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Beyond Dialogue: Reflexive, Reciprocal, and Inclusive Loops for Participatory Justice

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Abstract

Contemporary participation in sustainability transitions often operates under efficiency imperatives, with budget and time as scarce resources. Participation becomes a top-down, streamlined practice of extractive consultation, techno-economic reductionism, and the absence of loops that return learning, accountability, or value to communities. This results in low engagement, with outcomes reduced to collective acceptance of one-size-fits-all solutions rather than the co-creation of diverse practices that bring together multiple societal perspectives. This paper explores how participatory design can transform this paradigm by advancing a collective reflexive practice in which engagement becomes a continuous, justice-oriented process. It introduces the concept of reflexive, reciprocal, and inclusive loops, a design logic for reconfiguring participation as loop-driven and continual rather than episodic and discrete, where communities and institutions sense, interpret, act, and cultivate self-awareness together. Building on justice-oriented design theory, we articulate a loop-driven participation framework structured around the principle of reflexivity as an act of collective self-awareness to detect and repair injustices around: inclusivity, ensuring equitable voice and fair distribution of benefits and burdens, and reciprocity, establishing non-extractive exchanges of knowledge, responsibility, and value. We argue that realizing this framework requires a reframing of digital technologies from decontextualised instruments of participation to socio-digital infrastructures that actively mediate relationships, redistribute power, and expand collective capabilities. Such infrastructures must be co-created, open, and accessible, enabling communities to model, simulate, and assess inclusive and reciprocal scenarios across domains like energy, mobility, and biodiversity. The paper contributes formative concepts and design heuristics for structuring participatory processes that embody reflexivity through inclusive and reciprocal loops reimagining participatory design as a process of ethical coexistence, where

dialogue becomes a continual and processual infrastructure of care and justice, rather than a one-off event.

CCS Concepts

• Human-centered computing; • Cross-computing tools and techniques; • Design;

Keywords

Participatory justice, Reflexivity, Inclusivity, Reciprocity, Feedback Loop, Digital–Social Infrastructures

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1 INTRODUCTION

Across Europe, sustainability transitions—guided by the European Commission’s Recommendation on promoting engagement of citizens in the green transition [10] are intensifying the call for active public participation [28]. Yet engagement efforts remain fragmented, extractive, or tokenism-oriented, producing little transformation and even less trust. Governmental institutions are primarily busy with implementing *speaking* agendas to communicate scientific knowledge, yet there are limited development and implementation of *listening* and *acting* agendas [9]. Communities invited to contribute with data, opinions, or attendance are often left out of the power to shape agendas, interpret knowledge, and define outcomes. Participation becomes a ritual of consultation rather than a system of learning, failing to build collective capabilities [4] or to repair structural injustices [12, 15].

The dynamics: episodic engagement, extractive exchange, and technocratic optimisation, reinforce low representation, low legitimacy, and declining engagement over time.

This paper explores how these dynamics can be reimagined and reconfigured. We consider participation as an ongoing framework maintained by reflexive relationships. Drawing on discussions in participatory design (PD) and sustainability transitions, we enquire how the principles of reflexive inclusivity and reflexive reciprocity

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could facilitate more equitable and sustainable forms of coexistence. Building on this, we elaborate on how reflexive reciprocal and inclusive loops, X-loops, can underpin participatory design for justice and coexistence. We present a conceptual and methodological framework for loop-driven participation, built upon these principles describing how socio-digital infrastructures can sustain this logic in practice. By reframing participation as a continuous, reflexive process, we argue that design can play a pivotal role in transforming fragmented engagement into collective capability and long-term coexistence.

1.1 Conceptual background

Participation has become a defining term in contemporary sustainability discourse, yet much of what is described as “participation” remains limited in scope and duration. In urban transitions, public consultations, digital surveys, and stakeholder workshops it is often deployed to legitimise predetermined plans rather than to co-create them. These practices extract information without returning agency, fostering what can be described as extractive participation, processes that consume time, attention, and data from citizens while offering little in return.

At the heart of extractive participation lies the absence of feedback loops, mechanisms that would return learning, accountability, or benefits to the people who contribute. Extractive participation asymmetries are reinforced by the techno-economic framing of sustainability transitions, where impact is primarily measured through efficiency and cost-effectiveness rather than fairness, recognition, or care. Over time, communities learn that their involvement carries little consequence, leading to an erosion of trust and participation fatigue [22].

Earlier debates in PD framed these challenges through metaphors of vicious and virtuous circles [7], illustrating how participation can either reinforce exclusion or generate empowerment. While useful, such metaphors imply closure, a loop that completes rather than evolves. Moving beyond this closed logic means sustaining open-ended processes of relation, accountability, and repair through reflexive, reciprocal, and inclusive loops that continually regenerate participation.

Breaking this “circle paradigm” requires a fundamental shift from participation as input to participation as infrastructure. PD can serve as a reflexive infrastructure of coexistence, where citizens, institutions, and technologies interact continuously through feedback loops that support shared understanding, learning, and accountability. Participation should be recognised as a loop-driven and cumulative process, a system of relations that aligns perception, action, and reflection among those who affect and are affected by change.

Loop-driven participation replaces one-way communication with reflexive loops (iterative movements of realising, revealing, repairing, and reinforcing) that raise collective self-awareness and sustain inclusive and reciprocal relations between communities, institutions, and environments. It reframes participation as justice-in-the-making, where fairness is not a fixed end state but an evolving collective practice. This logic resonates with Participatory Action Research traditions, which emphasise cycles of reflection and action, participant agency, and situated knowledge [16].

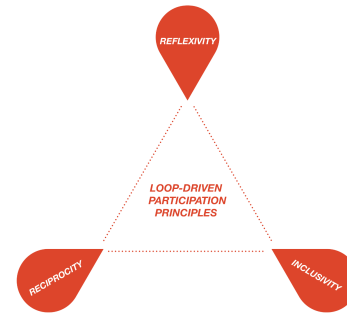


Figure 1: Loop-driven participation principles, via the authors

Realising this vision requires a parallel rethinking of digital technologies. Too often, digital participation platforms reproduce the asymmetries they seek to solve by optimising for data extraction rather than shared understanding [1]. To support loop-driven participation, digital systems must evolve into socio-digital infrastructures as hybrid constellations of people, tools, and institutions that co-produce knowledge and sustain dialogue. Such infrastructures are defined less by sophistication than by accessibility, transparency, and adaptability, enabling low-cost, open, and modular participation on communities’ own terms.

Reframing participation through these lenses transforms design from an activity that delivers solutions into one that sustains relationships of coexistence. Loop-driven participation, supported by socio-digital infrastructures, offers an alternative to the extractive logic of conventional engagement. A path toward participatory processes that are inclusive, reciprocal, and reflexive by design.

2 LOOP-DRIVEN PARTICIPATION IN PRACTICE: PRINCIPLES, PRACTICES, AND INFRASTRUCTURES

2.1 From principles to practice

Participation as loop-driven and reflexive practice requires a normative foundation. Within this orientation, we propose the principle of reflexivity forming the normative and ethical backbone of a reciprocal and inclusive participatory design (Figure 1):

- Reflexivity is the deliberate practice of self-awareness, ensuring that participation processes and outcomes remain open to critique, adaptation, and repair [8]. It compels a participation process to become self-aware, critical, and adaptive by continuously examining its own assumptions, biases, values, and power dynamics. Reflexive practices entail questioning plurality aspects of participatory processes [29]: who is participating and who is not? Whose knowledge counts and whose is marginalised? What are our shared and unshared assumptions? How is power distributed and exercised? Such

questioning can be supported by open reporting, participatory evaluation, or dedicated learning communities that detect biases, respond to unintended consequences, trace and repair inequities as they emerge [23, 31]. For PD, reflexivity is crucial as it converts participation from a procedural step into a dynamic learning system by introducing cycles of self-realisation, correction, and care that prevent the institutionalisation of injustice. It provides a way for all actors to examine their assumptions, biases, language, and metrics. Embedding reflexivity in reciprocal and inclusive practices as a methodological foundation means that participation collectively becomes self-aware, cultivates and, when needed, repairs reciprocal and inclusive participation.

- Reciprocity addresses the ethical quality of exchanges in participatory processes, ensuring that they are mutually beneficial by acknowledging, enabling, and rewarding the diverse contributions communities make [13, 18, 21]. Traditional participatory schemes often rely on voluntary input from communities while institutions retain control of resources and interpretation. In contrast, a reciprocal approach makes participation meaningful by treating it as a fair exchange where every actor both ‘gives’ and ‘receives’ value ensuring that contributions of data, knowledge, and effort are met with recognition, reward, or influence. This entails creating clear pathways for returning values to participants. This may involve tangible forms of return, such as incentives or shared savings, and intangible forms, such as recognition, knowledge access, or influence. For PD, reciprocity is fundamental because it provides an ethical and practical foundation for fair and sustained engagement towards a relational knowledge co-creation built on mutual respect for diversity in contributions and benefits by participants.
- Inclusivity is the principle and practice of ensuring that all groups, especially those historically underrepresented, can influence decisions and share in the benefits and burdens of transitions [6, 17, 25, 26]. This entails commitment to dismantling the systemic barriers that limit engagement. Since participation is never neutral, inclusivity requires active work to lower barriers of language, literacy, time, and access [5, 27]. It involves ensuring both material and symbolic accessibility: affordable technologies, clear language, and interfaces that accommodate diverse literacies and abilities. Inclusivity calls for cultural recognition, which values different worldviews as resources for collective learning rather than obstacles. Without inclusivity, PD processes risk replicating the very inequalities they aim to address, reinforcing inequalities. It is foundational for integrating diverse forms of knowledge and building shared and collective capabilities.

From the above definitions, reflexivity is not an added layer to the ongoing discussions about PD, but the condition making participatory justice possible and what makes reciprocity and inclusivity coherent and valuable.

Turning the conceptual ambition of loop-driven participation into practice requires embedding reflexivity as a collective capability to ensure that both principles of reciprocity and inclusivity

are at the core of just participation. Participation rarely fails because people resist engagement; it fails because engagement is not designed as a social and continuous relationship. The shift from extractive to loop-driven participation can be understood through the notion of reflexive loops. In many participatory initiatives, information flows linearly: citizens provide input, experts interpret it, and decisions are communicated back with little opportunity for revision. The absence of feedback leaves participation incomplete. Reflexive reciprocal and inclusive loops, X-loops, by contrast, turn this one-way sequence into open-ended collective awareness where knowledge, values, and responsibilities are co-created among all actors (Figure 2). To move beyond short-term consultation, PD must cultivate forms of collective capability, tools for reflexivity and open infrastructures for continuous learning.

2.2 Reflexivity as a collective awareness

Reciprocal and inclusive participation begin with the recognition that people’s ability to engage is uneven. Many communities lack the time, technical skills, or confidence to navigate institutional processes. Participation responds by building collective capability for reflexivity, the capacity of groups to reveal, repair, and reinforce together even when individual resources differ.

A key obstacle to just participation lies in what remains collectively invisible or uncoded. Top-down evaluation frameworks privilege economic and technical indicators, such as energy efficiency, cost reduction, and productivity, while neglecting social and cultural dimensions like comfort, aesthetics, equity, or biodiversity. Loop-driven participation seeks to rebalance this visibility. Participatory modelling and simulation can translate everyday narratives into meaningful, quantifiable dimensions [20]. When communities describe discomfort, exclusion, or pride in local heritage, these accounts can inform new indicators regarding social well-being, spatial justice [3], or cultural identity. Integrating these indicators into planning and decision-making enables institutions to reason (reveal, repair, and reinforce) not only about performance but also about fairness. In this sense, data become relational artefacts: they carry stories, values, and responsibilities.

Reflexivity within our framework becomes the engine of loop-driven participation, transforming questioning into an ongoing, relational practice of collective action. Rather than an individual exercise, reflexivity operates as shared self-awareness through which communities and institutions continuously realise and reveal assumptions, biases, power relations, and value distributions, while repairing resulting harms and reinforcing fair practices. It functions as a structured and sustained dialogue in which participation remains open to critique, adaptation, and care throughout the process, enabling actors to adjust goals and practices over time.

Within this dynamic, reflexivity operates directly in relation to reciprocity, establishing *reflexive reciprocity* as a core operational quality of loop-driven participatory systems. By continually questioning what tangible and intangible values are exchanged and who benefits from participation, reflexive reciprocity enables mutual learning and fair exchange among all actors. This process makes the consequences of engagement visible, allowing participants to see how their contributions matter and fostering trust, continuity, and ethical accountability. Through reflexive reciprocity, participation

becomes not only effective in achieving outcomes but also just in its operation, sustaining equitable relationships and genuine care as ongoing conditions of collective action.

Our framework also brings reflexivity into the context of inclusivity, proposing reflexive inclusivity as a vital loop for sustaining equitable participation. Moving beyond procedural inclusion, reflexive inclusivity operates as a value-driven practice of care that continuously interrogates whose realities, capacities, and knowledges are centred and whose remain overlooked. Through reflexive monitoring and dialogue, participation becomes responsive to difference rather than merely representative of it. Designing for reflexive inclusivity involves recognising and mapping the diverse capabilities of individuals and groups and transforming them into collective capabilities through shared learning, adaptation, and mutual support. In doing so, the participatory system itself evolves over time, lowering barriers to engagement and fostering conditions in which all participants can meaningfully contribute to and co-create outcomes.

2.3 Embedding reflexivity through open infrastructures for co-creating knowledge

Operationalising these principles requires an integrated participatory medium: **socio-digital infrastructures** that connect on-site and online engagement through hybrid mediation practices. Low-cost digital mapping, mobile ethnography, and real-time polling can help visualise experiences of inequality, while in-person facilitation and mentoring support interpretation and sense-making. When such tools are embedded in open and accessible interfaces that communities can co-design and adapt, participants can trace how their perspectives shape collective decisions, closing the loop between contribution and outcome.

Socio-digital infrastructures mediate ethical relationships between people, data, and institutions by combining social processes (dialogue, co-design, and collective reflection) with digital functions such as mapping, modelling, simulation, and analytics. Their role extends beyond technical support: they scaffold civic practices of presence and recognition (making voices visible), negotiation and exchange (ensuring reciprocity), and repair and accountability (sustaining reflexivity). In doing so, infrastructures become not only transparent and open, but relational and caring.

To sustain inclusivity and reciprocity over time, participation must be supported by infrastructures that distribute rather than concentrate power. Transparency makes data provenance, assumptions, and decisions visible and contestable; accessibility ensures tools are open-source, multilingual, and affordable; adaptability allows governance and technical architectures to evolve through collective decision-making. Within such systems, reflexivity monitoring becomes a shared responsibility rather than an external audit. Dashboards and visual reports can provide ongoing feedback on who participates, whose inputs are acted upon, and how benefits are distributed, embedding justice monitoring into everyday practice.

Crucially, metrics for inclusivity and reciprocity should function as formative tools rather than ranking devices. Their purpose is to open dialogue about where justice is achieved and where it fails, making measurement part of collective reflection rather

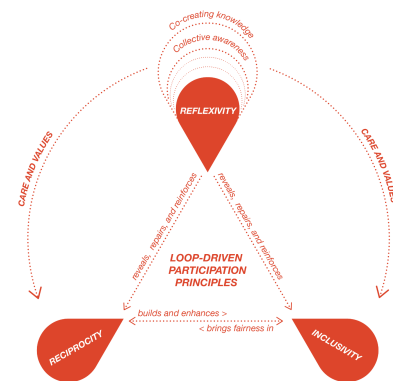


Figure 2: Loop-driven participation principles, via the authors

than a verdict. Governance structures play a central role here: distributed ownership of tools and data, supported by open-source infrastructures and participatory data governance, ensures communities retain control while institutions remain accountable [2].

Finally, such infrastructures must resist the assumption that technological novelty guarantees inclusion. Low-cost, open, and modular systems grounded in local capabilities enable communities not only to express needs, but also to analyse data, simulate alternatives, and evaluate trade-offs, transforming participation from consultation into shared reasoning.

3 REFLEXIVE RECIPROCAL AND INCLUSIVE LOOPS: A CONCEPTUAL MODEL

These principles are relevant to both project-related engagement and participatory policymaking, where institutions must learn to remain accountable and adaptive to citizens' voices. They propose redefining policymaking as a reflexive infrastructure that continuously learns from and collaborates with its publics.

We reframe X-loops as infrastructures of coexistence that connect local practices with participatory policymaking, enabling inclusive processes of democratic care. This perspective shows how design can scaffold institutional capacity to remain adaptive, accountable, and responsive across time. Reflexivity in PD extends beyond reflection or evaluation. It is an active condition of awareness, in which participants and institutions examine assumptions and adjust their actions accordingly. A reflexive loop emerges when this awareness becomes structural, when sensing, interpreting, acting, and learning are built into the same process. The purpose of such loops is not only to improve decisions but to ensure accountability and repairability.

Within a reflexive loop, participation becomes both process and outcome. Each cycle generates new insights about what fairness means in context, and these insights feed back into how the system defines and measures justice. Reflexive loops thus operate as ethical feedback mechanisms: they transform raw data into shared understanding and shared understanding into institutional adaptation.

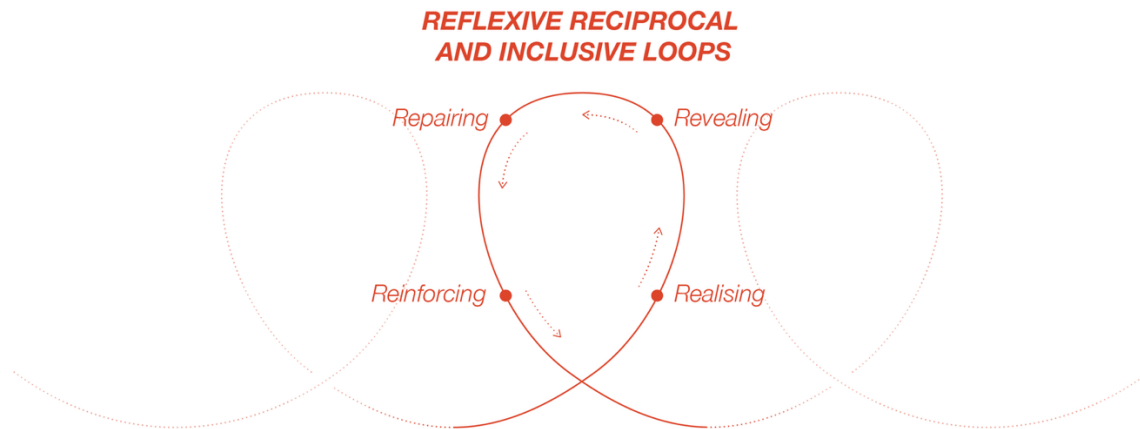


Figure 3: Reflexive reciprocal and inclusive loops (X-loops), via the authors.

3.1 Dynamics of the loop

A reflexive reciprocal and inclusive loop can be described as unfolding in five interlinked phases, which are not strictly sequential but constantly overlap, influence, and reshape one another (Figure 3).

- **Realising.** The loop begins when signals and evidence trigger awareness that change is needed. Data, lived experiences of both human and more-than-human agents, and emerging tensions make the longing for desired futures visible. What matters is that these signals are recognised as valid inputs to collective reasoning.
- **Revealing.** As this awareness unfolds, difference and perspectives are made explicit by turning individual experiences into collective understanding. Narratives, visualisations, and participatory simulations act as boundary objects that bridge institutional and everyday languages. They make differences visible and negotiable, enabling communities and decision-makers to explore multiple framings of the same issue.
- **Repairing** transforms insight into intervention. Here, new indicators, design parameters, or policy adjustments are generated from what has been learned. Action is not the endpoint of the process but a provisional step, always open to revision.
- Finally, **reinforcing** strengthens the loop through reflexivity and iteration. New voices, changed assumptions, justice metrics, feedback mechanisms, and pluriversal values allow for transparency, accountability, and flexibility. Reinforcing consolidates learning by leveraging and embedding reflexivity without closing the loop.

Thus, reflexive loops resist closure and sustain participation as an inclusive, responsive, and regenerative process.

3.2 From dialogue to coexistence

This section briefly engages with ethical dimensions such as justice, care, and responsibility, not to treat them exhaustively, but to situate the proposed loops within a broader landscape of participatory ethics.

Reflexive reciprocal and inclusive loops move PD beyond the idea of dialogue as a single moment of exchange. Dialogue becomes infrastructure: a durable arrangement that sustains the conditions for listening, acting, and learning together. In such systems, coexistence is not an end state achieved through consensus but a continuous practice of alignment and care.

By institutionalising reflexivity through open infrastructures, accessible technologies, and ethical metrics, participation can evolve into a means of maintaining peace and justice in everyday governance. X-loops make visible the interdependencies that bind people, technologies, and environments, turning participation into an instrument of collective self-awareness. They suggest that coexistence in complex societies is less about agreement and more about the ongoing capacity to stay in relation, to listen and adjust, and to keep the loop open.

While this model introduces a loop-based approach to participation, its principles resonate with Global South epistemologies that reframe agency as contextual and dynamic rather than individual and autonomous [11, 19]. These frameworks reject deficit-based models and emphasise contributive justice, situating participation as the capacity to act meaningfully within one's own conditions [24]. Postcolonial feminist and Indigenous perspectives further challenge universalist norms by foregrounding "differently-equal" forms of agency, relational accountability, and collective action [30]. Rather than rediscovering such practices, this paper situates reflexive loops within broader traditions of agential constructivism across postcolonial contexts. Participatory action research aligns with these values by recognising participants as co-creators of knowledge and transformation [14].

4 DISCUSSION: DESIGNING THE CONDITIONS FOR REFLEXIVE COEXISTENCE

If PD once aimed to democratise industrial systems, its challenge today is to democratise complex socio-technical ecologies systems shaping how people live and relate. X-loops offer a framework to reorient participation toward justice and coexistence within these

ecologies. Yet they also reveal tensions and paradoxes that require careful navigation.

4.1 Participation as Ongoing Governance

Traditional participatory frameworks assume a clear distinction between design and use, consultation and decision, beginning and end. Loop-driven participation disrupts these boundaries. It treats participation as an ongoing mode of governance, where communities shape and adapt systems. This shift demands institutions willing to share control and to acknowledge uncertainty as an inherent feature of just transitions.

The implication for design practice is profound: designers are no longer facilitators of discrete projects but stewards of ongoing relationships. Their role is to hold the loop open to design the interfaces, infrastructures, and cultures that sustain iteration. Success is measured not by consensus or closure but by the system's ability to continually learn and adapt inclusively.

4.2 The politics of infrastructures

Socio-digital infrastructures are never neutral. They mediate what can be seen, said, and valued. Designing them reflexively means recognising that every technical decision is also political: the choice of data models, indicators, or interaction formats embeds assumptions about what counts as legitimate knowledge.

A reflexive approach, therefore, calls for infrastructural transparency and pluralism. Open-source architectures, traceable data flows, and participatory metric design can make biases visible and negotiable. Rather than concealing conflict, infrastructures should reveal it allowing different values to coexist without being reduced to a single optimisation logic. This politicisation of infrastructure does not threaten design's neutrality; it replaces the illusion of neutrality with a deliberate ethics of exposure.

4.3 The temporality of justice

Justice, in this view, cannot be secured once and for all. It must be continually enacted and renewed. X-loops make this temporal dimension explicit by embedding monitoring, dialogue, and repair within everyday practices. They institutionalise time for reflection, countering the acceleration of policy loops and the immediacy of digital decision-making.

For PD, this implies a methodological shift from impact to continuity. Evaluation should no longer be limited to outputs or adoption rates but include indicators of sustained engagement, learning, and mutual care. Projects might end, but the feedback loops they generate should remain alive, adopted, adapted, and extended by the communities themselves.

4.4 The ethics of care and responsibility

Reflexive participation introduces an expanded ethics of design grounded in care, attentiveness, and responsibility. It recognises that participation involves emotional as well as cognitive labour: listening, negotiating, and remaining open to discomfort. The designer's task is not merely to facilitate inclusion but to nurture the relational conditions that make inclusion meaningful.

These ethics extend to the digital layer as well. Infrastructures that collect, process, and visualise data must do so with explicit

consent and accountability. Reflexivity means not only monitoring outcomes and interrogating the ethics of the technologies themselves their accessibility, ownership, and ecological footprint. Care, hence, is not an abstract value but a design requirement embedded in code, interface, and governance.

4.5 Toward participatory systems of coexistence

Ultimately, the ambition of X-loops is not only to improve participation but to reimagine how societies coexist amid difference. Coexistence here implies more than tolerance; it denotes the collective capacity to relate through continuous negotiation of values and impacts. Participatory systems designed for coexistence do not erase conflict but channel it into constructive circulation, preventing stagnation and exclusion.

Reflexive loops become both a metaphor and a mechanism for peacebuilding a design of living systems that can learn from friction. Therein, PD aligns again with its democratic origins: it becomes a practice of political imagination, capable of translating care and justice into the infrastructures of everyday life.

5 CONCLUSION: KEEPING THE LOOP OPEN

PD has long been defined by its commitment to democracy, dialogue, and inclusion, but amid crises and fragmentation, these commitments must evolve. Reflexive reciprocal and inclusive loops reframe participation as a living infrastructure sustaining peace and coexistence not through consensus but through continuous responsiveness.

Participation fails when it is linear, extractive, or finalised, turning citizens' input into bureaucratic silence or technological opacity, breeding distrust rather than empowerment. Reflexive loops counter this by embedding cycles of realising, revealing, repairing, and reinforcing within socio-digital infrastructures, making participation iterative, open, and self-learning.

This shift repositions PD within an ethics of coexistence: designing not just for and with people, but with the relations themselves among people, technologies, and environments. Justice, in this framing, is a practice of accountability and repair, where inclusivity, reciprocity, and reflexivity sustain participation as generative rather than extractive.

Digital technologies are pivotal in this transformation. When designed as open, transparent, and accessible infrastructures, they can extend participation without reproducing inequality. If treated not as ethical and political agents, they can shape whose voices are heard, how knowledge circulates, and which futures become thinkable. Reflexivity turns data and algorithms into mediators of dialogue and democratic care, rather than mechanisms of control.

X-loops thus reimagine PD as a practice of peace, not resolving conflict but providing the means to experience it constructively. Coexistence emerges when societies are equipped with infrastructures that support mutual listening, transparent exchange, and shared learning. Keeping the loop open prevents participation from becoming a performance and sustains it as a collective form of care.

To design for peace, dialogue, and coexistence, then, is to design for continuity: processes that endure difference without closing it, infrastructures that hold complexity without collapsing it, and communities that stay in relation through cycles of reflection and

repair. Keeping the loop open is both a methodological and ethical act, the foundation of participatory futures capable of justice and coexistence.

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