Relational Vulnerability as a Design Entry Point: Activating Community Connections Through Micro-Prototypes

Yang Zhao

Politecnico di Milano, Milan, MI 20156, Italy

ABSTRACT

Research on vulnerability in community contexts has largely centered on physical infrastructure or gaps in public services. This study focuses instead on relational vulnerability—the decline of everyday social ties, which remains less visible but significantly shapes how communities collaborate. The research proposes treating vulnerable relationships as a primary focus of design. It introduces a method based on micro-prototypes—small, embedded interventions aimed at making social connections more visible, easier to initiate, and possible to sustain. Fieldwork in a pilot community revealed three relational design mechanisms: perception, which helps residents notice missing or silent connections; triggering, which invites informal and non-obligatory interaction; and sustaining, which supports continuity through recurring, low-effort social cues. Rather than solving defined problems, these relational strategies help open up space for encounter, attention, and emotional engagement in daily life. The findings show that design can quietly help bring inactive forms of collaboration back to life.

Keywords: Relational vulnerability, Micro-prototypes, Community, Participatory design, Social interaction

INTRODUCTION

With the advancement of urban renewal and infrastructure development, many communities have overcome early-stage resource shortages. However, social bonds among residents have increasingly weakened. Traditional neighborhood interactions are fading from daily life, replaced by one-way and impersonal forms of engagement. While institutional coverage has expanded, emotional ties within communities have quietly faded. Compared to overt structural poverty and functional deficiencies, vulnerabilities in social relationships are more challenging to detect but have profound impacts on community development.

The loosening of social ties is evident not only in the restructuring of family units and increased population mobility but also in the dominance of digital platforms as primary communication channels. It's becoming common for residents to "see the delivery person more often than their neighbors," indicating that human connections are gradually being replaced by services, outsourced to institutions, or interrupted by silence.

This paper centers on the concept of "relational vulnerability," advocating for its use as an entry point in design interventions. It proposes shifting towards an intervention logic aimed at "relationship activation." Through the "micro-prototype" design approach in practical cases, this study explores how to awaken neglected forms of connection, perception, and response in the routines of everyday community life.

THEORETICAL FOUNDATIONS

Vulnerability has long been discussed in terms of material shortages or institutional gaps. More recently, research has begun to focus on the ways relationships weaken in daily life—a form of vulnerability that is harder to detect but no less important. This shift reflects a broader turn toward relational thinking in both social science and design.

Relational vulnerability goes beyond a lack of contact. It includes the breakdown of everyday rituals—small gestures like greetings, eye contact, or casual conversations—that hold social life together. Goffman (1967) described such rituals as the building blocks of interaction. When they disappear, the sense of being part of a shared space begins to erode. Hochschild (1983) also noted that people often perform emotional labor to keep social situations running smoothly. When this effort is missing, a deeper kind of distance can form between people, even in close physical proximity.

Design research has followed a similar shift. Early design often focused on solving problems or improving functions. Today, more scholars see design as a way to support social change and rebuild meaning. Manzini (2015) calls on designers to help activate cooperation and mutual aid in communities. Escobar (2018) views design as a process of shaping relationships, not just delivering solutions. Light and Akama (2014) emphasize care and shared presence. Krippendorff (2006) argues that design is less about making things and more about shaping how things are understood. Redström (2006) reminds us that not all problems are meant to be solved—some are ongoing and require different kinds of attention.

These ideas point to a relational view of the world—what some call a relational ontology. In this view, people and systems are defined by their connections, not by what they are alone. De Landa (2006) describes such systems as ever-changing networks made up of many parts. Latour (2005) similarly suggests that what something is depends on what it relates to. For design, this means relationships are not just something we respond to—they can also be shaped, supported, and made visible.

More researchers now argue that relationships should not be seen only as outcomes of design, but as starting points. In everyday life, small and often unnoticed connections create the conditions for trust and collaboration. Designing for this level of interaction means working with what is quiet, subtle, and sometimes invisible—but always present.

METHODOLOGY: MICRO-PROTOTYPES FOR EVERYDAY RELATIONAL ACTIVATION

When facing relational vulnerability, structured service systems—often shaped by institutional logic—can unintentionally deepen the sense of

disconnection. In contrast, micro-prototypes provide a more lightweight and flexible way to engage with everyday social life.

These micro-prototypes refer to small-scale, low-barrier interventions embedded in familiar community settings. Rather than offering fixed solutions, they create space for people to meet, respond, and collaborate. This approach builds on Gaver et al.'s (1999) use of cultural probes, where objects such as maps, postcards, or diaries were used to invite stories and emotional responses. Rather than aiming for clear answers, such methods provoke participation and reflection. It also aligns with Sanders and Stappers (2008), who emphasized how design tools and prototypes can spark co-creation and allow users to take an active role in shaping outcomes.

More than linking people, these designs can give new social roles to everyday objects. A notable example is the study by Tutenel and Heylighen (2024), where a decorative aquarium in a pediatric oncology ward became a focal point for shared interaction. Children played beside it, families gathered nearby, and staff joined in casually. The aquarium—originally intended as a comforting object—evolved into a relational hub, showing how design can support evolving connections without prescribing them.

Based on such insights, three types of mechanisms can be observed in micro-prototype practice:

Perceptual mechanisms: These help people recognize hidden or unnoticed relationships. Visual tools like relational maps or interaction logs can prompt residents to see patterns of contact in daily life. As Cipolla (2018) notes, design can help make presence visible, even before engagement occurs.

Triggering mechanisms: Simple, interactive setups in shared spaces—such as message boards near elevators, balcony swap corners, or kitchen counter sharing stations—invite casual encounters and encourage light interaction.

Sustaining mechanisms: Low-effort practices, such as plant-care relay cards or rotating community tasks, allow relationships to gradually grow and leave visible traces over time. This reflects Bjögvinsson et al.'s (2010) idea of "collaborative infrastructures"—distributed, flexible systems that help relationships continue.

While each mechanism serves a distinct role, they often operate in overlapping and dynamic ways. In practice, perception may serve as a precondition for triggering interaction—residents cannot respond to one another without first recognizing a gap or opportunity. Triggering, in turn, opens brief moments of encounter that may lead to deeper, sustained involvement, especially when supported by simple rituals or community habits. Sustaining mechanisms often emerge from repeated interactions and feedback loops, evolving over time from informal gestures into community norms. The three mechanisms, rather than standing alone, form a relational loop in which awareness, response, and continuity reinforce each other.

Rather than resolving predefined problems, micro-prototypes foster a "problem field"(Redström, 2006)—an open, evolving context where new forms of interaction can emerge. As Cipolla (2018) suggests, the role of design lies not in producing connection directly, but in creating conditions where meaningful encounters can happen.

WORKSHOP IN PILOT COMMUNITY

In practice, relational design often manifests through small-scale behavioral prompts and embedded triggers in daily life. In the context of an aging residential community in Pingliang, Gansu Province (China), the design team conducted three micro-prototyping experiments involving interviews, observations, and co-creation workshops. The goal was to "reactivate the microcirculation of community relationships."

Case 1: "Story Post-it Wall" (Storyboard 1)

Installed in elevator lobbies, this message wall allows residents to write daily moods, anecdotes, or holiday greetings for others to read and respond to. Cleaning staff update the wall daily, creating a "flowing community language field." This prototype uses written words to evoke attention and responses among residents, establishing emotional connections without face-to-face interaction. Some residents have even formed message groups to regularly change the "theme topics," transforming the wall from an interaction medium into a window for shared memories (Brandt et al., 2013).
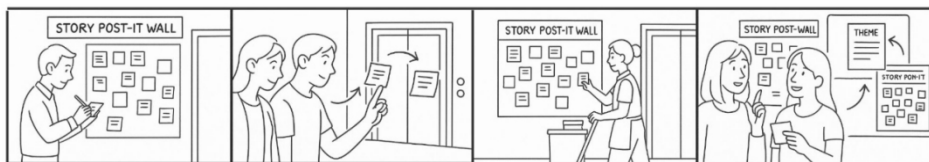
Storyboard 1: Story Post-it Wall (A message wall placed near elevators invites residents to leave short notes, greetings, or drawings. These messages are updated daily and create a gentle form of connection among neighbors. *Illustration by the author*).

During the fieldwork, several moments illustrated the wall's emotional resonance. Residents were observed pausing in front of the board before entering the elevator, smiling as they read messages from neighbors. Some would reply directly, while others left short notes like "Have a good day!" or "Thank you for yesterday's cookies." Children sometimes drew small pictures as responses. These gestures, though brief, contributed to a sense of mutual presence and shared rhythm in the building.

Case 2: "Balcony Plant Exchange" (Storyboard 2)

Residents are encouraged to display and exchange balcony plants in public spaces, accompanied by planting story cards. The movement of greenery creates a relational trajectory that is visually recognizable and emotionally lasting. Through participation in the exchange, residents develop a sense of familiarity, such as "I recognize the flower you planted." Additionally, signage records the "plant circulation history," enhancing the narrative and communicative aspects of neighborhood relationships (Cipolla, 2018).

Storyboard 2: Balcony plant exchange (residents place small plants in shared areas, with handwritten cards telling their stories. The plants are passed between neighbors, helping them get to know each other in a quiet, friendly way. Illustration by the author).

Over time, this exchange created small but meaningful interactions. Some residents began leaving short handwritten notes tied to the plant pots, such as "Grown from my grandmother's jasmine" or "This one loves morning light." A few neighbors would water unfamiliar plants when noticing signs of neglect, sparking follow-up conversations like "Is this yours? I took care of it yesterday." These exchanges slowly built a sense of shared responsibility and mutual recognition, even among those who had never spoken before.

Case 3: "Shared Kitchen"(Storyboard 3)

A light food sharing point is set up in a communal area, where residents can bring snacks or tea for others, along with message cards. Although not continuously operated, spontaneous acts of giving and responding shift community relationships from passive reception to active contribution. Some residents have even left their contact information on the message cards to form interest-based groups(Ehn, Nilsson & Topgaard, 2014).

Storyboard 3: Shared kitchen (in a public corner, residents leave snacks and drinks with thank-you notes. Others can take what they need and leave messages in return, turning the space into a place of small kindnesses. *Illustration by the author*).

Informal exchanges often sparked small acts of care. One resident regularly left thermos flasks of warm tea labeled "For anyone who got caught in the rain," while others offered cookies with notes like "Baked too many—please take one." On rainy days, someone added extra napkins and wrote "Stay dry." These small gestures invited quiet, mutual noticing. In one instance, a resident left a thank-you message in return: "The tea warmed more than my hands." Such moments, while modest, helped transform the space from a neutral corner into a quiet site of everyday generosity.

These micro-prototypes not only elicit emotional responses but, more importantly, activate the previously silent collaborative energy within the community, making it possible for residents to "see each other."

DISCUSSION

The value of micro-prototypes lies not in solving specific tasks but in activating social processes within communities. In this context, designers transition from being mere providers of products and services to becoming creators of situations, setters of mechanisms, and facilitators of relationships. This perspective aligns with Margolin's (2002) proposition of a "social model" of design, which emphasizes addressing human needs over market-driven objectives. When design shifts focus from providing functions to generating relationships, vulnerabilities within communities can be reinterpreted as potentials for collaboration. This approach(Halskov & Hansen, 2016) offers several insights:

Design as a Perceptual Tool: Design can help communities recognize previously unnoticed relational gaps. For instance, the "Story Post-it Wall" enables residents to share daily experiences, fostering non-face-to-face emotional connections through written messages.

Prototypes as Catalysts: In uncertain and unstable environments, micro-prototypes can initiate small-scale collaborations by providing non-obligatory spaces for interaction. The "Balcony Plant Exchange" encourages residents to share plants and their stories, creating visually identifiable and emotionally enduring relational trajectories.

Community as a Generative System: Micro-prototypes can form a "micro-circulation system" within communities, allowing for long-term integration through self-organization and periodic feedback. This concept resonates with Manzini and Rizzo's (2011) view of participatory design as an open, participative process that fosters social innovation.

This perspective suggests that relational vulnerability is not only a condition to be addressed, but also a starting point for design. Micro-prototypes do not aim to fix gaps, but to make them seen, felt, and slowly reconnected through everyday participation. By shifting from delivering solutions to opening up situations, design becomes a way to work with the vulnerability of relationships, not simply to repair it. In this process, vulnerability becomes meaningful—not as weakness, but as a space where attention, care, and cooperation can take root.

CONCLUSION

Grounded in the concept of relational vulnerability, this study proposed a design approach based on micro-prototypes that aim not to solve structural problems but to reawaken dormant social ties. Fieldwork in the pilot community showed how everyday interventions—when carefully situated—can help residents notice absences, initiate small acts of interaction, and sustain informal forms of care. These three mechanisms—perception,

triggering, and sustaining—offer a way to understand how design can work with, rather than against, the vulnerable texture of community life.

Three key insights emerged from this process: design can function as a tool to reveal overlooked relational gaps; prototypes can act as catalysts that spark informal cooperation; and communities can be seen as generative systems, where relationships grow through self-organization and feedback.

There are still limitations to consider. The study was conducted within a single community, and the long-term effects of the interventions remain uncertain. The focus also remained on local, micro-level practices, with limited attention to broader structural or institutional influences.

Even within these bounds, the research presents a practical perspective on how design can engage with everyday relational dynamics and offer entry points for rebuilding trust and mutual coordination in community life.

REFERENCES

Björgvinsson, E., Ehn, P. and Hillgren, P.-A. (2012). Design things and design thinking: Contemporary participatory design challenges. Design Issues, 28(3), pp. 101–116.

Brandt, E., Binder, T. and Sanders, E. B.-N. (2013). Tools and techniques: Ways to engage telling, making and enacting. In: J. Simonsen and T. Robertson, eds., Routledge International Handbook of Participatory Design. New York: Routledge, pp. 145–181.

Cipolla, C. (2018). Designing for vulnerability: Interpersonal relations and design. She Ji: The Journal of Design, Economics, and Innovation, 4(1), pp. 111–122.

DeLanda, M. (2006). A New Philosophy of Society: Assemblage Theory and Social Complexity. London: Continuum.

Ehn, P., Nilsson, E. M. and Topgaard, R. (2014). Making Futures: Marginal Notes on Innovation, Design, and Democracy. Cambridge, MA: MIT Press.

Escobar, A. (2018). Designs for the Pluriverse: Radical Interdependence, Autonomy, and the Making of Worlds. Durham, NC: Duke University Press.

Gaver, W., Dunne, T. and Pacenti, E. (1999). Design: Cultural probes. Interactions, 6(1), pp. 21–29.

Goffman, E. (1967). Interaction Ritual: Essays on Face-to-Face Behavior. Garden City, NY: Anchor Books.

Halskov, K. and Hansen, N. B. (2016). Participatory design: Re-evaluation as a socio-material assembly. Anthropology in Action, 23(3), pp. 14–24.

Hochschild, A. R. (1983). The Managed Heart: Commercialization of Human Feeling. Berkeley: University of California Press.

Krippendorff, K. (2006). The Semantic Turn: A New Foundation for Design. Boca Raton: CRC Press.

Latour, B. (2005). Reassembling the Social: An Introduction to Actor-Network-Theory. Oxford: Oxford University Press.

Light, A. and Akama, Y. (2014). Structuring future social relations: The politics of care in participatory practice. In: PDC 2014: Proceedings of the 13th Participatory Design Conference, Windhoek, Namibia. New York: ACM, pp. 151–160.

Manzini, E. (2015). Design, When Everybody Designs: An Introduction to Design for Social Innovation. Cambridge, MA: MIT Press.

Manzini, E. and Rizzo, F. (2011). Small projects/large changes: Participatory design as an open participated process. CoDesign, 7(3-4), pp. 199–215.

Margolin, V. (2002). The politics of the artificial: Essays on design and design studies. Chicago: University of Chicago Press.

Redström, J. (2006). Towards user design? On the shift from object to user as the subject of design. Design Studies, 27(2), pp. 123–139.

Sanders, E. B.-N. and Stappers, P. J. (2008). Co-creation and the new landscapes of design. CoDesign, 4(1), pp. 5–18.

Tutenel, T. and Heylighen, A. (2024). Interweaving vulnerability and everyday design: Encounters around an aquarium in a pediatric oncology ward. [pdf] KU Leuven.