Centring Communities in Early Warning Systems: A Living Lab Approach

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Turkish-Dutch residents and municipal representatives in a Living Lab setting in Dordrecht

On a sunny afternoon in September 2025, a group of Turkish-Dutch residents and municipal representatives gathered in a neighbourhood in the city of Dordrecht, the Netherlands, for a workshop on flood risks and early warning systems. Dordrecht (pop.: 123,000) is regarded as a frontrunner in flood preparedness and public awareness in the Netherlands. Yet, when participants were asked whether they had received or even knew about municipal flood-risk campaigns, most responded 'no'. This revealed a striking disconnect: even where sophisticated warning systems and communication mechanisms exist, they do not always reach or resonate with the communities at risk.

This gap presents a key challenge within the wider domain of early warning systems (EWSs). As climate-related disasters, including extreme weather events, intensify, EWSs have become a critical tool for improving disaster preparedness and risk reduction. These systems increasingly rely on (advanced) monitoring and forecasting technologies to predict hazards and communicate warnings to at-risk communities. However, EWS development has largely remained top-down and technocratic, prioritising technological sophistication over everyday community realities and local knowledge. Communication is largely unidirectional and inadequately adapted to the linguistic, physical, and cultural diversities of at-risk populations

as well as their varying capacities to receive and respond. As a result, warnings consistently fail to trigger meaningful (early) action, particularly among vulnerable or marginalised groups.

Recognising this gap, the Indo-Dutch collaborative project, 'LODESTAR', adopted a Living Lab approach to place communities more centrally in the (re)designing and studying of EWSs. The LODESTAR Living Labs are an attempt to supplement or challenge the predominant top-down and data-driven approach to creating and improving EWSs, which continue centring technologies and formal expertise. Rather than treating people as passive recipients of warning messages, Living Labs create participatory spaces where communities, researchers, practitioners, and policy-makers interact, exchange experiences, and co-create solutions. In doing so, LODESTAR seeks to bridge the disconnect between those who produce risk information and those who ultimately receive, interpret, and act on it.

In 2025 and 2026, LODESTAR organised multiple Living Labs in Dordrecht, the Netherlands, and in Guwahati and Bengaluru, India. These cities face significant flood risks in their own ways: where in Guwahati and Bengaluru floods are a recurring reality, in Dordrecht the occurrence of large-scale floods – whilst currently unlikely – will become increasingly inevitable as climate change escalates. Across these diverse contexts, existing warning and response systems leave much to desire and the Living Labs revealed both contrasting realities and surprisingly similar concerns.

In Guwahati (pop.: ~ 1.44 million), the Living Labs offered a first opportunity for residents, business owners, civil society actors, and local authorities to discuss flood challenges and experiences without reservations. Participants highlighted confusion about who is responsible for responding during flood events, difficulties reaching officials, and the absence of clear, localised warning information. The discussions also revealed how communities often rely on informal coping mechanisms amidst declining trust and ineffective institutional responses. The Bengaluru (pop.: 14.7 million) Living Labs revealed an interesting contrast, even within the same city. In one location, flooding of a railway underpass was largely perceived as an inconvenience rather than a major risk, particularly among relatively affluent residents with

Mapping of flood-prone locations in Guwahati Living Lab

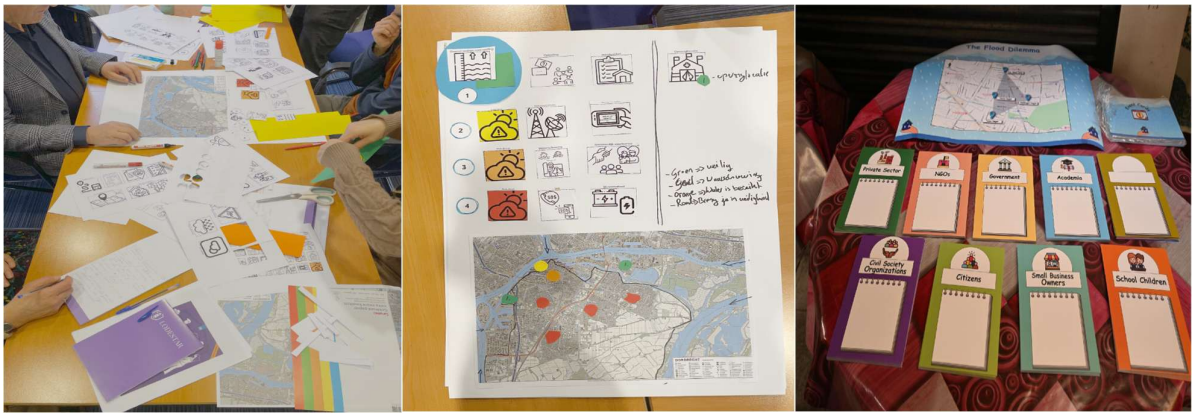
adequate response capabilities. In another severely flood-affected neighbourhood, discussions were far more intense and grounded in the lived experiences of repeated flooding. There, residents portrayed themselves as first responders during disasters and raised concerns about "warning fatigue", where official SMS alerts are frequently ignored because they are lost beneath a deluge of other messages. These discussions highlighted how perceptions of risk, vulnerability, and preparedness can vary significantly depending on social and economic realities.

Living Lab in Bengaluru

In the Netherlands, decades of successful flood management have created a perception among many residents that severe flooding is unlikely. For numerous Living Lab participants in Dordrecht, flood risk therefore seemed distant or abstract despite living in a flood-prone region. Yet, even within this context, participants expressed concerns about how warnings are communicated and whether official systems communicate with diverse communities adequately and inclusively. Turkish-Dutch participants, for instance, often preferred relying on trusted community networks such as neighbourhood WhatsApp groups rather than official websites or dashboards. They also strongly emphasised collective responsibility and caring for vulnerable community members during disasters, in contrast to the predominant individualised culture in the Netherlands.

Participants engaging in an interactive game - Dordrecht Living Lab

What makes the LODESTAR approach particularly significant is that it moves beyond viewing EWSs solely as technological systems. Instead, it demonstrates that effective warnings depend equally on social relationships, trust, communication, and people's everyday realities. By creating spaces for dialogue between communities and institutions, the Living Labs provide an important framework for designing EWSs that are not only technologically effective, but also socially inclusive, locally grounded, and capable of supporting meaningful early action. Their low-cost execution – simply requiring some printed (craft) materials, a modest functional venue, and a group of keen participants – means Living Labs present a highly accessible and replicable tool for pursuing early (flood) warnings for all.



Serious Game activities of the Lodestar Living Labs