

Data Literacy in Participatory Civic Design: A People-Centered Approach

Jeongeon Park
University of California San Diego
La Jolla, CA, USA
jep034@ucsd.edu

Steven P. Dow
University of California San Diego
La Jolla, CA, USA
spdow@ucsd.edu

Abstract

In this work, we position participatory civic design as a data literacy challenge. Community members must combine heterogeneous data—such as quantitative indicators, spatial data, constraints, and community narratives—to form justified, meaningful contributions. Yet novices often lack support for interpreting what counts as evidence, assessing gaps and bias, and reasoning about tradeoffs under feasibility constraints. Drawing on a participatory planning practice, we propose a people-centered approach of data literacy that can foreground stakeholder perspectives and deliberation, and propose discussion directions for the design of tools and interventions that can translate scattered data into representations that better support informed and meaningful deliberation.

Keywords

data literacy, participatory civic design, people-centered approach

ACM Reference Format:

Jeongeon Park and Steven P. Dow. 2026. Data Literacy in Participatory Civic Design: A People-Centered Approach. In . ACM, New York, NY, USA, 3 pages. <https://doi.org/10.1145/nnnnnnn.nnnnnnn>

1 Introduction

Data-driven decision-making increasingly shapes civic and urban planning processes, from transportation redesign and housing policy to public space and neighborhood revitalization [2]. In practice, planners and partner organizations routinely rely on multiple streams of evidence such as operational measures (e.g., traffic and demand), contextual conditions (e.g., incidents or weather), and community context (e.g., land use and socio-economic profiles) to justify and refine interventions. Research has examined how these data streams enter planning conversations and how they influence decisions, including transportation planning work that documents the breadth of data planners draw on in day-to-day practice [5].

At the same time, community members are often invited to provide input on proposals supported by heterogeneous datasets. These ranges from traffic counts and transit usage, to environmental measures and neighborhood-level context from lived experiences. For example, Le Dantec et al. [3] introduces a way of data-driven participation in transportation planning and describe how such crowdsourced route traces become one input among many when discussing new cycling infrastructure, alongside existing knowledge about streets, safety, and usage patterns. Such collected data then gets linked to make community-generated evidence legible

within institutional planning workflows, so that it could be interpreted alongside established metrics and project constraints. For instance, Local Ground [6] proposes a toolkit to show how planning-relevant knowledge extends beyond official datasets to include local annotations and qualitative place-based evidence in the form of photo and audio, and how these can be layered with conventional GIS layers such as demographic information and facility locations.

However, meaningful engagement in these processes often requires participants to not just simply understand information that is given to them. It extends further to interpreting complex visualizations, evaluating competing metrics or constraints, and reasoning through tradeoffs under uncertainty. Le Dantec et al. [3] shows that in planning meetings, even when data is presented as authoritative, participants frequently perform *interpretive work*. They question representativeness of the data, by reconciling data with local knowledge and using data to argue through alternatives and tradeoffs. This interpretation can be more difficult when evidence consists of a mix of domain metrics with community-generated signals (e.g., community preferences, lived experiences and values), where the shape of the data may be uneven and contested.

In this position paper, we argue that civic participation in urban planning is fundamentally a data literacy challenge, but one that is inseparable from the domain realities of planning: heterogeneous data sources, situated interpretation, and value-based tradeoffs. Moreover, the core challenge in participatory civic design is not access to data, but support for deliberation across heterogeneous evidence and stakeholder perspectives. While many current tools effectively surface diverse datasets, prior work suggests that participants still face challenges in synthesizing this information in context [4]. This calls for moving beyond data presentation toward designing scaffolds that help participants connect evidence to lived experience and construct more grounded collective decisions.

We use a concrete scenario in urban planning to discuss what “being data literate” means for public participants (i.e., residents and community stakeholders) and surface opportunities for designing tools, representations, and learning interventions that better support public sensemaking and participation in such decisions.

2 Motivating Scenario: Participatory Mapping Workshop for a Park Design

Consider an in-person participatory mapping workshop focused on redesigning a neighborhood park. Here, residents gather around a large printed map (or a shared digital map) to discuss what the space should become using a mix of *spatial*, *contextual*, and *preference data*. Facilitators introduce multiple forms of evidence through heterogeneous data artifacts: a base map with existing features and parcels, demographic context and nearby assets, notes on constraints (e.g.,

maintenance access, drainage, lighting, permitted uses), and a set of design ideas generated from prior community input (e.g., more baseball fields, an auditorium for community events, safer design), each paired with basic feasibility information (e.g., estimated budget range, required area, intended use, target population). Participants are asked to place or draw directly on the map to explore preferred redesign of the park given a list of potential design ideas, while discussing as a group to identify conflicts and reach an intermediate consensus.

Without sufficient data literacy, this deliberation can quickly skew toward whichever evidence is most legible in the moment (i.e., vote counts) or whoever has the strongest voice in the room, while other signals remain hard to interpret or integrate. Participants may treat demographic layers as deterministic (e.g., “this neighborhood needs X”) without questioning representativeness, or conflate popularity with impact (e.g., assuming a highly preferred option is automatically the best use of limited space and budget).

In contrast, when the citizen group has stronger data literacy, the map can become a shared space for inquiry: participants more readily ask what data is missing, compare alternatives using multiple criteria (e.g., cost, accessibility, maintenance burden), make uncertainty explicit (e.g., what is known vs. assumed), and connect lived experience to the formal artifacts (e.g., why “safer design” may imply a combination of better lighting, clearer sightlines, and smoother circulation rather than a single amenity). This shifts the conversation from selecting a favorite option to building a collectively reasoned rationale for tradeoffs, and making it more likely that the intermediary consensus is both actionable within constraints and defensible across stakeholders.

3 Deliberative Data Literacy through Stakeholder-Centered Perspective Taking

In this position paper, we argue for an approach we tentatively call people-centered data literacy: a way of supporting citizens in reasoning with heterogeneous planning evidence by explicitly grounding deliberation in the lived priorities of different community members. In participatory mapping, the challenge is rarely a lack of data; rather, it is the difficulty of connecting seemingly disconnected data (constraints, demographic layers, preferences, and place-based accounts) into justified decisions. Following the workshop’s framing of data literacy as inquiry, critical thinking, and inference in real-world contexts, we view “being data literate” here beyond simply understanding domain knowledge, but as the ability to ask what is missing, critique what evidence does and does not imply, and reason through tradeoffs collectively to synthesize the data.

Rather than framing data literacy as the ability to interpret or understand data, we position it as a collective practice of constructing holistically considered decisions under heterogeneous and often conflicting evidence. Existing participatory and data-driven tools primarily support access to and visualization of information, or the inclusion of stakeholder perspectives as inputs. In contrast, our people-centered data literacy framing treats stakeholder perspectives as scaffolds for reasoning, enabling participants to translate between different evidence types and deliberate through tradeoffs grounded in lived experience.

To support this, we imagine scaffolds that help groups *deliberate through stakeholders*, inspired by existing works such as value-sensitive design [1]. For example, discussing how a proposed redesign potentially supports or burdens a caregiver with a stroller, a group of teens who needs a place to gather safely, an older adult seeking quiet walking routes, or a vendor/community organizer who relies on event infrastructure. These lenses have the potential to act as a bridge between evidence types: they make it easier to translate a constraint (e.g., “maintenance access”) or a dataset (e.g., “nearby assets”) into implications for everyday use, while also making tradeoffs discussable (e.g., “more sports courts” may increase activity but could conflict with noise concerns or limit shaded seating). Rather than treating personas as a fictional construct, the core idea is to use perspective-taking to structure inquiry (e.g., “who is missing from our conversation?”), critique (e.g., “what assumptions are we making from this layer?”), and inference (e.g., “given constraints, what is the most defensible compromise?”). These stakeholder lenses could be implemented as interactive prompts, role-based annotations, or lightweight interface elements (e.g., filters or overlays) within participatory mapping tools, guiding participants to consider how different community members are affected as they explore and discuss design options, rather than defaulting to aggregate preferences or the most immediately legible data.

On the other hand, personas introduce immediate risks that require careful design. Stakeholder-based deliberation can unintentionally stereotype or flatten lived experience, or it can re-center voices that are already dominant if the default persona mirrors the most represented participants. It may also be contested: some residents may reject proxy perspectives or see personas as distracting from structural constraints (budget, zoning, maintenance). A people-centered framing therefore needs guardrails: lenses should be co-created or editable by participants or anchored to community-elicited evidence. Furthermore, it could be explicitly communicated as provisional tools for reasoning rather than claims about who the community is. I hope to discuss about this idea further in the workshop through such questions:

- (1) What does data literacy look like in participatory mapping when “data” includes community-generated signals and value-laden tradeoffs?
- (2) How can people-centered perspective-taking act as a data literacy scaffold (asking what’s missing, critiquing evidence, reasoning about tradeoffs) without stereotyping?
- (3) How should participatory tools surface the context behind preference signals (e.g., vote counts, who participated/was missing) so they are interpreted data-literately?

References

- [1] Batya Friedman. 1996. Value-sensitive design. *interactions* 3, 6 (1996), 16–23.
- [2] Rob Kitchin. 2017. Data-driven urbanism. In *Data and the city*. Routledge, 44–56.
- [3] Christopher A. Le Dantec, Mariam Asad, Aditi Misra, and Kari E. Watkins. 2015. Planning with Crowdsourced Data: Rhetoric and Representation in Transportation Planning. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing* (Vancouver, BC, Canada) (CSCW '15). Association for Computing Machinery, New York, NY, USA, 1717–1727. doi:10.1145/2675133.2675212
- [4] Narges Mahyar, Diana V. Nguyen, Maggie Chan, Jiayi Zheng, and Steven P. Dow. 2019. The Civic Data Deluge: Understanding the Challenges of Analyzing Large-Scale Community Input. In *Proceedings of the 2019 on Designing Interactive Systems Conference* (San Diego, CA, USA) (DIS '19). Association for Computing Machinery, New York, NY, USA, 1171–1181. doi:10.1145/3322276.3322354

- [5] Nasim Sharbatdar, Yassine Lamine, Brigitte Milord, Catherine Morency, and Jinghui Cheng. 2020. Capturing the Practices, Challenges, and Needs of Transportation Decision-Makers. In *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (*CHI EA '20*). Association for Computing Machinery, New York, NY, USA, 1–7. doi:10.1145/3334480.3382864
- [6] Sarah Van Wart, K. Joyce Tsai, and Tapan Parikh. 2010. Local ground: a paper-based toolkit for documenting local geo-spatial knowledge. In *Proceedings of the First ACM Symposium on Computing for Development* (London, United Kingdom) (*ACM DEV '10*). Association for Computing Machinery, New York, NY, USA, Article 11, 10 pages. doi:10.1145/1926180.1926194