Understanding the Methodological Value of Mapping Alternative Fiction Scenarios in the Context of Domestic Violence

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Abstract. Smart homes have revolutionized the way we live, with new technologies connecting users' devices with everyday objects. However, these advancements have also led to the emergence of unexpected dangers relating to technology-facilitated abuse. Domestic abusers can now maintain control beyond previous spatial boundaries, making it impossible for victims to recognize that they suffer from abuse. This paper is part of an ongoing MA project that aims to prevent smart products from being used as tools for domestic violence. The paper demonstrates the methodological value of mapping speculative scenarios during the ideation phase in the design process. The scenarios aim to encourage reflection, speculation, and debate about the potential consequences and ethical implications of emerging technologies. The paper proposes potential solutions that reimagine how applications can support healthy relationships by emphasizing transparency, consent, and trust-building. It highlights the need for awareness, empathy, and ethical design practices to ensure that smart homes promote the well-being and privacy of their occupants.

Keywords: Smart Products · Domestic Violence · Privacy · Speculative Scenarios

1 Introduction

According to [1], in 2021 the smart homes market was valued at USD 79,13 billion, and it is expected to reach USD 313.95 billion by 2027, registering a CAGR of 25.3% over the forecast period of 2022–2027. New technologies connect users' devices with everyday objects, such as virtual assistants (e.g., Alexa, Google Home, Amazon Echo), smart watches, smart locks, cameras, and more.

However, as [2] notes, technology has also allowed domestic abusers to "inflict old harms in new ways". [3] similarly argue that the rapid advancement of digital communication services, smart homes, and digitalization procedures creates unexpected dangers

relating to technology-facilitated abuse. These technologies expand the ability of abusers to maintain control beyond previous spatial boundaries, making it impossible for victims to recognize that they are suffering from abuse [4]. As a result, victims often suffer from isolation and alienation from family members and friends, making it even more difficult to realize and prove the abuse [5]. It is impossible to deny how easier certain aspects of everyday life are thanks to smart products. However, as [3] argue, the emergence of smart systems and the entry of novel business models have also fostered harmful social interactions and unfair control dynamics. Moreover, While smart home devices offer numerous advantages, such as enhanced security, convenience, and entertainment, they have also inadvertently granted device owners significant control over their intimate partners within the same household, potentially leading to instances of tech-facilitated domestic abuse, as recent studies have indicated [6].

This paper is part of an ongoing MA project focused on the research question, "How can we prevent smart products from being used as tools for domestic violence?" To collect data, a five-part questionnaire [7] was used that covered demographic information, technological experience, personal privacy, technological abuse, and the impact of abuse. The questionnaire also included open-ended questions to gather specific data for developing speculative scenarios.

This paper aims to demonstrate the methodological value of mapping speculative scenarios during the ideation phase, which is a middle stage in the design process. The data collected will be used to suggest ways to redesign smart products that protect privacy.

2 Background

2.1 Speculative Design

[8] introduced a design approach that fosters reflective conversations and disagreements concerning prevailing cultural values. Originally termed "critical design," this concept evolved into "speculative design" to better encapsulate its practice, wherein design artifacts are employed to explore potential alternative futures that are both plausible and thought-provoking [9]. The objective is to ignite discussions about the desirability of these futures by bringing to light the aspects of everyday life that often remain invisible and overlooked.

According to [10], design serves as a tool for speculating about the potential trajectories of the world. While it maintains a forward-looking perspective, it refrains from making explicit predictions. Instead, its primary aim is to evoke responses and address issues related to politics, as well as the prevailing social, economic, and technological configurations. This approach contributes to the unveiling of a world that extends beyond its current representation [11], making previously hidden aspects more visible and accessible.

Speculative design liberates novel ideas that can enhance the likelihood of realizing more desirable futures. By frequently utilizing the phrase "what if" in their inquiries, [10] stimulates debates and discussions regarding the kinds of futures people aspire to achieve and those they wish to avoid. They argue that as speculation becomes more pervasive, the boundaries of future realities become increasingly flexible. To illustrate

this concept, they developed the model depicted in Fig. 1 to explore potential future scenarios, akin to [12] representation of concentric cones, which portrays the expanding possibilities over time.
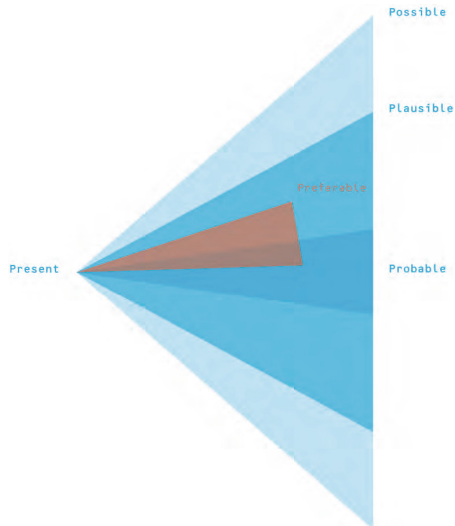

Fig. 1. PPPP-Diagram [10]

To create provocations or "narrative elements to predict and explain possible futures for design," speculative design uses tools and methodologies of design, scenarios, techniques, and literature review [13]. The resulting scenarios fuse realism and imagination, allowing consideration of potential outcomes, ethical considerations, and the need for reflection and critique that requires thinking outside the box.

[10] argue that the emphasis has shifted from architecture, products, and the environment to laws, ethics, political systems, beliefs, values, fears, and hopes translated into tangible manifestations and serve as fragments of a different reality. The authors suggest that developing scenarios that integrate philosophical, social, and technological elements can add a further layer of credibility.

Nonetheless, it can be challenging to instrumentalize speculative elaboration in a way that offers additional experiments and procedures [14]. [15] present a three-step process to consider in any speculative and critical design:

1. Establish a context for discussion: Most speculative design scenarios center on a particular subject. Typically, the topics deal with moral dilemmas brought on by problems, in this case, those involving new technology or social norms.
2. Idealize, identify problems, and construct a scenario. Using the "what if" technique, which is widely used to brainstorm and imagine solutions to issues that serve as the main idea of a scenario.
3. Materialize the scenario: This entails turning the scenario into stories, things, or a combination of both. To achieve some level of veracity, this must be elaborate and filled with details.

According to [15], since the goal of speculative design is to elicit behaviors and thoughts that encourage people to reflect on and reevaluate previously accepted norms, one must keep the scenarios open-ended, ambiguous, and even complex while adding additional provocations using black humor and satire.

2.2 Domestic Violence and Privacy

The use of smart products is becoming more prevalent in modern smart homes. However, user privacy concerns are also increasing. Several studies have documented privacy and security concerns related to tracking smart speakers. These studies have noted that users have been trading off privacy for the convenience provided by smart speakers, which is a concerning trend (e.g., [16]).

In addition to smart speakers, numerous studies have claimed that the use of social networks, text messages, and phone calls has led to widespread surveillance (e.g., [17−22]) With the emergence of new technologies that connect to devices, such as home security systems and Internet-connected home assistants, there is an increased risk of privacy breaches and ubiquitous surveillance [23].

Particularly concerning is the fact that such technologies make it easier for intimate partners to be subjected to surveillance, which can have serious implications for privacy and safety. Therefore, it is crucial to address these privacy concerns when designing and developing new smart products. By prioritizing user privacy and safety, designers can ensure that smart homes remain a safe and secure environment for all residents.

3   Speculative Scenarios

There is an opportunity for strategies that enable and facilitate understanding of the complexities of privacy and security and measuring user perceptions using speculative design about the potential moral decisions resulting from a technological intervention that smart products may experience. It is possible to pose more precise and in-depth queries about the potential function of currently in-use technologies by combining design fiction, stories, and scenarios.

It is also worth mentioning that the aim of these scenarios is not necessarily to predict or propose practical solutions but to encourage reflection, speculation, and debate about the potential consequences and ethical implications of emerging technologies, policies, or societal trends. By presenting provocative and thought-provoking visions, these scenarios aim to raise awareness, broaden perspectives, and inspire critical thinking about the impact of innovation on individuals, communities, and the world at large.

Moreover, [24] highlighted that victim-survivors stressed how individualized and targeted the attacks were, and they said that while some of the examples they recalled may seem unremarkable to an outsider, they may have read as unsettling or threatening to them due to their prior experiences or perceptions. Therefore, it is important to create speculative scenarios based on experiences.

As previously mentioned, the scenarios were formulated using open-ended questions from a questionnaire. Participant recruitment occurred through three distinct methods: face-to-face interactions, digital platforms, and electronic means. A combination of

direct invitations, dissemination through digital platforms such as Facebook, LinkedIn, and Instagram, along with email outreach, was employed. This approach primarily targeted support services for victims of domestic and sexual violence, as well as specialized communities within the study's generalist counseling and social assistance services sample. Ultimately, 309 valid responses were gathered for subsequent analysis. The sample encompassed individuals of varying ages, ranging from 15 to 81 years ($M = 36.48$; $SD = 14.86$), comprising 233 females ($M = 37.17$, $SD = 14.91$) and 75 males ($M = 34.53$, $SD = 14.51$), all of whom possessed at least one smart device. The open-ended questions pertained to digital abuse, specifically focusing on the misuse of technology related to location monitoring, and concerns regarding smart products.

3.1   Scenario 1: Stalkerware Application

Thirteen respondents identified identical situations: device cloning, unauthorized cloning, or unauthorized access to smartphones. Some quotes from the respondents are as follows: "My daughter's boyfriend cloned her cell phone", "an ex-boyfriend has accessed my cell phone without my authorization and read all my conversations", "my aunt's husband cloned her phone to have access to her conversations ", "I heard situations told by other people saying that their partners often ask for location sharing", "after an argument, my old friend got into my phone, accessed my Instagram, changed my data and pretended to be me, offending me and posting pictures of me as a child".

Speculative Scenario. Privacy concerns have reached new heights in a near-future setting, where technological advancements have led to more sophisticated digital tools. The story follows a couple, Sarah and Mark, and delves into the consequences of their actions.

Sarah, a 30-year-old woman, is plagued by insecurities and jealousy in her relationship with Mark. They recently had a bitter fight due to her unfounded suspicions, but later that evening, they decide to reconcile and spend the night at Mark's house. However, Sarah's doubts persist, and she is still unsatisfied with the situation, finding it hard to believe Mark's claims.

While Mark peacefully sleeps beside her, Sarah contemplates her next move. Consumed by her insecurities, she surreptitiously unlocks Mark's iPad using his fingerprint, taking advantage of his vulnerable state. Driven by her desire for answers, she installs a Stalkerware program, cunningly disguised as a harmless calculator app.

Unbeknownst to Mark, this deceptive application grants Sarah complete access to his iPad and all the programs shared with his cellphone. The Stalkerware becomes an invisible intruder, silently collecting and transmitting vast amounts of private data, including Mark's precise location, browsing history, photos, messages, call recordings, and even camera access.

Over time, Sarah becomes an unwilling observer of Mark's digital life. She watches his every move meticulously, growing more convinced of her initial suspicions. The information she gathers through the Stalkerware feeds her insecurities, eventually leading her to confront Mark with the evidence she has amassed.

As Sarah confronts him with her accusations, Mark is initially stunned and perplexed. He is unaware of how Sarah could have accessed such detailed and recent information

without him noticing any password changes or security breaches. A deep sense of anxiety begins to set in, undermining his trust in the digital realm and causing doubt about his actions and privacy.

This speculative scenario serves as a cautionary tale, shedding light on the ethical implications of invasive technologies and the erosion of trust within relationships. It raises questions about the boundaries of privacy, the dangers of unchecked surveillance tools, and the psychological toll they can exact on individuals and their connections. This speculative scenario proposes a potential solution that reimagines how applications can support healthy relationships by emphasizing transparency, consent, and trust-building. However, it is essential to approach the design and development of such applications responsibly, considering the potential ethical concerns and legal implications and always prioritizing user privacy and well-being.

3.2   Scenario 2: Intelligent Lights

Eighteen respondents mentioned the presence of intelligent lighting in homes. Additionally, [25] provides instances of smart home-related domestic violence. This scenario consequently developed from these implications.

Speculative Scenario.   In a near-future setting, a three-person family—Helen, John, and their child—moves into a modern smart home, expecting the convenience and simplicity that automation promises. Life becomes more streamlined and efficient with everything controlled automatically, including the lights. Helen, who primarily works from home, finds smart home technology immensely helpful, easing her daily tasks. Through a shared application accessible to all family members, they can select colors and control the lights even when away from home.

However, beneath the surface of apparent convenience, a darker dynamic unfolds within the household. One morning, Helen and John become embroiled in a heated argument over bathroom usage, leading to John's tardiness for work. Holding onto their frustrations, an unhealthy power dynamic emerges, impacting their mental well-being.

Exploiting the smart home features to assert control and inflict emotional distress, John decides to use the automated lights to annoy Helen. When Helen finds herself alone at home, the lights unexpectedly switch off. Initially, she perceives it as odd and promptly switches them back on, assuming a temporary glitch. However, the lights repeatedly go dark after a few minutes, leaving Helen bewildered and suspicious about a potential issue with the house.

Seeking solace and hoping for resolution, Helen confides in John, sharing the perplexing light situation through a message. Unfortunately, instead of understanding, John responds with dismissiveness and blame, exacerbating the distress. He belittles Helen, asserting that she lacks comprehension of technology and the situation, shifting the blame onto her and exacerbating her helplessness.

Realizing the deeply concerning nature of the situation, Helen begins to recognize the implications of the mental abuse she is enduring. Determined to regain control over her well-being and protect her privacy, she takes decisive action. Helen explores the smart home application's privacy settings and security features, seeking a solution that will safeguard her autonomy and mental health.

This speculative scenario delves into the deeply troubling dynamics of domestic abuse and mental well-being within a smart home context. The solution proposed centers around privacy and ethical concerns, emphasizing the importance of empowering individuals to safeguard their autonomy, establish boundaries, and seek support when faced with abusive situations. It underscores the need for awareness, empathy, and ethical design practices to ensure that smart homes promote the well-being and privacy of their occupants.

3.3 Scenario 3: AirTag

The majority of the respondents (n = 48) mentioned ways of tracking. Some quotes from the participants are: "My daughter's husband cloned her cell phone to keep an eye on her and put a chip in her car to track her and know where she is ", "the boyfriend of a close friend of mine bought a GPS tracker on the Internet to have control over where she was going", "My husband offered me a new car in order to control me. Track all my steps through the GPS that is connected to his cell phone".

Speculative Scenario. In a contemporary setting, an ex-couple, who had ended their two-year relationship on amicable terms, finds themselves entangled in a problematic situation. Alice, a social individual who frequently ventures out to meet friends, visit coffee shops, and go shopping, experiences a growing sense of unease as her ex-partner conveniently appears in various parts of the city. Initially dismissing it as mere coincidence, the frequency of these encounters raises suspicions of stalking, leaving Alice deeply concerned for her safety.

Determined to unravel the truth, Alice embarks on an online investigation, exploring possible tracking methods that could explain her ex's ability to locate her with such precision. As she delves deeper into her research, she stumbles upon the idea that her iPhone might be compromised. However, upon careful analysis and consultation with experts, it becomes evident that her phone has not been hacked or tampered with. To her surprise, even when she purposely leaves her phone at home and relies solely on her Apple Watch, her ex continues to appear unexpectedly.

After enduring weeks of tense situations, Alice confides in a long-lost friend who works at her workplace. During their conversation, they make a significant realization – these encounters consistently happen when they are driving somewhere. Intrigued by this pattern, they searched Alice's car for suspicious devices.

Their search unveils an alarming discovery – a cleverly concealed AirTag discreetly attached to the car's license plate. This revelation takes aback both Alice and her friend. They realized that since Alice does not use an iOS device, she received no notifications or alerts regarding the tracking device following her. Armed with this newfound knowledge, fear, and apprehension consume their hearts. Alice feels utterly powerless to override her ex-partner's actions, concerned for her safety and uncertain about future episodes.

In this speculative scenario, we witness the disturbing nature of stalking and the potential misuse of tracking technology. It highlights the need for vigilance and personal security awareness, even in seemingly amicable breakups. The scenario also raises awareness about the importance of privacy measures and the ethical considerations surrounding tracking devices. It emphasizes the necessity of comprehensive security

practices to protect individuals from potential harm, ensuring their well-being in an increasingly interconnected world. Given that it is as frequent as or even more frequent than individual experiences of intimate partner violence and pertains to the reporting of offline experiences, data protection intended for this smart product must anticipate technological victimization by intimate partners.

3.4   Scenario 4: iRobot Roomba

Twenty respondents indicated they regularly clean their homes with the assistance of autonomous robot vacuum cleaners. In this regard, the final scenario includes an iRobot Roomba.

Speculative Scenario. In a domestic setting, Ana and Jack navigate the complexities of their relationship while juggling the demands of work and raising their two young children. Having recently returned to work, Ana struggles to balance her time between her career and the responsibilities of motherhood. Despite her best efforts to prioritize herself and her work, Jack becomes increasingly demanding, constantly pressuring Ana about her absence and making her life more difficult.

Feeling overwhelmed by Jack's persistent demands, Ana occasionally leaves work earlier to address their relationship issues and spend more time with her family. On one such day, when the children are at school and will not return until late afternoon, Ana seizes the opportunity to catch up on some much-needed rest. To avoid causing alarm, she informs Jack of her decision to leave work early and take a nap, hoping it will alleviate some of the tension between them.

As Ana drifts off to sleep, she is suddenly startled awake by the sound of the iRobot, an automated home device, unexpectedly running. Confused and fearful, she quickly turns it off, trying to comprehend what happened. It dawns on her that she has been experiencing instances where things are activated without her consent, and she suspects that she may have unintentionally triggered certain actions due to forgetfulness or oversight.

Ana's suspicions are confirmed when she discovers that her husband, Jack, had used the application to reactivate the iRobot just ten minutes after she turned it off. Realizing that he has succeeded in disturbing her sleep and maintaining control over her, Ana is filled with a mix of fear, confusion, and frustration.

This speculative scenario delves into the power dynamics of a domestic relationship, revealing the manipulation and psychological distress experienced by Ana due to her husband's behavior. It highlights the significance of recognizing and addressing instances of domestic violence. The scenario emphasizes the need for support systems, open communication, and resources to empower individuals like Ana, enabling them to break free from toxic cycles and create a safe environment for themselves and their children. It also raises awareness about the role of technology in exacerbating power imbalances and suggests implementing features that promote transparency, consent, and joint decision-making within smart home devices. By prioritizing ethical considerations, technology can contribute to fostering healthier relationships and protecting personal boundaries.

4 Conclusion

The paper examined the methodological value of mapping alternative fiction scenarios during the ideation phase, focusing on privacy concerns within the context of domestic violence. Four speculative scenarios were created to highlight the importance of considering unpleasant situations such as domestic violence in the design process. These scenarios demonstrate how a product can be used to harm victims, causing them to doubt themselves and experience low mental well-being.

While the User-Centered Design approach typically addresses user pain points, it may not fully encompass more complex dimensions such as domestic violence. Including alternative fiction scenarios allows designers to gain a deeper understanding of the potential challenges and ethical implications associated with emerging technologies in relation to domestic violence. This understanding can inform the development of more inclusive and responsible design solutions that prioritize user safety and well-being.

In conclusion, designers hold a critical responsibility in developing innovative products, systems, and services that cater to customer needs and enhance convenience. They must draw upon their understanding of user requirements and available technologies to achieve this goal. However, it is equally important for designers to consider the potential misuse or incorrect use of these technologies rather than solely focusing on their advantages. The speculative scenarios presented in this paper serve as valuable tools for highlighting the negative implications and privacy concerns associated with certain smart products within the context of domestic violence. As a future direction, conducting user testing to evaluate the potential privacy issues arising from these scenarios would provide valuable insights and contribute to a more comprehensive understanding of the challenges and ethical considerations involved. By integrating such insights into the design process, designers can foster the development of more responsible and user-centric solutions that prioritize privacy, safety, and well-being. Furthermore, it is worth noting that these scenarios consistently depict situations in which women adopt the role of victims, while men are consistently portrayed as aggressors. Given that intimate partner violence is a health concern affecting individuals of diverse genders and social backgrounds [26], it is worth considering that this conventional representation may be constraining, as the identified issue has the potential to affect relationships spanning a wide range of gender identities, generations, and familial connections, including those involving grandmothers, fathers, grandchildren, stepsons, and various other associations. Consequently, future research should broaden its scope to encompass a diverse range of potential victims.

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