

ERC Starting Grant 2023 Part B2 (not evaluated in Step 1)

a. State-of-the-art and objectives

Access is often conceptualised as a functional criterion in the design, development and evaluation of technologies. However, disability studies and interactive theories on technologies indicate that access might be a multi-faceted, situated experience made by disabled and non-disabled people¹ alike. ACCESSTECH will investigate the potentials of crippling practices and their transformative implications on an understanding of technological innovation.

By centring disabled experiences in the assessment of technological artefacts, we will provide a deeper theoretical, methodological and conceptual understanding of what it means to experience access in interaction and to design for it.

a.1. Grand Challenge

“We don’t just use or admire technology; we live with it. Whether we are charmed by it or indifferent, technology is deeply embedded in our ordinary everyday experience.” (McCarthy and Wright, 2007, p.2)

Given the increasing prevalence of technological artefacts structuring our lives, whether we interact with them is often out of our own control, rather we have to do so to participate in communities and society at large. Hence, the experiences we make with technologies do not shape the direct interaction with them, but also those with others in mediated settings. However, as the above quote illustrates, we have been focused on a limited set of experiences, so far: 1) *charming* ones (e.g., Hassenzahl and Tractinsky, 2006, Hornbæk and Hertzum, 2017), ranging from hedonic (pleasurable) to eudamonic (meaningful) (Mueller et al., 2018), and 2) those that make people *indifferent* (e.g., Satchell and Dourish, 2009, Fuchsberger et al., 2014, along a notion of non-use). However, this ignores experiences that are fundamentally characterised by friction, particularly made by disabled people who are often not afforded access to these experiences through technology design only accounting for their needs post-hoc. In fact, some researchers even conceptualised access as an experience that requires embracing friction more generally (Hamraie and Fritsch, 2019). Hence, disabled peoples’ experiences with digital technologies are less shaped by charm or even indifference; they are dominated by *frustration* (in case of inaccessibility) and *friction* (to establish access). **Even though we understand that the experiences we make with technologies define how functional they can be to us, we do not yet understand well how matters of access relate to these experiences.**

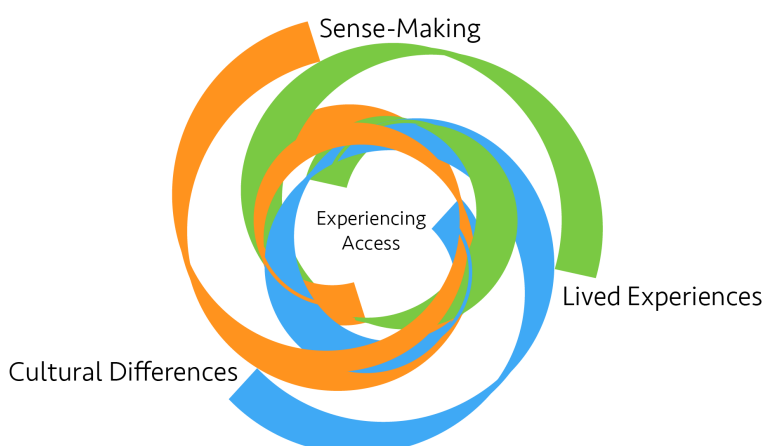


Figure 1: Aspects missing in most of current technology research on accessibility

Addressing matters of access has so far taken on a fairly functional nature in and of itself (e.g., Li et al., 2021, Mack et al., 2021). Research into automated subtitling (e.g., Soe et al., 2021) or the accessibility of image descriptions (e.g., Bennett et al., 2021) allows us to understand more about the technical possibilities of augmenting existing technologies and considering how disabled people interact with them after their original conception. However, we require to understand how access is prohibited not just on a technical and functional level, but also on a level addressing mismatches regarding lived experiences (e.g., the height of public

screens, making it difficult for wheelchair users to interact in the same manner as “walkies” (term taken from Clare, 2017)), cultural differences (e.g., communication modes following an auditory instead of a visual logic,

¹ Following recent activist and scholarly calls alike (cf. Andrews et al., 2019), we opt for identity-first language in our research to avoid having a euphemistic grammatical construct in place of the real disabling experiences disabled people make on a daily basis.

requiring Deaf people to follow most interaction in a language that is not attuned to their understanding of the world), and overall sense-making (e.g., assuming that sound and visuals will be processed in a similar manner by everyone, creating instances of under- or over-stimulation for neurodivergent individuals) (cf., Figure 1). That these issues have received less attention up to this point, is likely due to prevalent matters of epistemic injustice (Fricker, 2007), meaning that disabled people have largely been excluded in the technology research about them, including the way disabled researchers themselves experience being dismissed despite and even because of their lived experiences within the field (Ymous et al., 2020). Subsequently, most technology research operates from an understanding of disability as a deficit in need of correction (as the applicant has shown for technologies oriented on autistic children, games for neurodivergent populations as well as technologies for people with ADHD more generally in Spiel et al., 2022, 2019a, Spiel and Gerling, 2021), with instances of self-determined goals within the interaction (be they medically oriented or not) exceedingly rare. In this space, we need a more holistic understanding what access is beyond functional implementations, what it means to different people and how it constitutes a fundamental aspect of experiences with technologies. We only identify this meaningfully by explicitly centring the perspectives of disabled people and exploring how we may rethink technological design and development by similarly centring access early on in our processes and practices.

The increased move towards digitisation within European societies in particular already risks technocratic tendencies within our democracies (Hoffmann, 2022). However, for disabled people, this is pronounced, given they often make the experience of finding technologies inaccessible on self-determined measures, even when their use is required. If we keep marginalised perspectives out from meaning making and participation, we end up risking a sedimentation of unequal hierarchies in society. Given that this participation is increasingly facilitated through digital means, keeping disabled people's perspectives out of development and, subsequently, away from the interaction (or only through later-patched access means), risks creating technologies actively encoding these inequalities. Hence, we need to understand access holistically, as focusing on functional aspects alone risks encoding more and more ableist norms (Campbell, 2009) in our technological environments, which then, in return, shape our social interactions and the ways we live together, potentially as less inclusive societies than we aspire to be.

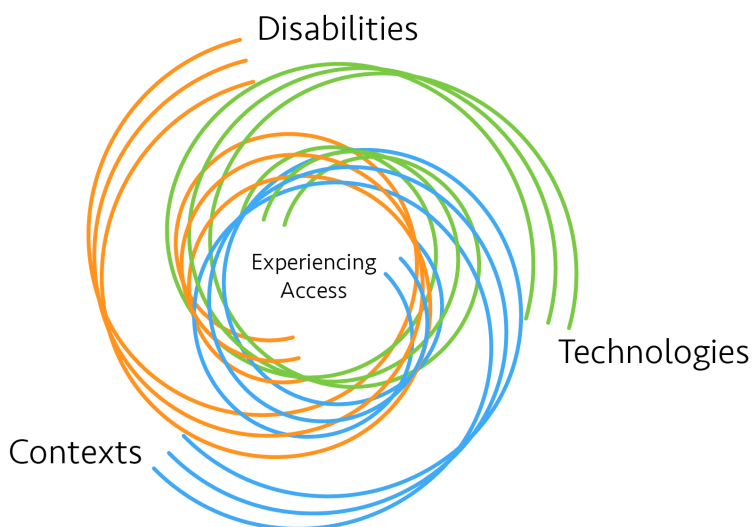


Figure 2: Relevant parameters to investigate through different means for understanding access as fundamental to experiences with interactive technologies

a.2. State-of-the-art

During the last few decades, the fields of Human-Computer Interaction and Interaction Design have increasingly established that experiences we make with technologies are highly relevant to their functionality. Only in understanding these experiences can we design technological artefacts that adequately engage people in providing the functionality they are intended to (McCarthy and Wright, 2007). Indeed, entirely new job descriptions have emerged

addressing issues of the qualitative aspects of our interactions with technologies, such as User Experience Design (Wright and McCarthy, 2010). Researchers and practitioners have identified that technologies do not just comprise neutral tools (Winner, 1980), but rather affect how we conduct our everyday lives. However, the way these experiences are framed and understood often generalise across different embodiments in ways that leave out the specificity and difference with which disabled people might experience their engagement with technologies, for example, shaped through lack of access (cf., Hamraie and Fritsch, 2019), trauma (cf., Salehomoum, 2020) or heteronomy (cf., Spiel et al., 2019a). For a holistic understanding of what it might mean to conceptualise ACCESSTECH and the experiences made with (in)accessible technologies, we need to consider all dimensions contributing to this: disability, technology and the context of interaction (cf. Figure 2).

Within technological research generally and Human-Computer Interaction more specifically, accessibility research has subsequently found more prominence and relevance (Mack et al., 2021). Going away from a deficit-oriented model on disability, alternatives were sought that would allow researchers to understand issues

and responsibilities for access more as a technical issue instead of one placed within an individual. Here, Ability-Based Design established a paradigmatic shift in turning away from a deficit-based approach to disability towards a more-strength based understanding at the basis of design for assistive and accessible technologies (Wobbrock et al., 2011). However, the concept does not necessarily centre the perspectives of disabled people in the purpose of technology development (Spiel and Gerling, 2021). A core question remains: **How we can conceptualise, articulate and design for access experiences as a distinct aspect shaping the interactive characteristics of modern technologies?**

Hence, the proposed work builds on theories and approaches drawing from (Critical) Disability Studies to augment researcher and practices in Human-Computer Interaction. From an understanding of different models of disability (e.g., an individualised, medical model vs a more political, social model as described by Marks, 1997, among others) towards principles of Disability Justice (Piepzna-Samarasinha, 2018), a range of approaches has identified opportunities for research centring disabled people and their experiences meaningfully. Particularly relevant to our work are the concepts of *ableism* (Campbell, 2009), i.e., the identification of a specific corporeal norm governing the dominant expectations towards people's bodies, the *minority body* (Barnes, 2016), i.e., the understanding of disabled people's bodies as mere difference instead of a value difference, and *Crip Theory* (McRuer, 2006), i.e., a commitment to self-determined, disability-centred ways of engaging with the world and our particular subject matter in research.

Basing our research on these theoretical foundations allows us to tap into the specifics of Disability Expertise (Hartblay, 2020) on matters of access. While all technologies afford access in one way or another and all humans feasibly make the experience of not being afforded access at one point or another, disabled people, unfortunately, have more experience in negotiating access in their everyday lives (Konrad, 2021) – with few exceptions far and inbetween (Valentine, 2020). This persistent and continued requirement for identifying, articulating and advocating for one's access needs makes disabled people prime experts in informing a conceptual understanding of ACCESSTECH.

To adequately make space for this so far often disregarded source of knowledge (Ymous et al., 2020), we turn to Participatory Action Research (PAR) (Hayes, 2011), Participatory Design (PD; Bødker and Kyng, 2018) and Participatory Evaluation (Spiel et al., 2017). These approaches consider the exchange of knowledge to be on an equal footing, a collaboration based on the mutual recognition of situated expertise towards the design and evaluation of technological artifacts. Additionally, the principles of *Crip Technoscience* (Hamraie and Fritsch, 2019) provide us with a solid foundation in how to establish a commitment to engage with non-academic collaborators. These methods provide us with the general tools to inquire into experiences of access, however, we still require methodological precision to understand how core principles hold when engaging with different embodiments as well as the specific needs and desires related to them. Hence, **critically positioned participatory engagements paired with Research through Design are crucial foundations to remain relevant in a theoretical conceptualisation of access as experience.**

This work will add to existing ones a subtle shift in understanding that comes with big theoretical and practical ramifications. Where research on assistive technologies and accessibility is predominantly oriented on ableist norms despite their best intentions (Shew, 2020), what we need is a coherent theoretical understanding of ACCESSTECH, that function across different disabilities, contexts and technologies based on epistemologically and methodologically diverse design investigation informing the research and development practices. Overall, **beyond functionally considering accessibility in technological setups, we need to address matters of ACCESSTECH in ways that acknowledge the expertise of disabled people about their life worlds as well as their right to self-determination in interacting with technologies.**

a.3. Preliminary Results

In my prior work, I focused on marginalised perspectives in interaction design more generally, with a specific focus on matters of gender and disability. I conducted a range of literature analyses, identifying gaps in technological research particularly as it pertains disabled people to account more for their lived experiences and desires beyond the limits of technology being used in a functioning mode to provide medical services (Spiel et al., 2022, Spiel and Gerling, 2021, Spiel et al., 2019a, Spiel, 2021a). I have further to critical analyses of existing technologies in light of the minority body theory (Gerling and Spiel, 2021). This work is augmented by critical speculative design inquiries probing the potential of alternative approaches to technology design (Kender and Spiel, 2022, Spiel et al., 2019b). Most recently, I lay the theoretical foundations in new materialism for thinking more about the potential in the development of assistive technologies instead of a deficit oriented approach to them (Spiel, 2022). Hence, I draw on a wide range of previous experiences to understand the subject matter of this research from a scientific perspective.

I am also well equipped methodologically, to facilitate and guide this interdisciplinary research. Particularly in the context of participatory research, I have already made contributions to ethical considerations that need to be taken in-situ (Spiel et al., 2018) as well as to how participatory design outcomes could also be evaluated in a participatory manner (Spiel et al., 2017). Additionally, they have published on issues of epistemic violence in disability related technology research (Ymous et al., 2020) and, in October, they will publish two experience reports at assets alluding to the specificities of researching as a disabled researcher with disabled participants (Fussenegger and Spiel, 2022; Spiel and Angelini, 2022). *What is missing is a coherent and empirically founded theory of how we can understand access as fundamental to experiences made with technologies across a range of different contexts, technologies and disabilities.*

a.4. Open Questions

As it stands, current research is focused on identifying opportunities for the functional aspects of accessibility largely as post-hoc approach to existing designs. However, these lead to frustrating experiences for disabled people and necessitate access as unnecessary friction within those settings. This can be traced back to matters of epistemic injustice and an overly deficit oriented understanding of disabilities. Subsequently, we need to include the lived experiences, cultural differences and overall divergences in sense-making on technologies, given that they increasingly enroach on our ordinary, everyday lives for all of us, including those who are already marginalised by dominant forces in society, including disabled people. Hence, the research gap we intend to address is threefold:

- *Theoretical gap:* We need to understand *access as a fundamental aspect of the experiences* we make with technological artefacts, not just for disabled people, but ultimately for everyone.
- *Epistemological and Methodological gap:* As disabled people are experts on negotiating matters of access in their everyday lives, centring their perspectives in this understanding is key. However, this requires us to further understand *how to centre disabled people in technological research.*
- *Designerly gap:* Knowing the above, we then need to understand *how to design for positive experiences* that are grounded in access as experience instead of aiming at costly patches post-hoc.

Addressing these gaps through different contextual arenas of investigation offers an opportunity for holistically addressing these gaps, fundamentally initiating a paradigmatic shift on how we encounter disabilities and technologies in research and practice. **Including lived experiences, cultural differences and divergences in sense-making about technologies allows us to fill theoretical, epistemological, methodological and designerly gaps in our understanding of what constitutes experiences with technologies generally and facilitated through access specifically leading to more inclusive research practices, technologies and, ultimately, democratic societies.**

a.5. Objectives

As shown above, theoretical conceptions and deliberations of what shapes our experiences with interactive technologies (McCarthy and Wright, 2007) build the foundations of how we may design these technologies beyond their functional requirements, but attending to the qualitative aspects affecting their use (Wright and McCarthy, 2010). Despite this direct connection between philosophical theories and design knowledge and practice, it has not yet been effectively weaved across to the contexts of disability and technology. Instead, we notice that technologies for disabled contexts are almost exclusively designed for functionality (Spiel, 2022), a tendency which is likely additionally amplified by the dominance of the medical model in the design and development of technologies for disabled people (for example, in the context of games, Spiel and Gerling, 2021). Hence, returning to the theoretical deliberations regarding how we might fundamentally understand experiences of access across several instances allows us to be more nuanced in our conceptualisation of interactive experiences, what aspects those are comprised of and how we might design for them appropriately. Centring access in our theories and, subsequently, our design processes means, ultimately, to centre the human in the interaction with technologies more holistically and more thoroughly understand a range of differently situated contexts influencing these experiences.

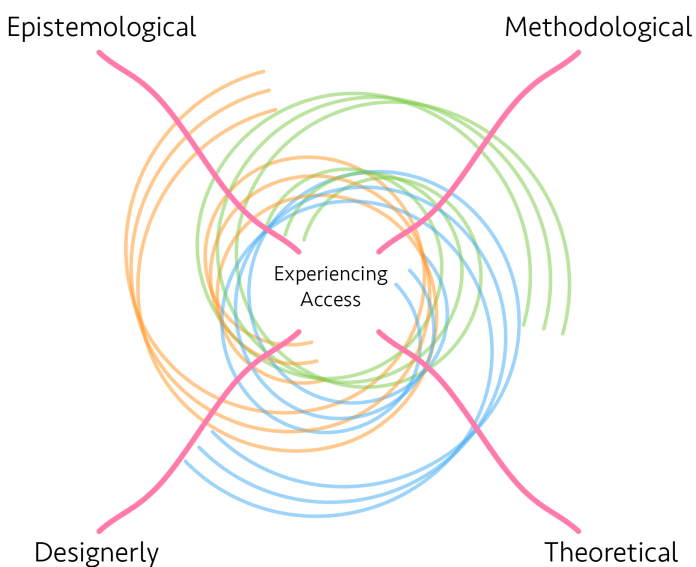


Figure 3: High-level goals of ACCESSTECH

With ACCESSTECH, we ask how we might understand access as a core part of experiences we make when engaging with technologies. As illustrated in Figure 3, this requires us to attend to a range of different sub goals relevant to holistically and deeply encounter the subject matter. For this we need to understand how the knowledge around access and experiences is constructed for interactive technologies. Subsequently, we define this as our *epistemological* objective (EO). Following such an analysis, we identified a *methodological* objective (MO) establishing the appropriate methods to engage disabled people in knowledge making and relating this back to the epistemological objective. We then have a *designerly* objective (DO) oriented on materialising proof-of-concepts to augment and strengthen the empirical work and fulfilling our

theoretical objective (TO) of providing an actionable, solid and multi-faceted approach to access as a core part of experience that requires designers to actively attend to.

For each goal, we identified a leading research question guiding our investigations. The methodological and the designerly objectives are split in two and will receive specific attention from the postdoctoral researcher within the team.

- EO *Epistemological*: What are the research and design parameters enabling us to produce knowledges about access-enabling technologies?
- MO *Methodological*: M1) Which methods already involve disabled people in technological research and design? M2) Which methods do we need to design and develop critical technologies that are rooted in disability cultures as well as accepted and desired by disabled people?
- DO *Designerly*: D1) What are the design features and differences when technologies are designed in a participatory fashion centring access? D2) How do different technologies afford different kinds of access experiences?
- TO *Theoretical*: How can we conceptualise and articulate access experiences as a distinct aspect shaping the interactive characteristics of modern technologies?

While the theoretical object can also be understood as the main objective of the entire research, we require all four objectives to fulfill it. To provide well-rounded insights, we are going to probe different types of disabilities (physical, sensory and neurological) in different types of contexts (environment, social, self) along different types of technological dispositives (social networking sites, virtual/augmented reality, tangibles). All of these will be addressed through Participatory Action Research (PAR) (Hayes, 2011) with local stakeholder groups as well as approaches from Research through Design (RtD) (Zimmerman et al., 2007). The combination of these approaches allows us to remain relevant to our situated inquiries while exploring alternatives and, ultimately, solidifying our theoretical deductions thereof.

b. Methodology

Across the entire project, we engage with overall four phases across three different arenas of inquiry: 1) A critical examination (similar to ones I have conducted previously, e.g., Spiel et al. (2019a), Spiel (2021a), Spiel & Gerling (2021), Spiel et al. (2022)) of the status quo to identify the needed research and design parameters enabling us to produce knowledges about access-enabling technologies. 2) By gathering consistent and diverging positions on which methods are required to design and develop relevant technologies that are rooted in disability cultures as well as accepted and desired by disabled people (akin to Spiel et al., 2017). 3) Several prototypes across the arenas of inquiry will aid us in understanding how different technologies, in different contexts, can afford different kinds of access experiences. 4) Analytically, we then conceptualise and articulate

access experiences as a distinct aspect shaping the interactive characteristics of modern technologies on a theoretical level. Hence, we now introduce the very foundation of the underlying methodology of *Participatory Research* after which we detail the relevant work packages, ethical considerations, the research infrastructure as well as the envisioned impact.

b.1. Work Packages

To understand how experiencing access constitutes a core component of our overall experiences made with interactive technologies, we probe into three particular contexts (WP1-3), which serve as the empirical basis for the methodological and theoretical work. Through experiencing access in (1) nature, (2) participation and (3) intimacy, we take a look at the roles interactive technologies of (1) Social Networking Sites (SNS) & Do-it-Yourself Making, (2) Virtual & Augmented Reality, and (3) tangibles can play for disabled people in engaging with their (1) environment, (2) others in sociality as well as (3) themselves. Across these cases, we include (1) wheelchair users, (2) Deaf individuals and (3) neurodivergent populations to understand a range of different types of interactive contexts, disabilities and technologies. This allows us to operate on a solidified basis to identify transferable aspects across the individual modes of inquiry. Additionally, WP4 and WP5 address the methodological and designerly foci, whereas in WP6, we formalize our commitment to the main objectives. Overall, these work packages aim at **investigating how we experience access across different situated contexts (environment, social, self), different technological dispositives (SNS and Do-it-Yourself Making, VR/AR, Tangibles) and different embodiments of disabilities (physical, sensory, neurological) provide us with the empirical basis to develop the methodological and designerly contributions laying down the theoretical basics for understanding access as constitutional to experiences made with interactive experiences.**

WP1: Experiencing Access in Nature

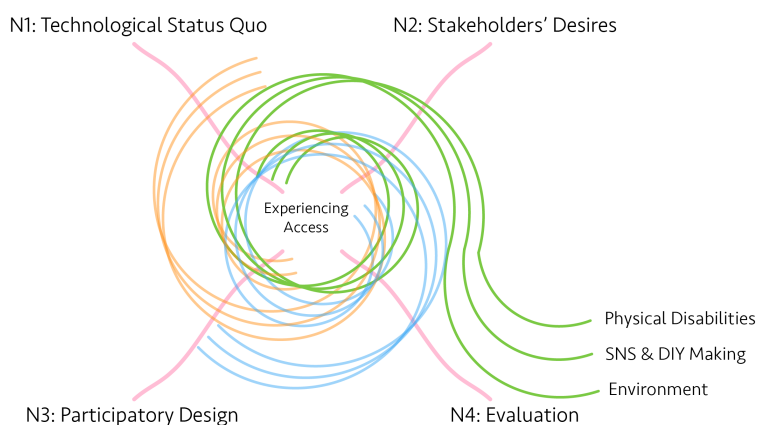


Figure 4: Context and Objectives for *Experiencing Access in Nature*

Context & Goal: Gaining access to natural environments is not just a matter of rights and functional requirements being fulfilled, it is further a matter of environmental justice (Dahlberg et al., 2022); not just given that many modern disabilities are, at least in part, consequences of side effects of unchecked industrialisation and the subsequent human-made climate change (Clare, 2017), but also due to the positive effects of natural environments and the outdoors regarding mental health and energy to live an independent life for wheelchair users (Terese, 2015, Fussenegger and Spiel, 2022). This issue of access even affects urban parks, which have the potential to be,

feasibly, made accessible more easily, though often the communal entities responsible for them lack a systematic implementation of existing policies or even guidance on how to achieve this (Bianchi et al., 2020).

The desire to experience nature and the outdoors has inspired and motivated wheelchair users to create their own approaches to modifying their wheelchairs (Perera and Villoing, 2019). In fact, off-road wheelchair riding has become an institutionalised parasport in France (Villoing et al., 2018). The response from technological researchers to this has predominantly been to systematically develop trekking wheelchairs (e.g. Baronio et al., 2021). However, in these development processes, comfort and affordability are often secondary to the functional requirements, making these innovations prohibitively inaccessible to most wheelchair users. Other researchers have aimed at creating virtual reality games to simulate these experience, though they overall pale in comparison (Gerling et al., 2020). Some of the strategies wheelchair users already employ in sharing information on the accessibility of built and natural environments lie, for example, in crowd shared maps (Mobasheri et al., 2017), though sharing strategies for wheelchair modification or tricks to navigate different environments effectively (e.g., Meissner et al., 2017), are less systematically organised and, subsequently, less accessible to wheelchair users, particularly those in community housing.

Activities: In WP1, we probe the situated context of engagements with larger *environments*, through the technological dispositives of *Social Networking Sites (SNS)* and *Do-it-yourself (DIY)* approaches with *physically disabled* people. Hence, this investigation will allow us to initiate the proposed research by probing

a field that has been mostly defined by highly functional approaches to this point and offering community oriented alternatives to ensuring access is facilitated through mediation of technologies.

- N1. Analysing the status quo on technological access to nature in more detail and in light of appropriate theories from Disability Studies. *Feeding into M1 and EO*
- N2. Conducting participatory ethnographies and interviews with wheelchair users along different stages of their lives to identify stakeholders' needs and desires more holistically along functional, but also social requirements. *Feeding into M2 and MO.*
- N3. Developing proof-of-concept prototypes through participatory design engagements specifically in a manner of Research through Design supporting D1. *Feeding into D1 and DO.*
- N4. Evaluating the usefulness and desirability of the designed artefacts together with initial stakeholders and design participants. *Feeding into D2 and TO.*

Risks: Medium to High. There is already a highly motivated potential researcher available to conduct this work, Felix Fussenegger. He brings in the necessary analytical, technical and lived expertise to conduct such work well and has started preliminary investigations into the topic area. However, it is possible that there is less interest in experiencing nature than expected for our collaborators, in which case we will negotiate how to come together with the desired and the proposed focus.

Outcomes: WP1 will generally feed into several overall objectives. At the end, there will be observational and empirical data as well as prototypes and tests on those that will be the foundations of paper publications as well as contributing to our exhibitions and public engagements.

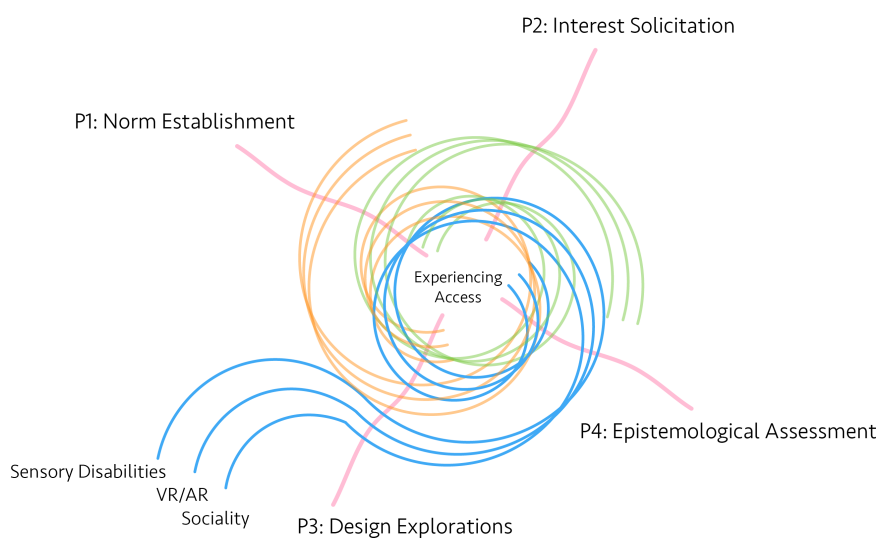


Figure 5: Context and Objectives for *Experiencing Access in Participation*

WP2: Experiencing Access in Participation

Context & Goal: Not all Deaf people identify with the concept of disability; instead, they consider themselves to be cultural and language minority (Hoffmeister, 2008). However, given the disabling experiences Deaf people make, especially in terms of being exposed to violent ableism (Campbell, 2009), particularly audism² (Eckert and Rowley, 2013) as well as the pathological posturing and paternalism they experience from a dominant hearing society.

Due to the structural equivalency to disability, we include Deaf experiences as relevant to ACCESSTECH. Within Human-Computer Interaction (HCI), we see a similar prioritisation of hearing individuals, occasionally even when explicitly seeking participants who are competent in sign languages (Rempel et al., 2014), where Deaf people are feasibly the main experts. Researchers within these spaces additionally rarely show a sufficient level of competency to confidently communicate in an appropriate sign language, even though that is fundamental for a respectful engagement (Mack and Tian, 2020). All this despite it being clear that there are specific ways of knowing embedded in Deafhood leading to alternative epistemological positions and insights (Hauser et al., 2010), and (hearing) HCI researchers becoming increasingly aware of the requirements involved in making research settings accessible to sign language communication (Unger et al., 2021) and specific considerations necessary to conduct co-design meaningfully in the context of children (Potter et al., 2014).

Additionally, the experiences Deaf people make with technologies are often wrought with discourses of power and heteronomy, as can be seen with the example of the Cochlear Implant (CI), which is often pushed towards

² Audism refers to “audiocentric (based on hearing and speaking) assumptions and attitudes of supremacy.” (Eckert and Rowley, 2013)

the (mostly hearing) parents of Deaf children without any alternative or additional support, e.g., in acquiring sign language competencies. Subsequently, upon finding a Deaf identity in adulthood, CIs are often refused (Salehomoum, 2020). Similarly, the experience of continued and constant disregard is also made in the context of other research, for example, into sign language technologies (De Meulder, 2021). Only few participatory research endeavours have been conducted in HCI with Deaf participants, albeit not lead by Deaf researchers themselves³ (Wilde and Marti, 2018). In this space, we deem the technological dispositive of Virtual and Augmented Reality (VR/AR) to offer lots of potential. For one, the ableist norms ingrained into most commercially available setups (Gerling and Spiel, 2021) make it possible to consider new modes of defining what virtual reality might even mean in the first place from a Deaf perspective. Further, in previous research, the more conventional approach was to translate audible content to other modalities in a synaesthetic manner (e.g., Mirzaei et al., 2020). Hence, it is further an open question as to how VR/AR experiences might be conceptualised and designed for if Deaf perspectives on social engagements are centred instead of added as an afterthought.

Activities: In probing possible ways of *Experiencing Access in Participation*, we have the opportunity to acquire insights related to sensory disabilities on a technological dispositive oriented within Virtual and Augmented Reality applications oriented on sociality. This part of the work comes with a high methodological factor to understand how the knowledges we create within Human-Computer Interaction are fundamentally based on ableist notion of not just who is involved in knowledge creation but also how. Altering this foundation allows us to more holistically understand what access to technologies means even before the conceptualisation of a given application.

The four aims associated with investigating the experiences made in this space combine methodological and designerly investigations to identify higher level epistemological concepts aiding us in understanding the access principles underlying them (see also, Figure 5). The specific context further allows us to directly cross-section these experiences directly with matters of research participation and acknowledging different epistemic positionalities which have been previously and are continually subjugated.

- P1. Establishing existing norms regarding bodily expectations in the methodological approaches within Human-Computer Interaction research. *Feeding into M1 and EO.*
- P2. Solicitating of interests regarding technological research within contexts of Virtual and Augmented Reality technologies as well as the methodological approaches to design. *Feeding into M2 and MO.*
- P3. Exploring and implementing design opportunities together with Deaf stakeholders and in doing so conducting Research through Design to identify core design characteristics supporting communicative and immersive needs alike. *Feeding into D1 and DO.*
- P4. Assessing the epistemological consequences of the knowledges derived from the methodological approaches and the resulting designs. *Feeding into D2 and TO.*

Risks: Medium to High. Similarly to WP1, we already have an enthusiastic potential researcher interested in conducting this work, in this case, Robin Angelini. He brings in the required skills and expertise for this work and is currently collaborating with the applicant during their Master's studies. Here, it is equally possible, that non-academic participants are interested in other subject matters or technology platforms. Additionally, despite the applicant being one of the very few academics in Austria sufficiently competent in Austrian Sign Language to advise and collaborate, as a hearing person, they might not be trusted and be invited to collaborate at the same level as a Deaf project lead might.

Outcomes: WP2 will also feed into several overall objectives. At the end, there will be observational and empirical data as well as prototypes and tests on those that will be the foundations of paper publications as well as contributing to our exhibitions and public engagements.

WP3: Experiencing Access in Intimacy

Context & Goals: Dominant discourses around physical intimacy and sex systemically excludes disabled people, othering them as abnormal (Yau, 2019). Even within sexuality discourses in HCI, disability is absent

³ The main applicant for this research is also hearing and only disabled in other ways. This means that the research lead is similarly with a hearing person. However, they are competent in Austrian Sign Language (ÖGS) at B2 level and are committed to employ Deaf researchers within the team to tackle this part of the research in the form of a pre-doctoral researcher (Robin Angelini) and ideally also for the first post-doctoral researcher involved. As described further below, we are also cooperating with Deaf collaborators to ensure cultural appropriateness and self-determination in the execution of the work.

(Kannabiran et al., 2011). So far, some probings into the potential of technological facilitation of stigma around intimacy in older age exist (Schulte and Hornecker, 2020), though the community still sheers away from explicitly addressing disability, specifically neurological disabilities, in this context. Yet, disabled people desire intimacy as much as anyone and have creative approaches as to how to facilitate that (Liddiard, 2017). In our proposed work, we specifically operate from a model of neurodiversity (Dalton, 2013), a model that understands the necessity of different neurotypes while also accounting for the potentially disabling factors neurodivergent people (those not exhibiting the dominant neurotype) experience in their environments (Spiel and Gerling, 2021). Specifically with the high stigma encountered around sexuality for neurodivergent people, their access to intimacy and sexual experiences constitutes a human rights matter (Taylor Gomez, 2012).

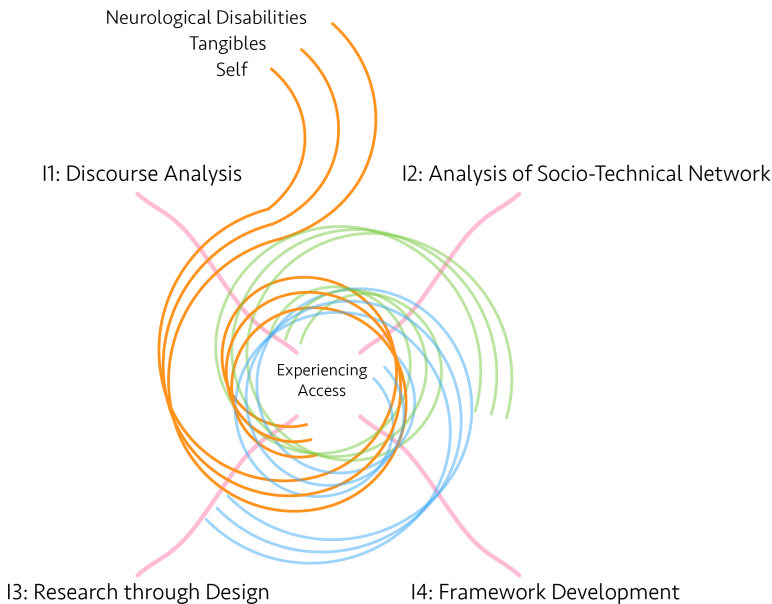


Figure 6: Context and Objectives for *Experiencing Access in Intimacy*

work developing technologies and sexual tools to support physical intimacy with the self have already been conducted for people with motor disabilities (Morales et al., 2018), though how this would be achieved for different sensory processing of neurodivergent people remains an open question.

Actions: Understanding access as an experience framing, shaping, articulating and enabling different forms of intimacies to take place with technological support, this strand of investigation asks generative questions concerning negotiations of intimacy for disabled people in technology research generally and Human-Computer Interaction specifically. In that, we consider a range of perspectives, specifically drawing on the experiences of disabled women and minority genders as they relate to positive as well as negative experiences made. We pursue the following aims, which are also detailed in Figure 6.

11. Conducting a Critical Discourse Analysis surrounding the concepts of intimacy and disability in current technology and HCI research. *Feeding into M1 and EO.*
12. Investigating the positions of different stakeholders (e.g., disabled people themselves, formal and informal carers and interest groups) carefully to identify their differing or shared understanding of intimacy and technologies facilitating such experiences. *Feeding into M2 and MO.*
13. Conceptualising and executing research-through-design explorations into the potentials of tangibles for masturbation as thought experiments materialising technological alternatives and inquiring into options for innovation. *Feeding into D1 and DO.*
14. Contextualising current methodological approaches and provide a coherent framework guiding HCI researchers and designers concerned with intimacy in their research practices with participants. *Feeding into D2 and TO.*

Risks: Medium to High. For WP3, a suitable researcher will have to be hired. Given that the topic is wrought with stigma, this might prove difficult, though, in general, we do not expect this to be an issue if addressed openly and transparently.

Outcomes: Through the four aims of inquiry, this strand of work results in critical, experiential, designerly and methodological knowledges on the design of intimate technologies and an understanding of *Experiencing*

Access in Intimacy. Envisioned outcomes include a constructive critique of the status quo, phenomenological descriptions of stakeholders' perspectives, design explorations through prototypes leading to deepened insights on parameters shaping access to intimate interactions and the experiences thereof as well as practice-led guidelines for future research on intimacies and technologies. Within the larger context of the proposed research, this strand provides a probe into experiences made with the self, through technological dispositives of tangible interactions with neurologically disabled people.

WP4-6: Collating Methodological, Designerly and Theoretical Insights

Given that WP 4-6 follow a similar structure, we describe them on a high level and collectively here.

Goals: Our goals in these work packages is to a) *methodologically* develop strategies and approaches that allow HCI researchers to involve different disabled populations in their work; to b) garner up the *designerly* knowledge inherent on the prototypes to identify strong concepts (Höök and Löwgren, 2012) for future interaction designs; and to c) develop a solid and empirically based *theoretical* understanding of how access is experienced in the interaction with technologies and how, in return, access comprises an aspect shaping the overall experience in such interactions.

Actions: The work packages follow an iterative cycle with interloping aspects. For example, when drawing out and collating the methodological requirements from WP1-3, these will be relevant to understand the designerly concepts, we identify and both of these will be relevant for our theoretical understanding while, in return, this theoretical understanding feeding back into our conceptualization of methodological requirements as well as our notion of what design aspects are relevant and so on. Hence, we engage in a collaborative *hermeneutical* analysis of the proceedings and results of WP1-3 (including visual and discursive methods), to contribute to the intended goals.

Risks: Medium. This work is going to be conducted by experienced post-doctoral researchers, including the principal investigator, who has already successfully contributed to HCI literature across all these domains. Regardless, it might not be accepted well within Computer Science and lack behind the impact it can make by not being adopted by researchers and practitioners alike.

Outcomes: Given the conceptual and theoretical nature of these work packages, the tangible outcomes lie in the academic papers stemming from them. The graphical material from visual analyses (such as, e.g., conducted in Spiel, 2022), can further be used to more broadly disseminate our findings.

b.2. Ethics & Equity

Given that ACCESSTECH operates in sensitive contexts collaborating with representatives of potentially vulnerable and certainly marginalised populations, we pay specific attention to considerations regarding ethics and equity in our work. We draw here on formalised regulations, situated documentation and continuous reflection within the research team. Even though both of these areas share some overlapping concerns, we present our plans on each separately.

Ethical Aspects of the Research: When working with marginalised populations, researchers need to be prepared to carefully navigate relationships as to be sensitive to potentially experienced traumata as well as avoiding triggering further ingrained micro-aggressions (Chen et al., 2022). To guarantee the safety of welfare of participants, but also that of the research team involved, a rigorous ethics framework, drawing from the guidance on “Ethics in Social Science and Humanities” from the European Commission, will ensure that there are protocols in place for all foreseeable situations. In an attempt to further strengthen this preventative base, all involved researchers will undergo sensitivity training in the context of marginalisations that are not shared with participants (for example, *trotz-dem*⁴ offering sensitivity training in the context of blindness, or *ÖZIF*⁵ for general sensitivity training with disabled people). Next to the common procedure of seeking informed consent from participants, the researchers will ensure ongoing consent and assent by regularly checking in and reflecting on micro-ethical dimensions of the collaborations (cf. Spiel et al., 2018). To support a persistent reflective practice, the team will implement ritualistic feedback mechanisms through which participants are getting used to providing critical feedback and are accustomed to speaking their mind regarding their comfort freely. The applicant will additionally develop protocols for data protection and safe data storage in all matters concerning the research participants. At TU Wien, the research can seek out advice and guidance by professional ethicists, for example, Dr. Marjo Rauhala, as well as through the newly institutionalised ethics board supporting peer counsel, which will be contacted for each of the work packages separately.

⁴ <https://www.trotz-dem.at>

⁵ <https://www.oetziv.org/access/sensibilisierungstraining>

In planning such potentially high-risk high-gain research and including others in conducting it, there are potential risks for all researchers involved to consider. For example, the individuals conducting work in specific arenas might be overwhelmed at some point by the responsibilities of care they have towards their participants, or the research through design aspects of the work might be less fruitful than hoped for. Here, the applicant together with their collaborators and their overall network will continuously reflect on how to best guide the researchers involved and how to best support them to productively deal with academic failures as well as successes.

Equity Considerations (including Gender): ACCESSTECH asks how our experiences with interactive technologies are shaped through access, is directly related to equity in science, research and technology development (Ymous et al., 2020). While there is no explicit core focus on gender as such, gender is implicitly one of the relevant intersectional categories of this project. Women and non-binary people have been historically systematically excluded from research and are additionally under-represented in accessibility related research (Mack et al., 2021), which only recently has started to account for overlapping modes of oppression (Bennett et al., 2021). In dominant strands of technology research, disabled people and their bodies keep on being represented only as an afterthought of technology design concerning human bodies (Spiel, 2021a).

As the research proposed here focuses on disability as a specific marginalisation concerning the bodies of different people in technology design, gendered experiences of disability will play a role as well (Clare, 2015), which is why when researching Access in Intimacy (WP3), we ensure to privilege the perspectives of disabled women and minority genders, preferably hiring a researcher holding one of these identities. By looking at the different strands within the matrix of domination (Collins, 1990), e.g., gender and disability as well as other aspects such as class and skin colour, the proposed research addresses equity more fundamentally (Crenshaw, 1990, Schlesinger et al., 2017). This approach allows for inherent gender-inclusivity as well as a heightened awareness to matters of unmarked norms and power influences potentially biasing the quality of our research (Bratteteig and Wagner, 2012). By conducting this research with a strong participatory component, the project makes an argument for more equitable research in the fields of Interaction Design and Human-Computer Interaction more generally and provides a range of illustrative examples on how this can be achieved.

b.3. Research Infrastructure

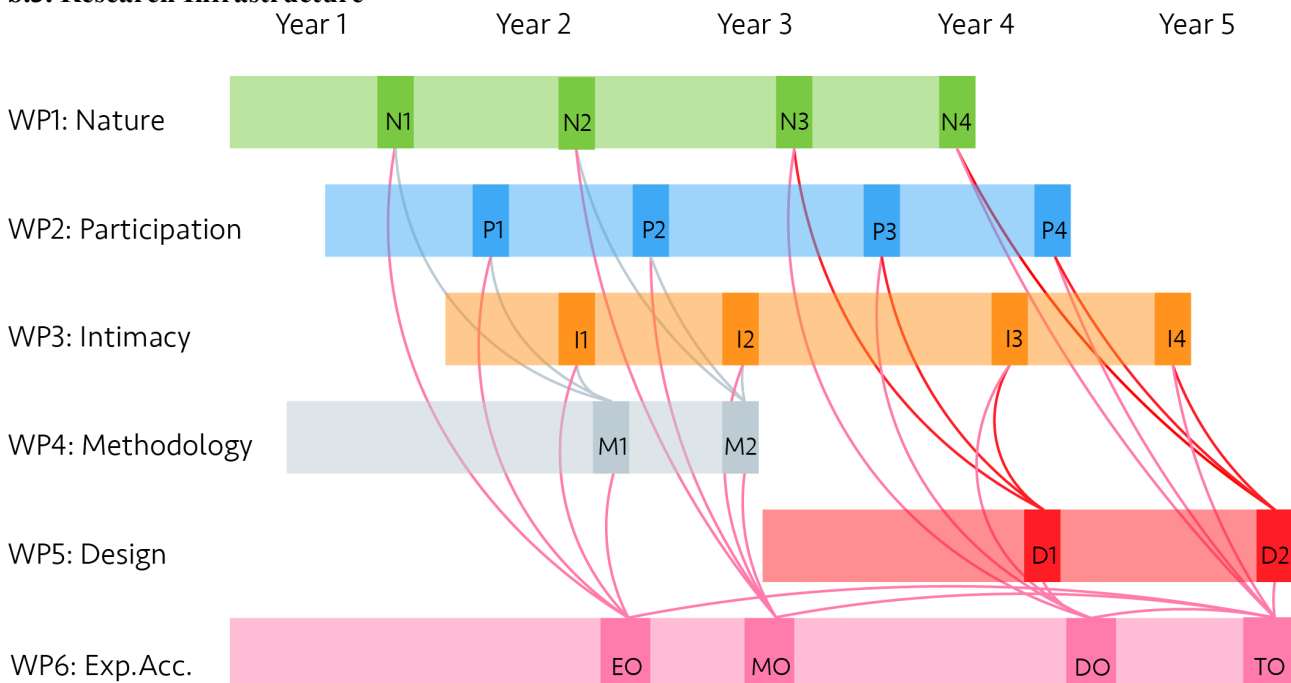


Figure 7: Gantt visualisation of individual work and time plans as well as deliverables and how they feed into each other.

Institutional Resources: Through TU Wien, the researchers involved in *Experiencing Access* gain access to fabrication devices (e.g., 3D Printers, Laser Cutters), potential workshop and exhibition spaces, as well as computer laboratories. The Physical Design Lab of the Human-Computer Interaction Group at TU Wien specifically offers these opportunities directly close to the office spaces, the Institute of Visual Computing and Human-Centred Technologies is committed to provide. Newly hired staff will have access to their own desk and basic technological infrastructure including access to a modern personal computer or laptop according to

individual preferences. Similarly, researchers will have access to state-of-the-art digital manipulation software such as the Adobe Suite, programming environments and software licences for analysis software.

Staffing and Project Organisation: The work will be carried out by a team consisting of the Principal Investigator, two postdoctoral and three pre-doctoral researchers. Given how each arena of inquiry, Nature, Participation and Intimacy, comes with its own aims and subsequent deliverables to attend to, Figure 7 illustrates when these should occur during the five years planned for this research and how they relate to the larger methodological and designerly questions as well as the overall goals. PhD refers to pre-doctoral researchers, PD to post-doctoral researchers. For each area of inquiry, the deliverables are referenced through their aims (N1, N2, etc.). The main objectives (epistemological, methodological, designerly and theoretical), within the responsibility of the research lead, and the methodological as well as designerly foci are similarly referenced (M1, M2, D1, D2). Subsequently, different members of the research team take on different responsibilities in ensuring specific goals are met in a timely manner and provide the relevant input for higher level objectives later on. Concretely, each of the individual aims in each of the areas of investigation will feed into the main objectives and the methodological as well as designerly focus therein to contribute to a holistic understanding of ACCESSTECH across specific disabilities, technologies and contexts of interaction.

Hiring and Equity: To conduct the proposed work, it will be necessary to draw on lived experiences of disability. This is in part to counter the widespread epistemic premises within classical technology and accessibility research (Ymous et al., 2020) and add alternative ways of investigation to already existing knowledges. Hence, beyond paying close attention to aspects of gender as well as racial experiences, applicants with lived experiences related to the fields of inquiry will be hired preferentially.

Management: The work will be managed mainly by the principal investigator, who will institute weekly meetings among the research team as well as implement a suitable digital infrastructure for ad-hoc communication. Additionally, the team will be included in the existing personal and digital setups of the broader Human-Computer Interaction group.

Risk & contingency planning: For the proposed work, we have identified five potential risks, for all of which we have mitigation and contingency strategies.

Delay in final funding agreement	TU Wien is an experienced institution with prior ERC funding management experience. The finance and research support departments will assist the PI in the logistical management of this work.
Lack of motivation from civil project partners	We have already tentative commitments from existing stakeholders as well as previous experience in collaborating with some of them. Additionally, we can draw on the broad network established through previous work with <i>Disability Studies Austria</i> .
Upswing in the pandemic with associated measures	Pandemic measures might limit our options for directly engaging with participants from stakeholder groups. To counteract this, we will plan our engagements mainly during the summer months, where outside meetings are an option. Additionally, we will have dedicated contingency plans to move meetings online or conduct them in a hybrid manner, if possible.
Design, development, prototyping and production delays	The principal investigator covers technical and theoretical expertise themselves and will assemble a team that, among them, also covers a range of expertise to avoid such delays. However, if necessary, we will draw on our collaborators and their networks to ensure the timely delivery of milestones.
Difficulties with dissemination	The research team will seek out opportunities to continually improve their writing and presentation skills.

Collaborations: The three strands of the proposed work are accompanied by different cooperation arrangements that specifically augment the expertise in the given area of inquiry.

- Prof. Kathrin Gerling (KU Leuven/Karlsruhe Institute of Technology from 12/22) is an expert in Human Computer Interaction and specifically focuses on accessibility for wheelchair users (e.g., Gerling et al., 2020). She agreed to cooperate in the design, prototyping and analysis parts of this work and contribute her concrete expertise on actively collaborating with wheelchair users in research. Specifically, Prof. Gerling will contribute to aims N2, N3 and N4 with the potential to conduct some evaluation in the context of N4 in Karlsruhe to understand more about the ecological validity of the

resulting design suggestions outside of the specific participatory engagements they have been developed in.

- Dr. Maartje de Meuler (HU University of Applied Sciences Utrecht) is a Deaf scholar with expertise in sign language technologies (e.g., de Meuler, 2021). Her expertise in Deaf Cultures and Disability Studies will strengthen our investigations on participation when collaborating with Deaf communities. She will concretely assist in addressing the aims P1 and P2, to ensure that the methodological foundation of the participation is well grounded in Disability Studies and, particularly, Deaf Studies. For P2, the predoctoral researcher of *Experiencing Access in Participation* will have the opportunity to conduct formal and informal interviews with Deaf scholars and activists in Belgium, to diversify the empirical data critically informing the methodological explorations when investigating aim P3.
- Finally, Prof. Eva Hornecker (Bauhaus-Universität Weimar) offers her support with regards to her deep knowledge of tangibles as a technical platform generally (e.g., Hornecker & Buur, 2006), but also intends to share her experiences made in recent works regarding tangibles in contexts of intimacy (e.g., Schulte & Hornecker, 2020). Her guidance will be particularly sought of in pursuing aims I3 and I4. A secondment for the predoctoral researcher in Weimar during the pursuit of I3 will allow them access to different fabrication technologies in addition to those available at TU Wien. Additionally, the researcher will profit from additional design related support and the interdisciplinary design approaches practised at the Bauhaus.

Moreover, we intend to collaborate with local NGOs of self-representatives such as *Selbstbestimmt Leben in Österreich (SLIÖ)*⁶, *Österreichischer Gehörlosenbund (ÖGLB)*⁷ or *Ninlil*⁸, all of which we have existing connections to and have solicited informal indications of interest from. SLIÖ showed particular interest in collaborating on *Experiencing Access in Nature*, finding the goal of self-determined access to different environments to align well with their own agenda. The ÖGLB, striving for the participation of Deaf and Hard of Hearing people more generally with larger society in Austria, mentioned to be intrigued on being involved in defining technologies on their own terms, contrasting their everyday experiences of technologies and living conditions being decided upon and defined by hearing people. Finally, Ninlil appreciates the opportunities for the development of artefacts supporting their clientele in developing strategies for desired forms of intimacies, communicating and experiencing them as well. We currently have not solicited explicit letters of interest but rather asked for informal support to not overly burden these very busy stakeholders and also not to raise concrete expectations within a highly competitive funding scheme.

The combination of cooperation commitments from within academia as well as civil society in Austria, however, illustrates the necessity, desirability, relevance and urgency this work takes on on several accounts.

b.4. Impact

Academic and Public Dissemination: Due to the interdisciplinary positioning of the work, dissemination will occur at a range of academic and more publicly oriented venues. Academically, we intend to publish in the venues with audiences stemming from Human-Computer Interaction and Design, specifically at conferences such as ACM CHI (Conference on Human Factors in Computing Systems), ASSETS (ACM SIGACCESS Conference on Computers and Accessibility), C&T (International Conference on Communities & Technologies), DIS (Designing Interactive Systems), TEI (International Conference on Tangible, Embedded, and Embodied Interaction) as well as PDC (Participatory Design Conference) and journals such as ACM ToCHI (Transactions on Computer-Human Interaction), Co-Design or Human-Computer Interaction. We further intend to cross over into more Disability Studies venues and Social Studies publication outlets, including conferences like 4S (Meeting of the Society for Social Studies of Science) or SDS@OSU (Society for Disability Studies Annual Meeting) and journals, such as DSQ (Disability Studies Quarterly), Sexualities, Disability and Society, or Science, Technology and Human Values. The main applicant is already well embedded in the communities pertaining to both of these areas, having published in most of them and been involved in co-organising some of them, including CHI, the largest conference in the area of Human-Computer Interaction. Additionally, the main theoretical contribution of this research shall be published as a long-form book, to extend the distribution of the findings towards interested lay audiences as well. All publications will be made available Open Access, for which costs have been budgeted.

⁶ <https://www.sliö.at>

⁷ <https://www.oeglb.at>

⁸ <https://www.ninlil.at>

Using these dissemination strategies will set up the doctoral researchers with opportunities to create their own independent networks as they are relevant to their specific works. Further, the postdoctoral researcher and the applicant will be able to solidify their position and expand their existing networks.

Additionally, we strive to disseminate the work to the general public through art exhibitions (e.g., Vienna Design Week), contributions to popular magazines (e.g., Crip Magazine), interviews and barcamps (self-organized). Ongoing feedback from these venues will further strengthen the empirical basis this work is based on and allow for on-going reflections on the relevance of the work particularly for local communities and our local partners.

Impact: With ACCESSTECH, we see the potential for impact in the *academic communities* we contribute to, but also *civil stakeholders* and *technology development*. Academically, the proposed research investigates a highly complex issue that comes with several complications. For one, we do not yet understand experiences with interactive technologies well as is, particularly not when this concerns disabled people. So far, measures of access have received scant attention by the dominant conceptualisations technological experiences (e.g. McCarthy and Wright, 2007, Dourish, 2001, Wright and McCarthy, 2010, only mention access as a general principle without explicitly addressing matters thereof), while matters of experience have been underexplored in treaties of access (e.g., Hamraie, 2017, Williamson, 2019, focus more on technical aspects of access and the expertise involved in understanding which measures are required). This matter is further complicated by the notion that disabilities are manifold and so are the resulting access needs and experiences when interacting with technological artefacts. Hence, a resulting theory of access as a core aspect of these experiences will need to account for multiple different ways of bodies engaging with them in different environmental and social contexts as well as a range of technological dispositives. In addition, most existing research in technologies operates from a largely medical model of disability (cf. Spiel et al., 2022, Spiel and Gerling, 2021, Spiel et al., 2019a) with limited methodological expertise in the academy on how to engage disabled participants only slowly accumulating (Mack et al., 2022).

To appropriately address the complexities involved in this research endeavour, we largely draw on participatory research methods to ensure the work remains relevant to stakeholders from *civil society* as well. There, we intend to collaborate with local initiatives to remain accountable to the communities we research with and for. The necessary contacts have already been established through prior engagements. Drawing on such an inter- and transdisciplinary approach further ensures that multiple perspectives are considered and provide a stronger empirical base. Additionally, we use multiple points of enquire in situated contexts to allow for a holistic assessment regarding what access might mean to different people in different contexts along different technological dispositives. Calls for including disabled people actively in the design of technologies for them (Mankoff et al., 2010, Bennett and Rosner, 2019, Hamraie and Fritsch, 2019) have increased, though we still require a solid analysis of the epistemological consequences of different methodological considerations in opening up technological development to more meaningfully include disabled people in technological research, design and development. We envision our investigations to build the basis for potential practical guidelines centering access early on in research and industry related processes.

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I have marked my own name in bold font and those of pre-doctoral as well as postdoctoral researchers I advised in italics.

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