

# Privacy for Everyone: Towards an Inclusive Design Approach for Accessible Privacy and Security Technology

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## 1. INTRODUCTION

User privacy preferences have been identified to be highly contextual and privacy-enhancing behaviour is widely considered as a situated action [17]. Even though this complex nature of privacy has already been acknowledged by the scientific community [8, 14, 5], many privacy and security solutions are still designed by experts without integrating end users into the design process. In most cases, designers and experts base their design decisions on previously conducted studies and educated guesses [18]. Approaches to design that acknowledge the situated nature of privacy practices such as participatory design [13] or value-centred design [4] are rarely used. As a result, privacy solutions are often too difficult to use in situ and are still designed for and evaluated within pre-defined narrow scenarios. They often do not consider situations where users are temporarily constrained in how they can operate devices and consequently exclude user groups with special needs.

When considering users with cognitive or physical disabilities, or environmental constraints that make it hard for users to operate a device or tool, we need to acknowledge that disabilities are situated and multifaceted and therefore hard to design for. We furthermore need to accept that many users will be at least temporarily disabled within their lifetime, but might still want to use a certain technology to protect their privacy, in fact might have more reason to do so. This highlights that considering users with impairments within the design of privacy technology is potentially beneficial for all users. Privacy preferences and decisions are often influenced by personal experiences and societal, cultural and individual values. Hence, these factors need to be considered when designing technology that works regardless of context and can be operated by a broad range of users.

In this position paper, we position inclusive privacy and security as third paradigm HCI research and highlight the need for participatory, value-based and situated design approaches to design inclusive privacy technology based on experiences from HCI research.

## 2. THIRD PARADIGM HCI AND SITUATED PERSPECTIVE

The term *third paradigm HCI* (also referred to as *situated perspective*) has been introduced by Harrison et al. [6, 7] to describe and frame a cluster of research that shares a practice and an underlying epistemological orientation that poorly fits traditional models and methods as they were initially used in HCI research. The notion of paradigms as used by Harrison was originally defined by Kuhn et al. [9] and refers to a common understanding of the phenomena under study as well as the kind of questions associated with a phenomenon, the methods and structured approaches used to answer the associated research questions and how the results should generally be interpreted.

Historically, the roots of HCI lie in engineering research which focused on human factors in interaction. The second wave in this field was shaped by cognitive science and considered human information processing related to computer signal processing. Harrison et al. [6, 7] systematise these two streams as the first two paradigms and emphasise that HCI research was mainly dominated by human factors and cognition. This implies, that challenges and methods beyond these two paradigms were marginalised within HCI research. They refer to this as epistemological trouble within the field and consider these elements as part of the third paradigm. The hallmark features of this new perspective is that it understands humans interacting with computers in a situated way, i.e. considering a wide range of contextual perspectives such as societal, motivational, personal, embodied or environmental aspects. This has resulted in a shift in methods to be value-sensitive, participatory and “in-the-wild”, as well as a shift in the underlying epistemology to be constructivistic (compare [7]).

The third paradigm covers methods as diverse as participatory design, ethnomethodology, user-experience design, interaction analysis and critical design. Considering the literature within the usable security and privacy research community, we observe that most scientific work that has been published in recent years uses approaches and methods that can be considered as within the first two paradigms of HCI. Third paradigm HCI research has rarely been used and is only slowly being adopted within usable security and privacy research.

We argue that privacy perception and privacy behaviour is commonly not operating within a task-oriented mindset, but more grounded in personal, and embodied experiences.

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As defined by Harrison [7], embodiment is based on phenomenology and focuses on the way we perceive and understand the world, ourselves and that interaction derives crucially from our location in a physical and social world as embodied actors. In the broader sense, this is true for privacy-enhancing and privacy-protecting behaviour, especially when it comes to ubiquitous and pervasive computing where the underlying information-sharing paradigms are often complex and hard to understand for end users. Additionally, privacy is often perceived as and influenced by emotion [19]. Emotion has rarely been considered in classic cognitive work, even though some approaches of emotion have been inspired by cognitive psychology [7].

These observations clearly highlight that in order to design reliable and pervasive privacy technology, we must rethink our design principles and adopt third paradigm HCI research methods such as participatory design in order to design privacy technology for a broader audience and broader application contexts beyond narrow, pre-defined scenarios. This is especially true when marginalised groups should be taken into consideration as they introduce manifold requirements that are not easy to address by rigid guidelines.

### 3. COGNITION AND USER MODELING

In traditional HCI research, understanding users and creating models of users' cognitive processes, has often been conducted to detect usability problems in software systems. Designing inclusive privacy technology for a broader audience however amplifies the complexity of user mental models and makes their formalisation potentially infeasible. Especially when humans with cognitive or physical impairments are considered, it is almost impossible to include and cover all criteria. As it is the case with most guidelines for accessibility (such as the W3C Web Accessibility Guidelines [1]) it is difficult to find a *one size fits all* solution as disabilities are diverse just as human beings are. In many cases, certain disabilities are singled out and addressed in narrow solutions that ignore all other groups of users. This adds additional complexity to the previously described situated perspective of human privacy behaviour.

Another point is that when considering diverse groups of users, multifaceted privacy requirements come into play. As already investigated in the existing literature, privacy preferences and behaviours are also determined by social norms and cultural factors [2]. Moreover, personal experiences add an additional layer of complexity. Marginalised groups have significantly different requirements regarding privacy in order to keep their information hidden from stakeholders that may discriminate them for their personal exceptionality. This is relevant when it comes to religious or sexual orientation as well as health issues and disabilities of any kind.

### 4. PARTICIPATORY DESIGN

The use of a participatory approach to designing technology is advocated for two main reasons. Firstly, on a pragmatic level including end users allows designers to learn about the needs and requirements in the most immediate way. Design is directly informed by the ideas and practices of those who will use it. Secondly, the acknowledgement that those who are affected by technology should be involved in its design, empowers user groups and provides a sense of

ownership; which in turn rapidly increases acceptance and use. Both aspects are highly relevant in a privacy context. Empowering people to want to use privacy tools that they feel they own and that they shaped to fit into the practices is arguably at least as powerful in protecting them, than any sophisticated encryption algorithm.

In order to overcome the challenges identified in the previous sections, we argue for the community to adopt participatory design methods to design and develop inclusive privacy technology. For the reasons explored in this position paper, we argue that only an approach that involves potential end users in the field can yield inclusive and customisable privacy tools that can be used for situated privacy decisions and privacy-protecting behaviour.

We propose adopting participatory practices [15, 16] in the field in order to ground design decisions to the context and the manifold requirements of end users. Within the context of HCI and Accessibility, participatory design has been proven to be a suitable method to actively involve people with disabilities in the design process [11, 3, 12, 10]. According to the literature in these fields, it is necessary to explore individual, cultural, societal and contextual foundations to expand our view towards the complex world of disability. This highlights that in order to understand approaches of privacy-protecting behaviour of multifaceted user groups, we need suitable research and design methods, such as participatory design in order to design our tools accordingly.

Weber et al. [18] were the first to explore the advantages of participatory design for security-related user interfaces. They have shown that participatory design can be used to generate ideas to design new security-related user interfaces and to improve existing ones. Besides the benefits that a participatory design approach offers, it has however also several limitations. As design sessions are usually conducted with a small number of participants from a targeted user group, the outcome and the implications obtained from the procedure may be biased and might not scale for all potential users of the system. However, in order to be deployed and adopted successfully in multifaceted application contexts by various user groups, inclusive privacy solutions are required to scale. In this case, design recommendations obtained from participatory design sessions can be considered as extensions to improve already existing systems that already fulfil the requirements of other users.

We also argue that inflexible, scenario-based solutions will never fulfil the needs of multifaceted user groups. Instead of rigid guidelines and recommendations, we propose to develop customisable frameworks in order to let individuals configure the system regarding their preferences and requirements and to make privacy-decisions in situ.

### 5. CONCLUSION

In this position paper, we discussed inclusive privacy within third paradigm HCI and argued that inclusive privacy solutions require active participation of future users including marginalised groups. As privacy is highly contextual and privacy requirements and privacy-protecting behaviour is often shaped by experience, embodiment and cultural, societal and individual foundations, tools must be designed taken these factors into account to suit situated actions. In order to address these challenges and to ensure that future privacy technology works regardless of context and does not exclude particular user groups, we propose to use participa-

tory design and other characteristic third paradigm research methods in the field.

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