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More-than-human participation: Design for sustainable smart city futures

Out of necessity or choice, people and wildlife are increasingly living side-by-side in urban environments. As more species live together in cities, this presents significant environmental challenges associated with high density living, poor resource management, long supply chains, habitat loss and pollution. These conditions can be toxic for humans and non-humans alike.

One response has been to make cities “smart” using networked sensing, cloud and mobile computing, to optimize, control and regulate urban processes. “Smart” initiatives are often presented as a social and environmental good. An accompanying agenda however has been to spur on sales of novel technology, with its attendant benefits for a small number of companies and their employees. In other words, smart cities are often positioned as solving environmental problems through technologically-driven, human-centered, and solution-optimizing approaches that promise great benefit, but include a number of faulty premises.

While many governments are developing participatory approaches to sustainability challenges, the focus however, remains largely human-centered. Such approaches are often too simplistic to address the complexities of long-term environmental sustainability. They also fail to acknowledge how human and non-human lives - or the “more-than-human” - are inseparable and interdependent, and how we all participate in urban life [2]. Without care, smart city agendas may exacerbate the very problems they seek to solve.

What will it take to create a real shift in mindsets of those responsible for smart city design to take a more-than-human participatory perspective? What can we, as designers and educators, do to respond to the environmental challenges our future cities face?

In this article we propose an alternative smart city agenda for the interaction design community in responding to a more-than-human perspective. To help us explore and imagine what this agenda could be like we illustrate our discussion with examples shared as part of an interdisciplinary workshop at the Participatory Design Conference, Hasselt Belgium in 2018 [4].

Encountering more-than-human worlds

In the age of the Anthropocene – a term used to refer to the most recent geological era in which human activity is transforming earth systems, accelerating climate change and causing mass extinctions – a human-centered perspective of cities is increasingly seen as untenable [5]. In fields such as science and technology studies (STS), environmental humanities, geography, planning, fine art, design and HCI, scholars are challenging traditional binaries such as Culture/Nature and Human/Non-human, to consider the entanglements between human and non-human worlds including “things, objects, other animals, living beings, organisms, physical forces, spiritual entities” [7] in urban contexts.

Ideas such as these have recently been mobilized in projects such as ‘Mitigation of Shock’; a speculative design project by Superflux design studio. The work interrogates food scarcity in

2050 through an installation of a reconstructed apartment in London. Where there was once a lounge, an all encompassing food lab, computer and growing hub made from recycled and salvaged electronics and everyday homeware has taken over the domestic space. The focus of the work was initially to explore how food shortages prompted by climate change could be re-imagined through alternative domestic food production. But in a recent talk Anab Jain described how a more meaningful co-dependent relationship emerged with the plants which became more than just the food they were growing [6].

“The project gave birth to new relationships, as we moved from just making things, to making things that grew. [...] we saw how roots were born, how they were formed and grew into these delicate ecologies, how they transformed and died or grew incessantly. [...] This direct experience drew us into the world of many interacting species. It provided a useful vantage point for knowing ourselves as participants in more complex human and non-human relationships.”

The project suggests opportunities for design process somewhere between science fact and speculative fabulation [3]. It also shows how making-with and growing-with have the potential for alternative forms of participation in fabricated multispecies worlds. But how could projects such as these also promote discussion on participation in smart city design to overcome problematic narratives of human privilege within the urban environment?

We present four parts of our agenda illustrative of future research practices to respond to these challenges.

Decentering human agencies Maria Puig de la Bellacasa [7] reminds us that any act of decentering needs to also remain “close to the predicaments and inheritances of situated human doings.” (p.2), that is, in how we interact, connect and commune with other species and other worlds. This needs to be balanced with an urgent understanding on how we cannot continue to act as though humans are separate from, and privileged over, other species. In fact, from the billions of bacteria within us, to the multitude of species on which our food supply depends, we are absolutely interdependent and entangled with the wellbeing of non-human others. Within cities we need to move away from a perspective in which urban environments are for human inhabitants alone. But how do we make the experiences of non-human other palpable? How do we hear, and how do we encourage others to hear, the non-human voices, and bring them into participatory processes when designing for smart cities? How do we convince others who are less familiar with such perspectives that decentering human privilege is important and relevant for the future of interaction design?

There are already many examples and approaches across fine art, HCI and design (see links to examples). However we currently need more consolidation, critical reflection and sharing of examples for others to learn from this vast and diverse range of exciting practices. For instance approaches from animal computer interaction (ACI) in developing embodied, compassionate and affectionate relationships with non-human individuals could be valuable. While a

perspective that takes into account the rights and needs of individual species does not address the interdependencies and entanglements of whole ecosystems, developing ethics and a sensitivity for (individual members of) other species could be one way to move beyond a human-centered perspective. Designer researchers could start to find ways to advocate with others to show how non-humans matter (e.g. figures 1, 2 and 3). For example in describing impact to our funders, we could talk about the impact of our work on individual non-human lives in the same way that we might talk about human lives.



Figure 1: During the workshop one group explored ways of making the voices of other species heard through imagining acoustic ecologies across the city. Paper cones were used as proxies to suggest swarms of technologies such as sensors and amplifiers to raise awareness of how species communicate with one another using sound.



Figure 2: The workshop included contributions to a public exhibition at the Z33 Gallery, Hasselt, from a selection of participants' existing work, including Kaylene Kau's Animal Diplomacy Bureau's Bird Games.



Figure 3: As part of the workshop we developed a speculative participatory masked walk; an embodied experiment in decentering human agency to consider potential relationships between different species in the city.

Exploring temporalities of the more-than-human There is a tension between the urgency of climate change, and the need to plan for longer timescales, or even deep geological time. Like our politicians and other decision makers, funded research typically focuses on limited linear timescales. How do we design for much longer timescales when our project funding is finite? How could we design an intervention that takes place over 100 years? Non-human timescales can be much shorter or longer than our own. How could we map our timescales with those of the more-than-human, e.g. other species, changing seasons, climate change? Stewart Brand's "Pace Layers" also offers insight into how we might consider the interdependencies and hierarchies of timescales from different components of a particular species; from the 1 year old pine needle of the conifer tree to the 10,000 year old biome in which it lives [1]. Other examples include Jo Law's series of 'Illustrated Almanacs', which present layers of different timescales from environmental phenomenon, (e.g. seasons and moon cycles) to different species migration. Also Natalie Jeremijenko's 'The Phenology Clock' that shows life cycle events for different species.

Incorporating other wisdoms about the more-than-human In some cultures "knowing the land" is a part of a community's notion of valued knowledge. The relationships between human and non-human species are more entwined and interdependent than typically presented in smart city projects, where the non-human exists either as a pest to be eliminated, or a resource to be extracted for human benefit. Worth consideration here are indigenous epistemologies and ontologies, in which the relationships between humans and other non-human species, including spirits and ghosts, are given significant attention and respected for their presence and import in driving decision making. Discussions on decolonizing design (<https://www.decolonisingdesign.com/>) suggest potential alignments with this agenda in advocating for the use of "disappearing" knowledge systems. Such multiplicity also points towards different understandings of "smartness" and the role of adaptation. For example, reading tree behaviour, as a bio-sensor, can help others learn about the wider environment

including pollution, weather, and climate change. This can further highlight sensitivities required to support a greater diversity of species that may also be impacted.

One suggestion is for designers to work collectively to create platforms, patchworks, and assemblages of technologies that incorporate certain “environmental values”. This could include allowing only certain actions that build on combinations of different wisdoms. The values could stem from different layers of situated knowledges ensuring our disentanglement was impossible.

Here we draw inspiration from Anna Tsing’s forthcoming *“Feral Atlas: the more-than-human Anthropocene”*. This is a digital archive, game, research and teaching tool for documenting, what Tsing calls ‘the new wild’; species that are thriving during the Anthropocene. Tsing evokes the term feral to describe how some species are adapting in unexpected ways, making use of new materials such as plastics and urban spaces by patching together available resources [8]. How could feral sociotechnical patchworks encourage alternative combinations and relationships that build on and continue to support more-than-human diversity in cities? One approach would be to advocate for the combined use of salvaged, recycled or living interfaces.

Design pedagogy and learning to mediate the more-than-human While interaction design education is hugely diverse across departments and countries, there are currently few design programmes that engage with other disciplines in substantial and longitudinal ways that could complement design expertise, particularly in areas of more-than-human design. Alternative design curricula could incorporate expertise from environmental legal professionals, community members, indigenous elders, environmental scientists, biologists, ecologists, geologists, anthropologists and urban planners to support more integrated design courses within higher education. Projects could be focused on the specific locality; geology, cultures, flora and fauna; to introduce a more holistic approach to pedagogical practice for the more-than-human. Further, building on the decolonizing design agenda, curricula would steer away from more traditional design examples from the western canon and work with other traditions such as folklore and mythologies.

One specific area of skill to be nurtured would be design mediation to help build new alliances. While this is not necessarily a new role for designers within participatory design practice, taking a more-than-human perspective on smart cities gives this a potential new dimension. Designers’ skills could focus on consolidating, interpreting and finding ways to present a range of knowledges and wisdoms about local environments to build such alliances (e.g. the conditions needed for urban trees to thrive). Skills would also be needed to recognize, understand and make palpable the potential discomfort, tension and compromise required to forge these new alliances. For instance, how do we form partnerships with moths that eat our clothes, worms that damage wooden infrastructures, plants with the potential to undermine the foundations of buildings, or soils that host ecologies of microscopic species we can barely see? Most importantly, how do we connect these worlds to those collectively responsible for making decisions for smart cities of the future?

Where do we go from here?

More than two thirds of the global human population is expected to live in cities by 2050. This is alongside a vast array of species negotiating the ongoing impacts of climate change; the sixth mass extinction [3]. Smart city visions so far remain firmly focused on solving sustainability problems from a human-centered and technocratic starting point, often ignoring the interdependencies of life. A more-than-human participatory approach to interaction design is one way to sensitize and challenge such perceptions and nurture ways of learning to live with our already damaged earth. But further care, attentiveness and commitment are also needed to share and translate these ideas into inclusive exemplars of practice. The workshop and accompanying art exhibits point to the value of bringing researchers together to forge new approaches and pool experience, offering not just insights but also a sense of a common agenda.

Acknowledgements

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EXAMPLES

Active Ingredient <http://www.i-am-ai.net/work/a-conversation-between-trees/>

Connected Seeds and Sensors <http://www.connectedseeds.org/>

Jo Law <http://almanac.photonicsmedia.net/>

Kaylene Kau <https://www.kaylenekau.com/>

My Naturewatch <https://mynaturewatch.net/>

Natalie Jeremijenko <http://tegabrain.com/The-Phenology-Clock>

Nature Smart-Cities <https://naturesmartcities.com/>

Superflux <http://www.mitigationofshock.org/>

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