Timelines: A World-Building Activity for Values Advocacy

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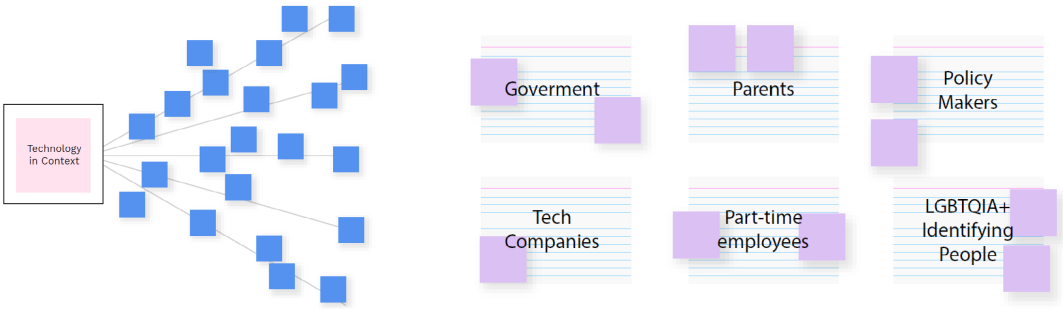

Figure 1: *Timelines* involves asking groups or individuals to create different headlines about a system (left), to probe its potential macro-level effects. Participants then view those headlines through the perspectives of social media posts from various stakeholders to probe the system's potential micro-level effects (right)

ABSTRACT

This paper presents Timelines, a design activity to assist values advocates: people who help others recognize values and ethical concerns as relevant to technical practice. Rather than integrate seamlessly into existing design processes, Timelines aims to create a space for critical reflection and contestation among expert participants (such as technology researchers, practitioners, or students) and a values advocate facilitator to surface the importance and relevance of values and ethical concerns. The activity's design is motivated by theoretical perspectives from design fiction, scenario planning, and value sensitive design. The activity helps participants surface discussion of broad societal-level changes related to a technology by creating stories from news headlines, and recognize a diversity of experiences situated in the everyday by creating social media posts from different viewpoints. We reflect on how decisions on the activity's design and facilitation enables it to assist in values advocacy practices.

CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI)**; • **Social and professional topics** → *Codes of ethics.*

KEYWORDS

values in design, values advocacy, design fiction, ethics, values work

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1 INTRODUCTION

As technologies become adopted and used in new aspects of everyday life, controversies ranging from algorithmic bias [55] to concerns of surveillance [28, 48] have motivated the development of tools, methods, and frameworks to surface discussion of values and ethical issues related to technology development and use (e.g., [25, 52]). New practices, skills, and roles have been developed to attempt to address these issues, such as: growing research into values and ethical practices of technology practitioners [26, 29, 41, 51]; the growth of the role of "ethics owners" in technology companies, whose work includes integrating thinking about ethics across an organization [43]; and practices for teaching ethics-driven courses within computer science and engineering departments across academic institutions [56].

At the same time, values and ethics conversations often emerge through a quandary approach, where hypothetical examples like the trolley problem (e.g., [2]) are used to surface debate about ethical dilemmas, such as privacy, fairness, intellectual property rights, reliability and responsibility. These often lead to discussion about formal ethical reasoning frameworks. While useful, there is a desire among researchers and practitioners to create tools that surface discussion of values that are grounded in situated contexts (which can potentially lead to actionable interventions and outcomes). This is reflected in technology professionals' "on the ground" perspectives, expressing desires to find methods that "look around corners" to identify potential privacy harms and other ethical issues related to products [4].

Within HCI, researchers have used speculative design and design fiction practices to anticipate ethical implications of novel technologies. By creating conceptual artifacts situated in everyday experiences—such as product catalogs [12, 20] or product reviews [3]—these techniques create "plausible, mundane, and speculative futures" [39] where values, politics, and ethics of technological artifacts can be considered in situated contexts. However, these design futuring approaches are sometimes critiqued as being removed from everyday practice by being presented in media or exhibitions, or using techniques that end up gatekeeping and limiting who gets to future to a small group of designers and researchers [36].

This paper introduces *Timelines*, an accessible, low barrier-to-entry design activity that facilitators can use to help participants to think about technologies, values, and ethics. In the emerging domain of technology ethics, an accessible method to discuss ethics by various stakeholders—such as practitioners, researchers, students, and users—is pivotal. In Timelines, participants (a) create news headlines to build a broad storyworld in which the technology exists, and (b) create social media posts from various stakeholders' point of view. By thinking about possible worlds at macro- and micro-levels in an approachable way, Timelines helps participants connect changes at scale with the diversity of situated experiences and impacts a single technology can have. In order for Timelines to be facilitated in a wide range of settings, we designed the activity to be lightweight in terms of materials.

We developed Timelines to assist in values advocates' practices [50] by creating a space for participants to surface, discuss, and recognize the relevance of values and ethics to technical practice. Timelines serves as an activist intervention that enables participants to express concerns, desires, and to create "arguments that are not present in existing technological paradigms" [1]. Timelines can be facilitated in a variety of settings where values advocacy occurs, including classrooms, workshops, research, or workplaces.

This paper contributes an activity, Timelines, and documentation of the theoretical background that drove design decisions in the activity. The paper first discusses related work and motivations. The paper then presents the activity steps, documentations design decisions, and discusses how the activity and its facilitation can assist in values advocacy practices. This paper is aimed at helping values advocates (whether technology practitioners, members of a research team, or educators of technical students) make use of and facilitate an activity like Timelines to create a space for discussion of values, ethics, and politics.

2 RELATED WORK

Timelines builds on several strands of prior work that have complementary approaches to surfacing discussion of values and ethics using design practices.

2.1 Values Advocacy

Timelines is developed to help in *values advocates'* practices. As defined by Shilton, a values advocate is someone who "has a designated interest in, and lobbies for, social and ethical concerns" surrounding the design process [50]. Values advocates can work in a range of contexts, such as being a member of an academic research team, or a worker at a technology company. While a values advocate is often embedded as part of a group, we want to design Timelines as something that can cross into different contexts where values advocates might work. In designing a tool for values advocacy, our goal is not necessarily to make an activity that will integrate seamlessly into design processes. Rather, the goal is to create a space for critical reflection [49] and expression among activity participants in a way that furthers values advocates' work.

Thinking about advocacy as a form of activism, our design orientation is inspired by Asad et al., who write that "Activist work is contestational, both within an organization and outside it. In looking at and discussing how technology is used in activist practices, these design interventions provide a space for participants to express their concerns and desires and to create arguments that are not present in existing technological paradigms." [1]. Thus a goal in the design of Timelines is for it to create a space for people to consider alternatives and critically reflect on values and ethics.

2.2 Values in Design & Value Sensitive Design

Interdisciplinary values in design research seeks to: understand how social values and ethics are intertwined with technology through practices of design, maintenance, and use; and to create new interventions for designers, researchers, and other stakeholders to surface, discuss, and address values and ethics in new ways [19, 35, 46, 53]. Recent research has conceptualized values as situated and experiential; what a value means and how it is enacted depends partly on a local context and situation [33, 38]. People in different subject positions or contexts experience that value in different ways (e.g., privacy as a value is not universal; some people are provided with more or less privacy, and experience privacy differently along various dimensions [44]). We aim to reflect this conception of values as situated and differentially experienced in our design activity.

Value sensitive design provides a set of methods [24] that incorporate thinking about social values in the design process using techniques including card activities [23], scenarios [45], and empirical research. Importantly, value sensitive design asks designers to think about both direct stakeholders (such as users) and indirect stakeholders (those who do not directly use, but may still be affected by the technology's use) [25]. We incorporate this stakeholder aspect of value sensitive design in the design of Timelines.

2.3 Using Design Futuring Practices for Values and Ethics

Shilton et al. point to the use of design research methods and design interventions as being useful for eliciting discussion and consideration of values [52, 53]. Increasingly, design futuring practices (such as speculative design [16, 62], design fiction [6, 9], critical design [47], or adversarial design [15]) have been deployed to surface discussion and consideration of values and ethical issues related to technology design, development, and use. These practices create conceptual artifacts that help designers ask "what if?" to surface, propose, and discuss the relationships among the social, political, and technical. This helps spark critical and reflexive questions about technologies and values for designers, and among people who view and interact with the conceptual design artifacts.

Many of these design futuring projects fit in a model where concerned design researchers create conceptual artifacts to explore particular values or political issues that they are interested in as experts. The researchers can then discuss how the designs help provoke thinking about these values. Examples include: Fiesler's design fiction to explore privacy and ethics questions when using public data for research [18]; Wong et al.'s design fictions exploring labor and power issues resulting from uses of brain computer interfaces [64]; Fox et al.'s speculative catalog surfacing issues of menstrual tracking, gender, surveillance, and power [20]; and Colusso et al.'s speculative designs on how diversity efforts in the technology industry can re-inscribe forms of racism, ableism, and sexism [13].

While these projects create thought-provoking projects, design futuring methods more broadly have sometimes been critiqued for representing the viewpoints and perspectives of a narrow set of expert designers and researchers. Kozubaev et al. propose that designers engaging in design futuring can better acknowledge their positionality and use design futuring to engage with the "real world." [36]. As one way of engaging with the "real world," some design futuring projects utilize workshops to include participants in generating visions of the future. This includes structured activities like future workshops to try to create visions of the future that can be realized [27], as well as more open-ended design workshop activities to learn about participants' experiences, desires, and concerns [37], or surface discussion of arrangements of social power [59].

Several design futuring projects engage participants through the practice of design fiction—creating fictional worlds to consider a technological artifact "in relation to the sociocultural contexts in which it is presumed to exist" [64]. Participants co-create design fictions in order to help surface critical self-reflections about values and ethics. For instance: Ballard et al.'s *Judgment Call* game engages participants in creating fictional reviews for technology products from different stakeholder perspectives [3]; Merrill's *Security Fictions* helps software developers role play and surface discussion of potential technical and social attacks to a system that might cause harm [42]; and Baumer et al. use design fiction with students to explore ethical issues related to a range of technologies [5]. These practices help participants create and explore values and ethics in rich fictional worlds, situated in familiar everyday experiences and objects (such as by creating fictional product reviews). They also help participants think about social values and ethics from the perspective of very situated and contextual practices – such as imagining how a specific stakeholder might write a product review for an artificial intelligence product, or how a security practitioner might respond to a specific attack that causes social harms.

Timelines draws on design futuring practices, particularly design fiction, to engage participants in creating fictional worlds using everyday and familiar forms (news headlines and social media posts). However, it also extends design fiction activities by thinking about values and ethics at multiple scales—both at a local situated level, and at a level that considers broader socially shared effects of technologies.

2.4 Futuring at Different Scales with Scenario Planning

Futuring practices can depict and interrogate worlds at different scales. For example, Coulton et al. compare the different scales of a fictional artifact and fictional legislation, and the different types of scales that they are acting on [14]. Design fiction often depicts worlds at everyday scales, presenting an artifact and asking the viewer to consider how a user or other stakeholder might interact with that artifact.

A different futuring practice, scenario planning, often focuses on changes in the world that occur at broader scales. Scenario planning has roots in futures studies, business, and military planning [34, 61]. Faced with risk caused by uncertainty about the future, scenarios explore how the world can change in unexpected or unforeseen ways, allowing planners to prepare contingencies. Scenarios employ world-building [60], but often interrogate these worlds at a broader macro-level scale, postulating changes to broad social, economic, and political trends. Design-like tools like the "implications wheel" [17] attempt to draw out secondary and tertiary effects of a change made in the world. Some value sensitive design activities, such as value scenarios, have adopted considerations of long-lasting and systematic values effects of technologies [45].

While values and ethics issues related to technologies are experienced and expressed at local situated scales, technologies are also capable of having broad, shared, long-lasting effects with values and political implications [63]. Thus, we similarly want Timelines to also help participants think about broader, shared effects in the world, including potentially unanticipated secondary effects.

3 DESIGN PROCESS

Our high-level orientation to creating Timelines was that the activity should create a space to help participants express their concerns and desires, create new arguments, and reflect on the relevance of values. From our review of prior work and the values in design research literature, we developed four goals for creating an activity to assist in values advocacy. Our primary design goals were to help participants:

(1) Recognize how values are differentially expressed, experienced, and situated (drawing on values in design's conception of values);
(2) Identify both direct and indirect stakeholders (drawing on value sensitive design);
(3) Create rich fictional worlds, situated in everyday experiences and objects familiar to them (drawing on design fiction practices);
(4) Analyze broader, shared societal-level effects of new technologies, including (potentially unanticipated) secondary and tertiary effects (drawing on scenario planning).

To achieve these goals within a design activity, we took inspiration from a parallel project studying values advocates, then looked to existing visual representations of concepts such as time and ecological systems. We then iterated on the activity's design multiple times in order to develop the activity and facilitation techniques.

3.1 Background Interviews with UX Values Advocates

In a parallel project, the lead author interviewed 12 user experience (UX) professionals who work at large technology companies and explicitly view values advocacy as a part of their work. While these interviews occurred outside of the Timelines design process and a full reporting of their findings is beyond the scope of this paper, we were inspired by two aspects of the interview findings.

First, some interviewees noted they were looking for ways to shift co-workers' minds and help them see the relevance of values and ethics to their technical work. One senior designer described this as "I don't know how to [help others] go from unseeing to seeing. I feel like I've made that shift through a course of years, and a degree in anthropology, and a lot of self-work into this. And I don't know how to bring others along for that when they're only interested in doing it a few short times, but aren't really interested in bringing in those lessons." This inspired our design goals and overall framing of *Timelines* as an activity to support values advocates in their practices to help others recognize, identify, and discuss values.

Second, interviewees discussed their own practices of values advocacy, such as bringing up concerns about values and ethical issues during meetings and at other times in their work (to varying success). Some described facilitating design activities to do this work, such as having a group of co-workers brainstorm their own episode of *Black Mirror* (a dystopian television show) based on their company's products, or using value sensitive design Envisioning Cards [23] to spark conversations. These existing practices suggest that UX professionals who conduct values advocacy in their work would be well-equipped to facilitate Timelines if the activity is deployed among technology practitioners. We thus imagine a skilled facilitator as an important component of the activity.

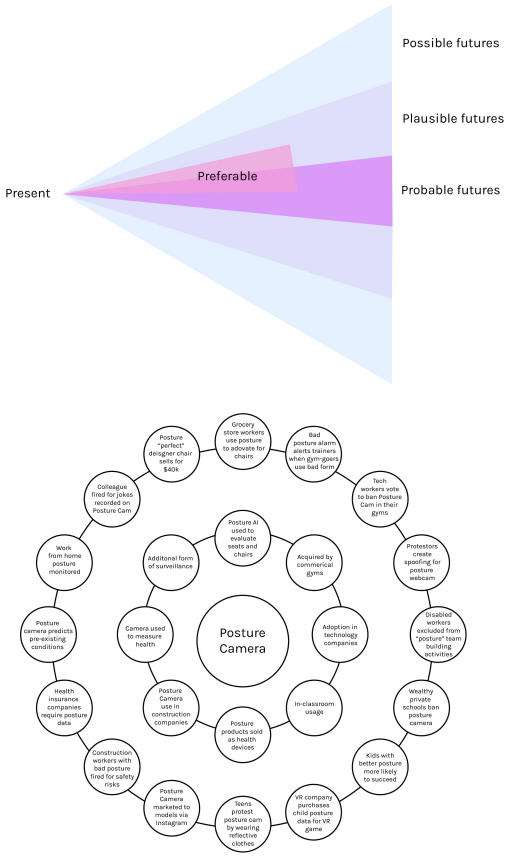

Figure 2: The futures cone (top) provides a representation of possible, plausible, and probable futures as time travels from left to right. The implications wheel (bottom) provides a representation of immediate and secondary effects as time travels from the center circle outwards

3.2 Design Inspiration

In creating an activity to help participants think about possible future worlds at different scales, we wanted to create a shared visual activity board template for participants to use. In order to develop what this board might look like, we looked at existing design representations that depict possible future worlds and different scales of effects, such as the "futures cone" and "implications wheel" (Figure 2). The futures cone, stemming from design futuring practices, imagines time moving from left to right, with a cone shape representing all possible futures: more probable futures occur closer to the center of the cone, and possible but less probable futures occur near the edges of the cone [16]. The implications wheel, stemming from scenario planning, imagines times moving from a central "present" point, expanding outwards: events occurring closer to the center represent immediate effects of a technology, while events occurring further away represent secondary and tertiary effects [17].

In addition, we also found inspiration from various data visualization structures, such as binary trees, ecosystem diagrams, and trophic pyramids, particularly when considering creating activity boards to represent qualities other than time. In an early iteration, we used the trophic pyramid metaphor to depict ascending magnitudes of impacts or scale of events (Figure 3). We also considered using a concentric diagram, which would emphasize how impact varies for different stakeholders. While these representations clearly emphasized relations between events, institutions, and stakeholders, they did not clearly exemplify how storylines can mutate temporally or how technological artifacts may manifest rhizomatically.

We decided to simplify our approach and create a single activity board that focuses on creating sets of stories that take place over time (rather than having multiple boards—for creating stories, for analyzing stakeholders, for analyzing impact, etc). One idea for a choose-your-own adventure type of activity board drew on a binary tree design, where each event in the story leads to two possible outcomes (either a positive or negative one) (Figure 4, top). These iterations of our activity board drew on the implications wheel metaphor of time, starting with a central point that represents the introduction of a new technology, with different storylines branching off in different directions (Figure 4). However, early participants found this representation of time somewhat confusing.

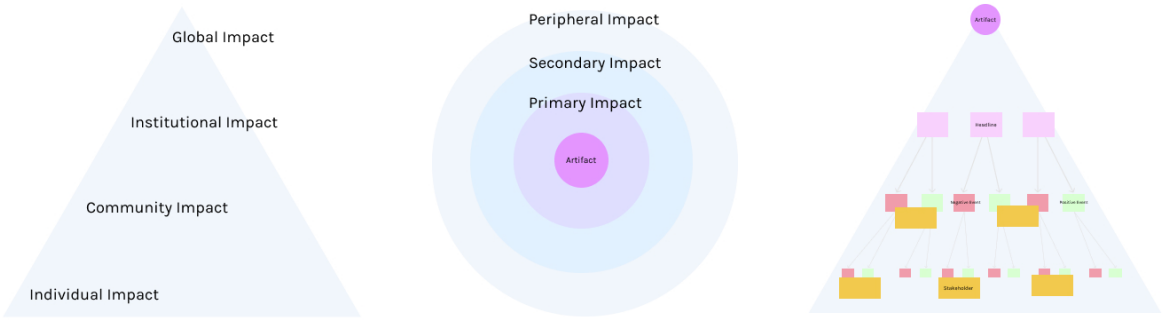

Figure 3: The pyramid (left) follows the trophic pyramid metaphor (the trophic level of an organism is the position it occupies in a food web). This design was created to emphasize how stakeholders may vary in their size and power. Meanwhile, the concentric design (center) served to depict how artifacts may effect certain stakeholders more directly than others and how this impact may reveal power relations between stakeholders. The prototype (right) was an early design of what Timelines would look like once completed. Participants would create three initial headlines, and then they would create a negative and positive headline that followed each one. Then, they would map which stakeholders were involved with a certain headline wherever applicable.

Later iterations combined the left-to-right presentation of time from the futures cone, but the different areas on the cone represent different storylines or "timelines" that might occur (rather than more or less plausible futures) (Figure 5). This representation worked the best for us since it provided flexibility for participants to imagine multiple storylines while maintaining a chronological structure. We name this activity board the Timelines triangle.

3.3 Facilitation and Iteration

Over the course of 12 months from late 2018 to late 2019, we playtested iterative versions of Timelines with different groups and in varying environments. We developed this activity based at an academic institution in Northern California, with geographic proximity to the San Francisco Bay Area and Silicon Valley. The institution is connected to the technology industry through training students and practitioners who go on to work in the technology industry, and by conducting research in collaboration with industry partners. These proximities mean that we had opportunities to facilitate this activity among students training to go into the technology industry as well with academic technology researchers. Furthermore, our positionality in this institution helped us recognize the interconnected relationships between industry technology practice, academic research, and teaching. As such, we sought to create an activity that could be legible and accessible to all of these communities, and used in these settings.

Thus we conceptualize Timelines as an activity that can shift between educational, practice, and research purposes, helping participants engage in different processes including reflection, critique, learning, and sense-making. We have facilitated Timelines in a variety of contexts and settings, including:

- As an educational activity in two graduate-level courses relating to social aspects of technology;
- At multiple academic conference workshops that focused on thinking about privacy or ethics in emerging technologies;
- With an interdisciplinary university research lab studying sensing technologies to help them reflect on the implications of their research;
- With masters students in an information technology program as research participants to understand how the activity helps them surface and discuss values issues.

After the sessions, we (the authors) would debrief, discussing facilitation techniques and possible changes that might be made to the activity. We found that iterating on Timelines with different groups enabled a wider range of dynamics, leading to more diverse reflections. For instance, our facilitation style shifted depending on which groups were participating in the activity. Throughout these sessions, we incorporated feedback to iterate on both the design of the activity and our facilitation strategies.

While we designed the activity to be used in settings where a skilled facilitator would be available (e.g., a design researcher, a UX designer on a product team, or an educator leading a class), we thought about how to distribute responsibility for surfacing discussion of values between the design of the activity and the facilitator. In early iterations of Timelines that used multiple activity boards, we designed mechanisms that might lessen the facilitator's role. For instance, we designed a 2x2 chart for participants to fill out when generating possible stakeholders (along a Direct/Indirect stakeholder axis and a Group/Individual stakeholder axis). Feedback from these sessions was that these charts felt too constraining, and we found that participants focused their energy on doing a "good" job filling out the chart. In contrast, discussion about potential ethical issues arose more freely without these constraints. We decided to design a more open-ended activity with only one activity board. The activity tasks would help surface initial discussions of values

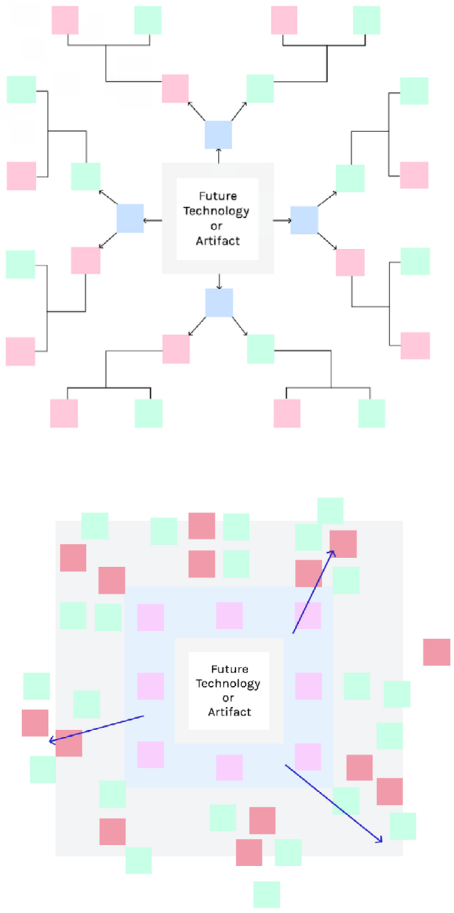

Figure 4: Early versions of the Timelines activity board represented time starting from a central "present" point, expanding outwards in different directions. One version is more structured (each event leads to two more), and one version is more open-ended.

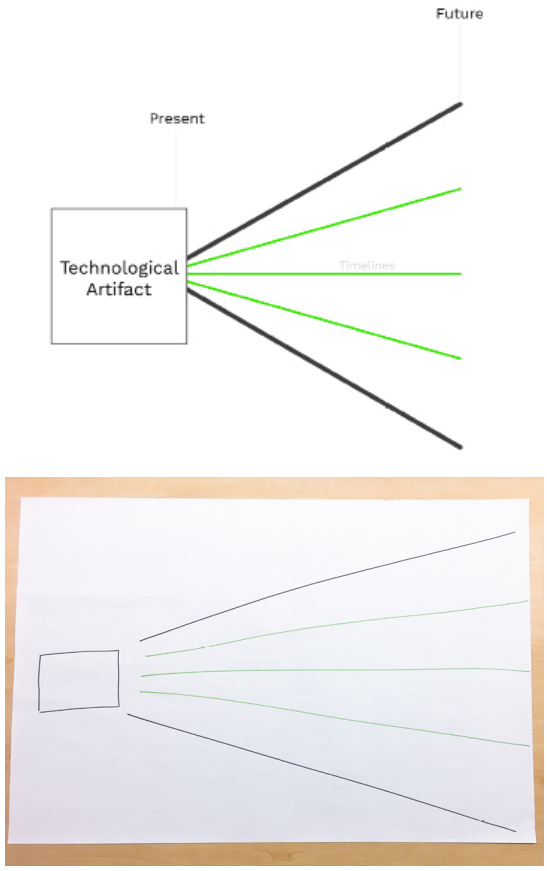

Figure 5: The final design of the Timelines triangle activity board (top). The left side represents the introduction of a new technology or artifact. Going towards the right, lines indicate different possible stories about the artifact as time progresses. Participants use a large version of the timeline triangle to create a storyworld around different ways an artifact gets used and adopted. The timeline triangle can be easily drawn on a large piece of paper or whiteboard, allowing the activity to be done in a wide variety of contexts (bottom).

and ethics, and the facilitator would be responsible for steering those discussions. We next present the steps of the Timelines.

4 INTRODUCING THE *TIMELINES* ACTIVITY STEPS

This section presents the steps of *Timelines*. [1] The main contributions of this paper are the activity itself, documentation of design decisions made in creating it, and our reflections on our role as facilitators; an analysis of the content created by participants and their experience doing the activity is beyond the scope of the paper. However, as an exemplar of how the activity might be used, we show the content created by one group of participants who provided their consent to share their experience of the activity. Each subsection starts by presenting an overview of the instructions given to participants for each step, followed by an example.

The high-level steps of the activity are as follows:

- **Step 1**: As a group, decide on an artifact—a technology, system, or feature—that you want to explore.
- **Step 2**: On index cards, brainstorm stakeholders—someone who is related to the artifact, either directly or indirectly.
- **Step 3**: Using sticky notes, brainstorm potential news headlines related to the artifact.
- **Step 4**: Take turns to place the headlines on the large shared timeline triangle to create stories of events related to the artifact.

[1] Naming the activity *Timelines* refers to the two main aspects of the activity: creating multiple stories and timelines using news headlines; and creating a "timeline" feed of social media posts from different stakeholders' perspectives.

- **Step 5**: Return to the stakeholder index cards from Step 2. Brainstorm possible social media posts from situated points of view of different stakeholders.
- **Step 6**: Share your social media posts, and shift into a broader discussion to reflect on insights from the activity.

We used the following materials to facilitate the activity:

- A large timeline triangle drawn on a large piece of paper or white board. For group facilitations, we used large 25 by 30 inch pads of paper or drew the triangle on a whiteboard. (Figure 5)
- Sticky Notes
- Index Cards
- Sharpies or markers

Prior to the start of the activity, we would set these materials up in the activity space, usually at a large shared table for participants. When participants arrive, we would seat them around the table. For larger groups, such as classes or large academic workshops, we would split people into smaller groups of about 4-6 people and run the activity in parallel with the multiple small groups.

4.1 Step 1: Choose Artifact and Context

We start the activity by telling participants:

> In today's activity, we will create a range of stories surrounding a system or artifact, and explore those stories from different viewpoints. The goal of this activity is to think about possible futures, and critically reflect on the social values implicated by emerging technologies by looking at a range of stakeholders, contexts, and uses. Our goal is to explore and reflect on possibilities; we are not predicting the future.

Participants then decide on an artifact—a technology, system, or feature—that they want to explore, and a social context where it might be used. Some groups may already have an artifact in mind, while other groups may need more time to brainstorm. Participants are instructed to write down their artifact and context on a sticky note and place it in the square on the left side of the triangle.

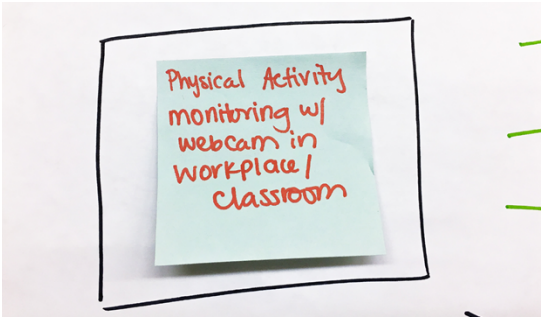

Figure 6: One group of participants decided to discuss a webcam that monitors a user's posture and physical activity in the workplace and in classrooms.

4.1.1 Example. One group of participants decided to discuss a webcam that monitors a user's posture and physical activity in the workplace and in classrooms (Figure 6). This was based on a prototype technology that the participants had seen at an event several months earlier. This group consists of three graduate students in a professional-oriented information technology program; one has had prior professional experience as a UX researcher at a software company.

4.2 Step 2: Generate Stakeholders

In the second step, participants individually brainstorm stakeholders for their artifact—someone who is related to the system, either directly or indirectly—and write them down stakeholders on index cards. In facilitating this step, we prompt participants to think about a variety of stakeholders, such as including individuals, groups, and institutions as stakeholders, or prompt them to include both direct and indirect stakeholders. The participants then share their brainstormed stakeholders with each other.

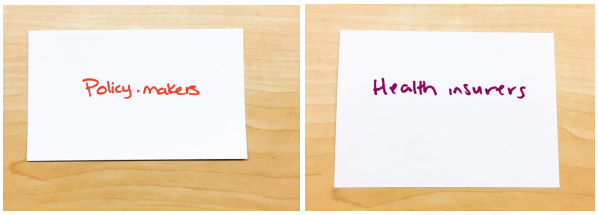

Figure 7: Sample stakeholders from participants, including policymakers and health insurers

4.2.1 Example. The participants in this example group thought of over 30 direct and indirect stakeholders, including: health insurers, medical providers, chiropractors, school boards, parents of students who might be subjected to the posture technology, students' friends, policymakers, employees at companies where the system is used, CEOs and C-suite executives at companies where the system is used, law enforcement, third party data purchasers, and rival technology companies (Figure 7).

4.3 Step 3: Brainstorm News Headlines

In Step 3, we ask participants to place the stakeholder index cards to the side for now; they will be used again later. Next, using sticky notes, participants individually brainstorm potential news headlines related to their artifact. When facilitating this step, we verbally prompt participants to consider creating headlines that portray both positive and negative events or positive and negative perspectives on the technology. We also suggest that participants try to have fun in creating a diversity of headlines, such as including blog post or clickbait headlines in their brainstorming.

4.3.1 Example. This group came up many headlines related to a posture camera app (Figure 8). These include:

- Posture is new form of authentication
- White, wealthy schools ban posture cams
- Kids who move are less successful in life
- How to train yourself to "sit rich"

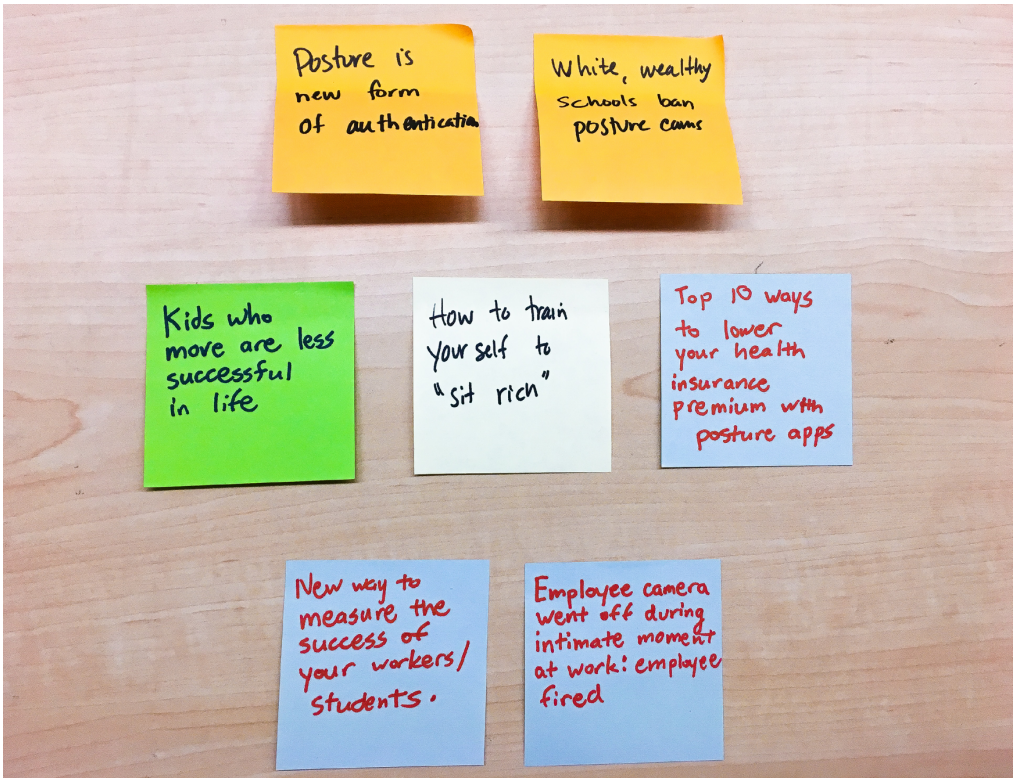

Figure 8: Headlines related to the posture-monitoring technology created by the group

- Top 10 ways to lower your health insurance premium with posture apps
- New way to measure the success of your workers/students.
- Employee camera went off during intimate moment at work; employee fired

4.4 Step 4: Place Headlines on the Timeline

In this step, participants share headlines with each other and take turns placing their sticky notes with headlines on the large shared timeline triangle (Figure 1, left). In doing so, they create multiple stories or chains of events related to the technology. Participants are also welcome to create new headlines and place them on the timeline triangle as the conversation progresses. When facilitating the activity, participants sometimes express concerns that the headlines do not form a single coherent story. We advise participants that having conflicting or non-congruous headlines is alright and even encouraged. We use this as an opportunity to point out that people's experiences with technology are multiple and uneven, particularly across different geographic, political, and demographic contexts. Reflecting these uneven (and sometimes conflicting or unsettling) experiences on the timeline is a useful feature. The timeline triangle thus allows participants to tell multiple stories about the same technology.

4.4.1 Example. The example group used their headlines to create different stories about the posture-monitoring technology (Figure 9). We refer to these as groupings of headlines, as the headlines do not necessarily follow each other temporally; rather they serve as a range of perspectives to paint a story around a theme that the participant group wanted to discuss.

One grouping of headlines explored how a posture monitoring camera might be used (or misused) in a variety of workplace situations, and what other data the cameras might collect.

- "Factory worker fired for bad posture - unsafe working conditions"
- "Teacher colleague fired for jokes captured on posture cam"
- "Employee camera went off during intimate moment at work; Employee fired"
- "I earned 6000 points for being a posture leader!"
- "Spoofing for the webcam"
- "Bonuses tied to posture score"
- "Work from home surveillance: 'So we know you're working'"

Another grouping of headlines reflected a conversation about how the posture camera technology might be adopted by schools and what debates might occur. Why might this system be appealing for schools to adopt? What types of schools might view the technology as intrusive surveillance?

- "Kids who move more are less successful in life"
- "No more standardized tests - evaluations based on physical productivity"
- "White, wealthy schools ban posture cams"

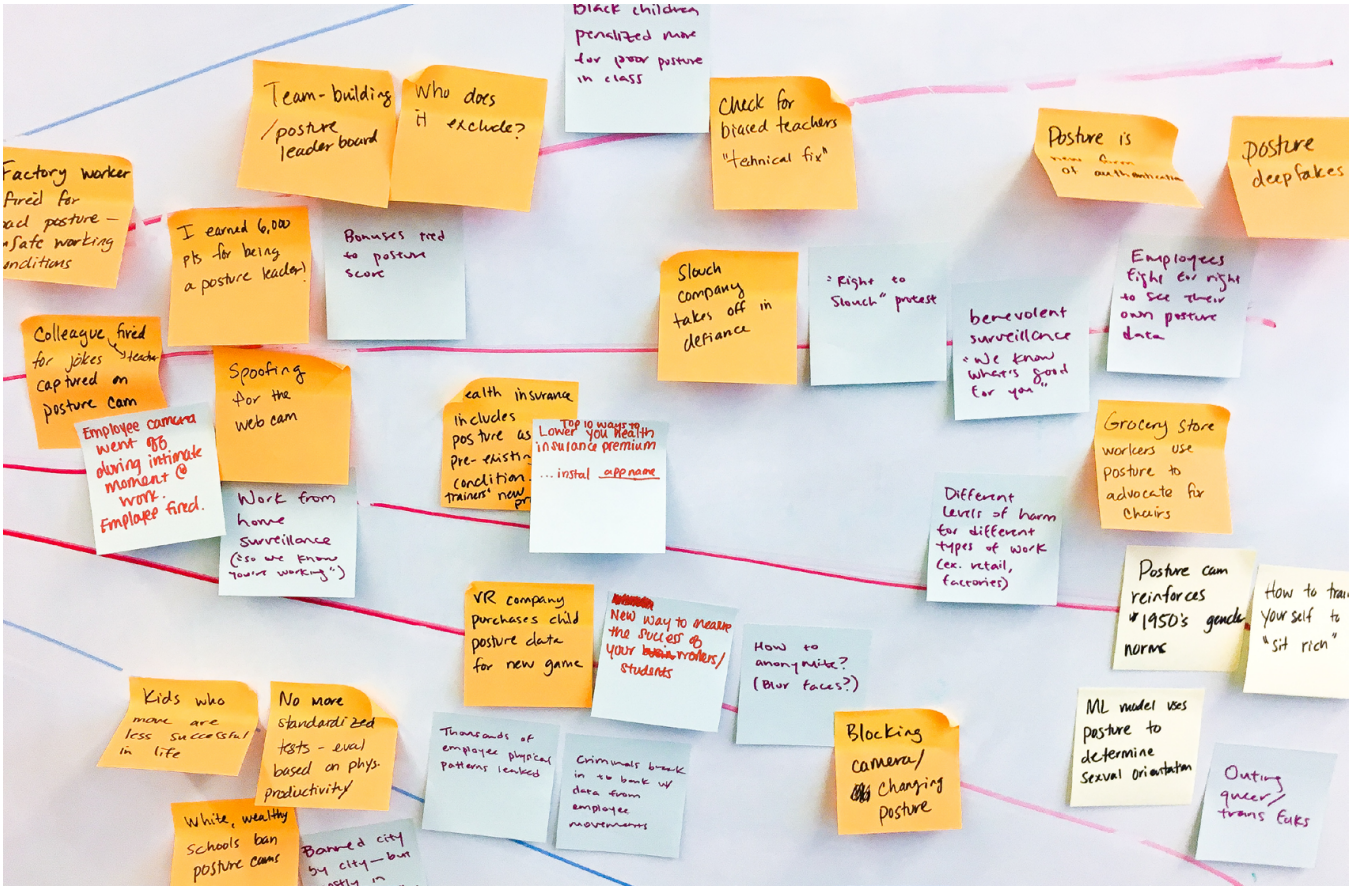

Figure 9: Example headlines about posture cameras grouped in different ways on the Timelines triangle

- "[Posture Cams] Banned city by city" - but mostly in white, wealthy schools

A third grouping of headlines reflected concerns about how the data collected by the posture camera might be re-used in new ways, misused, leaked, or cause harms.

- "Health insurance includes posture as a pre-existing condition"
- "Top 10 ways to lower your health insurance premium...install [Posture App Name]"
- "VR company purchases child posture data for new game"
- "New way to increase the success of your workers and students!"
- "Thousands of employees physical patterns leaked"
- "Criminals break into bank with data from employee movements"
- "How to annonymize [posture cams]"
- "Blocking cameras/changing posture"
- "ML Model uses posture to determine sexual orientation"
- "[Posture cams] outing queer and trans folks"

A last grouping of headlines tried to imagine ways in which the posture cameras might be resisted by some workers, but seen as useful by others.

- "Slouch company takes off in defiance"
- "'Right to Slouch' Protest"
- "Benevolent Surveillance: 'We know what's good for you'"
- "Employees fight for right to see their own posture data"
- "Grocery store workers use posture to advocate for chairs"
- "Posture cam reinforces 1950s gender norms"
- "How to train yourself to 'sit rich'"

4.5 Step 5: Create Stakeholder Social Media Posts

Participants return to the stakeholder index cards from Step 2. Now that participants have created a broad imagined world from the headlines that focuses on big events and shared changes, they can consider the events and changes in that world from the situated viewpoints of different stakeholders. Using sticky notes, participants create social media posts from the perspective of different stakeholders, and physically attach sticky note to a respective stakeholder index card. (Figure 1, right)

4.5.1 Example. In this example, a health insurer suggests that the posture app technology can usefully identify depression in children, while at the same time a parent sees the posture apps as a potential threat to children and celebrates when their child's school bans the

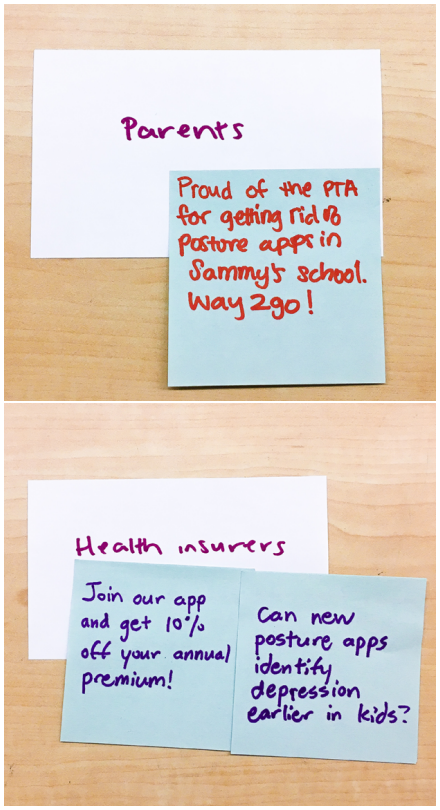

Figure 10: Example social media posts from Step 5

technology measuring children's posture (Figure 10). These reflect differing responses to the technology, and also raise questions about how different stakeholders might view values of health, surveillance, and autonomy in relation to the posture technology.

4.6 Step 6: Share-Out and Discussion

Participants then share their social media posts, and shift into a broader discussion to reflect on insights they have had throughout the activity based on a set of discussion questions we pose to participants. These questions include: What themes came up from this activity? What was surprising? What is missing from our stories? What aspects from the headlines and social media posts are already occurring today?" The questions ask participants to step back from the fictional world and begin to draw connections between the activity and their present practices.

4.6.1 Example. A common reflection we have heard from participants is that while the stories are fictional, they are surprised to find that the issues they discuss—such as inequalities, biased algorithms, or systems of power—are present in existing systems as well. This suggests that the activity can be useful for helping people reflect on their current technical practices.

Among the example group, the participants' reflections spanned many topics and perspectives, including:

Highlighting conflicting perspectives. Responding to a participant's social media post expressing joy for a gamified version of the posture app, another participant said, "I had a similar one [social media post], but reverse. Like 'I was so points hungry that I got my co-worker fired for a posture game.' Like feeling guilty about it."

Figure 11: Participants discussing the activity in Step 6

Connecting to existing technologies and issues. A participant reflected that "I would be most concerned about [...] the disproportionate effects that it will definitely have with low income people of color [...] it has very similar parallels to facial recognition."

Debating how technologists might address potential harms. Participants discussed how they might apply the reflections from the activity in a professional work setting. "Do you [as a user researcher] say like [...] 'the harms outweigh the benefits of this technology and so I don't support it'? [...] Or 'It's better to understand all of this [potential risk] [...] and try to think about how you might from a technical perspective make sure that like images or pieces of identifying information are stored in particular ways.'

5 REFLECTIONS ON THE DESIGN AND FACILITATION PROCESS

Timelines was designed to assist in values advocacy, to help participants recognize values and ethics as relevant to their own (technical). In this section, we reflect on how specific design decisions were theoretically informed, and we reflect on our role as facilitators which emerged as an important mechanism in helping move participants towards these goals.

5.1 Reflections on Design Decisions

As noted in Section 3, we had four primary design goals. Each goal is addressed through the design of different activity steps:

(1) Recognize how values are situated and differently experienced: Creating stakeholder social media posts (Step 5) and the ending discussion (Step 6) help surface multiple viewpoints and experiences of values.
(2) Identify direct and indirect stakeholders: Through the brainstorming of stakeholders (Step 2)
(3) Create rich fictional worlds in an approachable way: Creating new headlines (Step 3) and social media posts (Step 5) asks participants use familiar everyday forms to create fictional worlds
(4) Think about broader, shared, social effects related to new technologies: Creating stories through news headlines (Step

3) and timelines (Step 4) helps participants contemplate broader long-term effects.

We provide further reflections on our design decisions, organized by activity step.

5.1.1 Choosing an Artifact. The choice of artifact allows for flexibility based on different settings. Participants do not need to necessarily choose a real artifact, or the specific product they are working on for several reasons. One goal of Timelines is to create a space for participants to engage in critical reflections about technology without feeling defensive about their own work, and focusing on a "fictional" product, or an analogous product with some comparable features, can help facilitate this. Alternatively, participants might wish to analyze or critique an emerging technology for policy-making or research purposes, or review a competitor's technology product. Groups more comfortable with critical reflection might find it useful to choose an artifact or product they are working on or are more closely familiar with.

5.1.2 Generating Stakeholders. The design of this step draws on a range of theoretical literature. Asking participants to think about stakeholders beyond direct users users draws on value sensitive design's focus on direct and indirect stakeholders [25]. HCI research has also identified how relationships beyond "use" [7] provide opportunities to consider how values can be (re)inscribed in technologies and how harms can emerge. This includes considerations of non-use [8], abuse [22], maintenance and repair [21, 30], regulation [32], and re-appropriation [40]. Considering relationships beyond use when generating stakeholders can help surface questions such as "What forms of work or types of social and technical infrastructures might be necessary to maintain a system across time? Who does this work, and how is it valued (or not)? ... What alternative, and potentially adversarial, relationships might people have with a speculative artifact?" [63]. This step is intended to help participants start thinking about similar questions, though a facilitator can also explicitly ask these questions to participants.

This step is placed second, as in our experience participants found brainstorming stakeholders before headlines easier than the other way around. It also serves as a warm-up brainstorming activity. While we do not explicitly ask participants to use the stakeholders when creating headlines, some participants do use their stakeholders for headline inspiration.

5.1.3 Creating News Headlines and Creating Stories. The goal of the headlines step is to try to avoid creating hyperbolic dystopic or utopic visions of the future, but instead focus on everyday outcomes that can be both partially positive and negative [64]. As a design form, news headlines provide an accessible form that most people are familiar with. This adds to the activity's lightweight nature, allowing it to be deployed in many groups and settings, as it does not require special design expertise. We emphasize this familiarity in the facilitation by suggesting that participants might consider clickbait headlines and other styles that they might be familiar with, in addition to "serious" headlines. News headlines also help participants think about potential large-scale events and shared effects of technologies.

Putting the news headlines into chains of events to create stories draws inspiration from several sources. One source is the scenario planning "implications wheel" activity [17]. The activity asks people to think of a positive and negative effect of a technology, then a secondary positive and negative effect following each of those, and so on. This helps surface secondary and tertiary effects, and creates worlds that are neither fully positive nor fully negative. Thus we emphasize that participants create stories that include both positive and negative headlines. When participants raise concerns about potentially conflicting headlines, we use that as an opportunity to prompt participants to think about the multiple (and conflicting) ways that a technology may get experienced or adopted.

A second source is design fiction's exploration of possible worlds through stories [10] and world-building [14]. The headlines each act as a different entry point into the fictional world of the artifact, highlighting a different event, conflict, or perspective. Organized into chains of events, the headlines begin to tell multiple narratives and stories about the artifact.

5.1.4 Creating Social Media Posts. While news headlines depict events that reflect broader societal-level changes related to the technology, writing social media posts authored by stakeholders asks participants to consider the situated subject positions and experiences of different stakeholders. By moving from stakeholders (micro-level) to headlines (macro-level) to social media posts (micro-level), participants must look at their fictional world at multiple scales or levels. Recognizing research that shows how values are experienced in specific, situated contexts [33, 38], and critiques that design futuring often creates worlds from privileged perspectives [58], this step asks participants to look at the world they created from a broader range of perspectives. This surfaces different and potentially conflicting ways that stakeholders might interact with or be affected by the same artifact.

While social media posts allow for a short amount of text, and acknowledging that stakeholders relate to social media in very different ways, they nevertheless provide a format familiar to most participants. This familiar form provides an entry point for participants to begin having deeper discussions about differential experiences and impacts of technology.

5.2 Facilitation Reflections

We designed Timelines to be deployed where a facilitator is available, such as a UX professional guiding a team, or an educator teaching a technology and ethics class. While the design of the activity steps and instructions help provoke participants' discussion, the facilitator serves to steer this emergent discussion.

While we tested Timelines in many settings, we only obtained permission to analyze and share data from a few participants. Section 4 presented some of this data as exemplars, but we do not draw conclusions from this small dataset, which is a limitation of this paper. However, we take this opportunity to explicitly reflect on our roles and experiences as facilitators of Timelines to provide insight and guidance for future facilitators of the activity.

5.2.1 Creating a Generative Space (with Constraints). One common thing we found ourselves doing as facilitators was trying to create a open and generative space where participants would feel comfortable brainstorming and thinking about new ideas, while

providing constraints so that values and ethics issues of technology still remain at the core of the activity.

For instance, when facilitating earlier iterations of the activity, we had participants choose an artifact without defining a context of use. Sometimes this led to talking about the artifact an abstract or generic way. Making participants include a context helps emphasize thinking about values in specific, situated circumstances.

Over multiple iterations of facilitating, we found that splitting most steps into an individual brainstorming stage and group sharing stage allows individuals to self-select what they want to share with the group. Earlier iterations did not include time for individual brainstorming, but participants felt that this created social pressure to come up with a "good quality" stakeholder to share with the group. This also helped people who were resistant to coming up with ideas to have some time to think. While facilitating, we tried to notice if certain people were dominating the conversation. In these cases we would prompt "go arounds" where each participant would contribute an idea, involving more voices.

Using a large shared collocated space for the activity (e.g., a large table) allows participants to sort and group their stakeholder index cards when they share them. We allowed participants to share, sort, and organize stakeholders in a way that makes sense to them. In earlier versions, we asked participants to order stakeholders in various ways (e.g., from more individual-based to group-based ones, or from more direct to more indirect stakeholders) but participants found this over-constraining. Allowing participants to self-sort the cards allowed them to see new relationships among the stakeholders.

Similarly, headlines do not need to be placed in a strict chronology. Placing them roughly in a logical order provides a useful, but flexible, way to group the headlines and helps elicit discussion of secondary and unanticipated effects. An earlier iteration enforced a strict order of headlines which participants found too constraining, while another iteration required no ordering which made it difficult to surface secondary effects.

5.2.2 Moderating Between Dystopia and Utopia. The design of the headlines steps are intended to help participants explore the multiplicity of relationships and effects related to technologies. It was our intention to avoid the creation of fully dystopic and utopic worlds, as these hyperbolic extremes "muddle the banality of more probable outcomes" [64]. Some groups that we facilitated the activity easily thought of many negative headlines, but had trouble coming up with positive ones. To move participants away from creating purely dystopic worlds, we found it useful to introduce the verbal prompt "positive and negative for who?" Often when harms and negative outcomes occur, there is another stakeholder (often in a position of power) that obtains some benefit. Asking participants this prompt is not meant to suggest that harms are offset by benefits, but rather provides an opportunity to get participants to think about multiple subject positions.

Furthermore, encouraging participants to create a positive headline often elicits discussion of unanticipated or unintended negative effects that might follow, which would not necessarily arise from a purely dystopic world (such as how a well-intentioned public health technology can lead to unequal health outcomes). Prompting participants to create more complex storyworlds where benefits and harms of technologies are unevenly shared helps convey how harms can arise from everyday choices in the design, deployment, and adoption of technologies; it does not require a dystopia to identify harms stemming from technology design and use. Framing values and ethics as embedded in everyday decisions, helps us connect the participants' fictional stories to their own everyday practices.

5.2.3 Prompting Reflection. Throughout the activity, we found it useful as facilitators to explicitly prompt participants with reflective questions to try to expand their thinking. For instance, we might explicitly prompt participants with some broad suggestions during their brainstorming, such as asking "have you considered an adversarial stakeholder?" or "have you thought about people who are indirectly affected by the system?"

We developed a playbook of responses to common questions or concerns raised by participants that could prompt additional reflection among participants. For instance, multiple participants across different groups raised concerns that their group's news headlines did not form a single coherent story. We use this concern as an opportunity to point out that people's real experiences with technology are multiple and uneven, particularly across different geographic, political, and demographic contexts. Depicting these uneven (and sometimes conflicting) experiences on the timeline is a useful reflection. We advise participants that having conflicting or non-congruous headlines is alright and even encouraged, to tell multiple stories about the same technology.

The ending discussion serves as an opportunity for participants to draw connections between the fictional world created in the activity and their everyday day practices. While the main activity steps (Steps 1-5) help create an open space where participants can suggest new alternative ideas, this step allows facilitators to explicitly do values advocacy work, prompting participants to articulate how consideration of values, ethics, and politics is relevant to their own technical design and research practices.

6 DISCUSSION

Timelines provides a useful integration of several perspectives for thinking about values and ethics in technology. The world-building activity helps participants think about both macro-level broadly shared effects, as well as multiple micro-level situated experiences. To allow Timelines to be facilitated in a wide range of settings, we designed the activity to be lightweight in terms of its materials, and conceptually accessible to a wide range of potential participants by having them create mundane but familiar everyday artifacts—headlines and social media posts.

Compared to existing activities and methods, Timelines shares some similarities with value sensitive design methods like value scenarios [45] in that both highlight the situated experiences of indirect stakeholders and longer term (unintended) effects. Creating chains of news headlines shares similarities with scenario planning activities [17] which surface secondary and tertiary effects. Timelines adds a notion of plurality and multiplicity to these practices by drawing on design fiction's ability to create rich fictional worlds. The multiple headline story chains and social media posts created by participants occur within the *same* fictional world, but they do not need to neatly fit together. Design fiction allows the same storyworld or lifeworld to be shown from different perspectives and entry points [14, 63]. This aspect of the activity helps participants

recognize how situated experiences of the same technology may differ or be contradictory. As stories created in the activity are put in tension with one another, an uneasiness can emerge that creates space for critical reflections. This multiplicity and incongruence disrupts the idea of a singular perfect future, instead surfacing discussion that can lead to critical reflection on ethical issues.

Following the critical, speculative, and adversarial framing of design fiction [6], the focus when deploying Timelines is on how the creation of an imagined world can lead participants to critical reflection, rather than the aesthetic or narrative quality of the fictional world. The participatory and reflective aspects of Timelines build on Kozubaev et al.'s calls to use design futuring to "engage with the real world," and to consider "how design futuring generates new knowledge." [36]

The Timelines activity steps can be adapted to incorporate other values in design tools, stitching them together in new ways. For instance, to structure the brainstorming of diverse stakeholders in Step 2, facilitators might consider having participants use tools like the value sensitive design Envisioning Cards [23], or drawing on characters from popular fiction [11]. If facilitators want to explore particular social values, conceptual and theoretical frameworks can structure the creation of social media posts in Step 5. For instance, in one session of Timelines at a privacy research workshop, we asked participants to use Solove's taxonomy of privacy harms [57] and incorporate a privacy harm into each social media post.

Timelines' use of headlines and social media posts may at first appear as similar to marketing practices. This (surface level) similarity is intentional. In part, utilizing these everyday and mundane forms can make the activity more accessible to participants. Moreover, tactically, the activity's similarities to marketing practices may help facilitators and values advocates reach out to a broader range of participants. For instance, a values advocate might get more buy-in from corporate participants if the activity looks like it is about creating new headline reactions to products. However, Timelines is committed to a different set of politics than the commercial and public relations orientations of marketing activities. The goal of the activity is not about creating future worlds that are most easily marketable or achievable. By introducing indirect stakeholders, misuses, and long term effects, it instead directs participants towards critical reflection and discussion about values, ethics, and power.

At the same time, **the activity is partial as a design intervention**—it requires labor in facilitating (likely done by a values advocate), as well as labor in doing work to keep conversations going beyond the length of the activity. Furthermore, while Timelines helps with the work of centering values and ethics as important considerations, it does not necessarily make broader critiques around the economic frameworks of corporate technology production. The critiques that Timelines helps participants create are also focused on forward-looking stories. While participants connect their stories of the future to dynamics that are occurring in the present, the activity does not necessarily highlight the longer histories of values and ethical problems related to technologies. Future work may consider how to extend or re-appropriate Timelines to examine historical stories of technological politics, perhaps by having participants craft multiple stories about the past instead of the future.

At the same time, considering Timeline's partialness suggests potential tactical uses in introducing it into settings of technical practice. It is perhaps unlikely that Timelines will be integrated into everyday design processes in the technology industry. While relatively lightweight and short, adding another step into a design process faces barriers given economic and temporal pressures. While many values and ethics toolkits focus on introducing design interventions into the design process, that is not the only site of intervention in technology design. Rather than trying to get organizations to adopt this design activity into their design and development processes, designers and researchers might think more tactically about how design activities like Timelines can be used to empower values advocates' social, organizational, and educational work across a range of settings and contexts.

Within a corporate practice setting, a values advocate might make this activity legible to the broader organization by framing it as a type of "design thinking" exercise, tactically making use of the often seductive and appealing rhetoric of "design" [31, 54]. The activity's language of design and use of materials like sticky notes and markers, at a surface level, aligns with "design thinking" techniques. And the activity's use of headlines and social media posts make it familiar to people who may already be concerned with reputational risk and public relations. A values advocate facilitator can take this interest in "design thinking" and slightly subvert it to integrate more reflexive and critical thinking about values and ethics among participants.

These reflections suggest that designers of future values- and ethics-oriented design interventions should explicitly consider the role and work of the facilitator. While values oriented design toolkits are often viewed as immutable and mobile artifacts that have the agency to provoke reflection on values and ethics, our reflection on Timelines highlights the importance of having a facilitator work with the design artifact to advocate for values.

7 CONCLUSION

Timelines serves as an activity to help values advocates' work, creating a space for participants to propose and surface discussion of values, ethics, and politics related to technology. Timelines provides a useful integration of several theoretical perspectives for thinking about values and ethics in technology, drawing on practices from values in design, value sensitive design, design fiction, and scenario planning. The activity also makes use of everyday, familiar forms—news headlines and social media posts—and is lightweight in terms of materials in order to be facilitated in a wide range of settings with diverse groups of people.

Moving forward, the Timelines activity can be utilized in different ways by researchers, educators, practitioners, and other values advocates. For instance, it might be used as an educational activity with technical students, as a training activity in an industry setting, as a probe to understand stakeholder concerns in research, or as a way for policymakers and non-technical stakeholders to think about values in emerging technologies. Timelines alone will not solve values and ethical issue, nor should the activity's stakeholder exploration be viewed as a replacement for empirical research with real stakeholders. However, it can be a potentially useful tool in a values advocate's toolbox. By being adaptable, such as being able to focus on specific values or being able to integrate other existing toolkits and frameworks, Timelines serves as a lightweight activity

that can be used in many settings to surface and elicit discussion of values and ethics related to technology development and use.

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