# Multispecies Urbanism: Blueprint on the Methodological Future of Inclusive Smart City Design

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**Abstract.** The incorporation of digital infrastructure has become increasingly important in Smart Cities. Inclusive Smart City design requires an intersectional approach that engages human and non-human actors. While in academia inclusive design and socio-technical methods are emerging, Smart City practitioners lack universally accessible collections of methods applicable for diverse target groups. This workshop examines creative, qualitative and participatory methods with practitioners and researchers for inclusive design of Smart Cities that consider the needs and preferences of vulnerable target groups such as older adults, wildlife, and nature. A participatory approach is applied, taking into account the multidisciplinary complex work context of practitioners, e.g., representatives of municipalities. This workshop is the third of a series of workshops against this theme and closes the circle of different relevant stakeholders (researchers, vulnerable target groups, practitioners), resulting into a collection of inclusive, participatory methods which are made accessible to Smart City practitioners in an online toolbox.

# 1    Introduction

The United Nations has established 17 sustainability goals to reach climate neutrality by 2050[1], and Smart Cities are the prevailing mode municipalities are employing to reach this goal. However, many stakeholders are omitted from decision-making about the adoption of systems, structures, and other designs. This workshop is designed to gather the perspectives of practitioners in care, government, and the environment to work towards Sustainability Goals 10- Reducing Inequalities in and among countries and 11- Smart Cities and Communities, which "Make cities and human settlements inclusive, safe, resilient, and sustainable" (SDG 11) (Takaoka et al., 2023). In this workshop, we will focus on the experiences of practitioners in order to improve digital infrastructures in multispecies Smart City design.

## 1.1    Motivation: The evolution of Smart City design

Despite attempts to establish a generally valid definition of the term 'Smart City', it still functions as an umbrella term (Dameri et al., 2013; Toli and Murtagh, 2020; Winkowska et al., 2019). The traditional Smart City concept aims to improve quality of life of human citizens through a technocratic lens (Jiang et al., 2020; Kitchin, 2014; Kitchin et al., 2017). Recent Smart City research take a holistic approach (Edwards et al., 2023; Jiang et al., 2020; Tomitsch et al., 2021), recognizing fauna and flora as vulnerable target groups themselves. The overall dynamic embedding of stakeholders in urban socio-technical structures is key to designing a healthy ecosystem 'city' (Maller, 2018). Bottom-up approaches, offering "true participation" (Arnstein, 1969) where possible and useful have the potential to face these needs and challenges (Ertl et al., 2021; Scheepmaker et al., 2022). To give vulnerable groups a voice in shaping their urban environment,

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[1]    https://sdgs.un.org/goals

creative, qualitative, and participatory methods are needed (Takaoka et al., 2023). The purpose of this workshop is to collect and explore such methods and discuss their adaptability for different vulnerable target groups (human and non-human actors or their representatives).

## 1.2 Objective: Methods for Multispecies Urbanism

This workshop plan is in line with our overall objective to integrate vulnerable citizens (human and non-human actors) in Smart City design and gather different practitioner perspectives on methods to support this, building a Caring Community-based platform (Aal et al., 2023) that offers these methods in an online toolbox and possible ways of adaptation for multiple target groups. This aligns with CSCW's focus on how collaborative work and coordination can be arranged and supported by computer systems. Those methods can support building an inclusive co-located community for knowledge sharing against the background of methodological framing in design. This is the third and final workshop of a series (Ertl et al., 2021; Scheepmaker et al., 2022) to collect (vulnerable) stakeholder perspectives and methods to include vulnerable target groups in design processes of multispecies Smart City environments.

In this workshop, we'll integrate insights from smart city practitioners, previously collected in related workshops, to explore their relevance to computational multi-species urbanism. We'll explore methodologies, discuss applicability and develop case studies. We'll also create a Caring Community network for those interested in multispecies urbanism, and start building an online toolkit. This effort will follow five satellite workshops in three countries, targeting groups such as caretakers, biologists, social workers and urban planners, using existing networks for recruitment. The series will conclude with a final workshop for researchers to develop and share methodologies for engaging with vulnerable populations.

# 2 Inclusive Smart City Design: Understanding Multispecies Habitats

Human-centric Smart City approaches highlight the collaborative and inclusive character of urban places and focus on the needs of humans and their wellbeing (Cingolani et al., 2022). Co-creation with diverse groups of citizens can ensure that Smart City applications are inclusive and "do not reproduce social or economic biases"[2]. This requires methods and tools in Smart City processes which empower diverse vulnerable or marginalized groups of citizens, for instance people with migrant background, to (actively) participate in them. While in the field of HCI, diverse groups of citizens are increasingly involved in design processes and

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[2] https://digital-strategy.ec.europa.eu/en/news/berlin-declaration-digital-society-and-value-based-digital-government

the set of methods is growing, yet Smart City practitioners still struggle to empower citizens beyond the 'usual suspects' to participate (Burton, 2004; Ertl et al., 2021; Grinko et al., 2021; May, 2007).

In our proposal we want to focus on 'multispecies urbanism' which broadens the human-centered perspective to include the myriad of non-human species that share urban spaces with us. These can include animals, plants, fungi and even micro-organisms. Recognizing the importance of these non-human entities can lead to more sustainable, resilient, just and vibrant urban environments which can better cope with current and future climatic conditions (Pineda-Pinto et al., 2023). The concept of 'Multispecies urbanism' extends the CSCW perspective beyond human-human interaction to consider interactions between humans and non-human entities. This is a novel area where CSCW can contribute to understanding and designing for complex ecosystems of cooperative interactions among multiple species.

In the light of climate change (Lee et al., 2023), the role of flora is becoming more important than ever. Urbanizing and climate changes have a large impact on cities and put pressure on the quality of life and wellbeing of citizens. It also forms a danger for the flora in cities, for instance by increased risks of floods, droughts and heat waves (Hattum et al., 2016) whereby nature itself can be described as vulnerable. A decrease in flora amplifies the consequences of climate change. Here, a transition is needed in urban design to create cities which are climate adaptive and protect their flora to promote biodiversity, ecological balance, and co-existence (Takaoka et al., 2023). This endeavour must incorporate the achievement of individual goals of all human and non-human stakeholders.

Considering wildlife in urban design focuses on creating urban environments that prioritize their well-being and coexistence (with human actors) (Apfelbeck et al., 2020; Edwards et al., 2023). These designs include elements such as: wildlife-friendly overpasses/corridors and underground wildlife tunnels (Albers et al., 2015)), connecting natural habitats (Edwards et al., 2023; Apfelbeck et al., 2020), green roofs and strategically placed vegetation to provide shelter, nesting spaces, food sources and safe pathways (Mayrand and Clergeau, 2018), while also improving air quality and reducing urban heat (Liu et al., 2021; Arnstein, 1969), urban ponds that regulate water levels to create both aquatic and terrestrial habitats (Oertli and Parris, 2019), while floating gardens and solar-powered aeration systems can also be integrated to increase biodiversity (Liu et al., 2023; Burton, 2004), housing/nesting boxes (Mancini et al., 2023; Meier et al., 2020; Lee et al., 2023), connected (community) gardens (Edwards et al., 2023; Dameri et al., 2013), sensor-based animal-centric technology to collect animal data and inform about them, while such data can thus be integrated back into design processes for the protection of relevant species as well as minimizing human-animal conflicts (Grinko et al., 2021; Nandutu et al., 2022; Weise et al., 2019; Edwards et al., 2023) and animal-centered design frameworks that consider the ecological goals of animals in design and actively promote animal welfare (Webber et al., 2022). Interdisciplinary lenses in participatory design processes and evaluations after implementation are fundamental to design such elements on the needs of all:

animals, nature and humans (Apfelbeck et al., 2020), ensuring equitable environments.

To support multispecies urbanism, urban planning should adopt a 'multispecies justice' approach that considers human and non-human communities equally in decisions about novel ecosystems (Pineda-Pinto et al., 2023). Key recommendations include recognising their value, inclusive governance, avoiding unjust gentrification outcomes, and improving public perceptions of these wild spaces in cities. Incorporating perspectives from critical geography and indigenous knowledge helps translating theory into practical planning approaches to create ecologically sustainable and just cities (Fieuw et al., 2022). Current methods lack methods that combine social and ecological views from a multispecies angle. As urbanization grows, this approach is vital for shaping inclusive urban policies and designs, aiming for just and sustainable cities for all inhabitants. Practitioners play a key role in urban and governmental design and decision processes of future Smart Cities (Kempin Reuter, 2019).

Similar to researchers, they struggle to protect vulnerable target groups (human and non-human) in their cities (see for instance (Albers et al., 2015; Burton, 2004; May, 2007)). They partially have method collections to involve vulnerable agents in Smart City initiatives (see e.g., (Werkvormen ABC, Werkvormen.info, 2023; Werkvormen, EnergieParticipatie: 2023, 2023)), offering context-specific practical tools and methods. Figure 2 shows 'Beleidsmixer', a framework developed in the Netherlands, including different tools for municipalities and water departments to stimulate climate adaption strategies and to co-create such with citizens. Those method and tool collections are often presented in their respective countries language and shared on local websites or in local communities, which makes it challenging for researchers, academics or other practitioners to get access to them or to build upon previous methods. To our knowledge, there is no universally accessible collection of methods for Smart City practitioners with a focus on vulnerable target groups.

We argue for the development of a comprehensive collection of inclusive Smart City methodologies, emphasising the need to incorporate the experiences and practices of different practitioners. Our workshop will evaluate methods from different countries and engage Smart City practitioners in a co-creation process to 1) identify and collect existing methods and 2) understand their implementation challenges and effectiveness. The latter is especially relevant when we aim to go beyond the state-of-the-art method collections: There are already several methods in and outside academia to empower and protect vulnerable target groups in Smart Cities, however, practitioners (and researchers) struggle to implement them (Albers et al., 2015). Challenges for implementation are i.e., a low political standing of climate adaptive measures (Albers et al., 2015) or inclusive citizen participation (Lorenzo Squintani, 2022). We previously argued that next to the methods, a Caring Community is needed to be able to truly empower vulnerable target groups in Smart Cities (Ertl et al., 2021; Scheepmaker et al., 2022). This

workshop will explore how to establish such a community to enhance the empowerment of vulnerable groups in Smart Cities.



Figure 1. Example of method collection 'Beleidsmixer' from practitioners in The Netherlands.

# 3 Inclusive Future Cities: Workshop Goals & Structure

We will outline the objectives, structure and activities of the workshop before, during and after the conference, concluding with a visual timeline of all activities (Figure 2).

## 3.1 Objectives

This workshop will synthesise findings from satellite workshops in Germany, the Netherlands and Norway, and will bring together practitioners from different sectors (e.g. municipal representatives, caretakers, social workers, biologists and urban planners) to discuss inclusive smart city design practices. Recognising that Smart City practitioners do not typically attend research-focused conferences, this event aims to bridge this gap by focusing on methods and challenges related to the inclusion of vulnerable groups in areas such as migration, support needs, and urban planning. The results of the satellite workshops will be presented on a Miro board used during the main workshop to feed and inform the discussions and reflect the experiences from practitioners with researchers from diverse fields. The overall objectives are:

- to share creative, qualitative, and participatory methods from diverse vulnerable settings and to discuss the challenges and opportunities of

involving vulnerable groups through the use of such methods with practitioners and researchers,

- explore the methods presented (visualised in Miro) and reflect on them both in the homogeneous groups of practitioners (satellite workshops) and with researchers from different fields (conference workshop) against the background of the different vulnerable target groups and for adaptation in different disciplines/vulnerable settings,
- to bridge the gap between methods developed by researchers and experiences from practitioners, resulting in a collection of methods from researchers and practitioners and
- to build an active and sustainable Caring Community against the backdrop of this get together and foster it in the future through post workshop goals.

## 3.2 Workshop planning during the ECSCW conference

The workshop will be a hybrid event, hosting both on-site and remote participants for half a day. On-site participation will be encouraged for deeper dialogue, but will not be mandatory, recognising the shift towards online events and climate change considerations. We will use Miro as a collaborative platform to share results from the satellite workshops and to document the outcomes of the workshop. The session will focus on evaluating the applicability of the shared methods across disciplines and for vulnerable groups, addressing their potential and limitations. The aim is to compile a collection of interdisciplinary methods from practitioners (primarily in satellite workshops) and researchers (in the main workshop) for future application testing. For a hybrid realisation, a projector, two screens, a microphone, a room camera and a room speaker are required.

## 3.3 Application procedure

To ensure easy access to the workshop only motivation letters are demanded for application via Google Form which additionally pre-collects all methods and further details to ensure efficient and time-saving work during the workshop. We will tailor the workshop based on access requirements (i.e. captioning), please let us know if you require any services to support your participation. We aim to have a maximum of thirteen participants. The essence of motivation from the accepted submissions will be posted in Miro before the workshop for asynchronous viewing considering time constraints. Likewise, the method presented in the letter of motivation, which corresponds to personal experience in dealing with the respective vulnerable target group.

## 3.4 Post workshop plans

We aim to develop a publicly accessible online toolkit for multispecies urbanism, containing collected methods, examples and a network of practitioners. In addition, we plan to expand this toolkit and network to foster an active Caring Community.

| ECSCW workshop activity (main workshop, on-site & online) | Time frame |
|---|---|
| Welcome words & pre-workshop gathering (getting to know each other on-site & online) | 08:30 - 09:00 |
| Exploration of satellite workshop results and individual note taking (in Miro) | 09:00 - 10:00 |
| Morning break | 10:00 - 10:30 |
| Sub-group discussion and documentation (in Miro) | 10:30 - 11:30 |
| Small-group presentations & large group discussion | 11:30 - 12:15 |
| Coffee break | 12:15 - 12:30 |
| Closing discussion | 12:30 - 13:00 |

Figure 2. Time (UTC) and activity schedule for the conference workshop.

# 4 Organizers

**Tanja Aal** is a PhD student in Information Systems, esp. IT for the Ageing Society, at the University of Siegen. Her research focuses on vulnerable human and non-human actors, (digital) participation and inclusion and on the use of ICT, its potentials, benefits and limitations against this background.

**Laura Scheepmaker** is a PostDoc researcher at the Smart Cities research group at Saxion University for Applied Sciences in the Netherlands. Their work focuses on developing design methods aimed at fostering inclusive citizen participation in Smart City initiatives by collaborating with Smart City professionals to implement those methods in practice.

**Alicia Julia Wilson Takaoka** is a PostDoc at Norwegian University of Science and Technology (NTNU) in informatics and software engineering. Alicia holds a PhD from University of Hawai'i at Mānoa and is part of ACM-Women Europe, Chair of ACM Women Trondheim, and EUGAIN: Gender Balance in Informatics. Alicia's research focuses on the Gender-Climate Change-ICT Nexus and mental health and computing education.

**Doug Schuler** is Professor Emeritus of the Evergreen State College Washington State, US. Coming from a background of computer science, software engineering, AI research and collaborative work he has been working in the field of democratizing technology for 35 years. He was a longtime activist for Social Responsibility and a founder of the Seattle Community Network.

**Alan H. Borning** is a renowned American Computer Scientist recognized for his contributions to Human-Computer Interaction. Specifically, his work emphasizes designing with human values in mind. He develops systems that promote civic participation and deliberation and creates tools that simplify the use of public transportation.

**Claudia Müller** is a professor in Business Informatics, esp. IT for the Ageing Society at the University of Siegen. Her expertise is in Participatory Design and Community Informatics for older adults, vulnerable user groups, and intergenerational settings, aiming at co-production of socio-technical systems strengthening autonomy, empowerment, social and digital participation and digital sovereignty.

**Konstantin Aal** is a PostDoc at the Chair for Information Systems and New Media at the University of Siegen. He is part of *come IN*, a project on computer clubs for children and adults including refugees. His research circles around social media usage by political activists in conflict areas such as Palestine, Iran, Tunisia and Syria.

# 5   Call for Participation

This half-day workshop will explore creative, qualitative, and participatory methods for the inclusion of vulnerable human and non-human groups (wildlife, nature) in Smart City design.

We seek motivation letters where potential participants share one method each related to the workshop theme. Letters of motivation should be submitted via Google Form by Mai 10th, 2024. At least one author of accepted letters must register for the main workshop (attendance onsite or hybrid) and at least one day of the conference (attendance onsite).

This hands-on hybrid workshop, which is the third in a series of workshops and whose orientation is based on all previous measures, will facilitate the exchange of methods and knowledge, the building of skills in the use of the methods presented, and the collaborative design of an active Caring Community using a user-centered evaluated spectrum of methods for inclusive Smart City design processes that give voice to the most vulnerable groups. With this focus, we lean on CSCW-related studies that design and support collaborative work and coordination on the basis of computer-supported systems.

The workshop-related Miro board will share the essence of the accepted letters and diverse methods to inform all participants before the workshop and give therefore more space for deep dialogue, exploration and adaptation of methods in the workshop.

We invite researchers interested in the theme but also professionally active or experienced with at least one of the vulnerable target groups (human and/or non-human actors) and/or their practitioners. Motivation letters can be uploaded in the Google Form sharing your motivation, professional background, method used and experiences linked to that. For more details and future collaboration see our Caring Community platform.

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