



Manifesto for Digital Social Touch in Crisis

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This qualitative exploratory research paper presents a *Manifesto for Digital Social Touch in Crisis* - a provocative call to action to designers, developers and researchers to rethink and reimagine social touch through a deeper engagement with the social and sensory aspects of touch. This call is motivated by concerns that social touch is in a crisis signaled by a decline in social touch over the past 2 decades, the problematics of inappropriate social touch, and the well documented impact of a lack of social touch on communication, relationships, and well-being and health. These concerns shape how social touch enters the digital realm and raise questions for how and when the complex space of social touch is mediated by technologies, as well the societal implications. The paper situates the manifesto in the key challenges facing haptic designers and developers identified through a series of interdisciplinary collaborative workshops with participants from computer science, design, engineering, HCI and social science from both within industry and academia, and the research literature on haptics. The features and purpose of the manifesto form are described, along with our rationale for its use, and the method of the manifesto development. The starting points, opportunities and challenges, dominant themes and tensions that shaped the manifesto statements are then elaborated on. The paper shows the potential of the manifesto form to bridge between HCI, computer science and engineers, and social scientists on the topic of social touch.

Keywords: touch, social touch, digital touch, sensory, haptics, design, manifesto, interdisciplinary research

INTRODUCTION

This qualitative exploratory research paper presents a *Manifesto for Digital Social Touch in Crisis* (Figure 1). The manifesto's call – to rethink and reimagine digital social touch through a deeper engagement with the social and sensory aspects of social touch, is motivated by concerns that social touch is in crisis (both historically and looking forward). There has been a significant decline in social touch over the past 2 decades with an increase in a culture of “low-no-touching” (Linden, 2015), a decrease amplified by Covid-19 (Field et al., 2020). The problematics of inappropriate social touch, abusive social touch, and the ethics of social touch are well documented (e.g., Field, 2014). This raises

MANIFESTO FOR DIGITAL SOCIAL TOUCH IN CRISIS

This manifesto is for designers and developers working on digital touch across academia and industry. It is a vision designed to challenge and provoke debate, raise awareness, incite questions, inspire and direct research and design on the social and sensory aspects of the digital design of touch.

Human touch is at risk. Of disappearing. Neglected touch. Low touch. No touch. Not enough touch. Touch hunger. Skin starvation. Touch deprivation. Remote. Distant. Missing. //Flip -Switch// Too much touch. Intrusive. Unwelcome. The wrong kind of touch. Feel the cacophony, the weight of fears for technological touch – but don't forget the good dreams.

1. MAKE SOCIAL TOUCH CENTRAL

Human touch matters! Hone in on social touch. Include 'touch matters' at the heart of digital communication. Amidst conflicting social concerns and uncertain futures, we must find routes to navigate the technological realities and promises for social touch. Give life back to the digital: Feel the pulse.

2. DESIGN TOUCH FIRST, TECHNOLOGY SECOND

Touch is at risk in technology. Technology (alone) is not the solution. We need technologies to better realize digital touch. Goals for digital touch should be set by something more than technological availability. Amplify interdisciplinarity to PRESS RESET. Rebalance the dialogue between the social, sensory, tactile aesthetic and technological drivers underpinning digital touch development. Bring nuance to a collective imaginary of future touch.

3. DEMOCRATISE TOUCH: DON'T LOCK IT IN

Touch is political. Touch is infused with power. We are positioned to touch through socio-economic and socio-cultural drivers. Let's interrogate how digital design reshapes touch needs and norms. Digital touch needs to be a felt conversation. Everyone is qualified to have a say on what digital touch might be/become. The touch etiquettes of the 20th century will not suffice. OPEN up 'opportunity spaces' to AVOID imaginations of touch getting 'locked in'. DESIRE HETEROGENEITY. Just say no to 'homogenised touching'. Amplify diversity through haptic encodings.

4. PROTECT TOUCH: KEEP TOUCH PRIVATE AND SECURE BY DESIGN

Touch is intimate. Touch reveals myself and my boundaries. When I touch what do I convey about myself? What did I feel of you? Am I identify-able? Did you feel it was me? Can I touch back? Touch overload. Touch Space Invader. Unauthorised touch. WARNING. Alert! Deceptive touch. Hacked feel. Fake Touch 'Retouchée'. Guarantee me control of my digital touch patterns and

preferences. Record. Share. Replay. Mix. Consent. I own my digital touch. Don't wait to tame the haptic 'Wild West'. Develop a haptic business model beyond haptic-monitoring. Let the user decide when, how and where technology touches.

5. MOVE BEYOND VIBRATION: FEEL BEYOND THE HABITUATED

Pay closer attention to the FEEL of touch. Re-encode touch sensations. Create landmarks of felt resistance in the tactile terrain. Materialise touch! ROUGH it up - WARM it up. Give us texture. Soft, bouncy, warm and comfortable. How about a bit of give and take - Material reciprocity beyond the limits of the slick or smooth. Give me a digital touch I don't expect. Negotiate new tactile rhythms. Make time for touch. Ambient S-I-O-W touch. Enrich the shallow vibrating utilitarian feel, venture beyond the hand, beyond the skin, and make digital touch thrive.

6. FOSTER EXPLORATION OF MEANINGFUL TOUCH EXPERIENCES

PERSONALISE TOUCH. Design for a plurality of touch preferences and sensitivity thresholds. Keep it indoors, get mobile, take digital touch outdoors? DESIGN a varied touchy terrain. Include more options. LEAVE SPACE for MUTUAL touch creation. STRETCH the embodied limits of touch socially and functionally to explore new possibilities. A customisable tactile landscape to support the development of social touch languages. Give the user felt feedback to sense their own touch and handle when and where touch lands. Give digital touch value: calculate its biological cost. Allow social touch to extend beyond the immediately comfortable everyday zone.

7. REMAKE, DON'T ONLY REPLICATE!

Free digital touch from the limits of its analogue reflection and let go. Confound and RECALIBRATE touch. Challenge the status-quo. Foster alternative visions. Engage with unfamiliar touch, prepare to touch newly. Trash the touch-screen devoid of feedback. Translate the rich language of non-human touch into the tactile landscape. Rename touch. Reconfigure reliance on visuality. Take a leaf from nature, mimic reality as a stepping stone to remake touch. Or JUMP into the water and wade to a new bank to refresh touch.

8. MANAGE GREAT TECH-XPECTATIONS

Frame users' techy touch expectations. Communicate and contextualise digital touch. Avoid the feel of disappointment. Digital touch is a long-term endeavour. Temper commercial HYPE. No need to over-promise - LIKE NOTHING EVER FELT BEFORE! Keep possibility alive within an honest sense of promise. Metaphors and imagination can bridge a user to unexpected social, sensory and digital touch. Managing expectations is an important step towards adoption.

9. DEVELOP OPEN TOUCHY TOOLS

We need diverse collaborative tools, libraries and archives, technical tools, thinking tools and sensitizing tools to expand touch in the digital realm. Shared tools that can travel between users, designers, developers, researchers. Make Try. Explore. Tools to inspire and educate and bring potential users into the digital touch dialogue. Generate new touch metaphors. Grab at it, pinch and mould it, make our vocabularies work so we can hone new relationships between language and technology to create touch sensations: talk me into feeling it. COMMUNICATE! We need to understand each other better.

10. KEEP SPECULATING

Revisit touch pasts. Interrogate touch presents. Take an E-X-P-A-N-D-E-D view of touch. Forecast the influence of digitally-mediated touch on social interaction. Explore the texture in the space between touchy Dystopias ...

FIGURE 1 | A Manifesto for digital social touch in crisis.

questions of the agency, control, and regulation of social touch (in workplaces, schools, healthcare settings etc.), much of which are entangled with the politics of power and gender (e.g., #MeToo) in both institutional and domestic settings (Field, 2002; Halley, 2007; Owen and Gillentine, 2011; Green, 2017; Pihkala et al., 2019). Despite this social touch remains central to human experience (Bull et al., 2006; Field, 2014), communication

(Gallace and Spence, 2010), and relational, psychological and physiological well-being (Jakubiak, and Feeney, 2017). The impact of a lack of social touch on communication, relationships and well-being and health is well documented as having demonstrable negative connotations (Gallace and Spence, 2010; Field et al., 2020). The specific and immediate consequences of the Covid-19 pandemic for social touch have amplified

Things (reviewed in Fritsch et al. (2018)), and futures more generally (e.g., the Dagstuhl Manifesto series initiated in 2011). The manifesto as we know it today is also a “fundamentally transdisciplinary device” (Obrist, 2010).

While manifestos may emerge from or be informed by research, they are not a scientific outcome. Manifestos aim to provoke. The purpose of manifestos is “prompting new ideas by temporarily liberating scholars from the confines of careful speech and rational argument” – to offer a chance to question and imagine possible futures (Hanna et al., 2019:2), and this, it is argued, has the potential to “give new life to” HCI (ibid). They usually emerge from uncertainty, set out to define a moment of crisis and “invite us, loudly, to some new way of thinking” (Caws, 2001: xxix): in short, they signal a desire for change. The *Manifesto for Digital Social Touch in Crisis* offers a set of 10 statements characteristic of the manifesto form, using a playful variety of poetic, ambiguous and provocative formulations to challenge the reader. Phrases such as “///Flip -Switch///” for example, mark the binary extremes that dominant the response to digital social touch technologies as either “lacking/absent” or “overwhelming/wrong”; “Feel the cacophony” is used to point to the noisy debates of what digital social touch should be, as well as the non-stop sound of vibrating devices that we live with; and “Tech-Xpectations,” is a play on Charles Dickens’s novel *Great Expectations*, which is ultimately about the eventual triumph of good over evil. It takes up the challenge to articulate the “struggle to negotiate between the possibilities that technologies offer, and the concerns that they engender” (Fritsch et al., 2018: 1) and proposes paths toward future roadmaps or directions for digital social touch in society.

The qualitative work (including the manifesto) presented in this article is explorative rather than experimental. Qualitative research is defined as an iterative process through which improved understanding of the scientific community is achieved by making new significant distinctions resulting from getting closer to the phenomenon studied (Aspers and Corte, 2019). Here, the purpose of iteration is as a reflexive process to spark insight and develop meaning (Srivastava and Hopwood, 2009). Using this approach, we sought to understand the concepts, opinions, and experiences raised by the complex “real-world” challenges and opportunities faced by designers in relation to the social and sensorial aspects of designing digital social touch. Our focus, in line with the characteristics of qualitative research, was on building categories, patterns and themes from the ground up (inductive) to capture the participant collaborators’ meanings – here in the innovative form of a manifesto. The manifesto is thus developed through and rooted in the interdisciplinary expertise of social touch designers/developers/researchers: a research outcome of a qualitative iterative design process (Sale and Thielke, 2018). Rather than providing a starting point for the manifesto, the literature on the contemporary landscape of social touch and haptics (reviewed below) situates the manifesto within the wider debates and challenges of haptics and serves to contextualise the concerns crystallized within the manifesto. The article sets out the process that shaped the manifesto development, the curation of its statements, and discusses the opportunities and challenges and the dominant themes and tensions that informed the manifesto.

BACKGROUND

The manifesto emerges in response to the contemporary landscape of social touch. It situates itself within the larger field of haptics, addressing both the study of human touch and technology that stimulates the senses of touch and motion (Hannaford and Okamura, 2016; Jones, 2018). Social touch refers to the many forms of touch in social communication – e.g., greetings, intimate communication, corrections (van Erp and Toet, 2015). It can comprise one or multiple sub-modalities: touch, temperature, itch, pain, and affective touch. We use the term ‘digital touch’ to denote digitally mediated touch sensations, digital social touch and haptics (both referring to the study of the human sense of touch, and its submodalities, touch, temperature, itch, pain, and affective touch, as well as the use of technology that stimulates the senses of touch and motion (Hannaford & Okamura, 2016; Jones, 2018)) more broadly. We outline this landscape below.

Social Aspects of Touch and Haptics

Social touch is part of the human socio-affective, communicative repertoire in the form of interpersonal touch (Gallace and Spence, 2010; McGlone et al., 2014; Jewitt et al., 2020). Social touch, in the form of, for example, hugging, hand holding or stroking, plays a critical role in human development (Cascio et al., 2019), is related to improved overall well-being (Field, 2019), can reduce stress (Ditzen et al., 2007), blood pressure and resting heart rate (Light et al., 2005), and pain (Goldstein et al., 2016), plays a role in communicating emotions (Hertenstein et al., 2006), can enhance a positive mood (Debrot et al., 2013), and has positive effects on pro-social behavior (the Midas touch effect; Haans et al., 2014). Social touch is typically experienced as signaling intimacy and occurs particularly frequently between people in a romantic relationship (Guerrero and Andersen, 1991), or between parents and children (Chopik et al., 2014). Social touch is considered a cross-cultural phenomenon that, although different in form and in its embedding in social practices (see Carra et al. (2014)), occurs across the globe (Sorokowska et al., 2021). Variability in social touch practices can relate to differing environmental aspects (e.g., climate), cultural aspects (e.g., prevalence of religion), and social norms (Sorokowska et al., 2021). Moreover, individuals’ history of touch interactions from early on in life influence how they experience touch in later life (Bales et al., 2018), and there are differences between individuals in how comfortable they are with touch in general, which can be captured by touch avoidance (Ozolins and Sandberg, 2009) or longing for touch questionnaires (Beßler et al., 2020). The Covid-19 pandemic has made palpable that a lack of social touch can have negative consequences for well-being, with research into “touch hunger” (Field et al., 2020; Durkin et al., 2021) finding that the majority of people profoundly miss being touched by others. Prior research has highlighted the negative effects of prolonged absence of social touch on well-being (Field, 2010), and these findings are supported by research on other mammals (Ardiel and Rankin, 2010).

While the mechanisms behind the effects of social touch (also known as socio-affective touch) are not fully understood, they are

assumed to involve an interplay between social, cultural, neural, and opioid factors (Cascio et al., 2019). For example, part of this interplay of factors involves the importance of social touch in the early life of infants to maintain homeostasis and bond with a caregiver, which through a process of reinforcement-learning cements touch as an especially intimate and salient social signal in later life (Fotopoulou and Tsakiris, 2017; Cascio et al., 2019). It is also suggested that there is a prominent role for C-Tactile afferents (CT-afferents) in social touch (Olausson et al., 2010; McGlone et al., 2014). These are low-threshold nerve-fibers that are particularly sensitive to slow stroking touches, that is the types of touch that are judged as particularly pleasant (Löken et al., 2009; Olausson et al., 2010) and considered to signal socially relevant touches. This further distinguishes “CT-touch” from touch involved in tasks such as object manipulation (Cascio et al., 2019). Effects of social touch, such as those on stress reduction, might thus be strongest when CT-optimal touch is applied (Morrison, 2016). Finally, there is also research to implicate opioids such as oxytocin (which are released during social touch) as accounting for positive effects of social touch such as pain reduction (Walker et al., 2017).

Work on the effects that social touch has on well-being and the role it plays in communication has inspired investigations into the use of haptic technology for social touch interactions (Huisman and Darriba Frederiks, 2013). The current state-of-the-art in haptic technology showcases the efforts of designers and engineers to create compelling digital touch sensations by making creative use of existing or the design of new actuator technologies. In one strand of research, haptic technology is used to mediate human-human social touch with the aim to reproduce some of the effects of actual social touch (Haans and IJsselsteijn, 2006). For example, Haans and IJsselsteijn (2009) used vibrotactile feedback during an online chat conversation as a form of mediated digital social touch to investigate whether receiving this type of feedback would affect helping behavior by the recipient of the feedback (i.e., the Midas Touch effect (Crusco and Wetzel, 1984)). Although the authors found an initial effect of digital social touch on helping behavior similar to that of the unmediated Midas touch effect, later research indicated that this might reflect a potential confederate bias, where the effect only occurred when the confederate was aware of the experimental condition (Haans and IJsselsteijn, 2014). Other studies have looked into how mediated social touch affects interpersonal trust (Erk et al., 2015), can be used to communicate emotions (Huisman and Darriba Frederiks, 2013; Rantala et al., 2013), and examined how textual tone affects the evaluation of mediated social touch (Ipakchian Askari et al., 2020). Embedding digital touch into social sensory contexts of established social touch communication remains complex and raises key design issues for effective mediated social touch.

Research closely related to work on mediated social touch looks at how touch could also serve as a modality for virtual agents and social robots to communicate with humans (Huisman and Darriba Frederiks, 2013; van Erp and Toet, 2015). Here, sensors are used to grant virtual agents or robots the ability to detect touch and haptic technology serves as a way for these

artificial social agents to apply touch to humans. For example, Huisman et al. (2014) used vibrotactile actuators to enable a virtual agent in augmented reality to apply touches to a participant’s upper arm, which was found to affect participants’ perception of the agent’s personality. In other research, where a social robot was used to apply touches to participants’ upper arms, it was found that touches by the robot attenuated physiological stress responses induced by watching movie clips (Willemse and Van Erp, 2019). Similar work with robots and virtual agents has focused on the expression of empathy through robotic touch (Bickmore et al., 2010), the communication of emotions (Cang et al., 2015; Obrist et al., 2015), and on improving well-being (Block et al., 2021). The integration of digital social touch interactions in these kinds of artificial social agent systems is not straightforward, however, since multimodal cues, including, facial expressions and speech prosody, can overshadow the effects of touch (Bickmore et al., 2010). These efforts all fit within a broader view on affective computing where touch is seen as another modality that could be used to gather emotionally relevant information from users as well as to apply emotionally salient stimuli to users (Eid and Al Osman, 2015).

Efforts to mediate social touch through haptic technology or to enable artificial social agents to engage in social touch often have the aim of reproducing aspects of naturalistic social touch, the idea being that technologically mediated social touch can have positive effects on well-being (Huisman, 2017). With the Covid-19 pandemic resulting in increased experiences of touch hunger (Field et al., 2020; Durkin et al., 2021), it has been suggested that haptic technology can help to alleviate touch hunger to some extent (Prattichizzo, 2021), for example, by enabling affective touch interactions over distance (den Dekker et al., 2021). How touch is conceptualised matters in shaping technical advancements, bringing opportunities and challenges for development and design and raising questions for how touch experience is reconfigured. Recent work on touch in VR, for example, suggests that while the area is dominated by notions of touch as replication and illusion, interpretive designs of touch can disrupt established “real world” socialities of touch and their renegotiation by users in the space of digitally mediated touch in VR (Price et al., 2021). However, current research into the exact effects of digital touch technologies on the reduction of Covid-19 induced touch hunger are non-existent.

Touch Technology

Haptic experiences and devices (using force, tactile, vibrotactile feedback) have been increasingly applied in HCI and the development of immersive touch experiences is now relatively commonplace. A recent survey (Saleme et al., 2019) details the range of commercially available haptic devices including wearables (e.g., Tesla Suit, Dexmo, ARAIG, KOR-FX and Subpac¹); handheld devices (e.g., Vibrotactile mice and

¹Tesla suit available at <https://teslasuit.io> Dexmo available at <https://www.dextarobotics.com/en-us> ARAIG available at <https://araig.com> KOR-FX available at <http://www.korfx.com> Subpac 101 available at <https://subpac.com/subpac-101/>

joysticks), desktop devices (e.g., Phantom Omni (Danieau et al., 2012), and Ultrahaptics, (Limerick et al., 2019; Rakkolainen, et al., 2021)), and haptic chairs. Haptic technology has found its way into various commercial applications, such as gaming (Orozco et al., 2012; see also Parisi, 2018), virtual reality (Srinivasan and Basdogan, 1997), tele-operation (Hirche and Buss, 2012), haptic gears (Shah et al., 2014; Prasad et al., 2014), automotive interfaces (Harrington et al., 2018; Breitschaft et al., 2019), digital signage (Limerick et al., 2019), mobile (Kwon et al., 2010) and wearable devices (Pacchierotti et al., 2017; Parisi and Farman, 2019), augmented reality (Romanus et al., 2019) and (inevitably) sex toys (Döring and Pöschl, 2018; Liberati, 2017).

The industry standard for high-resolution touch input is capacitive touch contact sensing. Such sensors have been available inside rigid touch screens and mobile devices for a while. Technologies for haptic output can be subdivided into approaches for kinesthetic and for cutaneous feedback, the former delivering forces and torques and the latter delivering tactile skin sensations directly on the skin (e.g., vibration, skin stretch, thermal cues). Early haptic devices were mostly grounded and often focused on kinesthetic feedback (Culbertson et al., 2018). Haptipedia provides a comprehensive overview of grounded force-feedback devices (Seifi et al., 2019). Recent research in haptic technologies puts particular emphasis on cutaneous feedback, in part due to the lower complexity and lower cost of cutaneous feedback devices and their improved mobility (Prattichizzo et al., 2012).

Today, vibratory feedback is most widely used and most popular in commercial devices. The typical approach of binary on-off feedback or simple arrays to convey directional information (Meier et al., 2015) is arguably too restricted for rendering social touch. By controlling detailed parameters of vibration, such as amplitude and frequency, more expressive and nuanced output can be generated. Prior work has demonstrated various vibrotactile illusions, such as rendering directional cues (Culbertson et al., 2018), rendering the impression of compliance (Heo et al., 2019) or a specific surface texture (Strohmeier and Hornbæk, 2017; Strohmeier et al., 2020). While force mapping sensors are important to capture the nuances of touch (Kim et al., 2011), multi-modal sensors (Roberts et al., 2013) allow a strong personal and emotional way of interaction.

Feel-through tactile interfaces allow for new forms of tactile augmented reality, where real-world objects are superimposed with synthetic tactile renderings (Withana et al., 2018). Integrating touch sensors into deformable surfaces such as textiles (Orth et al., 1998), elastic polymers (Wessely et al., 2016; Teyssier et al., 2020) and even human skin (Weigel et al., 2015; Nittala et al., 2018) has enabled more expressive touch interaction. Emergent technologies are being developed to enrich digital social touch interactions and embed other input modalities such as force, shear, twist, and squeeze (Weigel et al., 2014). For example, tactile feedback can even be contactless and rendered in mid-air (Hoshi et al., 2010; Carter et al., 2013; Rakkolainen et al., 2021). Going beyond vibration (a point we make in the manifesto and return to later in this paper), skin deformation has been shown to add to the expressiveness and

realism of haptic output. For instance, cutaneous haptic devices for the fingertip make use of skin indentation (Pacchierotti et al., 2014) or lateral stretching (Leonardis et al., 2015); haptic renderings with larger-scale skin deformation have been realized using adhesive skin patches with embedded artificial muscles (Hamdan et al., 2019). Moreover, flexible electronic skins are promising for conveying social touch; prior work covers vibratory (Yu et al., 2019) and electro-tactile (Withana et al., 2018) feedback amongst other modalities. It can be expected that advances in new materials (Biswas and Visell, 2021) and soft robotics will further expand the richness of multi-sensory haptic feedback (MacLean et al., 2017). In short, technological boundaries of what can be rendered, especially in cutaneous feedback, are continually being pushed. Novel actuators at different stages of maturity are in development that render a variety of tactile experiences (e.g., thermal feedback, pain, stickiness etc.) with potential for mediated digital social touch.

Adoption of Haptic Technology: Haptic-Hype and Visions

Against the rich backdrop of successful haptic devices outlined in the previous section, the integration of active haptic feedback (i.e., computer-controlled stimulation of the sense of touch via various actuators (Srinivasan and Basdogan, 1997; Hayward et al., 2004; Culbertson et al., 2018; Parisi, 2018)) in digital technology has been part of many visions on what interacting with these digital technologies should or could be like. Haptics has been envisioned as crucial to developing “the ultimate display” (Sutherland, 1965), has been described as vital for enabling “computing with feeling” interactions (Atkinson et al., 1977), has been called the “holy grail” of telepresence (Stone, 2000) or more recently, has been made central in the next generation of the Internet in the form of Tactile Internet (Fettweis, 2014). While many of these visions have been brought to full fruition others remain, for the time being, out-of-reach (Culberston et al., 2018; Parisi, 2018). Without diminishing the success of haptics as a field and within a variety of domains, there remains considerable debate on the claims made for haptic technology and what it can deliver in terms of social touch (Parisi et al., 2017; Parisi, 2018). Parisi (2018, p.32) argues that the promise of a haptic revolution in HCI is yet to be fulfilled: “[...]haptic interfaces are suspended in this state of perpetual immanence, always just on the horizon, always only five short years away [...]” Some have argued that haptic design tools (and their availability to interface designers) are too limited (Schneider et al., 2017), and that standardization of haptics is low in comparison to other modalities (Van Erp et al., 2010). Efforts are, however, underway within the industry to address these challenges. For example, Apple has recently formulated haptic design guidelines for developers creating applications for Apple products; Google has released guidelines for haptic design in Android applications; and manufacturers of haptic actuator technologies have united in a “Haptics Industry Forum” (<https://hapticsif.org>) to collectively address challenges in the field, including the standardization of “high definition” haptics. Other notable examples include MPEG which develops standards for coded representation including

haptics (<https://www.mpegstandards.org/standards/Explorations/40/>) and the Tactile Internet (https://standards.ieee.org/project/1918_1.html).

MATERIALS AND METHODS

As set out in the introduction the qualitative work presented in this article is explorative and uses an iterative process to get closer to and reflect upon (Srivastava and Hopwood, 2009; Aspers and Corte, 2019) the complexity of designers in relation to the social and sensorial aspects of designing digital social touch. This involved inductively building categories and themes to capture the participant collaborators' meanings to understand the "real-world" experiences, concepts, opinions, and challenges and opportunities that they face. This served to root and develop the manifesto in and through the interdisciplinary expertise of social touch designers/developers/researchers. The *Manifesto for Digital Social Touch in Crisis* was initiated at an Eurohaptics 2020 workshop titled "*Designing Digital Touch: Social and Sensory Aspects and Challenges*." The workshop itself was sparked by an interdisciplinary dialogue on touch between the social science team of the InTouch project (University College London, United Kingdom) and the computer science and engineering-oriented Interactive Skin project (Saarland University, Germany).

Participants

The workshop was targeted at researchers, interaction designers and developers interested in the challenges, methods and techniques of designing the social and sensorial aspects of digital social touch. The workshop call was disseminated and participants were recruited via relevant listings (e.g., ACM), a workshop website, and the Eurohaptics2020 conference. The 16 participants who attended the workshop have backgrounds in engineering, informatics, computer science, and HCI, academia and industry and were based in France, Germany, United Kingdom, the Netherlands, Switzerland, India, China, and the United States. Ten participants (herein, they are referred to as participant collaborators) attended an optional follow-on collaborative workshop focused on the Manifesto, six of whom continued to contribute to the development of the manifesto (and are co-authors of this paper).

Interdisciplinary Workshops

The manifesto was developed over the next 5 months through a series of workshops, iterative feedback and revisions. Throughout the process Miro, a collaborative online platform was used to support, share and capture brainstorming, the outcome of activities, and discussion. The Miro boards provided data with which to map the process of the manifesto development, alongside facilitator notes, and group reflections on the process (Figure 2).

Workshop 1: Designing Digital Social Touch

Participant position papers, and 2 min introduction videos (stating their discipline, research focus and interest in the workshop) were shared prior to the workshop. Three 10 min "scene setting" talks were shared before the workshop: first, an

overview of new haptic technologies and interfaces for skin (Steimle); second, a presentation of key issues concerning the sociality and sensoriality of digital social touch (Jewitt); and third, an introduction and demonstration of the "Multi-Touch Kit" (Pourjafarian et al., 2019), an open-source touch sensing toolkit. The workshop facilitated a group mapping activity (on Miro) to identify points of connection, contradiction and compatibility between these different perspectives on the designing digital social touch.

This collective map laid the groundwork for a second activity exploring the social and sensorial challenges of digitally mediating social touch using the Multi-touch toolkit, and the Designing Digital Touch Toolkit. These resources provided a grounding and springboard for the collective interrogation of digital social touch. Each group was facilitated by an interdisciplinary pairing (one socially orientated) and used design scenarios as prompts to elicit participants' experiences and to generate design considerations and key themes, challenges and opportunities for digital social touch design. The activities laid the groundwork for a "Manifesto" for digital social touch.

Workshop 2: Manifesto

The optional follow-on manifesto workshop comprised of pre-workshop activities centered on understanding and exploring the manifesto form including working with the Manifesto Game (Ashby et al., 2019), and reviewing Workshop 1 Miro boards to suggest three to five themes for the manifesto. This helped to crystalize the issues and prioritize areas of the social and sensory design of digital social touch for the manifesto.

The workshop activities facilitated debate of the purpose of a manifesto for digital social touch, and collectively agreed a manifesto focusing statement. The rationale and starting point for "social touch in crisis" emerged from this debate. The consequences of different manifesto orientations, tones, openings, and provocations were explored. The right "feel" for a manifesto on digital social touch was agreed to be a challenging vision, playful, excited and hopeful, questioning and future-facing, and provocative. The themes prioritized by participant collaborators were discussed, sifted, clustered and connections made across them to create higher-level themes. The interdisciplinary mix of participant collaborators, their cultural and political experiences, and immersion in different disciplinary and industry research/literature combined to produce a creative fusion on social touch and the digital. This was a lively process of debate that brought key concepts, challenges and opportunities to the fore and seeded a set of initial themes that were later developed into statements for the manifesto.

Manifesto Development Process

The *Manifesto for Digital Social Touch in Crisis* itself was developed through a collaborative and iterative cycle of review and revision. Initial themes, comments and ideas on the Miro boards were used to develop 12 draft manifesto statements: Manifesto Version 1. These were reformulated and consolidated into 10 statements in version 2, during which the workshop Miro boards were used to compile a complete collection of comments and ideas around each

statement. These collections were used to compile a short paragraph elaborating on each manifesto statement, including some verbatim comments from the boards. Manifesto versions 2 and 3 were reviewed by the group, and revised to produce Manifesto Version 4 which was externally reviewed by six established international experts in haptics (collectively nominated by the authors) from HCI, design, media and cultural studies, computer science, and engineering. They offered critiques of the manifesto form, questions of audience, terminology, definitions, language use (e.g., the exclusion of the word “human”), and highlighted statements or aspects of digital social touch (e.g., privacy) that they considered required more development or emphasis. The reviewers’ feedback and a final review by participant collaborators informed the final manifesto (version 5) at the center of this paper.

FINDINGS: CURATING THE MANIFESTO STATEMENTS

In this section, we make the history of the manifesto statements visible by describing the process of how the statements were curated, reordered, clustered and consolidated to realize the shape and flow of the final manifesto. The quotes used are written comments on the Miro boards or, if indicated, from the expert reviewer comments.

Throughout, a key consideration was getting the right tone for the manifesto statements through the collective iteration and development of the heading and content of each statement. For example, statement 2 was initially titled “Balance Touch and Technology” and as the manifesto developed, participant collaborators felt that title was not strong enough: *“This could use a more provoking title, the priority is the experience of touch, technology is just a tool to achieve it.”* It was amended to “Touch first, technology second.” Conversely, for Statement 5 the original formulation of “Lose Vibration! Feel Beyond the Habituated” was later considered to be too strong, and was changed to read, “Move beyond vibration: Feel beyond the habituated.” Similar remarks were made about the content of other manifesto statements. For example, the text for Statement 7 “Remake, Don’t Only Replicate!” included the statement “Trash the touch-screen,” which a participant collaborator noted, *“I would perhaps add “devoid of feedback” or something like that, as touchscreens per say in HCI have opened up many avenues in education, accessibility to information, etc.”* a suggestion that informed the iteration of the manifesto.

A key aspect of the external review was the sense of how the manifesto might “land” within the research field. The manifesto format was quite new and somewhat confounding for some: *“... the form of writing serves another purpose than having a scientific discussion about what we know and which facts we know about touch”*. At the same time, however, the manifesto was found stimulating, and the reviewers were positive about the format: *“The style of the manifesto is very new to me and although initially confusing (just the way it is written and words used, syntax and semantics), I see how it can draw in attention”; “I found it highly inspiring, not only in its content but also in the structure; I felt it was controlling my train of thoughts, in creative ways.”*

These iterative cycles of review, comment and revision led to the *Manifesto for Digital Social Touch in Crisis* presented in full at the beginning of this paper **Figure 1**, each statement is presented and discussed below.

Statement 1: Make Social Touch Central

This statement (initially named - Keep touch central) reflects the collective view that there is a need to bring an urgent emphasis to social touch, linking to the significance of the social aspects of touch interactions (set out in the background literature), for well-being and communication (Gallace and Spence, 2010; McGlone et al., 2014) and development (Cascio et al., 2019) and how these have inspired investigations into the use of haptic technology for social touch (Huisman, 2017).

One expert reviewer noted that *“the word “Human” is mentioned only once, for “non-human.” In my opinion, it is quite central and should be mentioned.”* In response, “human” was included in the text of the statement. There was a broader sense of the need to ensure that social touch – not only its technical realisation - remains “center stage,” both in the context of visual and audio prominence in digital spaces and the Covid-19 pandemic. The “at risk” sense arose from the notion of “poor” social touch interactions due to the way technology is designed, for example the prominence of flat screens, or “minimized” touch effects such as the buzzing of smartphones (Culberston et al., 2018; Parisi, 2018). The statement also reflects the priority that is generally given to visual and auditory modalities, while the tactile is more difficult to realistically achieve in digital social touch devices accessible to the public (due to cost, form factors, functions/roles, etc., so in turn limited to buzzing), and as a result, is perceived as superfluous or not as convincingly necessary as audio or vision.

Statement 2: Design Touch First, Technology Second

This statement combines what were originally (in earlier versions of the manifesto) two statements - *Marginalize the technology* and *Amplify interdisciplinarity*. This highlights the need to foster the richness of haptics set out in the background of this article, and to encourage the ongoing development or realization of “better” digital social touch, and the value of interdisciplinarity (Jewitt et al., 2020). *Marginalize the technology* related to a sense that technology dominates the haptics scene (e.g., conferences, papers, projects), shaping digital social touch in particular ways and aimed to argue for less technology-driven development: it generated significant debate among the participant collaborators. The intention was to emphasize that technology should not be the (sole) driving force, however, while recognizing the need to reduce the dominance of technology, “marginalize” was considered too strong a term, since technology is important. As one participant collaborator wrote, *“Right now technology seems to be driving development of applications and user experiences involving digital touch, but at its core technology is supposed to be a tool to achieve a goal, and maybe we want that goal to be set by something else than just the availability of certain techs?”* Rather than a “techno-push” the manifesto also points to a

need to ensure users are included in the design process and remain at the core of the technology. Alternative statement suggestions included “Touch first, tech second,” and “Avoid technology dominance.” An expert reviewer with a design background liked this statement: *“This is my favorite! I always use this as the only teaching rule for my wearable technologies course. Design experience first, technology second. I think it’s great!”* The other statement *Amplify interdisciplinarity* that was folded into this final manifesto statement, again to mark the insufficient attention to the creative arts and sought to redress the dominance of Computer Science and Engineering in the development of touch technology. Promoting interdisciplinarity was considered one effective way to avoid technology dominance.

Statement 3: Democratize Touch: Don’t Lock It In

This statement links with the discussion of social touch as a cross-cultural (Carra et al., 2014) global phenomenon (Sorokowska et al., 2021) in the background literature section. It was also inspired by Lanier’s description (Lanier., 2010, p7-9) of “lock-in” as a process which causes “digital designs to get frozen into place...culling the ambiguities of flexible thoughts as more and more thought structures are solidified into effectively permanent reality.” The statement went through a variety of title changes - *Democratize touch* and later, *“Don’t lock touch in: desire its heterogeneity,”* in an effort to highlight the potential role people can play in the creation and definition of touch. It involved much discussion: *“...when we say everyone should be involved, do we then mean everyone in the field or also the average user?”* The consensus was that democratization meant involving all people - *“if you have a sense of touch, you are pretty much automatically qualified to contribute to defining what digital touch can become.”* This statement had social and political connotations, raising many questions for participant collaborators including who drives the norms around touch? How do we make sure we all have a say in how touch gets “created”? How do we address power imbalances? While for others the statement arose from the need for touch to be designed such that end-users would have the agency to personally define and develop their own touch language.

Ultimately, this manifesto statement speaks to a need to develop “opportunity spaces” that support exchange between users and developers and designers, prior to “creator” notions of touch, social touch and digital social touch get “locked-in.” Touch cultures were seen to be at risk from the (digital) touch norms that were established by one culture developing the technologies of digital touch: notably the risk of hegemonic companies “flattening” culture and individuality. However, there was also a recognition of diversity needing to be brought into balance with notions of digital social touch design standardization (Van Erp et al., 2010). This statement highlights the need to keep cultural distinctions or even to amplify the (cultural) diversity of touch that exists (Remland et al., 1991). As one participant collaborator noted, *“Touch is a*

conversation and like a conversation it should be open to develop and is made by interaction.”

Statement 4: Protect Touch: Keep Touch Private and Secure by Design

This statement speaks to critical concerns of privacy, security and ownership of touch communications, such as maintaining ownership and share-ability rights over one’s touch “record and replay.” These concerns run like a thick seam through the strata of all technologies (Kamleitner and Mitchell, 2019), are never far from the surface of haptics, and were consistently raised as important throughout the process of developing the manifesto. That process brought out different, although related specificities, highlighting the complexity of privacy of touch. For example, concerns were expressed regarding the need to account for privacy *“when you start recording and sharing touch gestures”* and the need to *“protect touch ownership”* and guarantee control over privacy *“with participant collaborators suggesting they would want “control over what information about me and my way of interacting through touch becomes public or not”* as well as *“what touches me, how it touches me, and what information is conveyed to me through touch.”* There was agreement that touch data, *“perhaps even more than other types of data given the connotations with intimacy”* needed to be protected. Similar to issues raised about how users can be identified through their body posture/motions this could also apply to touch (see Miller et al. (2020) for an example in the context of VR; Ornati., 2022. A comment by one of the expert reviewers raised the phrase *“Keep touch private and secure by design”* from the explanatory text to the statement heading. While another expert reviewer comment helped us to reshape the manifesto framing of touch ownership: *“It starts too negative, when this ownership is actually so liberating and empowering. Would there be scope to start with something on the flip side of this ownership? E.g.: Touch is intimate. Touch reveals myself and my boundaries. Touch can be intrusive.”* This helped us to rewrite the opening paragraph of this manifesto statement.

Statement 5: Move Beyond Vibration: Feel Beyond the Habituated

This statement emerged in response to the dominance of vibration and the emergence of new actuators for social touch (see the background section), as well as participant collaborators’ express desire to disrupt technological interfaces (e.g., through notions of “touchless touch” (mid-air haptics) or extending touch beyond the hand to a whole body experience) that create a reduction of sensation in types of touch, touch feedback (e.g., primarily vibration motors) or touch experiences. It was agreed in order to bring the richness of “real” touch into the digital, that there is a need to move out of the restricted range of both actuation technologies and interface materials that are available in current digital social touch implementations. A variety of possible formulations of this emerged: *“Move beyond vibration and glass,” “Move beyond flat, move beyond vibrate,” “Move beyond a rigid surface,”* or *“Touch beyond vibration.”* However, we recognized the need not to assume

touch research is only about flat surfaces and vibrations, and to include work on grounded force-feedback (Seifi et al., 2019) and skin deformation (Hamdan et al., 2019). (For further examples, see also Tibbits (2017)). This consideration led to the final manifesto statement.

Statement 6: Foster Exploration of Meaningful Touch Experiences

This statement (initially named “*Create responsive touch experiences*”) focuses on personalizing touch to enable touch to be responsive to the individual (touch preferences) and context. This statement links to the need for digital social touch to respond to on touch cultures, the variation and levels of intimacy of social touch, and the importance of embedding digital touch into social sensory contexts of established social touch communication – all of which are complex issues that raise questions for the design of effective mediated social touch (see *Background* section). Discussion of this statement involved suggestions of using the term *reciprocal* to be more explicit that touch interaction concerns bi-directional communication rather than being a technical property. Participant collaborators considered an emphasis on the *personal* to be critical, or the *adaptive* which captures both reciprocity and personalization. The contextual needs of touch experience were foregrounded, such as in mobility, static, outdoors vs. indoors. The adaptability to context was also highlighted, particularly in terms of privacy, with possible noise or simulations generated by touch technologies. These aspects are encompassed in the “meaningfulness” of touch experience.

Statement 7: Remake, Don’t Only Replicate!

This statement - originally named *Stop replicating touch* and later *Don’t just replicate touch, remake it*, highlights a tension in the design and development of social touch between a drive to replicate or mimic touch (Price et al., 2021) versus designing new forms of touch experiences (see *Background*). It is aimed at encouraging a move beyond replication to forms of more innovative and creative digital social touch experiences. Participant collaborators noted that replicating is, however, sometimes needed or desired and saw the real issue as being that digital social touch should not be limited to replication: “...remaking is making anew, which I tend to associate with technology. So perhaps it should be made clear in the explanation that it is not only about technologizing touch in yet to be imagined spaces.” The statement is an offer of inspiration and an invitation to think outside the box.

Statement 8: Manage Great “Tech-Xpectations”

This statement concerns the need to manage both user expectations of technology in relation to commercial hype and marketing and the vision and promise of digital social touch (Parisi et al., 2017; Parisi, 2018) (see *Background*). It is informed by discussion of how personal experience can lead to predictions of how “digital social touch” should feel, and result in disappointment or surprise if/when the actual feeling is different. Suggestions

involved offering clarity on what is technologically possible, and both the lowering of expectations by avoiding overly hyperbolic advertising and the changing of user expectations through education and communication on new forms of haptic feedback. Touch technologies were, it was argued, a long-term endeavor. The statement was seen as “*offering a user counterpart to statement 9*” and an invitation to designer/developers “*to try crazy new things (i.e., don’t worry, go try these new ideas, the digital touch you are designing should feel different from what’s already out there/ what people expect).*” One collaborator noted that in French law (Republic Francaise, 1994), if a photograph is used in the media is retouched it must declare that it is “*photo retouchée*” and they suggested that the same could be required of touch, as in “*toucher retouchée*” as a way to temper the hype of digital social touch promises and to reframe expectations.

Statement 9: Develop Open Touchy Tools

This statement focuses on the need for new design tools for the development of touch experiences that expand our perception of touch and touch vocabularies. Participant collaborators agreed that a diverse range of technical tools is needed to enable designers to include touch more broadly (Schneider et al., 2017; Seifi et al., 2020), and to help broaden thinking about touch: “*to build shared resources for designing and talking about touch.*” For example, design tools to engage with the social and sensory aspects of touch (e.g., Designing Digital Touch Toolkit <https://www.in-touch-ucl.design>). The statement focuses both on tools and the need to share these (discussed in the *Background* section), as one participant collaborator noted, “*it is also about making it accessible to anyone or with various levels (public, tech experts, designers), in transparency of the device(s) used, with adaptation to the context of use (mobile phone, VR, etc.).*” The significance of access was incorporated in the final manifesto statement, as was the need for tools to be “open” to resonate with design and engineering communities.

Statement 10: Keep Speculating

This final manifesto statement was motivated by a need to draw attention to wider social and political responsibilities for technology development, particularly given the lack of social forecasts for touch, and the often-unintended negative consequences of existing applications. Some highlighted the need to outline future utopian and dystopian scenarios for digital social touch. The statement can be read in two ways: first, “keep speculating” in terms of imagining digital social touch; and second, a wider political use of the term speculation in relation to a lack of regulation and social responsibility in which manifestos are seen as calling “for political or judicial reconfigurations” rather than placing such responsibility for action on designers and developers (informed by Fritsch et al.’s (2018) analysis of IoT manifestos). This statement is also a call to users, decision-makers and regulators to consider how to develop and regulate digital social touch design in its nascent stages, to be imaginative, and to actively think through future scenarios and potential consequences as part of the design process. The call to speculation is aimed at energizing the field to: “Move beyond the Feelies” (Huxley, 1932)!

The above 10 statements comprise the *Manifesto for Digital Social Touch in Crisis*.

DISCUSSION

Through analysis and reflection on the process of developing the manifesto, opportunities and challenges, and key themes were identified as foundational to engaging with the social and sensory aspects of designing digital social touch. These informed the manifesto development. Each is discussed below (the quotes used are written comments on the Miro boards).

Opportunities and Challenges

Throughout the development of the manifesto, digital social touch was considered to offer growing opportunities in terms of bringing new awareness to the importance of touch and haptics more broadly. The global Covid-19 pandemic was understood to have increased awareness of the value and importance of touch communication (particularly in contexts of social isolation) and prompted people to question their touch needs. A need for digital social touch and an appreciation of the way it can provide a sense of closeness when apart, particularly for those who cannot leave their homes was seen as an opportunity. One consequence of this is a new context for understanding the design of digital social touch. The potentials of technology were seen to offer opportunities for new ways to develop remote touch, from integrating touch functionality “into virtually any surface and material,” to haptic illusions (Hayward, 2008), or robotic skin and autonomous systems that can sense touch. Digital social touch was felt to open up new and different ways of engaging, such as through physical interaction not possible with “analogue” touch (e.g., replay touch or record/saving of tactile memories), generating software frameworks for prototyping and implementing different haptic interfaces or parameterizing haptic design for people from other fields to design digital social touch.

Emerging challenges for engagement with the social and sensory aspects of digital social touch through design were also identified.

The conceptualization of touch, that is, how researchers, designers, engineers, or lay people conceptualize touch was a challenge in the development of digital social touch. People’s general understanding of touch was perceived as being limited oftentimes to ritualized human-human touches (e.g., handshakes). This serves to foreground touch in terms of functional rather than social encounters or touch as utilitarian as opposed to aesthetic (e.g., touch that is pleasurable). It also excludes touch with other entities as one participant collaborator noted, “I feel I have a rich language of touch with my cats but this seems to be “forgotten” when we think about touch tech.” This prompted conversation around mimicking or replicating touch. Should we or *can we* mimic social touch through technology? Challenges around which features of touch were important and how to manage these, were linked to the ways that touch was conceptualized (Price et al., 2021). For example, how to manage sensory input and output or how to integrate contextual factors surrounding touch. Of particular prominence were notions of

control: how to allow options of control (e.g., touch on which body parts, and the right to be unavailable), finding haptic encodings that are comprehensible and acceptable to users across different genders and cultures, and how long to keep a recording of a digital social touch, similar to the “right to be forgotten” (<https://gdpr-info.eu/art-17-gdpr/>).

Several technical challenges were identified, including how to identify the most appropriate interface for a specific social touch experience or end-user. Other challenges centered on the early development of digital social touch design. For example, content design tools for haptic sensations whilst recognised through some significant commercial successes (see *Background*), were nonetheless considered less mature than visual and auditory modalities, which somewhat limits possibilities for people in non-technical fields to creatively explore the medium. Further considerations concerned knowing what is and is not “designable” and a lack of extensive data sets for a wide range of “real haptic stimuli.”

Three methodological challenges in the design of digital social touch were discussed. First, the challenge of how to undertake sensory measurements to collect data on people’s touch sensations at scale, that is to build libraries of different kinds of sensory feedback around the body, including the measurement of people’s thresholds for negative and positive touch, and the development of standards or benchmarks for digital social touch. Second, a need for more interaction design tools for digital social touch. These included a need for a common language of touch (developing libraries) and developing metaphors for design; recognizing the different affordances of haptic technologies for digital social touch. Third, challenges were raised related to a need the design of digital social touch interfaces to support end-user customization; the development of software frameworks for prototyping and implementing interfaces to support creatively “playing with” digital social touch concepts and foster design. Interdisciplinarity was felt to be key to overcoming these challenges. Collaborations that brought together “engineering, material, experience designers, and social scientists (and others) from an early stage” and built “relationships across academia and industry” were valued as highlighting the importance of developing “A shared vocabulary when describing touch (users, designers, researchers).” This was seen as valuable to “Avoid techno-push attitude: more communication or steps to opening minds on disciplinary collaborations/users at the center, not solely the beauty of the technology.”

A number of *socially orientated challenges* emerged in relation to user expectations and the digital translation of aspects of social touch. The management of user expectations drew attention to the need for the design of digital social touch to consider users’ prior social touch experiences and how this shapes expectation. As one participant collaborator put it, “Users have personal experience and might predict that the “digital touch” feels a certain way and be disappointed/surprised when the actual feeling is different from this expectation.” The notion of branding was highlighted as needing careful consideration, particularly in terms of what brands convey, and how they manage users’ “fears” of digital social touch, and whether and how people “should” be encouraged to overcome such concerns.

This speaks to a tension between users' generally high expectations of technology versus what is realistically possible with current touch technologies, and a need to balance these two factors to avoid user disappointment or manage surprise when tactile sensations differ from prior touch experiences. Relatedly, the challenge of individual differences in people's touch experiences was raised as a challenge, with the recognition that touch is socially and culturally bound and idiosyncratic to some extent, raising the challenge of how these experiences could be responded to from a "fixed" engineering or design perspective. Linked to this point, the question of how to frame digital social touch, which can allow us to touch differently from the "physical" world, was seen as significant in fostering users' responses to it: from an open-acceptance versus evoking fear. This links directly to *models of the commercialization, branding and business* that digital social touch is embedded within, and raises the challenge of how to avoid haptic-monitoring and control of haptic content (likened to Facebook type models) and/or the use of haptic data as yet another source of data for building user-profiles for the targeting of individuals (e.g., for advertising).

Key Themes

The need to enrich digital social touch experience: the need to move beyond vibrotactile applications and the status-quo of touch to make digital social touch a richer experience was consistently expressed. *"Status-quo is touch in the form of touch screens. A way of thinking perpetuated by tech companies selling devices + apps. Thinking about touch seems mostly visual in this situation (also in the addition of touch to AR/VR). How do we break this way of thinking?"* It was suggested that in order to do this there is a need to rethink what digital social touch is, what it means, and could be. That is, participant collaborators felt the need to extend beyond realism and known experiences of touch to consider and design new forms of touch (whilst balancing user expectations and acceptability): to extend haptic technology beyond mimicking human tactile experiences. Some participant collaborators questioned whether it is possible to mimic social touch through technology. Ultimately there was a sense that rethinking digital social touch demands a more nuanced understanding of touch, whether by collecting people's touch sensations at scale, understanding individual and cultural touch needs and perceptions, or identifying and mapping the nuances of touch and reviewing potential use-cases for digital social touch.

The need to engage with the wider socio-political context of touch: Social distancing practices resulting from responses to the Covid-19 pandemic newly underscored the need for digital social touch and prompted discussion of the political character of touch and physical proximity. As one participant collaborator noted, *"I'm also reminded of how COVID strikes those in poorer communities harder because they do not have the opportunity for social distancing. In a way their physical proximity/touch practices are determined by their socio-economic status. How do we see touch technologies when taking these aspects into consideration?"* The "medium" of touch (i.e., the skin) and the question of who gets to touch what and who and when was considered a significant theme.

The design of touch privacy spoke to issues of consent, control, and ultimately human agency. The debate of these issues involved consideration of how designers and developers can incorporate

consent into touch technology. This raised questions of when and where the user (including the receiver of a touch message) is in control, with the right to be unavailable, and manage monitoring or privacy of communication. Participant collaborators concluded that digital social touch needs to develop acceptable haptic encodings, as noted from the discussion (and on stickies) *"that are comprehensible and acceptable for different users (gender, culture etc.)"* and which foster a sense of user agency in giving and receiving digital social touch.

Drawing on these opportunities, challenges and themes, the manifesto for digital social touch in crisis aims to provoke and prompt new ideas by opening an interdisciplinary space to question and imagine newly digital social touch. The manifesto seeks to be a bridge between HCI, computer science and engineers, and social scientists engaged with digital social touch - to "give new life to" (Hanna et al., 2019:2) the design of digital social touch.

CONCLUSION

This paper has offered a provocative call to action to designers, developers and researchers to engage more deeply with the social and sensory aspects of digital social touch in the form of the *Manifesto for Digital Social Touch in Crisis*. Drawing on the research literature and analysis of data from this interdisciplinary collaboration - centered on a series of workshops and collective iteration of the manifesto, the paper has highlighted the key opportunities, challenges and central themes that provided foundational steps in the development of the manifesto. These included the growing opportunities for touch offered by technologies, and increased awareness of the significance of social touch, the technical, methodological, and socially orientated challenges of designing digital social touch, including the development of design tools to enrich digital social touch experience, and engage with the wider socio-political context of touch. The paper has made visible the collective iterative process of curating, clustering and consolidating the manifesto statements, making the process transparent and signaled the potential of placing the social and sensory aspects of touch at the centre of the design and development of digital social touch.

As society engages with and emerges from the uncertainty of touch in Covid-19 times, the *Manifesto for Digital Social Touch in Crisis* signals a desire for change and offers a set of 10 provocations to support a rethinking and reimagining of the social and sensory aspects of touch through the design process. The ten manifesto statements offer designers, developers and researchers across different disciplines routes toward future roadmaps or directions for digital social touch in society.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not made publicly available because the identity of workshop participants/data (Miro boards) is linked to specific statements and participant log-in info in Miro and it is not possible to anonymise that data. Further queries regarding the datasets should be directed to c.jewitt@ucl.ac.uk.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by IOE, University College London ethics board. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

CJ, SP, and JS contributed to the conception and design of the study. CJ, SP, JS, LG, NP, and GH organized the research workshops. CJ and SP and GH performed the qualitative analysis of the study data. CJ led the drafting and writing of the manuscript. SP, JS, and GH wrote sections of the manuscript. All authors contributed to the development of ideas, manuscript revision, read, and approved the submitted version.

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Conflict of Interest: WF is employed by UltraLeap.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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