CommonSENSES
Standards for ENacting Sensor networks for an Equitable Society

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Goal & Outcomes
In collaboration with the city of Chelsea, MA and local non-profits, our interdisciplinary team will implement an award-winning participatory modeling and planning process to demonstrate how sensor networks in architecture projects can enhance local knowledge about microspatial inequities and mitigation by green infrastructure. This approach empowers communities to engage in the development process and to embrace architecture as an agent for advancing public health. The research will support a data-driven and radically inclusive planning process. Before-and-after data and models about factors affecting neighborhood climate, resilience, health, and equity will generate insights on how smarter green infrastructure mitigates microspatial inequities, and how accessible data and models can transform design. The resulting CommonSENSES Architectural Playbook and film, and the collaborative modeling platform (Fora.ai) adapted for this project will empower current and future architects, planners, and educators to advance the role of design in urban equity.

Challenges Addressed
(1) Climate resilience is both global and local—data models and practice must reflect this. Environmental hazards vary at hyperlocal scales—even street to street in the same neighborhood, creating microspatial inequities in exposure and health. Current data and models do not identify, track, or respond to these within-community disparities.

(2) Buildings shape microspatial inequities, but architects lack methods to anticipate and mitigate such impacts. Buildings help to determine the landscape of hazards in a community, either exacerbating or mitigating microspatial inequities. There is a need for paradigms and tools for designing buildings and green infrastructure that account for these hyperlocal impacts.

(3) Sensor networks are potentially a powerful solution but are underutilized in architectural practice. There are gaps in knowledge and practice, however, that must be addressed before this promise is realized. Currently, there are no guidelines for the cost-efficient design and implementation of sensor networks to inform and evaluate architectural projects.

(4) Dynamic data are only as powerful as they can be easily analyzed and interpreted to guide practice. A truly inclusive architectural practice will require processes and tools that communicate the data effectively to the communities with whom they collaborate, enabling better conversations and decisions on the project, informed of its potential impacts and benefits.

Research Plan
Chelsea, MA, a socially and environmentally vulnerable community near Boston’s marine industrial waterfront and airport, embodies the state of human and planetary health. In collaboration with the city, our team will implement transdisciplinary research methods in three integrated areas.

1. **Sensor Networks**: Leveraging high-resolution sensor data to identify, track, and respond to microspatial inequities

2. **Green Infrastructure**: Gaining insights on the broader socio-ecological impacts of designing green infrastructure in the context of a large architectural development project

3. **Participatory Workshops**: Empowering community members to grasp and deliberate how planning decisions impact local conditions, building on the development of the innovative participatory modeling platform Fora.ai

**Impacts of the Research**

**Smarter green infrastructure**
The integration of building projects and sensor networks can dynamically monitor the impacts of the built environment on urban ecologies and support better planning for public health.

**Inclusive process**
The generation of local knowledge about microspatial inequities can empower diverse communities to engage in the development process and to actively contribute with local knowledge to the design process, demonstrating a more inclusive model of architectural practice.

**Data-driven design**
The interpretation of local environmental data and diverse perspectives through participatory modeling and analysis can support better design decisions in individual projects and their integration with the surrounding community, which in aggregate can result in a more equitable urban landscape.