40 min	**Collaborative Mapping**
15:15 – 15:30	15 min	*Coffee Break*
15:30 – 16:20	50 min	**Speculative Design Activity**
16:20 – 16:50	30 min	Presentation and Discussion
16:50 – 17:00	10 min	Wrapping up & Next Steps

Networking and Framing Discussion. The workshop will begin with a networking activity in which participants get to know one another using their prepared visual posters. This will be followed by a facilitated group discussion to explore how participants understand and approach crisis resilience, more-than-human perspectives, and emerging technologies in their own work. This conversation will focus on identifying shared challenges, knowledge gaps, and emerging questions. The aim is to establish a common reference point and open space for critical reflection. The ideas raised during this discussion will help shape the direction of the subsequent activities.

Collaborative Mapping. Participants will work in small groups to create visual maps that represent the actors, systems, and relationships involved in community engagement during crisis events. This activity aims to explore both human and non-human perspectives, highlighting the interdependencies that shape decision-making in environmental contexts. Groups may use mapping to identify barriers, opportunities, or overlooked stakeholders, including ecological and technological actors. These maps will inform the speculative work that follows.

Speculative Design Activity. Building on the earlier discussion and mapping, participants will take part in a speculative design activity focused on imagining new tools, interfaces, or engagement processes for inclusive crisis resilience. This may involve designing AI-supported agents, immersive experiences, or participatory methods that include non-human perspectives. Groups will be supported with low-fidelity materials such as sketching templates, scenario prompts, and cards to help generate and communicate ideas. The activity encourages creative thinking about future systems of engagement grounded in ecological and ethical considerations.

4.3 Post-Workshop Plan and Expected Outcomes

(1) The workshop aims to create a space for researchers and practitioners with shared interests in more-than-human and participatory design to connect during OzCHI, with the intention of supporting future collaboration and knowledge exchange.
(2) This workshop will provide an initial exploration of the potential role of immersive and AI-supported technologies in participatory crisis planning. Insights from speculative design activities and group discussions will be documented in a summary report. These findings may also inform the development of an academic publication.

5 Organisers

Adrian Wong is an Associate Lecturer in Emerging Technologies at the University of Sydney's School of Architecture, Design and Planning. His research focuses on applying Artificial Intelligence to solve complex problems, particularly in high-stakes decision-making contexts.

Tram Thi Minh Tran is a postdoctoral researcher at the University of Sydney's School of Architecture, Design and Planning. Her research explores the applications and implications of emerging technologies, with a particular focus on AR/VR and autonomous mobility.

Callum Parker is a Lecturer in Interaction Design at the Urban Interfaces Lab within the University of Sydney. Callum's research seeks to gain a new understanding of how interactive digital city interfaces can work for everyone, of all shapes and sizes, and abilities. His work is also dedicated to exploring the evolving concept of "public space" in the Metaverse and understanding how diverse people can engage with it. Callum utilises cutting-edge technologies, including pervasive displays and augmented, virtual, and mixed realities.

Marius Hoggenmüller is a Lecturer in Interaction Design in the Design Lab at the University of Sydney's School of Architecture, Design, and Planning. His work focuses on prototyping interactions with emerging technologies in cities, such as urban robots and autonomous systems.

Nate Zettna is a Lecturer in Leadership and Organisational Behaviour within the Discipline of Work and Organisational Studies. He earned his PhD specialising in organisational behaviour and management from the University of Sydney Business School, where he was awarded the prestigious Business School Research Scholarship. His research focusses on team effectiveness and employee well-being. He is also a recipient of the John C. Harsanyi Graduate Medal (University of Sydney Alumni Awards).

Carlos Alfredo Tirado Cortes is a Lecturer in Interaction Design at The University of Sydney's School of Architecture, Design and Planning. His research focuses on the intersection of Mixed Reality, Human-Computer Interaction, and Data Visualization. He has worked on various immersive analytics projects aimed at developing technologies for bushfire applications, particularly in firefighter training and emergency response. His work investigates how Mixed Reality can be utilised as a tool to aid disaster response and training for extreme weather conditions.

Soojeong Yoo is a Lecturer in Design at The University of Sydney's School of Architecture, Design and Planning. Her research focuses on human factors in healthcare, aiming to design effective immersive interactive health technologies (VR/AR/MR) for work and hospital settings, and to promote wellbeing through technology integrated into everyday life.

Joel Fredericks is a Senior Lecturer in Design at The University of Sydney's School of Architecture, Design and Planning. His research is at the intersection of interaction design, community engagement, urbanism, and smart cities. Joel has worked on various transdisciplinary research projects that incorporate participatory methods to design, develop and deploy interactive systems that enhance community engagement and contribute to collaborative city-making. Joel has authored and co-authored in numerous publications and books. Most notably, he was the lead author of Media Architecture Compendium Vol.2 – Concepts, Methods, Practice, which draws on academic research and global studies to present an evolutionary account of concepts, methods, and practice for bringing media architecture thinking into projects.

Acknowledgments

This workshop is supported by a Collaborative Research Grant from the Sydney Environment Institute and the School of Architecture, Design and Planning, awarded to the project *'More-Than-Human Futures: Designing Crisis Resilience Through AI and Immersive Technologies'*.

A Appendix - Visual Poster Instructions

[Instructions provided to potential workshop participants]

As a way to prepare for the workshop, we invite you to create a simple visual poster that introduces one non-human entity you believe should be included in participatory planning for crisis resilience. This could be a species, an ecosystem, a geological feature, or any more-than-human stakeholder relevant to environmental futures.

You may choose to generate your visual using AI tools (e.g. DALL·E, Midjourney, etc.), draw by hand, or use collage, photos, or any other format. Posters can be as simple or expressive as you like. They will be shared in small groups during the workshop as a way to prompt discussion and reflect on multispecies inclusion.

Your poster should include:

- A visual representation of the chosen non-human entity
- A short caption (1–3 sentences) explaining: Why this entity? What does participation mean for them in planning?

References

[1] Rosan W. Chow, Judith Dörrenbächer, Anton Poikolainen Rosén, Daisy Yoo, Eva Eriksson, and Marc Hassenzahl. 2025. Paradoxes, Tensions and Challenges in Decentering the Human. In *Companion Publication of the 2025 ACM Designing Interactive Systems Conference (DIS '25 Companion)*. Association for Computing Machinery, New York, NY, USA, 23–25. doi:10.1145/3715668.3734160
[2] Simon Claes, Xuanyi Pan, and Martin Tomitsch. 2021. Situated data stories for immersive and actionable climate communication. In *Proceedings of the 2021 Designing Interactive Systems Conference*. ACM, 1819–1831.
[3] Carl DiSalvo and Jonathan Lukens. 2011. Nonanthropocentric design: tools for representing collective experience within ecosystems. In *Proceedings of the Designing Interactive Systems Conference*. ACM, 483–492.
[4] Barrett Ens, Maxime Cordeil, Chris North, Tim Dwyer, Lonni Besançon, Arnaud Prouzeau, Jiazhou Liu, Andrew Cunningham, Adam Drogemuller, Kadek Ananta

Satriadi, and Bruce H Thomas. 2022. Immersive Analytics 2.0: Spatial and Embodied Sensemaking. 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 91, 7 pages. doi:10.1145/3491101.3503726

[5] Willem Fieuw, Name Author2, and Name Author3. 2022. More-than-human design for inclusive urban futures. In *Proceedings of the Design Research Society Conference*.

[6] Samir Ghosh, Yuhui Wang, William Zhou, Kelly Lin, Joshua Mcveigh-Schultz, and Katherine Isbister. 2024. Designing Shared VR Tools for Spatial Scientific Sensemaking About Wildfire Evacuation. In *Extended Abstracts of the CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) *(CHI EA '24)*. Association for Computing Machinery, New York, NY, USA, Article 102, 5 pages. doi:10.1145/3613905.3650819

[7] Joseph Giacomin. 2014. What is human centred design? *The Design Journal* 17, 4 (2014), 606–623.

[8] A. Harika, G. Balan, H. P. Thethi, A. Rana, K. V. Rajkumar, and M. A. Al-Allak. 2024. Harnessing The Power of Artificial Intelligence for Disaster Response and Crisis Management. In *2024 International Conference on Communication, Computer Sciences and Engineering (IC3SE)*. IEEE, Gautam Buddha Nagar, India, 1237–1243. doi:10.1109/IC3SE62002.2024.10593506

[9] Marina Kogan, Chenhao Shen, and Cynthia Bennett. 2021. CommunityClick: Capturing and Reporting Community Feedback from Town Hall Meetings. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. ACM, 1–14.

[10] Vishal Sharma, Hongjin Lin, Asra Sakeen Wani, Jared Lee Katzman, Anupriya Tuli, Naveena Karusala, Shaowen Bardzell, Christoph Becker, Martin Tomitsch, and Neha Kumar. 2025. Advancing Post-growth HCI. In *Proceedings of the Extended Abstracts of the CHI Conference on Human Factors in Computing Systems (CHI EA '25)*. Association for Computing Machinery, New York, NY, USA, Article 767, 6 pages. doi:10.1145/3706599.3706731

[11] Carlos Alfredo Tirado Cortes, Mario Flores Gonzalez, Richard J. Hurley, and Dennis Del Favero. 2025. Designing an Immersive Wildfire Visualization System for Firefighters. In *Proceedings of the Extended Abstracts of the CHI Conference on Human Factors in Computing Systems (CHI EA '25)*. Association for Computing Machinery, New York, NY, USA, Article 183, 10 pages. doi:10.1145/3706599.3719903

[12] Martin Tomitsch, Joel Fredericks, Marius Hoggenmüller, Alexandra Crosby, Adrian Wong, Xinyan Yu, and Weidong Huang. 2025. AI-Supported Participatory Workshops: Middle-Out Engagement for Crisis Events. *Urban Planning* 10 (2025). doi:10.17645/up.9165

[13] Chidi Usanga, Cristiano Storni, Ann Light, Liesbeth Huybrechts, and Maurizio Teli. 2024. Giving Voice to Nature: Participatory Design with Non-Human Stakeholders for Sustainable Development. In *Proceedings of the Participatory Design Conference 2024: Exploratory Papers and Workshops - Volume 2* (Sibu, Malaysia) *(PDC '24)*. Association for Computing Machinery, New York, NY, USA, 215–218. doi:10.1145/3661455.3669896

[14] Ron Wakkary. 2021. *Things we could design: For more than human-centered worlds*. MIT Press.

[15] Honghao Zhu, William Sutherland, Serena Zheng, and Michael S. Bernstein. 2022. AI for civic deliberation: A framework for understanding design trade-offs. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*. ACM, 1–17.