



Designerly Tele-Experiences: A New Approach to Remote Yet Still Situated Co-Design

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The COVID-19 pandemic disrupted processes interaction designers took for granted, challenging some of our most commonplace design practices. Participatory and situated approaches have been impacted the most: where we engaged stakeholders in-person and in-context, during this time we must co-design remotely and in virtual environments. Such a dramatic change calls for new co-design methods. In this article, we present a novel remote strategy for involving stakeholders to co-design interactive technology: *Designerly Tele-Experiences* (DTE). Our methodological proposal enables participants to experience early design concepts in-the-wild as a provocation to contribute new ideas that resonate with their experiential preferences. Here we describe the rationale for DTE, unpack how it builds on and extends existing methods, and provide actionable guidelines from our experience of using it in our work. Our contribution will empower interaction designers to embrace participatory and situated approaches even when engaging stakeholders in person is not possible or desirable.

CCS Concepts: • **Human-centered computing** → **Participatory design**;

Additional Key Words and Phrases: Design methods, co-design, participatory design, situated play design, playful design, playful technology

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1 INTRODUCTION

Interaction designers have paid close attention to the idiosyncrasies of users and their contexts for a while; yet, there are calls for new methods that better support situated and participatory design practices (e.g., [3, 4, 8, 11, 12, 67]). Here we argue recent events have only exacerbated the need for new situated design methods: in times of a global pandemic, when social distancing

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measures shape the way we work, live, play, and interact with technology, it can be challenging for designers to engage stakeholders and empathize with contexts and activities they cannot have in-person access to.

In an ongoing playful technology design project, we experienced the challenges of this unprecedented scenario first-hand. When the COVID-19 pandemic broke out, we were just initiating a multi-stakeholder co-design process—one where it was important for us to co-design with stakeholders in-the-wild, in scenarios and activities relevant to our design goal. Due to the social distancing scenario, we had to quickly pivot from in-person to remote engagement, which compromised our ability to embrace a participatory and situated approach. We reviewed existing co-design methods to see how they might help us to do that remotely and, though we found several of them inspiring (as described in Section 2.2), none directly applied without needing refinement.

In this article, we introduce the *Designerly Tele-Experiences* (DTE) method that emerged from our exploratory process of trying to respond to the sudden challenges we faced when trying to co-design during the pandemic. DTE takes the form of multi-stakeholder co-design sessions where participants experience early design ideas as a provocation that helps them to familiarize with the targeted design space and contribute novel design ideas. Through DTE, remote designers can create and enact lo-fi technology provocations and make them available for co-located participants to experience and creatively disrupt. By experiencing those half-baked prototypes in-the-wild, stakeholders get an embodied understanding of important design qualities in a design space, which enables them to build on their own lived experience to contribute new design ideas.

DTE stems from and was refined through 13 design engagements in which we specifically studied adaptations to elements of existing situated co-design methods to engage researchers and designer participants in physical and digital design activities and dialogues. We present it as an adaptable starting point for conducting remote-yet-still-situated co-design: an early strategy and set of actionable insights that can guide other designers who want to embrace situated and participatory approaches in their own work, even when in-person engagement is not possible or desirable—which we believe might be useful during but also beyond the pandemic. Our contribution is thus methodological and consists of three items: (1) a comprehensive overview of existing co-design techniques and how they might support the kinds of participatory and situated practices that were necessary in our design project while working remotely (Section 2); (2) an in-depth and reflexive account of the design process that motivated us to develop a novel co-design approach building on the strengths of existing methods and working around their limitations (Section 4); and (3) the formalization of our DTE methodological proposal, as well as a discussion of its potential and limitations in relation to other methods (Section 5). We hope our contribution provides direct, actionable inspiration to designers doing similar work to ours, and that it contributes to an ongoing (and necessary) discussion about how to do remote-yet-still-situated co-design.

2 BACKGROUND AND RELATED WORK

2.1 Situated and Participatory Practices in Interaction Design: A Growing Need for New Methods

In interaction design, **User-Centered Design (UCD)** [1], **Co-Design** [63] and **Participatory Design (PD)** [57] methods are commonly used to embrace the idiosyncrasies of users and their contexts. Yet, recent calls suggest the need for new methods that support increasingly participatory and situated practices in this space (e.g., [3, 4, 8, 11, 12, 67]). Those calls highlight a number of necessary methodological advances, such as: finding more flexible ways to involve stakeholders at different levels according to the needs of each design project [8]; empowering them to appropriate, maintain, and even modify design interventions once a design is finalized (namely *design after design* [11]); adapting participatory methods to the idiosyncrasies of emerging design spaces

that did not exist before [12] or to design goals other than the ones traditionally targeted by PD, e.g., in play-focused projects [3, 4].

Here we argue that, while all these methodological advances are needed, the COVID-19 pandemic brought about a challenge that might be more urgent right now: designers lack mechanisms for doing situated co-design without engaging stakeholders in person. For example, it is currently not possible for designers to immerse themselves in context and engage people in person to empathize with their routines; it is challenging to conduct co-design workshops where co-located participants co-experience and co-prototype; and it is increasingly hard to invite stakeholders to test tangible prototypes, whether to iterate on early design ideas or to evaluate finalized designs. These and other commonplace design practices, which we consider key to interaction design, are rendered impractical by social distancing measures. We need new mechanisms that enable us to engage co-design participants remotely. In this article we address this gap.

2.2 Transitioning to Remote Co-Design: Strengths and Limitations of Existing Methods

Importantly, this article does not address remote co-design as a whole, nor does it seek to substitute for or diminish the value of existing methods. Rather, it presents a technique we created to respond to the particular needs of a specific design project where we experienced a lack of tools to conduct remote co-design. Here we focus on our own experiences in that project (described in detail in Section 4), which aimed at producing design exemplars that explored how technology could help people to be more emotionally present and socially connected around food. Because we think that the challenges we experienced might be relevant to other designers, we decided to unpack, reflect on, and share our process in the hopes that it will help others doing similar design work.

In particular, our methodological proposal focuses on a specific part of interaction design: engaging users as co-designers and empowering them to co-experience and further develop early design ideas. In our project, we struggled with a lack of strategies that helped us to do that remotely—especially because our goal was to empower stakeholders to not only respond to advanced design ideas but to actually participate in the development of early concepts as co-design partners. When the COVID-19 pandemic broke out and our plans for in-person co-design were disrupted, we reviewed existing participatory and situated methods to see how they might help us to do remote-yet-still-situated co-design. We found several inspiring ideas that could potentially address some of our needs. Yet, we could not find methods that addressed all our requirements at once, without needing to be reworked. Here we outline those requirements and how aspects of existing methods inspired us to develop a new strategy for addressing them.

First, we wanted to **engage stakeholders in-the-wild** [59] to keep the idiosyncrasies of their context and routines at the forefront of our conversations. Several methods allow us to work in-the-wild, e.g., co-design workshops that take place in naturalistic settings, like *labs in the wild* [74]. Though we are inspired by their designerly use of the spaces and activities targeted by the design project, these interventions require participants and designers to be co-located, which renders them impractical in social distancing times. Other methods overcome that challenge by enabling in-the-wild explorations where designers do not engage stakeholders in person. For example, *diary studies* [66] and *design probes* [13] prompt participants to collect information about their daily actions or routines on their own, and send it to the design team. However, these methods are often used for other purposes than co-developing design concepts, e.g., *cultural probes* [36] are used to collect contextual data that helps designers empathize with users and their context (i.e., to *inspire* design), or *technology probes* [45] are often used to test advanced prototypes in order to assess their potential impact (i.e., to *evaluate* design). Moreover, these methods do not facilitate direct and scaffolded interaction between designers and stakeholders. This was at odds with our

aim of anchoring the research to the immediate social and environmental context and engaging stakeholders directly to collectively imagine, rethink, and iterate on design concepts.

We also wanted to **facilitate iterative co-creation between designers and stakeholders**, empowering the latter to not only provide data or test advanced concepts, but also (and especially) to contribute to making important design choices. Myriad techniques can be useful to stimulate collective ideation. Embodied design methods, e.g., *object theatre* [62], *embodied sketching* [52], or *informance design* [19] use people's bodies as a prototyping material to enable them to co-imagine novel tech interventions and explore how they may pan out in practice. While embodied methods can be used individually, they have a lot of potential when they are used to ideate in group and in a shared space [44, 52]. Multi-stakeholder co-design methods provide tools for stimulating those kinds of group ideation processes; approaches such as *design collaboratoriums* [20], *dialogue-labs* [49], or *Design:Labs* [10] leverage the affordances of shared spaces and materials to enable fruitful co-creative engagements where diverse actors collaborate towards a shared design output. However, both embodied and multi-stakeholder methods tend to rely on in-person interaction, which challenges their implementation in remote scenarios. Gaver et al. have experimented with a different, DIY-inspired approach where people independently build their own prototypes, without any other intervention by the lead designer than a guide for building the prototype, e.g., in *Yo-Yo Machines* [46] or the *My Naturewatch Camera* [40]. The methodological proposal we present in this article builds on this rich tradition of embodied and multi-stakeholder methods and proposes a way of making their affordances accessible in remote scenarios. We also build on other participatory methods focused on stimulating the generation of and iteration on design ideas, such as *provotypes* [14]: provocative prototypes that, when experienced by stakeholders, will likely trigger a response that can be leveraged to explore both desirable and undesirable design choices in a particular design space. Interestingly, *provotypes* are remarkably versatile: they can be used in-the-lab or in-the-wild, with or without the presence of the designer. That is an important quality that inspired our work.

In our project, it was also important for us to **enable stakeholders to experience “for real” early and future-oriented design ideas**. We wanted them to experience our emerging ideas before a polished prototype had been developed. A plethora of existing methods can be used for that purpose. To create *half-baked-yet-still-experienceable* prototypes that were malleable enough to enable quick, in-situ, and spontaneous modifications, we looked at a range of embodied methods. For example, we were inspired by how the aforementioned *object theatre* [62] uses enactment to support rapid mocking-up, experiencing, and modification of design ideas. We quickly realized that the co-located nature of most of those methods challenges their remote implementation. *Wizard-of-oz* techniques [26] can also be useful for co-experiencing believable versions of in-progress tech concepts: they allow designers to “fake” functional prototypes and create an illusion that they work. Though wizard-of-oz is often used in rather advanced phases of design projects (e.g., to explore the impact of an existing prototype or to polish it), it has also been used in earlier stages of ideation, for example, as a sketching technique [21] or to “present users with rough sketches of interface ideas, even when it's unclear what the underlying technology should be” [29]. Here we build on prior works that have used wizard-of-oz techniques in earlier stages of interaction design, as well as on those that have explored how to deploy them remotely [53, 69].

It was also important for us to **enable stakeholders to experience and contribute to shaping a future-oriented design space**. The design ideas we were working on (e.g., a technology-augmented tablecloth, or a smart cutlery set, see Section 4 for detailed examples) were out of the scope of what most stakeholders were accustomed to interacting within their routines. *Design fictions* [68] can be a useful technique to expose co-design participants to futuristic tech: they have the potential of immersing people in fictional settings in ways they can project what it might mean for them to experience an otherwise unfamiliar scenario. Recent design fiction and speculative design

works, e.g., [18]’s *Future IKEA Catalogue* or [77]’s speed dating-inspired *menu of possible futures*, have employed narrative and visual designs to trigger people’s imagination and empower them to explore and think about how they might relate to a novel technology, or to critically reflect on how it might impact their lives. Other works have taken a more embodied and experiential approach. For example, [55] used VR to support *immersive design fiction* experiences where people could get an embodied sense of the implications of a futuristic tech; similarly, [24] leveraged the interactive and explorative affordances of digital games to enable co-design participants to explore speculative futures; or [32]’s *speculative enactments* and [22]’s *experiential futures* used enactment and performativity to allow participants of a co-design process to simulate and experience futuristic scenarios in ways that the emergent speculations felt meaningful and consequential to them. We are inspired by how those works managed to enable people to immerse themselves in futuristic and/or speculative scenarios, getting a realistic and even intimate experience of their implications that allowed them to contribute insightful design ideas. Our work builds on those methods by exploring how those kinds of speculative processes might be used in remote scenarios, to support collective, early decision-making when ideas are still at an incipient stage. We are also inspired by *Breaching experiments* [25], which can be used to engage stakeholders in-the-wild to both observe the rules regulating their contexts and explore how confronting those existing practices with a novel technology might impact them. From breaching experiments, we can learn how to investigate the social circumstances relevant to technologies that do not yet have a place in people’s lives and for which, consequently, people have not yet developed commonplace practices.

Our project also required **focusing our attention on the moment-to-moment experience afforded by the technology**. Our aim was to explore the socio-emotional potential of mealtime technology, rather than its utilitarian function. As such, we wanted to encourage stakeholders to focus on their playful and experiential preferences rather than on pragmatic requests—to carefully craft the experiential texture of tech ideas in ways that resonated strongly with people’s playful desires. Existing methods can support experience-focused co-design, e.g., the experiential design fiction methods described above, or *situated play design workshops* [6], which center participants’ efforts on exploring the inherent playful potential of real-life activities as a starting point for ideating design interventions that realize that potential. Though inspiring, these techniques tend to rely on bringing people physically together to co-imagine, -build, -experience, and -iterate on ideas. As such, we had to imagine how to reappropriate them for a remote scenario.

Finally, in our project it was critical to engage stakeholders remotely yet in ways that allowed us to experience and care for the embodied, tangible, and multi-sensory dimensions of the targeted design space. A plethora of research in HCI has explored how to engage remote participants in co-design, especially in the space of Child-Computer Interaction. For example, some works have explored mechanisms for asynchronous communication between designers and participants, e.g., through step-by-step guides for developing lo-fi prototypes [64] or by creating and dynamizing asynchronous remote communities on social media [50, 51]. Other works have employed virtual tools as platforms for synchronous collaboration between researchers and stakeholders, e.g., videogames [70], social media tools [58], or other forms of custom-made software [43, 71, 72]. However exciting, the virtual nature of those approaches was at odds with our embodied, multi-sensory focus. The COVID-19 pandemic has only exacerbated the need for more methods that support increasingly diverse forms of remote participation [7]; some authors have begun to propose strategies to respond to this need, e.g., *distributed participatory design* [23] or [48]’s *dimensions for online co-design*. Our contribution builds on and extends those works by providing a concrete, actionable strategy for conducting remote co-design in synchronous, embodied, and experience-focused ways, and with other stakeholders than children.

In summary, though our review of existing methods inspired us in many ways, it still did not respond fully to the methodological challenges we were facing: How can we engage stakeholders in-the-wild and synchronously? How can we enable them to co-experience early, half-baked, and future-oriented design ideas without a polished prototype or an existing technology that can be used as a reference? How can we focus our efforts on co-designing and iterating (rather than inspiring or evaluating) design ideas? How can we center our conversations on the experience afforded by the technology, rather than its technical requirements, utilitarian function, or larger impact on society? How can we keep the embodied, tangible, and multi-sensory qualities of the targeted activity or situation at the forefront of our co-design engagements? And, most importantly, how can we do all of that, in combination and remotely, when we cannot meet our stakeholders in person? To respond to those questions in ways that helped us to do our design work, we created a new strategy of our own, inspired by a combination of existing methods. In Section 4, we describe that process through a case study where we created, refined, and examined our emergent methods along the way.

3 METHOD

The DTE method proposal arose from the needs of a particular design project where we had to pivot from in-person to remote co-design. That challenge brought about an exciting opportunity for methodological innovation. To leverage that opportunity, we approached our design project through the lens of *action-reflection* [65]: we experimented with our design practice, reflected on it, and formalized those reflections into actionable methodological advice that may inspire other designers. We documented our ongoing reflections in autoethnographic narratives; where applicable, we also documented our participants' reactions to our process through semi-structured interviews. Throughout, we used a *reflexive* approach [16, 17] to *inductive thematic analysis* [42] to examine our practice: we engaged in an ongoing, generative process of meaning making where we reflexively distilled the key learnings that could be made from our design process and articulated them as advice that could be useful for other designers.

That meaning-making occurred progressively. To reflect the emergent, situated nature of our explorations, in Section 4 we describe in detail the case study that motivated them. That close description of our process sets the foundations of the methodological proposal we formalize in Section 5. Importantly, the case study is not the contribution of this article; rather, it presents the design process that served to develop our contribution, a novel remote co-design method. Our in-depth account of our process and thinking is meant to help other designers to contextualize, learn from, and make actionable our method in their own work: we present the unforeseen constraints we experienced, describe how we developed, and experimented with new ways of addressing them, and report how we reflected on and made sense of our exploratory process along the way. A synthesis and abstraction of the processes described in this section can be found in Section 5, where we formalize the DTE methodological proposals. We hope our detailed account of our hands-on experience and resulting reflections will inspire other designers to do similar work in ways that they find helpful.

4 THE CASE STUDY THAT MOTIVATED DESIGNERLY TELE-EXPERIENCES: EXPLORING PLAYFUL FOOD-TECH FUTURES

In this section, we describe the design project that motivated the development of the DTE method. First, we unpack our design process in detail, to offer a rich account of the several methodological explorations we undertook throughout the project (Section 4.1). Then, we present our reflections about how different aspects of our process worked, as well as how other designers might want to approach them in their practice (Section 4.2). Overall, the aim of this section is not to formalize

the DTE method (we do it in Section 5) or to evaluate whether and how it might be helpful other projects; rather, we provide an in-depth account of how we developed and used it in our specific design project, so other designers can position it in context and imagine how to appropriate it in their own work.

4.1 An In-Dept Account of Our Process: Pivoting to Remote Stakeholder Involvement

When COVID-19 broke out, we were immersed in a playful mealtime technology design project. Our goal was to use a participatory [57] research-through-design [39, 76, 78] methodology to explore how to support people to be more emotionally present and socially connected around food. In the weeks before the pandemic, we focused on contextual research: through a survey and cultural probes, we investigated how different people experienced the intersections between mealtime, technology use, and social interaction. In particular, we explored: (1) types of social experiences that might be socio-emotionally desirable at mealtime; (2) the impact (both positive and negative) technology might have in mealtime scenarios; and (3) people's ideas on how future tech might contribute to increasingly playful food experiences. We produced two outcomes to be used in our subsequent efforts: (1) a list of design recommendations for increasingly connected mealtime tech, and (2) a set of *play potentials* [3] of shared mealtime, i.e., people's existing playful mealtime practices that contributed to the quality of social food experiences. From there, our goal was to conduct multi-stakeholder co-design workshops to ideate novel technology concepts based on those design recommendations and play potentials.

Initially, we envisioned the workshops to be in-person. We wanted to build on embodied and situated design methods (e.g., *embodied sketching* [52], *object theatre* [62], *situated play design workshops* [6]...) to enable stakeholders to come together and iteratively prototype design ideas. We also wanted participants to not only envision and build, but also co-experience the prototypes in a shared space, so that their ideas would come not only from rational thinking but from their own direct lived experience as well. However, when the pandemic broke out, hosting in-person workshops was no longer a possibility. Below we describe the strategy we took in response.

Though social distancing measures made it impractical, we wanted to co-design with stakeholders to ensure that our designs resonated with their playful desires. We considered the idea of conducting workshops on online platforms (e.g., *Miro* [56]) but discarded that for several reasons: First, participants would have to become familiar with online tools that might not be straightforward to use. Second, it might make the task of co-imagining tech concepts in embodied ways too confusing for them: most participants would likely not be trained designers, and thus might have little experience with embodied methods to begin with. While that would also be true in in-person workshops, being co-located would allow us to demonstrate the methods in detail—a luxury we would not have in a virtual setup. Third, a virtual workshop would hinder our ability to use tangible materials, the physical space, and even our bodies as co-design material, detaching us from the naturalistic context we were designing for. And fourth, it might prevent us from co-experiencing the prototypes that emerged throughout the session, making it hard to be on the same page at an experiential level, thereby privileging rational thinking over ideation based on lived experience. Here we describe the alternative strategy we took to respond to those issues, comprised of three steps: early ideation, recruitment, and co-design.

4.1.1 Early Ideation. In our earlier cultural probe exchanges, we noticed that participants felt more comfortable with generating ideas when presented with provocations they could experience. For example, it was easy for them to expand food-based games we proposed to them, or to even create new ones if they did not like our suggestions. In contrast, they struggled with ideating new activities from scratch, when only provided with design recommendations. Their creative capacity

was better supported by experiencing something playful than by learning design principles in a rational way. Consequently, we thought our process would benefit from introducing our prior research outcomes (i.e., play potentials and design recommendations) in ways participants could not only learn, but actually experience them. Thus, we decided to create an initial pool of design ideas to crystalize the key findings from our research. Our goal at this stage was not to produce well-defined ideas to get feedback from participants. Ideas were not meant to be advanced prototypes we could test and validate. Rather, inspired by *provotypes* [14], we were after early, half-baked, and even poorly executed design concepts—ones that could be used as provocations, as somewhat ambiguous starting points that triggered participants to creatively contribute to a design space they would likely be unfamiliar with. Therefore, we treated our early ideas not as actual design propositions but as provocations for our research participants to contribute ideas of their own.

Four designers were involved in idea generation. First, working individually, we produced a collection of 23 ideas. We then clustered them by affinity, to find interesting design directions, and brainstormed to narrow down to a final set of 11 ideas. Though we did not include research participants in the ideation process, the ideas we produced are sensible to multi-stakeholder mealtime practices: rather than building on our own expertise and personal preferences only, they reflect the findings from our contextual research. Throughout that process, we kept a record of how the design ideas related to the play potentials and design recommendations from our research, to ensure that the resulting collection represented the breadth of our findings and resulting design directions.¹

4.1.2 Reaching Out to Stakeholders. Inspired by *design fictions* [68]—in particular by [18]’s *Future IKEA Catalogue* and [77]’s *menu of possible futures*—as well as by *design workbooks* [38], we created a catalog to communicate our early ideas. Our aim was not to simply get stakeholders to understand what the ideas were so they could provide feedback; we wanted to get them excited, to help them to relate to our technology speculations and imagine how it might be to try them out. We also wanted to entice people to think about what similar products they would like to see in the future. Our *Speculative Play-Food Technology* catalog² was thus meant to be both a tool for recruiting participants and a provocation to trigger their (creative) response. We wanted to see which ideas (and hence, which underlying design qualities) brought about more excitement and hear people’s early, visceral thoughts on how such future-oriented concepts did or did not resonate with their playful cravings. Figure 1 shows examples of ideas in the catalog.

Once the catalog was ready, we set out to recruit participants for a series of co-design sessions (see Section 3.2.3) where a group of co-located participants (e.g., a family, a set of housemates, a group of friends...) could co-experience our early design concepts as a starting point for imagining how future tech could afford mealtime experiences that were socio-emotionally rich. Inspired by works using social media as a design tool [5], we recruited participants by distributing the catalog on Facebook, LinkedIn, and Instagram (Figure 2). We also sent e-mails to participants from our earlier contextual research. In all cases, we presented the catalog as a collection of ideas for the future of mealtime technology, showing 2–3 examples in each post and inviting people to see the whole catalog and choose some ideas to playtest if they were interested. Those who reached out—by commenting on our posts, responding to Instagram stories, or answering our e-mail—were sent the full catalog. We scheduled a follow-up video call with them, to (1) share information about the project, (2) describe the co-design activity in detail, (3) ask which ideas they liked most and least (and why), and (4) schedule the co-design sessions. We did not offer any kind of compensation

¹A table linking early ideas, shortlisted concepts, design recommendations, and the play potentials can be found here: <https://bit.ly/3vJeNmb>.

²The full catalog can be accessed here: <https://bit.ly/3gTZ5QK>.



Fig. 1. Four ideas included in our catalog: *FoodLand*, a virtual environment made of food creatures representing what the users eat (top-left); *Screen-ED*, a system that projects funny images on a diner’s face when they use their phone during a meal (top-right); *PlaceMap*, a smart tablecloth that prompts diners with playful food rituals and traditions from all over the world (center); and the *Anxious Plates*, a set of plates that shake and move around when their owner does not engage in the mealtime conversation (bottom).



Fig. 2. Sequence of Instagram story posts we used to recruit participants for our co-design sessions.

or incentive for participating in the study, other than sharing more details about our work and allowing participants to play-test some of our early prototypes. We asked participants to gather a group of their acquaintances with whom they felt safe (pandemic-wise) to share a co-located co-design session—thereby acting as participantambassadors, i.e., participants who were in charge of recruiting others they wanted to co-design with. We offered our support to make that participantambassador role more actionable: First, we had a conversation to help them to internalize the key aspects of the study, so they could communicate them effectively to their recruits. Second, we provided a digital flyer (Figure 3) presenting the design idea they had chosen to experience and providing instructions for the co-design session; we encouraged participantambassadors to share it with recruits so they could read more about the study. Finally, where needed, we guided participantambassadors through all the technical processes involved in the co-design sessions, e.g., making sure that they knew how to log into a Zoom call, or helping them to set up their cameras and sound system.

4.1.3 Co-Designing Technology Futures through a Play-Food Experience. We conducted 13 co-design sessions, involving 37 participants in total. The number of participants per session varied, ranging from 2 to 5. All participants signed a consent form prior to their participation; our process was approved by the IRB board at the University of California Santa Cruz (protocol #HS3631). In Section 3.3, we use the conventions S and P to refer to sessions and participants, e.g., participant 3 in session 7 is “S7P3”. Participants were originally from or currently resided in 8 different countries and 4 continents. They had different relationships, including: groups of friends, couples living together, families with older children, or housemates. In the co-design sessions, participants were co-located; designers (between one and three, depending on the prototype), attended via video call. Inspired by existing in-the-wild methods (e.g., [74]) and by situated food design methods (e.g., [73]), we decided to conduct our sessions during participants’ mealtime. We wanted them to collectively experience, ideate, and rethink the future of mealtime technology in context, as they ate and shared their food, so the conversations would never lose touch with their ordinary food experiences.

Sessions were ~2 hours long. First, we connected with participants through video call and had an introductory chat (~15 minutes). We described the project, ensured they understood the procedures, and answered their questions. That was an important step—in most cases, we had only interacted with the participantambassador until then. In that phase, we also invited participants to share their early ideas about the catalog, so we could begin to gauge their reactions. We wanted to become familiar with participants’ own understanding of the ideas they chose to experience,

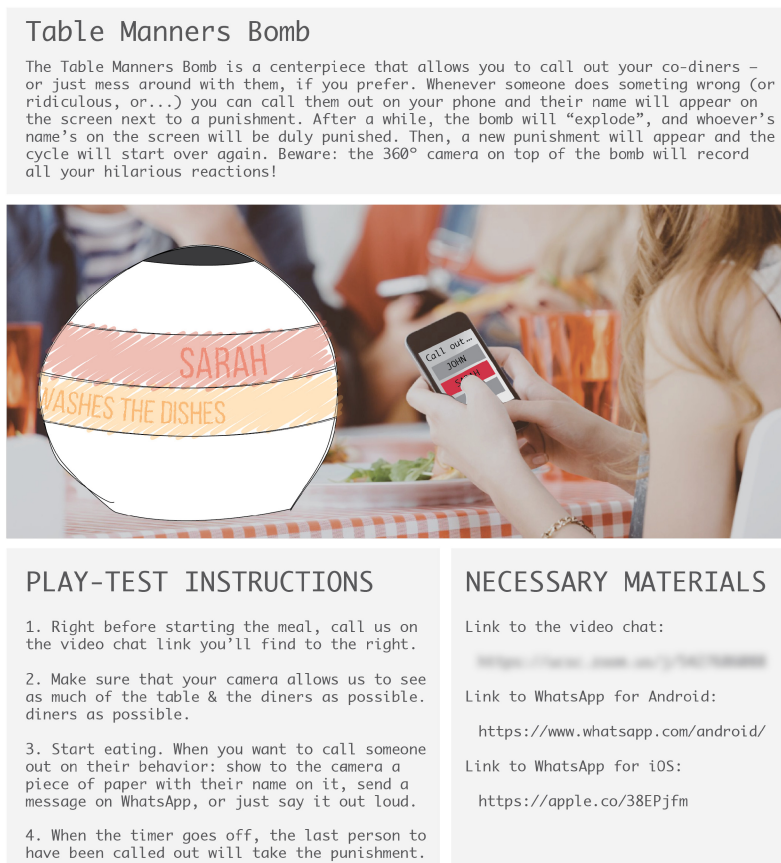


Fig. 3. Example of a flyer we used to inform participants about the procedures for play-testing the *Table Manners Bomb*, including: a short description of the design idea and an accompanying mock-up collage (top), instructions for the play-test activity (bottom-left), and links to access all the necessary technical resources (bottom-right).

to use that information to enact the prototype (as described below). After the introductory chat, we moved on to the meal (~1 hour). There, participants chose a technology from our catalog and experienced it as a half-baked prototype while eating; that was meant to provoke them and stimulate their creative thinking.

Because we allowed participants to choose the prototypes they wanted to experience, we ended up playtesting 6 ideas only: *PlaceMap* (6 times), *Table Manners Bomb* (2), *Talky-talky Cups* (2), *Sassy Cutlery* (2), *Screen-ED* (1), and *YouPhone* (1). During the meal, we did not intervene as facilitators. Instead, inspired by *wizard-of-oz* [21, 26, 29, 53, 69], we disappeared behind the scenes to *enact* the prototype: we turned off our microphones and camera and used screen-sharing to turn participants’ computer into a physical representation of the prototype. During the meal, the food people ate, where they ate it, the pace and duration of the meal, and so on. was up to them. We simply operated the prototype and took notes without interfering. That allowed the meal and social interactions to unfold naturally in a way that might not have been possible if we were physically present.

To develop the prototypes, we intuitively leveraged the affordances of existing technological platforms we thought could allow us to interface with remote participants (e.g., videoconferencing

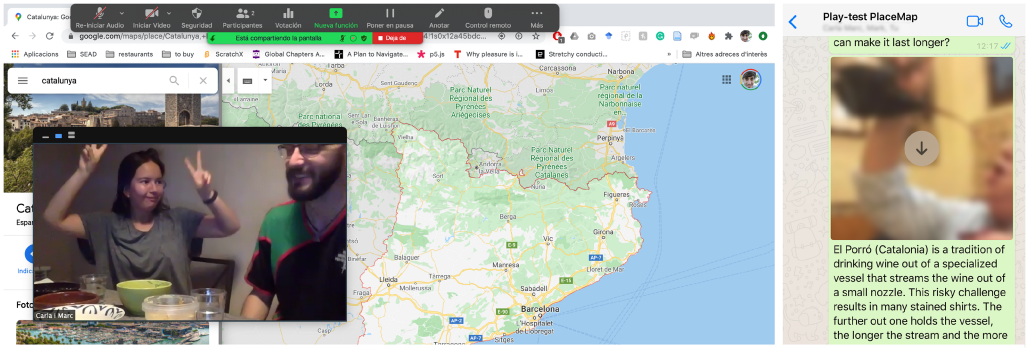


Fig. 4. *PlaceMap* in action, behind the scenes. Left: Screenshot of the view from the designer’s perspective, including the Google Maps interface (which was also visible on the participants’ end) and a small window displaying the feed from the participants’ camera. Right: Screenshot of WhatsApp messages that include photos taken by participants of their peers using their phones. Note: We share participants’ identifiable photos, without blurring their faces, because facial expressions are relevant to understanding the kinds of playful co-design engagements we did in our project. Most participants gave consent for us to share their identifiable photos on academic publications; the faces of those who did not consent have been anonymized.

tools or social networks). Rather than modifying the design concepts to adapt to the technical constraints of those tools, we did our best to leverage their (often limited) affordances to represent the core aspects of our designs. For example, to prototype *PlaceMap*—a smart tablecloth displaying a world map that highlights parts of the map and sends playful food traditions from those locations to participants’ phones (see Figure 1 left)—we did not build an actual technological tablecloth. Instead, we shared our computer screen displaying Google Maps, to indicate transitions between locations, and used WhatsApp to send prompts with playful food traditions to participants’ phones (Figure 4). Another example is *Screen-ED*, a concept where phones project silly messages on their owner’s face when they use their phone during a meal, effectively turning them into a screen for the rest of the diners. To prototype that idea, we asked people to police each other’s behavior during the meal and send us pictures (via WhatsApp) when someone used their phone; then, we (i.e., the prototype) added those pictures to an Adobe Illustrator canvas, which was visible to participants through screen share, and edited them to make fun of people they featured (Figure 5).

Our approach was different from traditional *wizard-of-oz* experiments, which generally aim at creating the illusion that prototypes “are real”. We were inspired by open-ended approaches to wizard-of-oz that employ prototypes that are visibly half-baked (e.g., [27]): our participants were well aware that both the ideas and the prototypes were incomplete, and that we were behind the scenes operating them. Our choice was deliberate: (1) we thought that experiencing clearly unpolished prototypes might encourage participants to creatively disrupt them with new and even radical ideas; and (2) we believed it would enable us to adapt the prototypes on-the-fly, based on participants’ early thoughts about our ideas (which they shared in the introductory chat) or and their ongoing interactions throughout the meal. To leverage the malleability of our prototypes to the benefit of emergent co-creation, we were inspired by improvisational methods e.g., *object theatre* [62], where using oneself as a prototype allows rapid iteration of ideas as they are co-experienced in-situ.

Once participants decided the meal was over, we moved on to the third phase of the session: a conversation (~30 minutes) focused on unpacking their experience of the prototype and building on that provocation to co-imagine playful mealtime tech futures. In this phase, we stopped enacting the prototype; we turned on our camera and microphone and returned to our facilitator

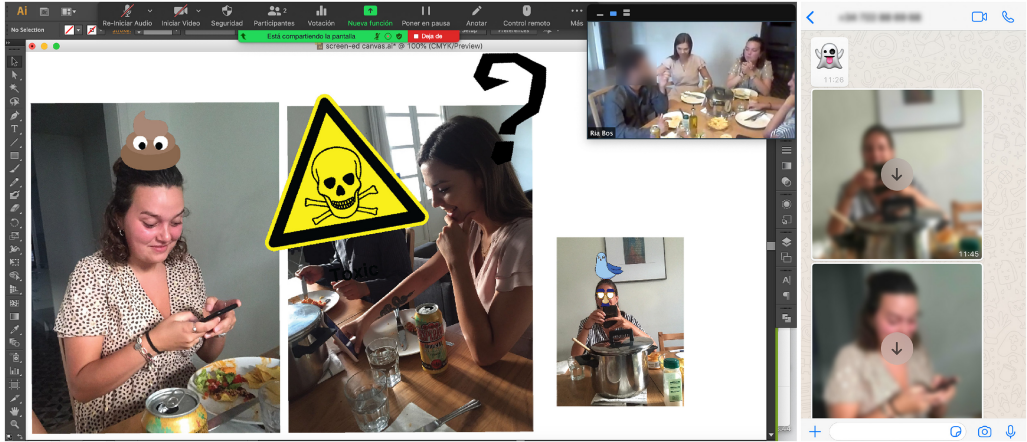


Fig. 5. *Screen-ED*, behind the scenes. Left: Screenshot of the view from the designer’s perspective, including an Adobe Illustrator canvas (also visible on the participants’ end) featuring diners’ photos edited in silly ways, and a window displaying the feed from participants’ camera. Right: Screenshot of the WhatsApp messages sent by a participant with photos of their peers using their phones.

role. Importantly, our aim was not to assess the impact of our prototypes; rather, we wanted to build on our participants’ fresh experience of the prototype to stimulate a creative response. We thus avoided discussing the prototypes through the lens of evaluation. Inspired by *provotypes* [14], we used them as provocative starting points to help participants think outside-of-the-box about the targeted design space. Our goal was to further challenge, advance, and rethink our early design concepts—ideally, generating completely new design ideas as well.

To initiate the conversations, we began by inviting participants to share their thoughts about the mealtime they had just experienced. Then, we encouraged them to build on, modify, and even rethink the prototype—or to discard it and come up with new ideas altogether, if they wanted. Once participants ran out of ideas, we wrapped up with a short debrief conversation about the methodology of our co-design session, focusing on understanding: (1) to what extent they experienced the technology idea “as real”, despite the fact that it was intentionally prototyped in low fidelity; (2) whether our presence behind the scenes influenced them, and how; (3) how our approach helped (or did not help) them to become familiar with a design space they were previously unfamiliar with, and thereby contribute new ideas to advance it. Below, we build on participants’ responses, as well as on our own observations, to reflect on how our strategy worked in practice, and to offer advice to others interested in using it to facilitate remote co-design.

4.2 Learnings from a Reflexive Analysis of Our Co-Design Process

Here we share the learnings from implementing our novel co-design strategy in practice. We discuss what worked and what did not and highlight reflections that came up during the process. Using a post-positivist approach with reflexive thematic analysis [16, 17], designers involved in the case study documented and reflected on their thoughts about the design process, engaging in an ongoing, generative process of meaning-making. That meaning-making occurred progressively, through a combination of individual self-reflection performed by each researcher and a series of debriefing sessions where we collectively discussed our reflections and articulated them into insights we thought may be useful for other designers. In our reflexive analysis, we also factored in our participants’ comments at the end of the co-design sessions, to contrast, challenge, and extend

our personal impressions. Here we present the resulting reflections. We hope our learnings will inspire others to do *remote-yet-still-situated* co-design work. We acknowledge that some of our findings resonate with aspects of design practice that have already been brought up in prior design methods research. Rather than claiming all our reflections as novel contributions to the field of design research, our aim is to show how some of those important considerations are relevant to the processes behind our proposed DTE method. We thus present the following reflections as insights that will hopefully guide and inspire designers interested in implementing DTE. These reflections synthesize our impressions of using our new design method in a concrete case study; future work should unpack in more depth how the strategies we employed might work in other design projects.

4.2.1 How to Approach Early Ideation: The Potential of Using a Catalog of Speculative Ideas.

The catalog got people excited and helped them to relate to the targeted design space. Sharing on social media got people’s attention and made them curious to see the full catalog. Once they got it, browsing the illustrated ideas helped people to understand our early ideas and imagine how these technologies might play out in their mealtime. The catalog made people familiar with our design space and goals; it exposed them to the design directions we had in mind. People seemed to easily relate to the ideas and imagine what it would be like to use of them, and as a result, they often responded with insightful comments—especially in our follow-up conversations over private messages and in the informational video calls. That led to a very interesting first round of feedback where we began to understand which concepts (and underlying design qualities) resonated more, and why. In that sense, it was key that our catalog featured ideas that represented different design directions: people’s spontaneous responses provided us with both quantitative and qualitative feedback about the design qualities they embodied. For example, we learned that *PlaceMap* was the most popular idea, with 23 participants interested in trying it out, while S10P2 said she loved it because she found it exciting “to talk about exotic recipes [and] exotic ways of eating food”. People’s responses to the catalog also allowed us to learn about how they thought they might use the designs, e.g., S6P1 “might only use [*Screen-ED*] in special occasions”. People commented on things they did not like, e.g., referring to the *Anxious Plates*—a set of plates that shake and move if people do not engage in the group conversation, making it impractical to eat from them—S8P3 argued that “it’s dangerous that machines have to tell us how to behave around the table [...], I’m not sure it’s interesting to have ‘social police plates’”. Overall, allowing people to choose from a diverse pool of concepts brought about positive consequences: it allowed us to test which design directions resonated more and provided participants with a feeling of agency that got them excited about the concepts they chose to playtest and co-design. As a result, participants ended up being better positioned and motivated to reflect on the experience of using those technology concepts and to co-create by building on them.

Presenting participants with half-baked ideas stimulated collaborative emergent ideation. The half-baked nature of the design ideas fueled our co-design exchanges. It put us in a position where we were both compelled and empowered to improvise several design choices on-the-fly: us, as designers-facilitators, by enacting the prototypes; participants, as play-testers, by interacting with and making sense of them. Often, participants asked about details of the prototypes we had not figured out yet. For example, in S8, they asked if in the *Table Manners Bomb*—a table centerpiece that allows diners to call each other out when they behave in anti-social ways, so they receive a punishment—they were allowed to not only call each other out but to decide custom punishments. We embraced that idea on the spot and began to use participants’ suggested punishments, both orally and via WhatsApp. That led to hilarious situations where people tailored punishments to their shared history, e.g., someone suggested “brushing hair” when she called out

another participant who had recently shaved his head, for which he was often teased by his friends. Far from being problematic, the fact that we had not figured out these kinds of details from the onset was productive: it allowed us to embrace participants' emergent ideas on the spot and to incorporate them into our malleable, enactment-based prototypes.

4.2.2 *Engaging Participants: The Potential and Challenges of Recruiting Through Social Media.*

Using social media to recruit participants can be a double-edged sword. Social media helped us to share our early design ideas in ways that were exciting for potential participants. By featuring the catalog on platforms they were used to interacting with on a daily basis (e.g., Instagram), we brought our design work to their ordinary domain. We did not only ask if they wanted to get involved in our research; we shared an exciting set of intriguing ideas that made them curious to reach out and know more. As a result, many became genuinely interested in our work. Recruiting through social media had another consequence: most participants were (in different ways) part of our personal and professional networks. The fact that we had an existing relationship with them could be problematic due to issues of bias in convenience sampling, e.g., some participants might not be comfortable with giving negative feedback due to a fear of damaging our personal relationship. However, throughout the process we realized that that situation could also be turned into an advantage: knowing our participants well allowed us to leverage our existing relationships of trust, which in turn made it easier for us to engage them, to help them feel comfortable with being honest, and to interpret their contributions through the lens of our shared history. An example of the level of trust and honesty we managed to establish with some participants is S6P2, who told one of us that at the beginning of the process she thought our work was “bullshit”; or S1P1, who described the *Anxious Plates* idea as “scary” and “dangerous”. Working with a pool of participants that we knew before created other tensions: it bridged the (sometimes conflicting) personal and professional spheres of our lives. On several occasions we felt awkward about asking our acquaintances to use their personal time in our co-design efforts, fearing they might get fed up with our invitations and project that on our personal relationship; or we avoided certain actions when enacting the prototype to protect ourselves and/or them from embarrassing or uncomfortable situations (see last items in Section 4.2.3 for a concrete example). Those tensions emerge when our roles as designers and as members of a community intersect have been explored before, and in-depth, in participatory design and participatory action research literature (e.g., [31, 54]). Here we suggest designers should pay special attention to those issues when co-designing with stakeholders they already know, which is likely to happen in DTE.

Scheduling informational video calls instead of sending long instructions helped to get people onboard and create a relationship of trust. In earlier phases of the project (e.g., in a cultural probe intervention), we noticed that interested participants often got overwhelmed when we sent long and detailed instructions. Many decided it was too much for them, and communication was lost; we did not even get a chance to help them to digest the instructions and make participation less intimidating. Learning from that, in the co-design phase we scheduled one-on-one video calls to deliver instructions personally. That increased the retention rate: all participants who attended a video call ended up following through, except for three who could not due to personal circumstances. To compel people to attend the video calls, we found it useful to show only some (2–3) of the designs in our recruitment messages: that made people curious to see the rest of the catalog and talk to us about it. The video calls brought about another positive effect: they allowed us to better understand which ideas resonated more and why, as people were often quite talkative about their opinions. For example, we learned that S6P2 liked *PlaceMap*, the *Table Manners Bomb*, *FoodLand*, the *Anxious Plates*, *Screen-ED*, and the *Sassy Cutlery*, but thought that the latter two would only be interesting in very special occasions, e.g., in meetings with friends.

Further, we found that allocating time for quality conversation with participants helped to establish a relationship of trust with them. In our post-meal conversations, we asked people how they felt about our backstage presence. Some said they were comfortable with it because they knew and trusted us. We also learned that trust could also be built with participants we did not know before: those in S2, all of them strangers to us, said they felt comfortable because they could talk to us before the co-design session and confirm that we were “good people with good intentions” (S2P4). It allowed them to “vet [us] and get to know the person behind the research” (S2P3). That reinforces our idea that allowing early opportunities for quality personal interaction plays an important role in remote co-design.

4.2.3 Co-Design Sessions: How to Leverage the Potential of Half-Baked Prototypes and Improvisation.

Having a chance to not only see, but also experience, our early prototypes stimulated our participants’ creative capacity. Playing with the prototypes allowed people to relate to our ideas in an intimate way. That impacted their understanding of the targeted design space and the design qualities that might be worth pursuing. For example, S6P2 told us that, when she first learned about our research, she thought our work was “bullshit”—she could not see the value of exploring how to design tech that playfully enhanced her food experiences. However, after experiencing one of our ideas, her views changed: she said she loved how the technology-enriched her mealtime, and that going through that experience helped her to understand and empathize with the motivations behind our work. Experiencing early design ideas “for real” can empower people to better connect with and contribute to a co-design process in ways they might not otherwise be prepared to—an especially relevant asset in projects targeting novel or unusual design spaces. According to participants, having a chance to play with prototypes that felt “real” enough for them to live the actual experience helped them to engage both critically and creatively with our work. By playtesting early, incomplete, and malleable prototypes, they did not get the experience of using a seemingly real technology. They became active co-designers: they not only gave feedback but also suggested substantial changes, or even rethought core elements of our early prototypes. All our co-design groups proposed new design ideas with varying levels of complexity. While some of these were rather minor, incremental changes meant to polish our existing designs (what [15] calls *small decisions*), others proposed more substantial changes that challenged foundational aspects of our original concepts (i.e., *big decisions* [15]). For example, S4 suggested that it would be great that *PlaceMap* allowed them to synchronously connect with players in other parts of the world who were concurrently experiencing the same tradition—something we never considered before. S7 also proposed a substantially new idea: they improvised a mechanism for choosing when *PlaceMap* sent prompts, transforming a prototype that originally made its own choices into one that acted upon the diners’ request. Another example is S9’s proposal of rethinking *PlaceMap* into a table centerpiece that did not involve phones or any other kind of personal device—an idea that challenged the original concept of distributing playful food traditions to people’s phones.

These examples show that, while participants’ ideas built on our early design concepts (which in turn built on the findings from our contextual research), they often challenged our assumptions and original design choices. Our approaches allowed us to shift power dynamics throughout the design process: In the contextual research phase, prior to co-design, we enabled participants to share their playful preferences with us—thereby determining the kinds of play experiences our design work would focus on; Then, we took a position of power to produce early design ideas that represented the breadth of playful cravings we identified in our contextual research, and made half-baked and prototypes of those ideas; Finally, we allowed people to experience, challenge, and disrupt those unfinished ideas. As a result, we empowered them to act as co-design partners at full right if they

wanted to: while some did not contribute beyond making incremental suggestions to existing ideas, others took a more active stance and proposed alternatives we had not thought of before.

Though half-baked, our prototypes delivered the intended experience—but only when they reflected real interaction patterns. Rather than just hinting at what the experience was supposed to be, our prototypes enabled participants to feel like the experience was incontext. They noted that they “had more fun than [they had] expected” (S4P1) and the experience was “overwhelmingly fun” (S12P1)—even if the prototypes were half-baked and did not look exactly like our catalog suggested. However, we noticed that some of our prototypes failed to achieve that: in particular, we found it problematic when the mechanisms for interacting with the prototype were considerably different from those described in the catalog. For example, *Screen-ED* was a concept where phones were supposed to detect when their owner was using them, to automatically project a silly image on their face. To prototype it, we asked participants to take pictures of each other once they saw someone using their phone, and to send them to us via WhatsApp. Then, we screen-shared those images to participants’ computer and edited them in funny ways. That mechanism was quite different from the intended experience and made it hard for people to relate to it. Learning from that, in subsequent sessions we brought the prototype closer to the intended interaction: we asked participants to stage a photo of each of other using the phone and send it before the meal; then, during the meal, we monitored when they used their phones, and automatically displayed and edited their photo via screen share. That way, people no longer had to police one another (and take photos about it) during the meal—technology already took that role, like in the original idea. The new prototype worked much better: people seemed to engage more with it, even if the silly image was not displayed on their faces (as it should be according to the catalog) but on the computer. Another example of a prototype where we failed to get the affordances right was the *Sassy Cutlery*, a set of smart cutlery that provocatively react to people’s actions by making sounds and talking to them. Originally, we decided not to wizard-of-oz this prototype ourselves. We asked participantambassadors to install a sound bank app and use it to enact the prototype: it was one of the diners, and not us, who was in charge of playing sounds in response to people’s interactions with cutlery. That detached that person from experience; they were too focused on using the app, which distracted them from both the food and the social situation. From those failures, we learned that, for people to genuinely experience early technology ideas, prototypes might not necessarily need to look exactly like the finalized product would. In *Screen-ED*, the experience was not compromised by the fact that we displayed the funny edited photos on a computer instead of projecting them on people’s faces; or in *PlaceMap* participants were OK with communicating through WhatsApp instead of a dedicated app. What we found to have a negative impact on the co-design potential of the experience was the inaccuracy of the interactions involved: interactions with and through the prototype should resemble the interaction mechanisms in the original concept, or else the momentum might be lost.

Being remote designer-facilitators allowed us to disappear “behind the scenes” when necessary. When people experienced our prototypes, they were generally able to abstract themselves from the fact that we were present, in ways that might not have been possible had we been there in person. In our post-meal conversations, we asked participants how they felt about our backstage presence; many said they were comfortable with it because they knew and trusted us. Knowing that we were operating the prototypes behind the scenes did not seem to dissuade them from enjoying the meal wholeheartedly and experimenting with the prototype (e.g., see Figure 6). Being able to, as facilitators, move behind the scenes during the meal contributed to that success. In fact, one of the prototypes was operated in plain sight and that hindered engagement. As noted above, when playtesting *Sassy Cutlery* (S13), it was one of the diners who operated the prototype. Unlike us, that diner could not move “behind the scenes”: they were physically there and others



Fig. 6. Examples of situations where participants submitted to the prototype experiences wholeheartedly. Left: a participant holding her cup with her elbows, motivated by *PlaceMap*'s prompt of drinking in challenging ways (S6). Center: an improvised marker-tattoo a participant received as a punishment from the *Table Manners Bomb* (S8). Right: two participants finishing their wine sitting upside down on their couch, responding to *PlaceMap*'s prompt of using the space in an unconventional way (S4).

could always see their operations. That affected other diners' experience of the meal and prototype; it made it hard for them to let go and submit to the experience, to a point they often blamed the participantambassador for their way of operating the prototype. In retrospect, we realized it might have been better to operate *Sassy Cutlery* ourselves, behind the scenes, playing sounds from our computer and sharing them via video call like in the other prototypes.

Enacting the prototypes allowed us to treat the technology as yet another “stakeholder”. Improvising with half-baked prototypes allowed us to experience what it meant to act in the ways they would. Because we enacted them (and participants knew it), we did not simply make the prototypes work; we *were* the prototypes. As such, we felt accountable for what they did, e.g., in *PlaceMap*, we often felt a sense of responsibility when deciding which traditions and prompts we sent to participants: “Should I really send this? What will they think?”. That forced us to experience the technology's actions intimately, as if they were our own, and gave us a much richer idea of how interfering in people's mealtime might or might not be appropriate and fun. Enacting the prototypes also helped us to read participants' social cues and add nuance to their post-meal reflections. For example, S4 said they might want a conversation topic to be over before *PlaceMap* sent a new prompt—yet, we observed they often enjoyed changing topics if the new prompt was relevant to something they had just done or said. Experiencing from the inside what it means to be the technology also helped us to experiment flexibly with the flow of the experience: we could dynamically adjust the tone, intensity, pace, and so on. throughout the meal. Overall, “becoming the technology” was very productive from a co-design perspective. It exposed us to decisions the technology had to make, and we got a much more in-depth and intimate understanding of the stakes of those choices—a process that is very different from making design decisions in a rational sense.

5 DESIGNERLY TELE-EXPERIENCES: WHAT, HOW, AND WHY?

The contribution of this article is the novel remote co-design approach we created to respond to the challenges of social distancing. It can inspire designers—in and beyond the COVID-19 pandemic—and initiate a productive discussion about the need for new methods that help us to co-design remotely. In this section, we formalize our methodological proposals to make them available to the interaction design community. First, we define the DTE method and provide actionable guidelines for implementing it (Section 5.1). Then, we reflect on the strengths and weaknesses of our proposal, as well as its relationship with existing methods (Section 5.2). Finally, we discuss the limitations of our study and the opportunities it opens for future work (Section 5.3).

5.1 Guidelines for Using Designery Tele-Experiences

DTE are multi-stakeholder co-design engagements where participants experience early design ideas as a provocation that helps them to familiarize with the targeted design space and contribute novel design ideas. Through DTE, remote designers create and enact lo-fi technology provocations and make them available for co-located participants to experience and creatively disrupt. By experiencing those half-baked prototypes in-the-wild, stakeholders get an embodied understanding of important design qualities in a targeted design space, which enables them to build on their own lived experience to contribute new design ideas. DTE combines strengths of existing methods to support remote co-design that is still embodied and situated: designers and stakeholders engage remotely through a video call, but stakeholders are co-located and, as such, they can co-experience, -discuss, and -ideate technology concepts in a way that is contextually meaningful. DTE is flexible and malleable: it can be adapted to respond to the idiosyncrasies of the stakeholders and activities that are relevant in each design project. Here we provide a set of actionable (and malleable) guidelines based on our tacit experience from using it in our work; see Figure 7 for a visual synthesis.

Step 1: Begin with in-house ideation. To use DTE, the first step is to do contextual research in order to identify design qualities designers want to explore with stakeholders, e.g., through interviews, cultural probes, ethnographic observations... Once a set of foundational design qualities have been defined, designers can generate early, speculative ideas that embody a breadth of those qualities. The resulting collection of design concepts should characterize the targeted design space and some of the possible design directions. Importantly, at this stage, ideas should not be precise, advanced, or complete; rather, they should be deliberately diverse, ambiguous, and unresolved, so that stakeholders can engage with the design directions they feel most interesting and appropriate them creatively.

Step 2: Make a catalog featuring the early ideas and plan for prototyping them. Once a pool of early ideas has been generated, designers can make a catalog that gets stakeholders excited and helps them to relate to the targeted design space. The catalog should be plain and simple, even commercial-looking—instead of technical or academically rigorous. The goal is to help people to emotionally connect with the design ideas and project how the proposed tech might play out in their own lives. Descriptions of ideas should be short and incomplete so stakeholders can begin to fill the gaps. To prepare for the co-design sessions, designers should create wizard-of-oz inspired *provotypes* that leverage the improvisational potential of enactment—see Section 4.1.3 for examples. Ideas should not be fully fleshed out: they should be malleable and leave space for ambiguity so they can be experimented with and concretized during the co-design sessions. Prototypes should not look like finalized products either—it is better that participants think of them as rather incomplete proposals they are welcome to disrupt. However, the interactions afforded by the prototypes do need to feel as real as possible, otherwise it might be too hard for participants to get a good experiential understanding of the core aspects of the technology idea. Section 4.2.3 provides further details about the necessary qualities of DTE prototypes.

Step 3: Reach out to stakeholders. The recruitment strategy is as important as the co-design sessions themselves: in our experience, producing a catalog of speculative concepts, sharing it on social media, and holding informational video calls played a critical role in engaging participants fruitfully. Once the catalog is ready, designers can distribute it through channels that feel natural to stakeholders, e.g., on social media. To elicit curiosity and persuade people to get onboard, designers can share some of the ideas as teasers, inviting people to reach out if they want to see the full catalog.

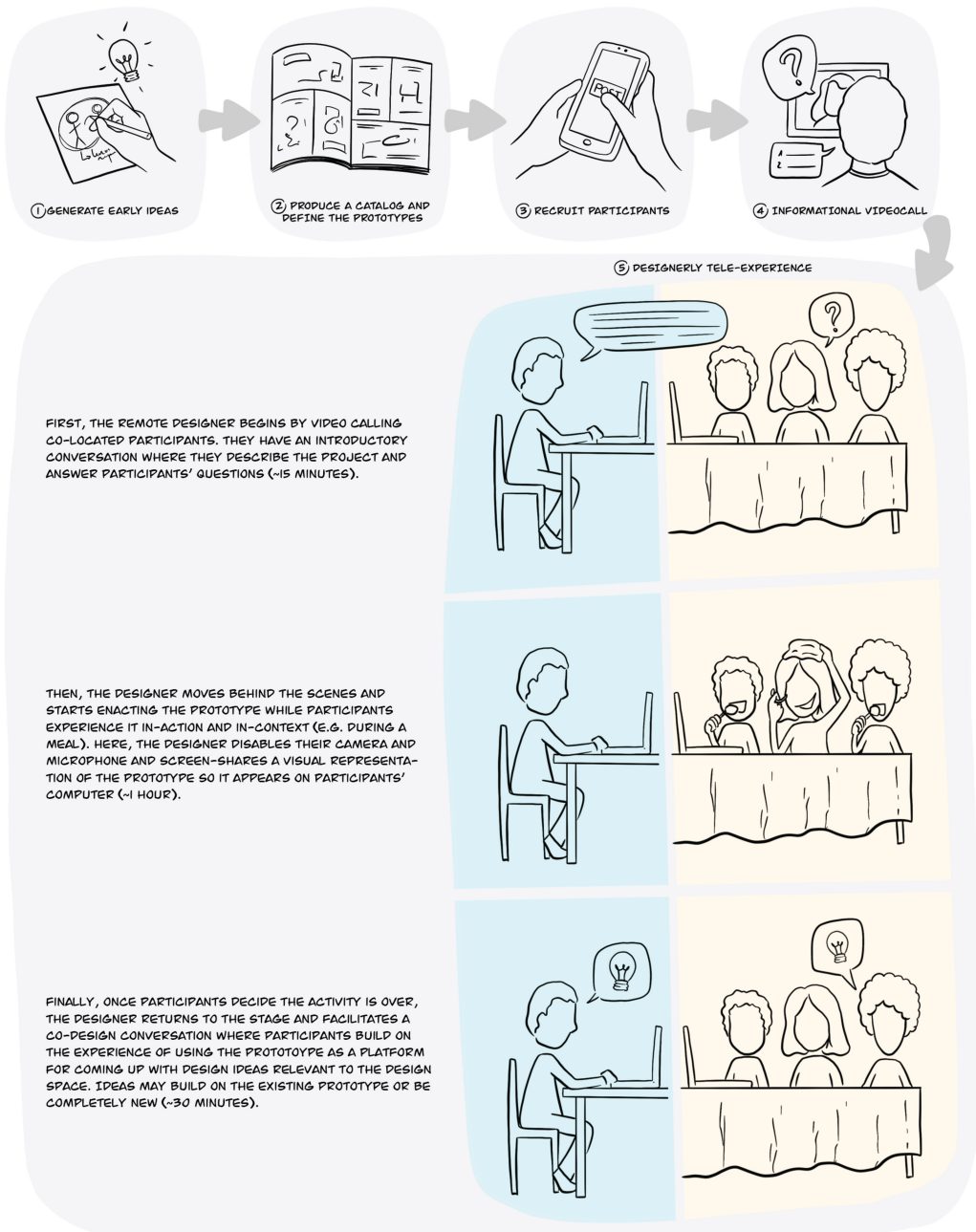


Fig. 7. Summary of our early and flexible guidelines for using Designerly Tele-Experiences.

Step 4: Schedule a video call to get participants involved. When stakeholders show interest in seeing the full catalog, designers will benefit from not simply sharing it with them. They should also invite participants to one-on-one video calls where they can (1) personally describe the project, (2) allow people to talk about their perspective on the catalog and early ideas, and (3) invite them to participate in a co-design session. At this stage,

designers will likely need to ask participants to recruit a group of their acquaintances to participate in the co-design session. It is important to provide participant ambassadors with guidance for how to do that.

Step 5: Conduct the Designedly Tele-Experience. The last phase of DTE is the actual co-design session: a ~2 hour video call where the designer(s) engage a group of co-located participants remotely to talk about the ideas in the catalog, experience one of them in context, and co-imagine ways of modifying and/or rethinking that idea. A DTE session will typically consist of three parts: an introductory chat where the designer(s) will describe the project and answer people’s questions (~15 minutes); a playtest of one of the early ideas, where the designer(s) will disappear “behind the scenes” to operate the prototype while people experience it within the targeted activity (~1 hour, depending on the nature of that activity); Finally, a conversation where designer(s) and participants will discuss their experience of the prototype and use it as starting point to iterate on that early idea or to co-imagine radically new tech ideas from scratch (~30 minutes).

5.2 Reflection on the Novelty, Strengths, and Weaknesses of Designedly Tele-Experiences

DTE address several methodological challenges that emerge in remote co-design—all of which we experienced in our own work. First, they allow designers to engage stakeholders remotely yet still in-the-wild: stakeholders are co-located and in context, and designers engage them through a video call. As such, DTE enables people to co-experience and co-imagine in embodied and situated ways, which in turn empowers them to contribute to further developing ideas rather than only evaluating finalized proposals. DTE also allows designers to present stakeholders with half-baked yet fully experienceable prototype-provocations that will likely stimulate their creative capacity. In our project, that gave participants a rich lived experience they used to familiarize themselves with an unfamiliar design space and set a solid foundation for their creative contribution. Finally, by supporting these embodied, situated, and communal engagements, DTE centers people’s attention on the experience of using tech rather than on its technical requirements or utilitarian function—an important point in interaction design projects focused on carefully crafting the experiential texture of a new technology. While existing methods respond to some of those challenges, they do not address all of them at once—even less so in remote scenarios. Below we unpack how DTE builds on, re-purposes, and leverages the strengths of existing co-design methods, extending them in novel ways (see Figure 8 for a summary).

Like *design fictions* [68] and *design workbooks* [38], DTE help participants to relate to futuristic and unfamiliar design spaces, ideas, and scenarios. In particular, DTE builds on embodied approaches to design fiction, such as *experiential futures* [22], *speculative enactments* [24], or *immersive design fiction* [55], and extends them by focusing explicitly on the experiential dimension of tech design. In that sense, DTE shares with in-the-wild co-design workshops (e.g., *labs in the wild* [74] or *situated play design workshops* [6]) and other multi-stakeholder methods (e.g., *design collaboratoriums* [20], *dialogue-labs* [49], or *Design:Labs* [10]) a focus on co-experience as the foundation of generative ideation: it brings stakeholders together in a naturalistic setting to collectively experiment with provocative artifacts and materials and use that experience as a platform for producing design ideas that are contextually sound. Taking inspiration from remote co-design methods such as *distributed participatory design* [23], DTE extends existing in-the-wild methods to allow remote yet still synchronous designer-stakeholder engagement—while participants are co-located in the targeted context, designers participate through a video call. To facilitate such remote interaction in ways that foreground the importance of materiality and embodied interaction (and thereby extend virtual forms of remote co-design, e.g., [43, 58, 61, 70, 71, 72]), DTE

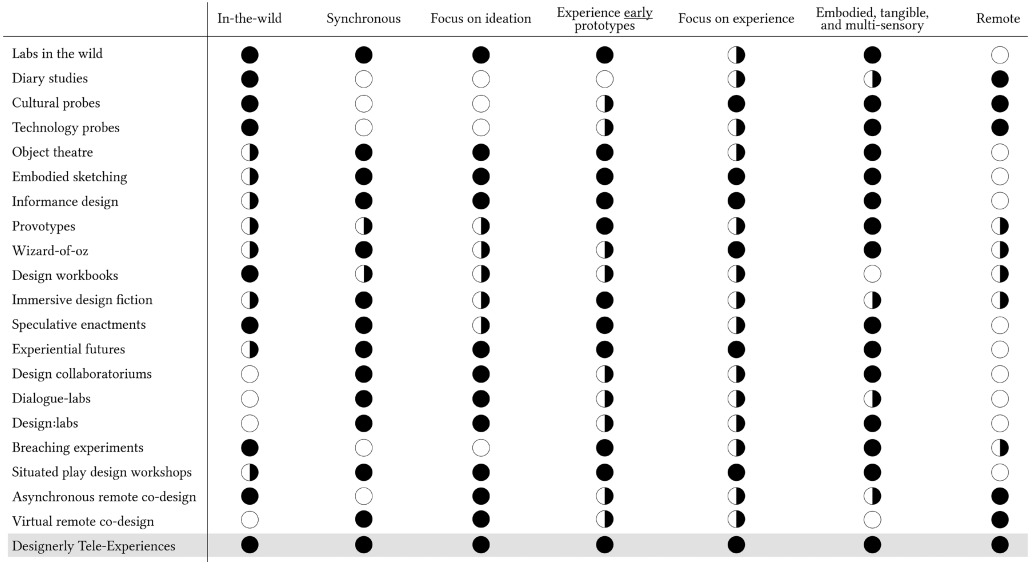


Fig. 8. We situate DTE with respect to existing co-design methods and our methodological requirements (described in Section 2.2). Circles indicate the strength of the relationship between methods (rows) and methodological requirements (columns). A full circle indicates a strong relationship, a half-full circle indicates a moderate relationship, and an empty circle indicates a weak relationship.

takes inspiration from *wizard-of-oz* [26] techniques (especially those done remotely, e.g., [53, 69]): it allows remote designers to present co-located stakeholders with experienceable prototypes so they can get an embodied understanding of the targeted design space. In particular, DTE builds on *wizard-of-oz* practices that focus explicitly on co-creating new design concepts (e.g., [21, 29]), rather than testing and evaluating prototypes of ideas that are polished or advanced. Inspired by *provotypes* [14], in DTE, prototypes are provocations that enable people to experience underdefined ideas that stimulate their creative capacity and empower them to be critical and ideate. In consequence, these prototypes are ambiguous and incomplete, which makes them malleable and easy to disrupt. They are also future-oriented (like e.g., *design fictions* [68]) and improvisational: DTE takes inspiration from improvisational embodied methods, especially *object theatre* [62], to enable designers to enact malleable prototypes and improvise design choices on-the-fly, in ways that spontaneous choices can be implemented rapidly as people experiment with prototypes.

Overall, as Figure 8 indicates, DTE is not necessarily better or worse than existing methods, nor it seeks to displace or substitute them. Instead, it combines many of their strengths to tackle the emergent challenge of supporting early and situated co-design ideation in remote settings—in ways that focus on and are grounded in people’s experience of a technology. In particular, DTE brings together and repurposes interesting qualities from existing methods to allow designers tackle a combination of 5 methodological challenges: (1) engaging stakeholders in-the-wild and synchronously (like e.g., *labs in the wild*); (2) focusing their efforts on co-designing, rather than inspiring or evaluating (like e.g., *object theatre* or embodied *sketching*); (3) enabling them to co-experience early, half-baked, and future-oriented design ideas without a polished prototype or an existing technology that can be used as a reference (like e.g., *provotypes* or *design fictions*); (4) centering the conversations on the experience afforded by the technology, rather than its technical requirements, utilitarian function, or larger impact on society (like e.g., *cultural probes* or *situated play design workshops*); (5) keeping the embodied, tangible, and multi-sensory qualities

of the targeted activity or situation at the forefront of the co-design engagements (like e.g., *embodied sketching*); and (6) enabling remote engagement between participants and designers (like e.g., *diary studies* or some *wizard-of-oz* techniques). In summary, DTE proposes a novel way of doing situated-yet-still-remote co-design by combining aspects of existing methods that, on their own, may not fully address all these challenges at once. We hope that our contribution provides interaction designers with a new technique to add to their toolkit—one that we argue will help them in design projects that resemble the case study described in this article. We hope that our in-depth account of the design project where we simultaneously developed and experimented with DTE provides other designers with useful and actionable inspiration for putting our method in practice.

An important consideration is that building on a tradition of generative design-based practices [34, 39], DTE is deliberately open-ended. Rather than a strict set of rules, it is an inspirational starting point that can empower other designers to engage stakeholders remotely while still doing situated co-design. Even in our case study, we adapted our process along the way to fit our needs as the project kept advancing what did not; for example, see Section 4.2 where we describe how we modified some of our prototypes along the way responding to our ongoing learnings from the process. The process described here worked in our case study, but designers should adapt it to the needs of their own work. We hope that the advice provided in this article serves as an inspirational starting point that designers can appropriate and use in ways that are useful to them.

By flexibly combining elements of a broad range of situated design practices, DTE opens numerous possibilities for designers. In our own experience, they were very helpful to empower our stakeholders to contribute to a design space that was unfamiliar to them. Although all our participants could clearly be considered experts in mealtime experiences (they had been partaking in them for their entire lives), most had never been exposed to the idea of a future where their food interactions might be technology-mediated. Design concepts like the ones we were after—e.g., smart cutlery, mechatronic plates, conversational centerpieces, and so on.—were simply out of the scope of anything they could easily relate to. By allowing participants to experience what it might mean to integrate those kinds of artifacts into their ordinary mealtime, we enabled them to explore and negotiate their own perspectives with regards to the targeted design space. We also enabled them to think from experience and not only from reason, which is arguably an important part of the generative nature of design [34, 39]. That allowed participants to be both critical and creative, and to contribute interesting design ideas as a result—as opposed to validating advanced ideas. They engaged as design partners at full right, and that brought about ideas that we, as lead designers, may not have considered otherwise.

Another strength of DTE is that it allows designers to treat technology as yet another relevant “stakeholder”. That enables them to engage with ideation through a different—perhaps more intimate and reflexive—way. By enacting half-baked prototypes, designers *become* the prototype and make improvised choices that they will likely feel as partly *theirs*. That is, at least, how we experienced it in our case study. By having such an intimate experience of what it means *to be* the technology, designers are much better prepared to understand the specific implications of making the choices that (and acting like) the technology would. That allows them to experiment with diverse ways of adapting the technology to interact with people in a more socially appropriate way. Further, by enacting a prototype for a long time (we did 13 sessions, each ~1 hour long), designers are exposed to scenarios that they may not have envisioned otherwise, leading them to address issues that might have been overlooked. In retrospect, we realize that DTE’s capacity for enabling designers to impersonate a technology could be seen as aligning with emerging more-than-human approaches to HCI and interaction design (e.g., [28, 41, 59]). Future work could investigate that intersection further, exploring how DTE might support processes where other subjects than humans

are considered as design partners to enable new ways of thinking about human-technology entanglements as more-than-human ecosystems.

A noteworthy aspect of DTE is its way of reaching out to and recruiting remote participants. Insofar as it proposes to recruit through channels such as social media and other online platforms, it has the potential of enabling global engagement with a design project, with little limitations other than time-zone differences. In our project, we could engage people from 8 different countries and 4 different continents. While we did not explore that specifically, we suggest that such affordances could be very useful in multi-site projects (e.g., projects where different, geographically distributed design teams collaborate remotely), or in projects that aim at enabling distributed stakeholders to ideate together. We are excited about the potential of DTE to respond to these and other remote co-design opportunities, and call for further research that explores that potential.

Another strength of DTE's recruitment mechanism is how it uses speculation as a way of getting them onboard. An important factor in unlocking participants' creative potential was the way we recruited them: our catalog of intriguing design ideas got people's attention and invited them to think about how those technologies might play out in their ordinary lives. That gave participants a feeling of agency: they could choose which concepts they identified with the most, as if they were purchasing them, and appropriate them to their own will. It was also crucial that we allocated space for one-on-one, quality interaction with our participants: it allowed us to get them excited about participating in our project and helped them to trust us and feel that it was safe to participate. That could also be seen as a weakness of our approach: designing polished catalogs of early ideas and engaging participants in one-to-one conversations are time-consuming processes. Yet, our experience shows that they were both key to ensure that participants engaged wholeheartedly with our co-design activities, which brought about interesting design ideas as a result.

Another weakness of DTE derived from its mechanism for reaching out to and engaging stakeholders is the issue of convenience sampling. Insofar as designers use channels such as social media or personal correspondence, it is likely that some of the participants they recruit belong to their personal or professional networks. It is important to acknowledge the possible biases in the data that might derive from co-designing with one's acquaintances; they must be taken into account when making sense of their co-design contributions. From our own experience (see Section 4.2.2), we suggest that such limitation can also be turned into an advantage: having an existing relationship of trust with participants can help designers to make them feel comfortable with sharing their opinions more openly and to better interpret the subtext of those contributions through the lens of their shared history.

Finally, a weakness of our approach is the effort it requires from participantambassadors. As it stands, DTE requires participants who reach out in response to the designer's social media prompts to recruit and coordinate a group of their acquaintances to share a co-design session with. While in our experience participants were willing to and able to do that, as they were excited about our speculative ideas and enthusiastic about the idea of experimenting with them, we acknowledge that having to actively recruit other people might be too much of a burden for some potential participants. That makes DTE more suitable for projects exploring design spaces related to the household or similar environments (an office, a classroom...) where a somewhat cohesive and structured group meet and interact on a regular basis—coordinating the logistics of a co-design session will likely be easier in such scenarios. We suggest there is a need for future research that explores how to (1) make it easier and smoother for participantambassadors to recruit acquaintances for a co-design session, and (2) make DTE more suitable for less controlled and structured social settings. Finally, we suggest that future research should also explore the temporality of DTE: in our study, we engaged each group of participants only once, but it may be interesting to explore

whether engagement through DTE could be extended over longer periods such as weeks (e.g., like [47]’s *bonded design*) or even years (e.g., like [30]’s *cooperative inquiries*).

5.3 Limitations of the Research Process and Planned Future Work

DTE stem from our own experience of reacting to the sudden limitations of social distancing. We developed them to respond to the needs of a specific design project—one where we experienced chaotic circumstances and a great deal of uncertainty. That brought about a clear limitation of our work: we did not experiment with DTE beyond the scope of that one case study. Therefore, we cannot be sure how they might play out in other scenarios. Though our experience makes us confident about their potential, we acknowledge the need for future work that evaluates if and how DTE might be helpful in other contexts and for other design goals. By following an in-depth, descriptive approach to presenting our emergent method, we hope that other designers will be empowered to appropriate it to fit the needs of their own work. We are excited to see how DTE is used in different projects with different contextual idiosyncrasies and design research goals; we are confident that it will be through use in different projects that we will be able to better understand the scope of applicability of our method, and we look forward to conducting such reflexive analysis of DTE once used in other design projects (ours and others’).

Furthermore, due to the organic and emergent nature of our case study, we did not have a clear and pre-defined mechanism in place for evaluating the performance of DTE as opposed to other methods. Instead, we reflectively built on our own experience of using DTE, as well as on our knowledge of and experiences with related methods, to discuss its strengths and weaknesses. Consequently, rather than sharing generalized guidelines that can be readily adopted without adaptation, we present early advice from our experimental practice, hoping to inspire designers facing similar circumstances. We see our contribution not as a consolidated method but as a formalized methodological proposal: we present experimental design research that led to early insights that can (1) inspire designers facing similar struggles, and (2) initiate a timely discussion about how to co-design remotely in situated and embodied ways. Despite the experimental nature of our study, we see the value of sharing our proposal now, when the motivations behind it are impacting designers globally. We see it as an opportunity to initiate a community conversation about new ways of doing remote-yet-still-situated co-design. We stress the need for future work that continues to experiment with our proposal: building upon it, enriching it through new perspectives, challenging it, and assessing its validity compared to other methods. Ultimately, we hope to spark a larger discussion about the need for new co-design methods that help us to respond to the contemporary challenges of interaction design.

Another limitation of our work is that, though we created and used prototypes in a remote co-design project, we never focused our study on investigating how prototypes should be made to fit remote scenarios as opposed to in-person ones. Our work is not a study of the technical affordances of videoconferencing tools when it comes to remote co-designing, but rather an account of how we used some of those affordances to our advantage. Future work should continue to explore this and investigate the full spectrum of affordances that current and future technological tools have to offer. In our reflexive analysis of our process, we identified some qualities of our prototypes that had an impact on the quality of our remote exchanges with participants (see Section 3.3.2)—yet, we did not examine the qualities and impact of our prototypes in detail, as that was not the focus of our study. Furthermore, we noticed that the approach to prototyping we intuitively took worked better for some design concepts than others. For example, the affordances of videoconferencing and social networking tools were a great fit for prototyping design concepts that were based on textual or auditory communication between the system and the users (e.g., *PlaceMap*), but were less useful when it came to conveying the experience of design concepts based on movement or

physical actuation (e.g., the *Anxious Plates*). Likewise, in our ongoing reflective process we realized that our approach to prototyping for remote co-design might have to be re-worked to fit a broader range of contexts and scenarios. In our case study, which was focused on the (rather controlled and bounded) context of home-based mealtime, it was relatively easy for us to gather people around a laptop and communicate through a videocall; in the future, we will explore how to adapt our approach to the needs of design projects targeting more complex and unstructured scenarios, e.g., those exploring how to design technology for the urban space. We are excited about future work that explores those question in more depth, examining the affordances of existing (e.g., videoconferencing tools) and emergent (e.g., consumer-level IoT and smart devices) technology to support novel forms of remote co-design activity. We see that as a necessary next step that will empower designers to craft prototypes that work well in remote scenarios, avoiding situations where the prototype's affordances compromise the quality of a co-design session.

Finally, though DTE originated as a response to the challenges derived from COVID-19, we argue that it might also be useful beyond the pandemic. In our case study, DTE enabled practices that might be equally relevant when social distancing limitations are no longer necessary. For example, it allowed us to access stakeholders from different parts of the world, intimately and in-depth, without travel expenses. It also allowed us to intervene and be present in our target design scenario in ways that did not prevent stakeholders from experiencing the co-design activities as being part of their ordinary routines. We see this as a promising move both in and beyond the pandemic: it allows us to co-design in the wild while minimizing the impact of our presence on participants' choices. We believe that those and other affordances of DTE might be very relevant beyond COVID-19, and we look forward to leveraging them in future projects to further explore that potential. We also look forward to seeing how other interaction designers appropriate DTE, adapting, improving, and finding new uses for it in ways that continue to enrich the palette of remote-yet-still-situated co-design strategies available in the field of interaction design.

6 CONCLUSION

In this article, we presented a novel methodological proposal for involving stakeholders remotely to co-design interactive technology: DTE. DTE enables participants of a co-design session to experience early design concepts in-the-wild as a provocation to contribute new design ideas that are contextually meaningful and resonate with their experiential preferences. Through a video call, remote designers can enact half-baked prototypes of early design ideas so that co-located participants experience them in context. That allows participants to get an embodied understanding of important design qualities in a given design space, empowering them to build on their own lived experience and use it as a foundation for contributing new design ideas. The novelty of our proposal is that it combines, repurposes, and extends a range of existing co-design methods to allow designers to: (1) engage stakeholders in-the-wild and synchronously; (2) focus their efforts on co-designing, rather than inspiring or evaluating; (3) enable them to co-experience early, half-baked, and future-oriented design ideas without a polished prototype or an existing technology that can be used as a reference; (4) center the conversations on the experience afforded by the technology, rather than its technical requirements, utilitarian function, or larger impacts on society; (5) keep the embodied, tangible, and multi-sensory qualities of the targeted activity or situation at the forefront of the co-design engagements and, most importantly, (6) do all that in combination and remotely, when participants cannot be engaged in person.

DTE stems from a playful interaction design project where we had to react to the sudden COVID-19 social distancing scenario and pivot to remote co-design. We argue that this approach can also be useful beyond the pandemics, as it enables a number of remote-yet-still-situated co-design practices that are valuable in interaction design. DTE can be a way of engaging stakeholders in

situations when it is not possible (or desirable) to interact with them in person, e.g., when co-designing with diverse communities around the world, or when designers want to avoid imposing their physical presence in a naturalistic setting to avoid interfering with stakeholders' ordinary practices. In this article, we described the rationale for DTE, unpacked how they build on, combine, and extend the affordances of existing co-design methods, and provided actionable guidelines based on our experience of using them in our work. We hope that our research contributes to enriching the pool of co-design methods available in HCI and inspires interaction designers to do participatory and situated work, even when they cannot engage stakeholders in person.

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