Stakeholder-Informed Prioritization (SIP): A Technique for Quickly Gauging Research and Design Priorities

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Abstract

As technology plays a growing role in children's lives, incorporating their perspectives is crucial for shaping future research and design. This paper introduces a lightweight technique, called Stakeholder-Informed Prioritization (SIP), designed to help child-involved groups quickly get informed about and prioritize research and design directions. We demonstrate the use of SIP through a case study focused on Virtual Reality (VR), a technology that is rapidly gaining popularity among younger users but remains underexplored from their point of view. We piloted SIP with 34 groups of children (aged 8 to 18) and their families during a community event. Our results show that participants in these groups can successfully complete SIPs and are generally satisfied with the results.

CCS Concepts

• **Human-centered computing** → **HCI design and evaluation methods**; **User studies**.

Keywords

Children, Focus Groups, Research Technique, Prioritization

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1 Introduction

Today's technologies are increasingly integrated into children's daily lives and continue to evolve. Involving children in research and design processes is essential for shaping research directions and defining design spaces that reflect their needs, perspectives, and preferences [19, 45]. Participatory design (PD) is a mainstream approach in the community of interaction design and children (IDC) that actively involves children as end-users in the design and research process [41]. Unlike approaches that treat end users as passive informants, PD emphasizes co-design, empowering children to actively contribute ideas, provide feedback, and collaboratively shape design outcomes at every stage of the process, and as stakeholders, be informed in the process [11]. However, children may have limited influence on research priorities. Their involvement is often confined to providing feedback on existing topics or prototypes, rather than helping determine what should be designed or studied in the first place [20, 46].

Many existing stakeholder-informed prioritization methods or techniques can be used in the PD process, such as focus groups, interviews, and card sorting, which present challenges when applied to children. These methods or techniques often rely on structured deliberation, ranking tasks, or consensus-building exercises that may be difficult for children to navigate [40, 51]. Additionally, power imbalances in intergenerational settings can unintentionally sideline children's voices, leading to decisions that do not fully reflect their perspectives [10, 46]. Children's attention span, cognitive development, and ability to express abstract thoughts further pose challenges for traditional approaches [17, 53], often requiring additional support to engage them in decision-making processes [47].

This paper contributes to the growing area of children-informant and participatory-based methods in IDC by proposing a new technique—Stakeholder-Informed Prioritization (SIP)—designed to complement traditional prioritization approaches by enabling children to quickly gauge research and design priorities. SIPs are structured group activities that engage participants, especially children, to collaboratively share their input early in the process, even before research or design directions are defined. In this paper, we provide a detailed description of the SIP technique and present a case study using Virtual Reality (VR) as an operational example. We piloted SIP with 34 child-involved groups (N = 94) at a large community event. Our preliminary results show that participants aged 8-18 can successfully complete two SIPs in 15 minutes and are generally satisfied with the results.

2 Related Work

2.1 Child-Informed Prioritization Research

Child-informed prioritization refers broadly to consulting with children, who are directly impacted by the technologies or designs being considered, to shape future research and design decisions. In other words, it refers to engaging with stakeholders to determine priorities for future innovation. Prioritization is an implicit goal in many current participatory design methods for children [14, 42]. For example, Fictional Inquiry [8, 22] and focus groups [47] have the potential to be adapted for prioritization or requirements gathering. However, like participatory efforts generally, prioritization with children has its unique challenges. A primary consideration in child-informed prioritization techniques is that engaging stakeholders is often laborious and time consuming [21]. This limitation is exacerbated when working with children, who have unique norms, communication styles, and complexities [11, 13]. Therefore, we build on the specific subset of rapid prioritization techniques. For example, Mahyar et al. [30] successfully engaged the general public by designing online "micro-tasks" (10 minutes per person). These rapid techniques offer a useful foundation for engaging children with short attention spans. Inspired by a similar idea of keeping activities short and engaging, co-design work with children often involves short (15 - 45 min) tasks completed over the course of a longer session or project [25, 52, 57]. Similarly, Walsh et al. [55] successfully solicited rapid evaluation from child participants using a line judging technique. However, most techniques are applied after a specific research/design question has been identified, rather than being involved before that, gauging the priorities of those questions. When working with children, it is important to take into account their shorter attention spans, which requires rapid and engaging child-informed prioritization activities [19]. We build on participatory efforts by proposing SIP, an in-person rapid prioritization technique specifically for collaborating with children. We situate our technique in terms of Walsh et al. [54]'s parameters to highlight how we balance rapid tasks with meaningful child engagement.

2.2 Group-based Methods in Child-Computer Interaction

Group-based methods focus on small, targeted groups of individuals who contribute more specialized insights. Those groups can take on various roles throughout the different stages of the research process. One such role is that of the informant, a crucial role in the discovery of novel insights rather than confirming existing assumptions [44]. Thus, they can contribute to systems, interfaces, or research at the beginning stage to shape the research direction without limiting their feedback to reactions rather than initiating ideas such as the conventional user-centered approach [11, 28]. Commonly used group-based informant methods in HCI include group interviews [3], workshops [16, 29], and focus groups [38, 47]. Although those methods differ in how they structure engagement and facilitate participant interaction, they are flexible data-gathering techniques that can take various formats, sometimes overlap or be used in combination, sharing a common goal of discovery and exploration, particularly when little is known about the topic of interest [3, 33]. For example, an informant focus group typically involves 6-12 participants discussing a topic set by the researcher [15, 50], who also acts as a facilitator to guide the conversation [32, 33]. Informant focus groups have proven successful in child-computer interaction research. For example, Simko et al. [47] explored a playful focus group style for eliciting mental models and values from children. Traditional group-based methods often involve children only after research or design directions have already been established, limiting their influence on shaping research questions or setting priorities. SIP addresses this challenge by providing a structured technique that enables children to actively participate in prioritizing research and design directions at an earlier stage.

3 Proposed Technique: Stakeholder-Informed Prioritization (SIP)

SIP is designed as a rapid technique that can be incorporated into various contexts to involve stakeholders to shape research priorities, whether within structured settings (e.g., research lab) or large-scale public environments (e.g., museums, state fairs). The speed and flexibility of SIP make it particularly useful for studies conducted at public events, where sustaining children's engagement in research can be challenging as it accommodates (1) children's limited attention spans, which make lengthy research activities impractical, and (2) the presence of parents or guardians, who often prioritize engaging in event activities over committing to extended research participation. In this section, we first introduce how SIP was developed and situated in the existing PD technique framework, then outline the step-by-step process of SIP.

3.1 Developing a New Technique based on PD Techniques Framework

A wide range of techniques have been applied to gather requirements from children. These include interviews, observations, focus groups (e.g., Would You Rather [47]), questionnaires, photo diaries, card sorting tasks, story writing, and line judging [10, 35, 44, 55]. Our technique focuses on the challenge of engaging participants in a short time frame while focusing on shaping research directions rather than simply answering predefined questions.

Walsh et al. provide a structured framework for developing techniques [55] that support children's participation in design. Building on this foundation, we identify key dimensions for designing a prioritization technique that enables children to actively influence research directions (see Figure 1): **Partner Experiences** (1): SIP is designed to work with participants who have little to no prior experience with participatory design or the technology in focus. It enables immediate participation, allowing even individuals "off the street" to engage meaningfully. However, since SIP requires participants to collaborate in small groups to discuss a new technique and understand each alternative to prioritization, it requires extensive prior knowledge of technology, collaborative skills, and literacy

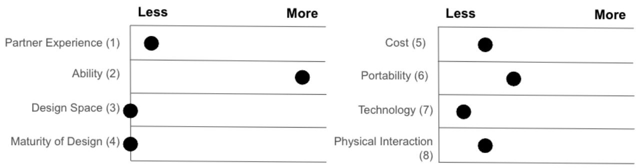

Figure 1: Situating SIP in the eight dimensions of the PD technique framework [55].

skills, so the **Ability** (2) is high. **Design space** (3) and **Maturity of Design** (4) should be situated before the design space is defined. It operates "off-the-scale early," providing insights even before the specific elements of the design are identified. Additionally, we hope that the implementation of the technique has low **Cost** (5), sufficient **Portability** (6) for flexible setup, and minimal **Technology** (7). This adaptability enables its use in diverse environments, from public gatherings to smaller-scale meetings, with minimal logistical requirements. By minimizing the technological barrier, SIP enhances inclusivity and supports deployment across diverse environments. **Physical Interaction** (8) is considered low-to-moderate for this technique, as excessive physical interaction may not be feasible due to the limited space often available in public settings. Children can actively engage with tangible artifacts, standing and gesturing to collaboratively prioritize alternatives to foster group engagement and supports collaborative decision-making.

3.2 SIP as a Technique

An SIP is carried out as follows:

- **Step 1: Identify Alternatives.** The research team should identify the salient alternatives for prioritization based on prior empirical engagements or insights. For example, to inform our SIPs about Virtual Reality (VR) technologies in the home, we consulted prior qualitative work where families identified important areas of uncertainty about VR [23, 24, 26]. The alternatives could also be a direct outcome from a traditional co-design or cooperative inquiry process with a small group of children as stakeholders. If insufficient prior work is available to identify alternatives that are meaningful and comprehensive, researchers should carry out such formative work. It is important to limit alternatives to no more than ten, as too many options can increase the decision-making burden, which could reduce the engagement of stakeholders [12]. If there are more than ten alternatives, the process can be broken into multiple SIPs (e.g., as we do in our study to discuss empirical vs. engineering priorities).
- **Step 2: Identify Recruitment Strategy.** SIPs are meant to provide a diverse perspective on stakeholders' priorities and should be deployed with enough groups to achieve a meaningful sample and data saturation. Since a single SIP can take as little as ten minutes, it can be deployed without overwhelming stakeholder burden in a physical or virtual space where stakeholders gather. For example, in our study, we deployed in a local research facility at the Minnesota State Fair (Figure 2). In other contexts, SIPs could be deployed in the first minutes of an existing meeting or during a break from another event.
- **Step 3: Create Materials.** Alternatives should be represented as movable artifacts which also allow stakeholders to add new alternatives. The specific instantiation will depend on the recruitment strategy. For example, in an SIP delivered in an existing online meeting, alternatives may be represented as notes on a digital whiteboard (e.g., [27, 31]), and participants should be encouraged to add additional notes. With an in-person recruitment strategy, physical artifacts offer good affordances for group interaction. For our SIPs, we created printed magnets for pre-selected alternatives and magnets with a dry-erase front to jot new alternatives during the group session.
- **Step 4: Collect Data.** Recruit stakeholders into groups of 2-5 participants. Each group is tasked with evaluating the alternatives, positioning them in relation to one another on a physical or digital whiteboard (e.g., higher on the board if it is of higher priority, with ties allowed). If an important alternative is missing, they may add it to the set and position it. The discussion process should be recorded for transcription, and the final ranking arrangement should be captured for analysis.
- **Step 5: Analyze.** An SIP yields two forms of data: discussion transcripts and alternative rankings. Discussion transcripts can be analyzed using standard data-driven thematic analysis methods (e.g., [4, 7]). Alternative rankings can be analyzed quantitatively (e.g., [2, 27, 58]). Each SIP group generates an ordinal rank for each alternative. Aggregated descriptive results for each alternative can be presented using median and interquartile range (IQR). If relevant, comparisons between multiple alternatives or between multiple sets of groups can be made using ordinal-appropriate methods such as the Mann-Whitney U test [43]. Qualitative and quantitative data may be used together to interpret the results.

4 Operationalizing SIP: A Case Study in VR Ethics for Children

To illustrate the feasibility and operationalization of the SIP technique in practice, we conducted a case study focusing on children's priorities regarding VR ethics in home settings. We used SIPs to investigate VR research and design priorities of children and parents. Drawing from prior qualitative studies exploring family perspectives on VR ethics and considerations [24, 26], we identified 18 salient issues requiring prioritization. As this is too many for a single SIP, we divided the alternatives into nine key empirical directions and nine engineering/design directions across two SIPs (see Figure 3). Each identified alternative was physically represented as a custom-printed magnet, facilitating tactile interaction and ease of group collaboration. Additionally, we provided blank magnets with a dry-erase surface, enabling participants to propose and incorporate new priorities not initially identified by the researchers. Participants collaboratively ranked these magnets by positioning them on a physical whiteboard.

The SIPs were operationalized over three consecutive days at the Driven to Discover research facility at the Minnesota State Fair.

Figure 2: Participants (masked white) are ranking categories in the SIP session. A researcher (masked blue) is monitoring the process.

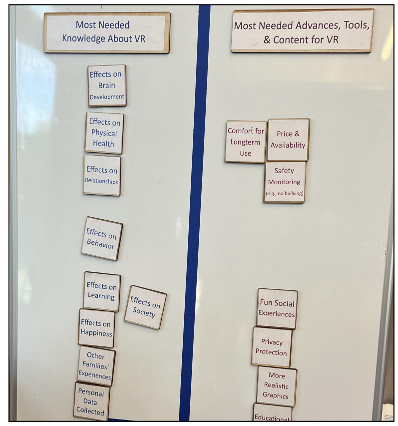

Figure 3: An example board for SIP Activities.

Recruitment occurred organically as families visited the event, inviting children aged eight years and older along with their guardians to participate. Participants gave their informed consent or assent, as appropriate, viewed short scenario-based videos that illustrate potential VR use cases at home [26], and subsequently participated in SIP group sessions lasting approximately 15 minutes. Researchers audio-recorded sessions, documented observational notes, captured ranking boards, and facilitated timely completion of tasks. After SIPs, researchers distributed a paper questionnaire, which included three statements using a 5-point Likert-type scale from "strongly disagree" to "strongly agree": (Q1) I felt comfortable sharing my thoughts with my group; (Q2) My group helped me consider issues in a new way; and (Q3) I am satisfied with the final results. After completing the study, participants were offered a backpack or toy as compensation.

We successfully recruited 94 participants in 34 groups, comprising 29 adults and 65 youth. Participants were recruited into groups of 2-5 members with an average group size of 2.752 (SD = 0.82). Among the parents who reported age, the mean age was 47.0 (SD = 10.3). For parents who reported gender, there were 14 females and 14 males. Among those who reported ethnicity, 22 identified as white, 4 as Latinx and 3 as other ethnicities. Youth participants, who reported age, had an average age of 13.4 (SD = 3.1), with 30 females, 29 males, and 2 identifying as another gender. Of the children who reported ethnicity, 44 identified as White, 1 as Black, 5 as Latinx, and 11 as other. Overall, these are fairly representative of the composition of the state in which the research was conducted.

Our recruitment results show a reasonable effort-to-participant ratio. Across the groups, we observed that participants were able to meaningfully discuss and negotiate their rankings of alternatives in two SIP sessions. Our preliminary results of the postactivity questionnaire showed that most of the participants expressed comfort during the discussions (Mdn = 4, IQR = 1), reported that the group helped them consider new ideas (Mdn = 4, IQR = 2), and were satisfied with the final results (Mdn = 5, IQR = 1). Details of the results of the rankings and qualitative data from the group discussion will be presented in future work.

5 Discussion and Future Work

We demonstrated that SIPs are feasible for quickly engaging a broad range of stakeholders, without imposing an overwhelming burden of time or effort on the participants. Participants generally agreed that they were comfortable sharing with their groups, considered issues in a new way, and were satisfied with the overall process. This provides initial evidence of a successful pilot of SIPs as a short-form technique to help researchers cast a wider net on children or family opinions. However, it is not meant as a replacement for in-depth methods such as semi-structured interviews [1], contextual inquiry [56], or participatory design [36], but rather as a complementary way to obtain a more generalizable understanding of the priorities. We encourage researchers to use SIPs to complement rather than replace other stakeholder engagement strategies.

Our future work will explore more granular group dynamics. For example, homogeneity can be defined along multiple dimensions. Previous work has noted that factors such as age, gender, or ethnicity [18, 39, 48] could further differentiate the degree of homogeneity or heterogeneity within these groups, thus affecting the process and outcomes. Similarly, in heterogeneous groups, examining the influence of pre-existing relationships (e.g., participants' acquaintances) [6] on SIP experiences would provide valuable insights. Furthermore, more factors such as task complexity, group size, familiarity and expertise levels [37] could be investigated to understand how they affect the prioritization process and provide more nuanced guidelines for optimizing group structures in diverse participatory research contexts.

In addition, aligned with prior research on participatory recruitment methods, which highlights how the mode of recruitment can influence participation rates, demographics, and data quality [9, 34, 49], future studies should investigate alternative recruitment strategies, such as online and hybrid approaches. Online recruitment, for example, has been shown to lower barriers to participation, especially for stakeholders who may be geographically dispersed or time-constrained [9]. However, it also introduces challenges related to sustained engagement and depth of interaction [5]. Given that prior work suggests a potential trade-off between ease of access and the quality of insights in virtual settings [5, 9], future research should explore how recruitment strategies might be impacted or optimized to maintain the quality of outcomes and experiences of SIP, which is good for scaling SIP to different stakeholder populations.

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