

New Approaches for Participation in Digital Society in Distant Times of COVID-19

Sharing challenges and opportunities from the professional field in support of physical closeness and digital engagement for public wellbeing

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The COVID-19 pandemic has changed many aspects of people's lives, and seems to have affected people's wellbeing and relation to technology now, and in the future. Not only has it changed people's lives and the way citizens live, work, exercise, craft and stay connected, the pandemic has also altered the way Human Computer Interaction (HCI) professionals can engage in face-to-face interactions and consequently participatory, human-centered design and research. Limitations in being close to others and having physical, visible and shared interactions pose a challenge as these aspects are typically considered critical for the accomplishment of a transparent, attractive and critical understanding of technology and respective civic and digital engagement for wellbeing. Consequently, the risk now observed is that citizens in the new 'normal' digital society, particularly vulnerable groups, are being even less connected, supported or heard. Drawing from a study with an expert panel of 20 selected HCI related professionals in The Netherlands that participated on-line (through focus groups, questionnaires and/or interviews) discussing co-creation for wellbeing in times of COVID-19 ($N=20$), and civic values for conditional data sharing ($N=11$), this paper presents issues encountered and potential new approaches to overcome participatory challenges in the 'new' digital society. This study further draws on project reporting and a 'one week in the life of' study in times of COVID-19 with a physical toolkit for remote data collection that was used with older adults (65+, $N=13$) and evaluated with professionals ($N=6$). Drawing on such projects and professional experiences, the paper discusses some opportunities of participatory approaches for the new 'distant' normal.

CCS CONCEPTS • **Human-centered computing** → **Human Computer Interaction (HCI)** → **HCI design and evaluation methods**

Additional Keywords and Phrases: Participatory design and methods, Digital citizenship, COVID-19, Remote data collection, Toolkit, Wellbeing, Data sharing, Physical interactions, Empowerment, Co-creation, Digital literacy

1 INTRODUCTION

People have a fundamental need for social and physical contact [6], democratic participation, health and ultimately happiness [4]. However, the consequences of the COVID-19 pandemic and the shift towards more virtual remote ways seem to be jeopardizing this [13; 31; 34; 36; 44]. As not only has the pandemic changed the way we live [47], work, craft [16; 37], exercise [10; 16; 24; 26] and stay connected [53], it has also changed the way we engage in face-to-face research, digital and creative collaboration [43] and is expected to do so in the future [12; 20]. Accordingly, not only users have changed permanently [20; 38], also researchers themselves have been affected by the crisis. For example, face-to-face studies for data collection, physical interactions and creative sessions with participants are limited, constrained or had to be cancelled, likely impacting participatory approaches in the digital society. This paper reflects on experiences of HCI professionals in The Netherlands on what transformations occurred during the COVID-19 crisis for better understanding of challenges and opportunities. It discusses the need for (1) physical contact and tangible interactions, (2) creative innovation and participatory research, (3) new forms of being together and experiencing connectedness, (4) addressing needs of (vulnerable) people and their wellbeing, (5) new forms of data collection, and (6) digital privacy and democratic engagement.

2 PROFESSIONAL PARTICIPATORY CHALLENGES

For the purpose of exploring new physical and virtual directions of supporting digital participation and engagement in times of COVID-19, it draws on the project portfolio and experiences from the Digital Life centre, its

partners in The Netherlands and beyond, and reporting from the field with a selected panel of HCI professionals to illustrate this. Different meetings and approaches were pursued to collect insights and experiences from the professionals to explore challenges and possible solutions, which entailed: (1) an online expert study ($N=20$, September-December 2020) including virtual meetings, whiteboard sessions (with Miro), interviews and on-line surveys with professionals in The Netherlands on the topic of co-creation for wellbeing in times of COVID-19. This included questions such as 'How has COVID-19 changed your professional practice and acting?', and (2) A study with professionals including expert interviews and survey ($N=6$, January-March 2021) on conditional data sharing with citizen participation and public values at the core. The next sections discuss the most notable findings of this study from the perspectives of the involved professionals.

2.1 The need for physical contact and tangible interactions

Physical closeness and visibility often seem to facilitate building towards more transparent, democratic and understandable (digital) systems. For example, research on data physicalization –making data physical– shows that physical making and methods can help in improving data literacy, collaboration, critical thinking and creativity [17; 27; 30; 45]. A project with Internet of Things students in which the assignment was to create a physical data escape room, accessible for people with visual impairments, seemed to show that this active experience made students as well as participants more conscious of ethical concerns in the handling of personal data [29]. It involved a playful and physical experience for which in the role of a hacker, the mission was to steal personal data and crack passwords through various tactile and interactive puzzles, for promoting awareness and debate on data ownership, cyber security, accessibility and ethical conduct. However, in the Netherlands, such physical activities could not be continued in the lockdown times of Corona and imposed rules for physical distancing (often called social distancing [53]). Still, the need for tangible approaches and physical interactions is particularly felt during the pandemic [40], as also illustrated by this professional (social designer, October, 2020): *"The physical, tactile aspect is an important part of our work. Now it is hard to be creative over distance. How can we do this... How can we re-invent and deploy digital tools?"* And this interaction designer & policy maker stated: *"We should all make the effort to be able to have physical encounters. Any digital encounter needs to strengthen and emphasize human behavior and needs. The question is how that is going to look like..."*

2.2 The need for creative innovation and participatory research

A recent Dutch study indicated that in this first phase of remote digital working, participants tended to go back into familiar structures and patterns, making it even more difficult to implement innovation, co-creation and change [41]. Indeed, now that professionals seem to have shifted in their role from being two-dimensional, instead of three-dimensional [42], what is also often mentioned in our studies such as the Co-Well project is that at a digital distance it is more difficult to (spontaneously) coordinate with each other, to let everyone participate, work together, be interactive and creative. Online questionnaires and meetings, for example, do not always achieve the same form of spontaneity, creativity and contextual insight that can be achieved with physical contact and co-creative workshops on-site. As one participant (HCI professor) stated: *"The problem is the lack of serendipity and creativity when working on-line."* Another professional told that he had switched to offering live-drawing services through videoconferencing, thus safely with a screen in between, and so enrich and facilitate creative collaboration from a distance [18]. The Co-Well on-line showcase connectedcreative.nl offers various ways and inspiration for being creative together in COVID-19 times, and is a way to swiftly convey new information and approaches, accessible at any time and place [28].

2.3 The need for new forms of being together, connectedness and experiencing closeness

Being with others is difficult during the pandemic with all its restrictions. For example, travelling to participants and access to care homes is limited. With the shift to the screen, there are also digital and sensory barriers in the experience with proximity and closeness. As one participant stated (innovator in e-health): *"We have moved to online solutions, meetings, which make it harder to get a good tangible feel of developments on site."* On the other hand, one UX professional working at government services noted that she experienced a new form of intimacy and closeness with

her study participants as with videoconferencing she got 'access' to their usual private student dorms, which lifted the interview conversations.

2.4 The need for addressing needs of (vulnerable) people and their wellbeing in the new normal

With insufficient knowledge about the new user situation caused by the pandemic, transparency and participation in digital shaping and co-creation have now become an even bigger issue to pursue, especially with vulnerable people. There is a great need for best practices and new approaches for the new situation as traditional ones are no longer always a good fit. As one professional (interaction designer & accessibility advocate) stated: *"From a distance it is more difficult to know how people are doing and to adapt to their needs."* Due to this lack, current approaches and digital solutions can turn out less compatible. For example, as the coordinator of a housing complex for older adults stated: *"There is a whole new large digital screen in the house, but nobody is using it!"* On the other hand, professionals and partners involved in our study were keen in enabling underrepresented people, such as people with visible impairments, to fabricate their own fit solutions, such as with toolkits and sensing devices for ensuring 1.5 meter distance [1; 9].

2.5 The need for new forms of data collection

For the time being, professionals seem to rely a lot on methods that we already know; literature studies, on-line surveys and interviews. But for this time, we also need to re-appropriate, re-think and re-design and deploy other and new methodologies [43] and answer new questions. For example, some professionals in this study wondered: *"How to do qualitative research on-line? How to address privacy, such as in the context of giving on-line consent?"*

Quite a few professional participants are turning to video calling for virtual user research. Other researchers are now using real-time Twitter data, machine learning and natural language processing techniques for understanding Dutch public sentiment during the COVID-19 outbreak period to inform governmental action [51]. Although these are safe ways to collect data from a distance from a large audience, and the new situation has motivated a digital uptake (e.g. [11]), not everyone is on digital or social media. Consequently, we need to also ensure that groups such as vulnerable older adults are being represented and heard [46]. We also need richer, sensorial and dynamic participatory approaches that consider the human context. One participant (HCI Researcher in Technology for older adults) stated: *"The difficulty I am experiencing is missing non-verbal cues when collecting data."*

An example of a new remote method for conducting research with older adults in corona times is the BAAT activity toolkit. The kit, loosely based on the probe method [21], contains a special activity journal 'One week in the life of' [35], activity cards, a folder with tips and tricks for engaging in (digital) activity [35] and a fitness band. It was used to gain more insights into the needs and attitudes of older adults (65+, $N=13$) with regards to physical activity and mental wellbeing during and after a 'lockdown' in The Netherlands and the potential supportive role of technology. Before the kit, there was an online survey with older adults (65+, $N=37$) that was used for gathering initial insights and as to recruit participants for the study with the toolkit. The kit was also evaluated with tech and care professionals ($N=6$), showing valued potential for obtaining richer insights into people's daily context and activities, motivations and emotional states. Findings show that the kit largely made the elderly participants more conscious of their routines and potential digital supportive ways. Interestingly, the participants found the analogue fitness band, one of the most useful items of the kit for continued use. The diary results further showed that technology did not play the leading role in their daily lives, while physical and social activities with their grandchildren for example often were. It indicates to seek approaches beyond a techno-centric focus. Also, according to Bitton *"We need to de-evangelize technologies"* [7], and as this participant (e-health innovator) stated: *"I prefer to think from a needs perspective, deciding what is needed and how to tackle it in a creative (online) manner. I think it is not so much about new technical tools, as well the organization and collaboration that is key."*

A different, more quantitative approach towards data collection, was the project 'FAIR: No words but data' [48; 49] aiming to make the data of research projects concerning the urban vitality of vulnerable people Findable, Accessible, Interoperable and Reproducible. It started just before the announcement of the COVID-19 pandemic. The

urgency of the implementation of the FAIR principles became even more evident to harness machine-learning and AI approaches to discover meaningful patterns in epidemic outbreaks [50]. However, the FAIR principles emphasize machine-actionability and computational support with often minimal human intervention and in a research context. Though FAIR data supports open science, it is not necessarily a 'fair' and controlled way of data sharing from a user-oriented perspective in civic context. From this perspective, considering human public values and principles, such as personal empowerment, data literacy and finding new ways to address this is at the core. The Digital Trust Infrastructure (DTI) project is such a new initiative in its aim to set an example in conditional data sharing in which public values are central [19]. At each moment, citizens should be able to carefully consider which specific piece of information is needed by a specific person, in what specific context and moment, for what specific purpose and for how long, such as in the case of fire. Although this is not without challenges (e.g. privacy protection [33]), by investing in democratic and participatory ways for safeguarding public values from early on, the DTI project's aim is not only to increase trust, but also use the results to motivate other authorities of doing the same and create the new normal for desired data sharing with public bodies in more responsible and transparent ways. From the expert study, it was found that data sharing from a civic perspective should be guided by democratic, user-centered and data principles [2] such as 'privacy by design' and data minimalism.

2.6 The need for digital privacy and democratic engagement

There is a risk that the increase in data collection, monitoring [23] and tracking spurred on by the pandemic can become a threat for personal freedom and privacy, which is fundamental for a good functioning democratic state [22]. On the other hand, there are initiatives that seek more public engagement and conditional data sharing in which civic participation and public values are central. Such as the discussed DTI, but also the Beehives initiative that created Let's Face-it, an AI rendered face on a mask, so that you will not be recognized by a facial recognition system and look more human, even though it is not really you [5]. Also, Code4NL, an online Dutch community of designers and developers for a fair and open digital society, and its international partners have exponentially grown in active members during the pandemic [14]. The Dutch trajectory and open process in the design of the 'Coronamelder', a corona trace app, and the evolutionary use of democratic principles such as 'privacy by design' has inspired better participatory initiatives and engagement for the future. The pandemic seems to have mobilized a network of HCI professionals, including governmental agencies [32], that are willing to make a change for which it is now easier to find each other and learn from worst and best practices. For this, we need to look at different aspects, as one professional (E-Health innovator) stated: *"This is a wicked problem with many interacting aspects and layers. We need to look at culture, financing structures, skills, collaboration... mutual understanding, speaking each other's language is important, so making sure that all relevant parties are present."*

This professional (HCI Researcher, Co-Well on-line meeting, October 2020) expressed the importance of sharing such knowledge: *"It is interesting to see how other researchers deal with this new situation and the opportunities it gives us. It gives us inspiration on how to deal with new ways of co-creation."*

3 OPPORTUNITIES AND DISCUSSION

This paper discussed participatory challenges that professionals in the HCI field are facing as a result of COVID-19. With the outlined challenges, the risk is that (vulnerable) citizens in the 'new' digital society are being even less digitally connected, supported or heard. On the other hand, HCI professionals, particularly in creative industry, social advocacy and governmental bodies such as discussed and in line with other emerging practices [3; 8; 15; 25; 39; 52] seem to be willing and resourceful in addressing such challenges and co-create approaches, methodologies and technology for good and democratic use, stimulate self- and digital resilience, and participation for public wellbeing. What is particularly new is that the pandemic has created a new sense of urgency for introducing and supporting new digital and participatory ways, in which the HCI professional plays a crucial role in bridging forthcoming digital, social and physical distances. It is important that we share those ways for timely action and collaboratively participate in actively shaping new best practices for the new 'closer' normal.

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REFERENCES

- [1] Bartiméus ontwikkelt Hugo, <https://www.bartimeus.nl/nieuws/bartim%C3%A9us-ontwikkelt-hugo>
- [2] Data principles, <https://www.thedigitalsociety.info/nl/over/dataprincipes/>
- [3] Mapping creative and positive solutions in times of Covid-19, <https://connectedcreative.nl/mapping-creative-and-positive-solutions-in-times-of-covid-19>
- [4] Aristotle, 350 B.C.E. Nicomachean ethics.
- [5] Madeleine Assadi, Pranamita Ray, Daan Walder, Robbert De Graaf, and Mick Jongeling, 2020. Project Hiveminds: Let's face it Digital Society School, Amsterdam University of Applied Sciences.
- [6] R. F. Baumeister and M. R. Leary, 1995. The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological bulletin* 117, 3, 497-529.
- [7] Joelle Bitton, 2019. *De-evangelising technologies*. <https://zurichmade.zhdk.ch/refresh-2/talks/joelle-bitton/>
- [8] Results of a survey about the implications of the Corona crisis for designers in The Netherlands, 2020, <https://www.bno.nl/web/image/28462/infographics> resultaten enque%CC%82te.pdf?unique=6ae3e78273cef8228b1e2cda8afe0f694ddaafb3
- [9] Leontine Born, Marije Kanis, and Joey Van Der Bie, 2020, Digital Life guest at SPUI25: 'From Drawing Board to Practice' <https://www.digitallifecentre.nl/nieuws/digital-life-aan-tafel-bij-spui25-van-tekentafel-tot-praktijk>
- [10] Kat Braybrooke, 2020. Together, we dance alone: Building a collective toolkit for creatives in a pandemic. *ACM Interactions* 27, 4.
- [11] More engagement in priority neighbourhoods since coronavirus:"Residents more engaged than ever, invest in this!", https://www.amsterdamuas.com/urban-vitality/shared-content/news/uv-news/2020/07/more-engagement-in-priority-neighbourhoods-since-coronavirus.html?_ga=2.136364722.362186101.1614349803-1234564624.1592125777
- [12] The 2020 state of remote work, <https://lp.buffer.com/state-of-remote-work-2020>
- [13] Eleanor Burgess, Renwen Zhang, Sindhu Ernala, Jessica Feuston, Munmun De Choudhury, Mary Czerwinski, Adrian Aguilera, Stephen Schueller, and Madhu Reddy, 2021. Technology ecosystems: Rethinking resources for mental health. *ACM Interactions* 28, 1.
- [14] Lorin Camargo, 2020 8 Months later civic tech takes on a pandemic, <https://medium.com/code-for-all/8-months-later-civic-tech-takes-on-a-pandemic-2e7a934d3508>
- [15] Peter Dalsgaard, 2020. HCI and interaction design versus Covid-19. *ACM Interactions* 27, 4.
- [16] Make your own tools, <https://www.notion.so/Electronic-Input-21d9a6aa304348378500bac3f209427f>
- [17] Pierre Dragicevic, Yvonne Jansen, and Andrew Vande Moere, 2021. Data Physicalization. In *Springer Handbook of Human Computer Interaction*, J. VANDERDONCKT Ed. Springer.
- [18] Live tekenen op afstand, <https://drawup.nl/live-tekenen-op-afstand>
- [19] Manon den Dunnen, 2021, Responsible data sharing for emergencies: Citizens in control, <https://research.ngi.eu/the-ngi-policy-in-practice-fund-announcing-the-grantees/>
- [20] Christopher Frauenberger, 2020. Entanglements. *ACM Interactions* 27, 4, 74.
- [21] Bill Gaver, Tony Dunne, and Elena Pacenti, 1999. Design: Cultural probes. *Interactions* 6, 1, 21-29.
- [22] Maaïke Harbers and Ivonne Jansen-Dings, 2020, Vijf inzichten voor overheden om digitale vrijheid te waarborgen, <https://ibestuurl.nl/podium/vijf-inzichten-voor-overheden-om-digitale-vrijheid-te-waarborgen>
- [23] Flóri Hofman, 2020. Software waarmee de baas je thuis in de gaten kan houden is populair. In *NRC*, <https://www.nrc.nl/nieuws/2020/06/03/big-boss-is-watching-you-a4001601>.

- [24] Noele Illien, 2020, A Swiss fitness movement from the 1970s comes back into vogue, <https://www.nytimes.com/2020/05/04/sports/vitaparcours-parcours-switzerland-coronavirus.html>
- [25] Human Computer Interaction Institute, 2020. HCII Responds to the Pandemic Carnegie Mellon University, <https://hcii.cmu.edu/news/2020/hcii-responds-pandemic>.
- [26] Johan Jakobsson, Christer Malm, Maria Furberg, Ulf Ekelund, and Michael Svensson, 2020. Physical activity during the Coronavirus (COVID-19) pandemic: Prevention of a decline in metabolic and immunological functions *Frontiers in Sports and Active Living* 2, 57.
- [27] Marije Kanis, 2019. Physical sensemaking: Crafting for an invisible world of data. In *Proceedings of CHI2019 Workshop: Troubling Innovation: Craft and Computing Across Boundaries*.
- [28] Marije Kanis, Co-Well: Connected creative, 2020, <https://connectedcreative.futuretechnologies.nl/>
- [29] IOT students present accessible Data escape room, <https://www.digitallifecentre.nl/nieuws/studenten-iot-maken-toegankelijke-data-escape-room?lang=en>
- [30] Marije Kanis, Shavonda Kewaldar, and Monique Pijls, 2019. *Revealing design: Physical & Visual results*. Amsterdam University of Applied Sciences, Amsterdam.
- [31] Kate Kelland, 2020, One in five COVID-19 patients develop mental illness within 90 days - study, https://mobile.reuters.com/article/amp/idUSKBN27P35N?_twitter_impression=true&fbclid=IwAR0k_23z7agW9DexC3zZ_KvmDf_eSumIS-vaSGObZuXDd0V6tj9-c7BXEyw
- [32] Maike Klip, De begripvolle ambtenaar, <https://debegripvolleambtenaar.nl/essay/inleiding.html>
- [33] Gina Kolata, 2019, Your data were 'anonymized'? These scientists can still identify you, <https://www.nytimes.com/2019/07/23/health/data-privacy-protection.html>
- [34] Leonhard Lades, Kate Laffan, Michael Daly, and Liam Delaney, 2020, Daily emotional well-being during the COVID-19 pandemic, <https://publicpolicy.ie/papers/daily-emotional-well-being-during-the-covid-19-pandemic/>
- [35] Amy Van Lith, Maaïke Bommerson, Marije Kanis, and Berber Nauta, 2020. *Activiteiten dagboekje: One week in the life of...* <http://www.digitallifecentre.nl/redactie/resources/activiteitendagboekjebaatsprong.pdf>. Mensen in Beweging, Hogeschool van Amsterdam, Amsterdam.
- [36] Fadi T. Maalouf, Bernadette Mdawar, Lokman I. Meho, and Elie A. Akl, 2021. Mental health research in response to the COVID-19, Ebola, and H1N1 outbreaks: A comparative bibliometric analysis. *Journal of Psychiatric Research* 132, Januari, 198-206.
- [37] MAKE: Covid-19 projects, <https://makeprojects.com/viewAll/?tag=covid19>
- [38] Kate Moren, 2020, COVID has changed users, <https://www.nngroup.com/articles/covid-changed-users/>
- [39] How researchers and experts in Human-Computer Interaction and Interaction Design can contribute to the COVID-19 crisis, https://docs.google.com/document/d/19_n2yjBZeAw8wIbi-aKhzs65cVKrWJEKx_KNfG4TOLM/edit?heading=h.x6j278j6pna
- [40] (K)Now #1 Presentatie Marlies Dinjens ism Daan Merkenhof Op Spotify, HvA, DMCI, Amsterdam, 2020. Podcast Knowledge Know, Aflevering 7 met Marije Kanis
- [41] Sander Prins, 2020. Webinar Digitaal werken Provincie Zuid-Holland Datawerkplaats.
- [42] Anje Ros, Helma Oolbekkink, Quinta Kools, and Henderijn Heldens, 2020, Wat leren we van Corona?, <https://didactiefonline.nl/artikel/wat-leren-we-van-corona>
- [43] Online Talkshow: How to do HCI research if your users are off limits?, <https://amp.ubicomp.net/users-off-limits/>
- [44] Het open einde van de coronacrisis is meer dan we kunnen verdragen, https://www.nrc.nl/nieuws/2020/10/16/het-open-einde-van-de-coronacrisis-is-meer-dan-we-kunnen-verdragen-a4016305?fbclid=IwAR30BFQ-gteqffAhDxdOYTIX5Ly_5cLRBmarVWVJ91t0Z5WaRvRjQUISkh0
- [45] Simon Stusak, Aurélien Tabard, and Andreas Butz, Can physical visualization support analytical tasks. In *Posters of IEEE InfoVis'13*.
- [46] Frank Suurenbroek and Gideon Spanjar, 2020. Maak in de stad ook ruimte voor ouderen. In *Trouw*.
- [47] Alex Taylor, 2020. Life less normal. *ACM Interactions* 27, 4.
- [48] Niek Van Ulzen, Anne De Jong, Marije Kanis, Rajaram Kaliyaperumal, Núria Queralt-Rosinach, Marco Roos, and Ronald Cornet, 2020. *Steeds FAIRder. Verslag van het Urban Vitality zaaijeldproject 'FAIR: geen woorden maar data*. Amsterdam University of Applied Sciences, Amsterdam.
- [49] Niek Van Ulzen, Anne De Jong, Marije Kanis, Marco Roos, Rajaram Kaliyaperumal, Nuria Quaralt-Rosinach, and Ronald Cornet, 2020. How interoperable is our semantic model and for who? In *International FAIR Convergence Symposium 2020*
- [50] Virus Outbreak Data Network, <https://www.go-fair.org/implementation-networks/overview/vodan/>

[51] Shihan Wang, Marijn Schraagen, and Mehdi Dastani, 2020, PuReGoMe: Understanding Dutch public sentiment during the COVID-19 outbreak period by analyzing real-time Twitter data using machine learning and natural language processing approaches, <https://www.esiencecenter.nl/projects/puregome/>

[52] Nikhil Welankar, 2020. How can designers fight the coronavirus? *ACM Interactions* 27, 4.

[53] Mikael Wiberg, 2020. On physical and social distancing: Reflections on moving just about everything online amid Covid-19. *ACM Interactions* 27, 4.