

Reflecting on Increasing Inclusivity through Distributed Co-Design Over Two Decades

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Abstract. Co-design, an integral practice in design research, has evolved significantly in recent years. This paper offers a practice-led reflection of distributed co-design through two decades of intergenerational projects, from early challenges to its current state, using temporal structure, technology mediation, and participation structure as interdependent lenses of inquiry. It defines the terms *distributed*, *online*, and *remote* as orthogonal dimensions of co-design practice. The paper concludes by supporting practice-led reflection as a way to reveal structural patterns of a generative-evaluative spectrum that contemporaneous empirical work cannot see.

Keywords: distributed co-design, participatory design, children

1 Introduction

Co-design, as a practice in the realm of design research, has witnessed remarkable evolution in recent years. One of the fascinating facets of this evolution is the emergence of distributed co-design which is a practice that transcends geographical boundaries and democratizes the design process by creating opportunities for more inclusivity in participation. This paper lays out my and my teams' experiences with distributed co-design and my evolution with the concept from the early 2010's until now and arrives at clearer distinctions among terms used interchangeably in the literature including "distributed", "online", and "remote" co-design, to better situate future scholars and practitioners, as well as a findings-driven spectrum of co-design with one end being generative and the other end being evaluative.

While much of the distributed co-design literature focuses on the technological means that enable the collaboration, this work focuses on a longitudinal, practice-based analytic framing of distributed co-design. Specifically, I use technology mediation, temporal structure, and participation structure as three lenses in the framing of the practice. Because co-design relies so heavily on participation, inclusivity in this analysis is reframed from being merely about access and instead a meaningful part of each project.

This paper makes three contributions. First, it presents a longitudinal, practice-led analysis of distributed co-design across two decades. Second, it proposes three analytical lenses for understanding inclusion in distributed co-design: technological mediation, temporal structure, and participation structure. Third, it

introduces a generative-evaluative spectrum that explains how different forms of distributed co-design require different structures of participation, technological mediation, and temporal structure.

2 Practice-led Reflective Account of Distributed Co-Design

This paper adopts a practice-led, autobiographically reflective approach to examining the evolution of my and my colleagues distributed co-design practice over time. Grounded in our work, the paper is written as a retrospective account of how contemporary forms of distributed co-design emerged through shifts in technological mediation, temporal structures, and participatory structures encountered in practice. It does not aim to provide a comprehensive history or comparative analysis of distributed co-design as a field, but instead offers situated reflection derived from long-term engagement in distributed co-design projects across academic, community, and applied research contexts.

The analysis draws on Fleck and Fitzpatrick's framework for reflection [1], specifically their R4 level of reflection, which emphasizes critical consideration of broader implications beyond immediate design outcomes. This level of reflection supports examination of how design decisions made in practice, particularly those related to mediation, tooling, and facilitation, shape participation, inclusion, and exclusion over time. Reflection is treated as an analytic way through which practice itself becomes the object of inquiry instead of merely a post-hoc commentary.

This paper uses the term "distributed" when referring to the work. As previously mentioned, words like "online" and "remote" have been used in the literature as synonyms. We argue that each term describes a distinct dimension of co-design practice. "Distributed" co-design is co-design that takes place with participants who are not in the same geographical space. "Online" refers to the technology enabling the co-design session and doesn't preclude co-located or distributed participants. "Remote" is a word that is used in Computer Supported Cooperative Work literature, broadly, to mean a physical distance from collaborators [2]. With these definitions, we can see that they can be used in conjunction when discussing this kind of work, such as an online, distributed co-design tool that users can remotely log into. On the other hand, we can use them separately such as a distributed co-design project that uses low-tech artifacts mailed back and forth or an online co-design tool where everybody is in the same room.

The source material for this reflection consists of distributed co-design projects undertaken by myself and collaborators since 2009. These projects include the design and deployment of tools, facilitation and mediation strategies, the design problems being addressed, and the technical and institutional constraints that structured participation. Instead of re-analyzing empirical datasets, the analysis proceeds through a thematic synthesis of practice, examining how projects built upon prior work, where they diverged from expected trajectories, and why particular efforts emerged as distributed co-design projects rather than co-

located alternatives. This work is not a comparative evaluation or controlled methodological assessment. Instead, it constitutes reflective praxis grounded in longitudinal engagement with design practice.

This reflective framing is further informed by Sengers et al.'s [3] notion of reflective design. In each section, projects are examined without imposing uniform structure or analytic symmetry across cases, allowing differences in context, intent, and outcome to remain visible. Reflection is used to surface limitations within the author's own design practice, to reconsider the designer's role in shaping technological mediation, and to attend to how technologies invite skepticism and reinterpretation in use. In keeping with reflective design principles, reflection is treated not as separate from action, but as inseparable from design activity and lived experience.

The analytic lenses introduced in this paper are derived from recurring decision points encountered in my practice, such as tool selection, facilitation structure, and representational form, rather than from an a priori theoretical model of distributed co-design. As such, the paper does not aim to reconstruct the general history of distributed co-design, but to surface situated insights that emerge from long-term engagement in its practice. Throughout this account, *I* is used when referring to the author's individual reflection and decision making, while *we* is used to indicate the collaborative work of the teams.

3 Early Beginnings

My experience with distributed co-design begins with a challenge posed by Carnegie Hall in New York City [4]. Our team's goal was to create a more engaging musical program for high school students in New York City, New Delhi, and Mexico City. Previous attempts had faced a formidable hurdle—how to foster meaningful cross-cultural engagement among students who were physically separated by thousands of miles. The conventional approaches had struggled to bridge these geographical divides.

In response to this challenge, a shift in perspective was required. The key was to find a way to involve students from distant locations in the design process itself. The rough idea of distributed co-design emerged as a promising approach. Co-design, fundamentally rooted in collaboration and inclusivity, held the potential to empower students to actively participate in shaping the musical program and would be the right solution if we were able to bridge their geographical locations. We attempted to do distributed co-design with this group by creating our own paper-based items that needed to be mailed back and forth or carried by someone going between the different locations forcing us to adopt a temporal structure of asynchronicity. Those solutions involved either worksheets, or sticky notes with prompts printed on them that participants could fill out and work with in an evaluative way. The idea was that the materials would be built upon by other participants so the distributed design sessions might be connected. For example, the artifacts from a co-design session with New Delhi students could be brought back to New York and built upon by the teen participants there. It was somewhat

cumbersome and highly mediated by adults who were at the two locations. While this endeavor was relatively successful in expanding our geographic reach, the worksheet approach really reduced the “in-the-moment experience” of generative, intergenerational co-design that we had seen in previous projects, and it felt like schoolwork. While trying to bridge time zones, the techniques we employed limited the teen participants as recipients of design challenges instead of agents in a design process. We knew we could do better.

4 DisCo is Born

After the Carnegie Hall project, I decided that distributed co-design was important to me and the field, so, I chose that as my focus in design research. Before making this decision, I had developed a participatory design technique called layered elaboration [5]. This technique allowed co-designers to add layers of new designs on top of existing ones, using transparent sheets from then “ancient” overhead projectors. It was a powerful tool for in-person co-design sessions, enabling participants to build upon each other's ideas seamlessly as well as providing an environment that was non-destructive during changes.

The concept of layered elaboration held potential, but it required adaptation to overcome geographical barriers that went beyond the courier model of carrying artifacts between design groups. This adaptation was my first step toward the creating of my own flavor of distributed co-design that would use technology to mediate the design process to remove geography. I began to investigate how to leverage this technique in a way that would enable children in different locations to collaboratively co-design, even when they could not be present in the same physical space. We began a design process to investigate and create web-based tools that could mimic the layered elaboration process but on an online platform. At this point, we realized online technologies not only bridged geography but give us the added benefit of having a record of each design move made by the participants that we couldn't see when using traditional markers and paper. The online platform would be asynchronous to support participants in different time zones and would afford intergeneration participants with an opportunity to generate and build upon ideas as design partners instead of merely reacting to prompts. We thought this web-based software would serve as a bridge, connecting participants from diverse geographical locations in a shared co-design experience.

5 On the Shoulders of Giants

To be fair, distributed design was not a new problem. The Computer-Supported Cooperative Work (CSCW) community had been working on it for some time in different forms [6–9]. While not always expressly focused on participatory design, these tools and projects did focus on cooperation either at a distance or at

different times, or as the CSCW literature refers to them, *geographical nature* and *form of cooperation*, of which the latter directly influences my lens of temporal structure.

The projects that most influenced my early work included those whose mission was expressly participatory design-focused or extensions of those projects. The tool PICTIVE [10] used plastic pieces and low-fidelity prototyping tools to conduct participatory design sessions that were recorded. The Cooperative Interactive Storyboarding Prototyping tool [11] was more akin to what modern distributed participatory designers might be used to: a screen-based system for design in which a camera recorded the sessions. Both of these tools had some of the features one might expect, but were both limited to a shared space and were more like technology-supported participatory design than distributed with little regard for inclusivity.

The PICTIOL and TelePICTIVE projects [12, 13] were my first introductions to actual “distributed” systems. Both systems enabled synchronous cooperation through multiple low-fidelity prototyping tools and both “locked” design elements as one person would modify them. This locking concept became important in later design prototypes.

The development of web-based co-design tools was not a linear process but rather an iterative one. Attempting to use the philosophy of Research Through Design [14], it involved constant refinement based on feedback from co-design participants as well as reframing of the design problem. The objective was to create an interface that was intuitive and accessible, ensuring that participants from different regions could use it with ease. We were able to create a prototype called “DisCo” which was short for distributed co-design [15].

As our web-based tools evolved, they introduced features that transcended the capabilities of traditional Layered Elaboration. Participants could not only add their contributions but also toggle layers on and off to focus on specific elements of the design. Groups of designers could “login” together at the same machine, design, and have their names and avatars be present on the layer they worked on leading to a documentation of collaborative participation that most online systems still struggle with when users share a device. Furthermore, the integration of voice annotation through an MP3 web-based recorder allowed younger participants to express their thoughts and ideas through text and, technologically interesting, through voice. The inclusion of voice aided in eliminating typing challenges, especially for younger co-designers which had the potential to broaden participation in a medium that had relied on text. The concept of annotation and building layers became the main features of this toolkit [16].

The compromise to make all of this happen in an asynchronous way and avoid two or more participants from trying to build on the same idea at the same time was the idea of locking design sessions. The intergenerational designers could be the only one in a layer at a time, unless they were co-located with someone at their device which we saw happen between some younger participants and their parents. A number of child participants commented that they didn’t feel like part of a team with this tool and sometimes felt lonely in using it.

Our journey through distributed co-design coincided with the technological revolution of the Apple iPad. With the iPad, the interface for design had transformed. Touch-based interaction and drawing with fingers had become the norm and parents were introducing children to and purchasing tablets for their children instead of computers. The new Google Chromebooks and even the One Laptop Per Child devices were essentially tablets with attached keyboards. However, the existing web-based co-design tools created relied on a soon-to-be obsolete technology and were ill-suited for this new paradigm.

The user interface that we had constructed did not work with the iPad because it was built using open-source tools that created an Adobe Flash movie. The Flash movie required a very common and ubiquitous browser extension to execute. However, Apple has never supported a Flash plug-in on their mobile devices so this version of the prototype was forever forced to be used on a desktop computer. Because of the way I built it using the open-source Flash compiler, I was able to port it to HTML 5. Unfortunately, some of the more interesting features, such as the layers turning on and off and the voice recording, had trouble working in the early ports due to the locked-down nature of early mobile operating systems. In fact, voice recording on an iPad through a web browser was not supported, and required an additional application installed on the iPad, which was beyond the scope of this particular project. This version of DisCo would forever be locked on standard, non-tablet-based computers.

The original instantiation of DisCo was born out of constraints, such as geography, and limited interactions between groups. This era of my co-design practice was about necessity of inclusion and enhancing participation for users instead of the novelty of an online system. Unfortunately, it essentially died because of constraints as well, such as the technological limitations of early mobile web-browsers and the interaction paradigm that children were drawn towards, the touch-based interface. More importantly for my future practice, the instantiation of DisCo rang hollow for many of my co-design participants because the inclusionary nature may have expanded geographically, its experience narrowed from what they conceived of as being part of a design team. As a proponent of participation, the idea of inclusion at the cost of a feeling of belonging was heartbreaking.

6 Post-DisCo Distributed Co-Design

The genesis of my journey into distributed co-design, rooted in the challenges posed by Carnegie Hall's cross-cultural musical program, marked the early chapters of a co-design tool challenge. These tools empowered co-design participants to collaborate across geographical boundaries but also highlighted the need for a more inclusive, community-creating, and democratized approach to design research. In my pursuit of design research into distributed co-design, the creation of immersive and collaborative environments has been a defining goal that grew out of that earlier work. This section discusses the evolution of such

environments, starting with my Minecraft era and venturing into developing custom-designed three-dimensional spaces that transcend traditional boundaries.

After a successful dissertation defense, I was offered a position at the University of Baltimore where I would continue my inclusive co-design work. The focus of the team was children who lived within the city limits of Baltimore City but was otherwise modeled on Druin's KidsTeam [17]. In order to try and tackle the challenges I experienced working with Carnegie Hall as well as potentially including rural and city children, we explored the possibility of creating a "KidsTeam-in-a-Box". The KidsTeam in a Box idea stemmed from our early distributed co-design work with Carnegie Hall. In this design, there would be some type of container of tools and supplies and prompts that could be sent to a remote location with an intergenerational design team. Unlike our previous courier-mediated design process, this one would offer remote design teams coaching and the opportunity to generate new ideas instead of filling in worksheets and reacting to and evaluating existing ideas. Those design artifacts and documentation could be sent back or along to another design team. Our intergenerational design team explored all of the elements that should be in a box. Besides the traditional art supplies, our co-designers thought that experienced adults should be in the box too! We thought this was funny but realized what they were saying was they were looking for some type of guidance or help that new teams might need. In their own way, they were adding the intergenerational aspects and design know-how as tools in the same way they might include scissors or glue.

We found that the children were very fond of the video game Minecraft. Beyond KidsTeam, the emergence of Minecraft marked a seismic shift in how people, especially children, interacted with digital environments. It was a game, but it was also a canvas -- a blank world where players could build, create, and collaborate. For our lab, this seemingly simple game held profound implications for developing a co-design environment to support participants where they were with tools they knew how to use. Inspired by this, we began exploring the potential of Minecraft as a co-design tool.

One of the most useful aspects of Minecraft as a co-design environment was its persistence. Unlike physical co-design sessions that had a finite duration, a Minecraft server could remain active indefinitely. This persistent virtual world allowed participants to jump in and out at their convenience, an essential feature in the realm of distributed co-design designed to be more inclusive.

Through all of this work, my motivation was the pursuit of Design Research and the abstract ideals of the potential for inclusion. However, that changed when one of my child participants in KidsTeam was no longer able to participate because his mother's work schedule changed. We couldn't afford copies/licenses for Minecraft for each participant, so, we started experimenting with a Minecraft-like environment called Minetest in order to see if we could use that to conduct co-design sessions [18]. When this participant was no longer able to join us in person, we tried to use it as a design tool to include him. We were successful on our inclusion of this participant even though he could not come in person. As usual, technological limitations and the rampant use of iPads with children made it difficult to utilize this co-design environment broadly. Unlike the original DisCo,

this could work, albeit slowly, on a tablet even if the experience was lacking for participants.

The Minecraft experiment highlighted the potential of immersive environments for co-design but also highlighted the need for a more accessible and versatile solution that children could participate with using the technology they owned in order to be more inclusive. This realization led to the development of a custom-designed three-dimensional environment that was not bound by the constraints of existing platforms.

Our design objective was clear--we needed to create a collaborative environment that was platform-agnostic and accessible to all, regardless of the devices they used. This custom-designed space would be an evolution beyond Minecraft, incorporating the lessons learned from the Minecraft experiment.

Eventually, we were able to build a completely custom JavaScript and HTML solution that used a Voxol-based three-dimensional environment to support co-design in both synchronous and asynchronous ways. The main difference between this and Minecraft was that this ran entirely in a browser and we chose to create basic, colored blocks instead of mimicking the graphics of natural terrains. This helped it not look like Minecraft and eschewed the expectations that this world was a game and not a design tool.

Due to the technical nature of this solution, our lab began to realize the potential of some newer tools on the web including NodeJS and Web sockets. These technologies run on a Web server and can be woven together to provide a mechanism for creating a persistent world that enabled multiple-users to share data in real-time.

The technologies we explored for the Voxol-based design environment gave my lab the inspiration for revisiting the two-dimensional nature of the original DisCo. However, instead of introducing multiple features for participants to use, we decided to focus on its essence and expand it through modern technologies. If the former tool I created was the equivalent of *disco*, this would be metaphoric equivalent of *electronic dance music*, or EDM, as it was an updated version of the previous.

This new EDM environment introduced a novel concept for our two-dimensional tools: It allowed participants to engage in synchronous design collaboration in an environment, akin to traditional co-design sessions, where they could interact in real-time in an interface that resembled DisCo. However, it also embraced the asynchronous nature of distributed co-design, enabling participants to work on their own time and in their own place enabling greater support for inclusivity.

Minecraft had ignited the spark of collaborative creation, but its limitations spurred us to move beyond its affordances.

This era of my distributed co-design practice was indicative of a move to more stable platforms with better accessibility in terms of device availability and interface paradigms. At this point, we began to see how tool access could privilege certain forms of expression with the reality of participant access coming into full focus and leading us to deliberately structure activities with all participants to maximize inclusion. Even with increased participation, we still saw uneven voices

and influence in design decisions. It became apparent that our inclusion goal of increasing “who could join” needed to be reframed as “who can meaningfully contribute.” The move towards these tools became more based in ethics and less in practicality. More precisely, it illuminated that inclusion and exclusion has less to do with access to technology, but is dependent on the “right” kind of technology being available to participants. Technological affordances of participation are not neutral and are the direct result of how experiences are designed.

7 The COVID-19 Pandemic

The development of the successor to DisCo, EDM, was completed in 2019, just before the world faced the unprecedented challenge of the COVID-19 pandemic. Suddenly, distributed co-design became more relevant than ever. Our EDM environment supported synchronous and asynchronous capabilities in desktop and mobile browsers, and enabled us to continue our co-design research despite the physical constraints imposed by the pandemic [19].

To those not involved in *distributed* co-design up to that point in history, one of the fundamental principles of co-design had always been physical co-presence where individuals come together in a shared physical space to collaborate, ideate, and innovate. However, the pandemic disrupted this paradigm, rendering traditional co-design sessions nearly impossible. The onset of the COVID-19 pandemic brought challenges to every aspect of life, and the realm of design research was no exception. The need for social distancing and restrictions on physical gatherings forced a rapid reevaluation of how collaborative design processes could adapt.

As other researchers and practitioners grappled with the challenges posed by the pandemic, distributed co-design emerged as a compelling alternative [20–23]. These approaches leveraged digital technologies, such as video conferencing, and collaborative platforms to facilitate design collaboration among geographically separated participants. While distributed co-design was not a novel concept, the urgency of the pandemic accelerated its adoption and evolution.

The pandemic once again emphasized a critical aspect of co-design that I had been talking about in project after project: inclusivity. In the past, many individuals—especially those in underserved communities or remote locations—struggled to participate in co-design sessions due to geographical constraints. Distributed co-design bridged this gap, enabling a more diverse range of participants to engage in the design process.

Across the design research landscape, distributed co-design projects began to flourish. Researchers, designers, and educators sought innovative ways to connect and collaborate remotely [24–26] through technology mediated tools and very often synchronously.

The COVID-19 pandemic served as an involuntary catalyst for rethinking the possibilities of distributed co-design. It challenged the notion that co-design had to involve geographically co-located participants and, instead, highlighted the importance of remote collaboration. The pandemic revealed that distributed co-

design could extend beyond geographical distances to encompass individuals who, while geographically local, could not meet in person due to various constraints. This shift broadened the scope of design research and expanded opportunities for participation.

The surge of pandemic-induced distributed co-design literature was significant in its necessity to keep this work happening during the global lockdowns. One of the conceptual problems at this time was the conflation of terms *distributed*, *online*, and *remote*. For example, the excellent work done in [20] distinguishes between Online PD, Offline Distributed PD, Asynchronous DPD, and Hybrid DPD which are useful categories to explain the practice of distributed participatory design and co-design. However, they conflate distributed co-design as both an extension of and instance of online PD which illustrates the entanglement of these terms. Because this work cites DisCo [15] and Layered Elaboration [5], we can see that work based on this practice does not have a clear vocabulary for talking about what kind of co-design was actually happening.

The distinction proposed in Section 2 of this paper between *distributed*, *online*, and *remote* focused on using those terms as dimensions rather than synonyms is not just theoretical. They come from the reflection that those dimensions don't mean the same thing. For example, the Carnegie Hall work was distributed but not online, the DisCo sections were online but sometimes co-located, and pandemic-era work was often online without being distributed in any way that changed who had the power in the room. Any time we derive terms from a single moment in time, no matter how well designed it was, we aren't able to see those distinctions. We need to look across time as the same confusions recur in different technology and institutional contexts. This is not a criticism on pandemic-era projects as they addressed very real constraints. Instead, it's an argument for what longitudinal, practice-led reflection can reveal.

For my practice, this era was an odd time. Large-scale remote collaboration was normalized and many institutions and researchers were jumping in feet first. A tension was forming between scaling and the experience of co-design, but this time, participation ran the risk of becoming superficial. In our own work, we saw that some participants gained a voice but others were relegated into observational roles with the number of people trying to participate at once. This echoes the tension my team had encountered before: not who can join, but who can meaningfully contribute.

8 Inclusive Generative and Evaluative Co-Design

The interplay between temporal structure, technology mediation, and participation structure looks fundamentally different depending on whether a co-design session is generative or evaluative which is a distinction that only became fully visible across the arc of these projects. The journey from ideation to realization encompasses a spectrum of feedback, ranging from the generative to the evaluative. This spectrum swings between creativity and critique, with each phase playing a crucial role in shaping the design process and its outcomes. Each

has its unique strengths and appropriate contexts. Generative co-design thrives when constraints are low, and options are abundant. It is the starting point of a design project, when creativity and exploration are paramount. On the other hand, evaluative co-design comes into play as a project progresses. It becomes valuable when a design has evolved and specific features and requirements have been identified. At this stage, feedback and evaluation take precedence over generative ideation.

At one end of the spectrum lies the generative phase which can be a messy incubator of creativity. This phase thrives in the early stages of a project when ideas are new, and possibilities are abundant. Generative ideation, during this phase, serves as a catalyst for creative thinking, igniting new concepts and inspiring innovative solutions. To be clear, generative co-design is not equivalent to generative AI. While generative AI could be used to elicit ideas from co-designers, it could also be used in later stages of the design process where evaluation is wanted.

Generative feedback is the realm of divergence, where participants are encouraged to think broadly, challenge assumptions, and explore the uncharted territories of imagination. It's a space where feedback becomes a collaborative tool that fuels the ideation process. It offers fresh perspectives, prompts alternative viewpoints, and sparks unexpected connections. In this phase, feedback is less about critiquing and more about exploring the vast landscape of possibilities.

An essential advantage of the generative phase is its inclusivity. In diverse co-design teams, individuals bring their unique perspectives and experiences to the table. Generative feedback welcomes this diversity, allowing for a rich tapestry of ideas to emerge. In this way, generative co-design sessions make the most sense to use synchronicity-supporting technology mediation that promotes a participatory structure. The bouncing of ideas back and forth between co-designers can contribute to divergence in ideas. It empowers participants to contribute their thoughts freely, knowing that every suggestion, no matter how unconventional, has the potential to trigger a breakthrough.

As mentioned, previous in-person co-design teams' sessions were changed to synchronous, distributed co-design sessions through a myriad of technology mediations. However, how does generative co-design work in an asynchronous temporal structure when the reflections reveal that interactions and interplay between designers are the key to good outputs and participant motivation? What happens when a co-designer is a novice and would be best served by real-time interactions to help them elaborate their generative designs?

The future role of generative AI cannot be underestimated in its potential as an aid to generative feedback in distributed co-design. Much like the child-codesigners' ideas to put the KidsTeam adults in a box as a key element of a tool kit for distributed co-design, Generative AI has the power to work alongside participants and help them participate inclusively by augmenting a non-designers ability to make contributions. Some work has been done in looking at AI as a co-designer and co-creator [27–31]. We imagine many more will follow in the next five years. In this way, an asynchronous temporal structure need not exclude

novice designers from generative co-design. A generative AI tool, assisting in place of a synchronous expert co-designer, could provide the real-time scaffolding that novice participants need to contribute meaningfully.

On the opposite end of the spectrum lies the evaluative phase. As a design project progresses, a clearer vision emerges, and specific features and requirements come into focus. This is where evaluative feedback takes center stage. It becomes a critical lens through which design decisions are refined and defined.

The evaluative phase within distributed co-design emphasizes the transition from exploring possibilities to making informed choices. Participants scrutinize design elements, assess functionality, and weigh the practicality of proposed solutions. Feedback in this phase is a tool for critical analysis, helping to identify strengths and weaknesses, potential pitfalls, and areas for improvement.

Evaluative feedback serves as a reality check, aligning design concepts with real-world constraints and user expectations. It provides the necessary guidance to make informed decisions and prioritize design elements effectively. While generative feedback encourages divergence, evaluative feedback promotes convergence, ensuring that the design evolves in a purposeful and inclusive manner especially if participants have a chance to have their voices heard.

This kind of feedback does not need to happen in a synchronous environment. Co-designers could see others' ideas in a tool that encourages ratings and commentary. The Carnegie Hall project did this in a distributed, offline way but it could be done online in a co-located design session. Importantly, not all online technologies would lend themselves to evaluative co-design, such as the Minecraft era work. An environment like Minecraft, with its participatory structures oriented around real-time building and no native annotation or commentary tools, is poorly suited to asynchronous evaluative co-design.

One of the notable advantages of distributed co-design is its potential to harness scalable feedback. In evaluative co-design, the ability to gather input from a larger and more diverse audience can lead to superior and inclusive outcomes. Some work has focused on participatory design at scale [32] while others have looked at social media as a way to include more voices in the design process [33–36].

However, managing and interpreting vast amounts of feedback poses its own set of challenges to distributed co-design researchers. Designers and researchers must grapple with filtering and prioritizing feedback, especially when cultural influences and recognized patterns come into play. The field of design research has begun to explore specialized tools to aid in synthesizing and making sense of the feedback, ensuring that it contributes meaningfully to the design process [37] and supports inclusivity.

9 Conclusion

The three lenses derived from reflection reveal that distributed co-design projects cannot be understood solely through technology. While technology mediation is

an enabling condition, temporal structure and participation structure each shape whether a project achieves meaningful inclusion. More importantly, the lenses are interdependent because a change in one modifies the others. For example, expanding temporal access through asynchronous tools may increase who can join while reducing the quality of participation on behalf of the designers. Reducing friction through online platforms can simultaneously include many more voices while at the same time drowning ideas in noise. No single lens explains success or failure, but it is their interaction that determines whether inclusion is genuine or merely procedural.

The findings could not have emerged without longitudinal, practice-led reflection. While each project built upon the previous one, the connections between them such as the courier model at Carnegie Hall and the promise of generative AI as a design partner, between the belonging problem in DisCo and observational role problem in pandemic-era sessions, only became visible in retrospect. Contemporaneous reflection reveals one slice of time. It is only when looking across the whole arc that the recurring structure beneath the surface variation becomes visible. Much of design research reflects on practice as it happens, which captures immediacy but misses larger patterns. When I first conceived of this paper, it was a way of closing down a line of research but the what the reflection revealed instead was how much of it remains unfinished.

This unfinished journey of distributed co-design isn't just about the destination but the shared experiences, the lessons learned, and the community we build along the way. Distributed co-design is not more inclusive with technological advancement by default. Its inclusivity depends on how design researchers balance mediation, facilitation, and temporal structure in their sessions. The work ahead is not a technological solution, but in sustained, reflective engagement with how participation in co-design is structured.

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