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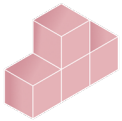

COCOON – CONCEPTUALISATION OF A VIRTUAL MEMBRANE IN THE CURRENT TRANSITION TOWARDS MORE-THAN-HUMAN DESIGN

CORNELIA HULLING
UMEÅ INSTITUTE OF DESIGN
CORNELIAHULLING@GMAIL.COM

JAN VON LOEPER
UMEÅ INSTITUTE OF DESIGN
HI@JANVONLOEPER.DESIGN

SWATHI SHIVARAJ
UMEÅ INSTITUTE OF DESIGN
SWATHI9410@GMAIL.COM

YANYI LU
UMEÅ INSTITUTE OF DESIGN
YANYICONTACT@GMAIL.COM

ABSTRACT

Through the COVID-19 pandemic, existing socio-technical work phenomena are revealed and magnified. With the help of a design case, this paper discusses where the Human-Centred Design (HCD) paradigm meets boundaries, asking to expand and shift towards More-Than-Human Design. The case at hand presents the metaphor 'Cocoon', furthermore allowing to speculate on the broader concept of 'virtual membrane'. Recontextualising the case from the scales of work-spheres and from user–tool towards human–nonhuman relations, we critique and discuss the socio-technical implications of HCD.

INTRODUCTION

With the development of technology and changing of social attitudes, people's choices towards working modes are becoming more and more diverse. During the pandemic, some people appreciate the flexible working schedules they have in their home offices while some others show signs of depression due to problems such as creativity stiffness, poor collaboration, feeling disconnected from colleagues, and information overload when working at home without face-to-face interaction (Clickshare, 2020). In fact, some of these problems already exist in our on-site workplaces but have often been ignored. Working from home now reveals and magnifies their impact on individual workers.

As an example, within open office spaces, putting on earphones could be seen as an unwritten consensus to create a shell, a sphere to focus and avoid distractions. Moving from the on-site office into a remote work environment, increasingly connected, new solutions need to be found. Therefore, it becomes more and more important to create a remote workplace culture which can empower employees to work agilely to bring the best of themselves into work practices depending on different circumstances.

Compared with the primary working tools of pen and paper in the last century, most of today's work almost cannot leave the screen, keyboard and mouse − these rigid interfaces. This implies that we are in a transitional process towards posthuman work practices. We have already entered the early stage of hybrid human-nonhuman in the context of work.

With remote work increasing our intimacy with technology, the risk of it infiltrating our private life gradually emerges. This paper aims to explore how a 'virtual membrane' can help workers dynamically manage boundaries for personal life and work, when remote or hybrid working modes become more common in the near future. It presents the scaling of the design approach to cater for the current technological growth through the perspective of tangible objects, their

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associated interactions and impact at a systemic scale. In the following sections, this paper will present the emerging issues of remote work and the explorative interaction design concept ‘Cocoon’. At the end, human-centred design (HCD) will be reassessed.

BACKGROUND

HCD APPROACH IN WORKPLACE DESIGN

Suchman (1995) mentions that people’s work is not always visible at a distance, and that the creation and use of shared artifacts and the structuring of communicative practices can be a possible design orientation for making work visible. However, with the increasing involvement of technology, like web cameras in the home office, Hodder (2020) expresses concerns about the surveillance of private spaces and the blurring of the line between personal life and work.

As for the consideration of wellbeing, Sachs (1995) argues for the importance of reconstructing the work environment by an *activity-based* view which emphasises using a HCD approach to redesigning for work and seeing work as learning activities to support individual development.

DESIGN METAPHORS AND TANGIBLE INTERFACES

Considering this emerging need to design for better remote work practices and enabling the capabilities of individual workers, the following works within interaction design offer perspectives on the creation of meaningful actions in complex socio-technical relations.

Dealing with questions of how to design for this increased complexity, Strömberg, Pettersson and Ju (2020) explore the use of enactments of metaphors as a tool to create interactive concepts. They state working with metaphors allows for abstract concepts, such as the relation between humans and technological systems, to take on concrete properties. Djajadiningrat et. al. (2004) and Redström (2008) argue for the design of tangible interfaces to establish more meaningful ways of interacting with technology.

As for metaphors describing boundaries between humans and things in the age of technology, ‘tele-cocooning’ is one of the representative terms raised by Kobayashi (2014). It means that the positive association of general trust, including social tolerance and social caution, disappears through the use of telecommunication.

DESIGN CASE ‘COCOON’

In this case we explore the design of a conceptual device to help creative remote workers navigate the increasing demand for a virtual presence. The case starts with a HCD approach to understand the needs of these users. Following this, a tangible interface comes to act as a representation of the concepts of ‘Cocoon’ and ‘virtual membrane’, with the intention to create a protective sphere for creative work and nurturing the capabilities of individual workers.

CREATIVE PROFESSIONALS AND THEIR STORIES

The process starts with a series of seven semi-structured interviews. Since the case focuses on the work practices around remote creative work, the participants are chosen based on their occupation and experience with remote work. They range from senior user experience researchers to junior interaction designers. Additionally, they all have different living situations - living either in single households, with partners, families and /or pets. The interviews all revolve around their individual experience of online communication tools, remote collaboration and how they might see work practices evolve after this experience.

The stories told by the participants indicate that with the current technology used, they have an overwhelming amount of channels and functions at their hands. The computer gets cluttered with sensory input which can cause distraction and stress. It also becomes clear that without the physical presence they have in their on-site workplace, there is an increasing demand to have a constant virtual presence. As a result, many of the interviewees state that their time gets taken up by back-to-back meetings, leaving no room in the schedule for their own work.

One of the interviewees stated to cope with this issue by blocking one day a week in the schedule to do self-contained and focused work (“actual work”) such as prototyping a GUI, or iterating a design solution. Opposed to this, the creatives we interviewed sometimes have to do open, visible and connected work like administrative tasks, sitting through unproductive meetings and simply communicating work. From this insight a distinction is made between ‘self-contained work’ and ‘open work’.

Based on the different living situations of interviewees, we also gathered that the spatial and social conditions at home had a big impact on the ways they worked and organized their daily lives in new ways. One interviewee living with a big family described how the work sphere intruded the private sphere. One example was that communication between them and their mother even got effected. Their mother started to use sign language to tell them lunch was ready if they were in a remote work meeting. Another interviewee, living with their partner, described the problematic situation of being two employees in one household, with only one working desk available. With scarcity of working spaces, other spaces in the house such as the bedroom, become working spaces. When focusing on more creative design work they would close the curtains over the bedroom window and immerse themself in a “darkmode bubble” or “cocoon”.

We can see how these new work practices reflect not only how professional and personal life are blending, but

how physical and virtual work practices are affecting each other as well. These practices of how the professionals manage their work time and space, both physically and virtually, is what pushes the project to further explore how to enable them to dynamically manage personal boundaries for their virtual work presence.

A WEARABLE VIRTUAL COCOON

Working with complex socio-technical relations, the continued process draws inspiration from the work of Strömberg, Pettersson and Ju (2020) on the enactment of metaphors to shape the interactive aspects of the design and the behaviour it aims to support. The encountered practices of closing a curtain and entering a workspace 'Cocoon', is elaborated upon as a means to concretise the act of setting boundaries. Unlike the notions of 'tele-cocooning' which negatively describes the barrier of trust between people caused by mobile technology (Kobayashi, 2014), 'Cocoon' here carries the positive notion of a protective membrane.

Following the argument from Djajadiningrat et. al (2004) and Redström (2008) the decision is made to design a device separate from the current tools of remote work and collaboration, and their screen-based interfaces. The concept takes the form of a wearable device with two main functions: Managing availability within one's online communication system and reaching out by voice user interface (VUI).

Figure 1. Closing the *light curtain*.

Primarily the user can set their availability by sliding a touch interface which gives feedback in the form of a changing light pattern (see Figure 1) i.e. opening or closing their light curtain, scaling their 'Cocoon' inwards or outwards. In this way they control their work mode within the range of 'focused on work' (being unavailable, the curtain is fully closed) to 'on a break' (being available to socialize, the curtain being fully open).

Additionally, the device has a Voice User Interface (VUI), which is activated by tapping on the device before speaking with it to make a call or check the availability of a colleague, out of the consideration of preventing surveillance. The VUI is introduced to the concept as it becomes clear that, as Redström (2008) notes, the capabilities of the tangible interface are restricted to its physical scale. The size of the device cannot offer complex overviews or show specific contacts.

Finally, when receiving a call or message, the device vibrates, and the user has to choose whether to answer or not by doing a sliding motion (opening or closing the light curtain) or tapping and speaking to the device to either accept or deny the call.

THE CONCEPT OF VIRTUAL MEMBRANE

By providing a tangible interface, the device gives a sense of control for the user to manage their time and mode of work. It provides the affordance and incitement to manage personal boundaries that current screen-based tools lack. It also keeps the user connected to their virtual workspace even when away from the computer, as long as it is carried around.

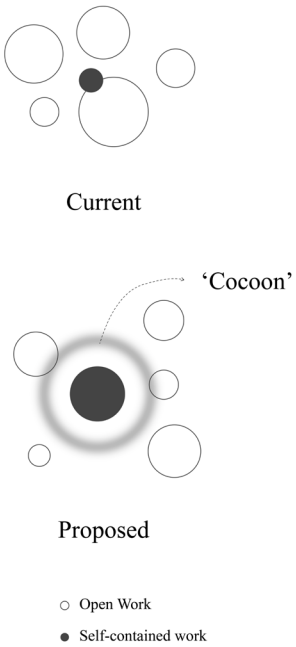

Figure 2. Comparison of current and proposed work relations.

We wish to point to the value of the user's ability to generate their own *virtual membrane* in their online workspaces (see Figure 2). Using posthuman design perspectives, we will now analyse and discuss the implications of the *'virtual membrane'* and its human-nonhuman hybrid relations.

DISCUSSION

Nowadays, there are different levels on which workers can regulate their availability towards colleagues:

- level 1: devices
- level 2: software / applications
- level 3: chat groups / message threads

Many existing devices offer discrete settings, such as loud/ vibration/ muted or on / off. Software or applications might offer availability settings, such as available / busy / do not disturb / offline. In message threads, it is possible to regulate notification settings, separately for each thread.

These discrete states do not allow for continuous regulation. It does not match the experience of moving through physical space, where the auditory experience changes, depending on where in space the worker is. These existing ways of regulating availability do not necessarily take into account how the private sphere and work sphere blend. Current solutions are embedded into work devices, such as the laptop and smartphone, which often in themselves have a more technical, rather than organic appearance and expressive modality, which influences how they integrate into private environments, such as the bedroom.

With a change of perspective, 'Cocoon' could be seen not as a tool, but a boundary, which affords to regulate permeability continuously. This might create an in-between intervention, a hybrid relation in between the individual human and the socio-technical work sphere. As a result, it would override all three previously described levels.

With the given case, 'Cocoon', we find ourselves in the midst of a paradigm shift towards More-Than-Human Design facing posthuman realities. Within the HCD framework, and with a given reality and context, it is possible to cater for the needs of a user, such as wellbeing. The emergence of a posthuman reality changes context and asks for a new framework, even if the needs for wellbeing remain the same. Upon reaching the boundaries of what can be conceived within the frames of HCD, as Giaccardi & Redström (2020) put it, we have to question the validity of it.

Forlano (2017) describes characteristics of posthumanism, which allow us to re-contextualise the case. The transition towards this hybrid, non-binary mode of thinking is not complete. But the typical blurring of clear boundaries between human and nonhuman, already becomes obvious. This process of integrating this self, situated in a work context, into a new human-nonhuman hybrid, is still at the beginning. Yet, in the case, we do not perceive the networked computational thing as a being with equal agency, but as a 'virtual membrane'. Effectively the human remains in the center. However, with the layer of the membrane, there is a potential for entanglements and dependencies.

The concept 'Cocoon' invites us to consider different dimensions of scale. It helps expand and contract one's availability within a virtual or augmented workspace. When perceived from a broader perspective, the outcome is related to the wellbeing of an individual and their abilities to structure work. This small systemic change is intended to impact a larger whole.

FROM BOUNDLESS TO MEMBRANE – SCALING OF SPHERES

We argue for the need to set boundaries. Firstly, new work spheres enter the private sphere, blending together. Secondly, users voice the need of a protected time or sphere to accomplish 'self-contained work'. 'Cocoon' comes as a 'virtual membrane', primarily to create a sphere for 'self-contained work'. Since it functions as a 'curtain', it allows the user to close off completely, effectively shielding from any distractions. However, it also allows for gradual in-between states, like dimming a light source.

In a work context, this might enable a permeable fine tuning. If the curtain is half-open, only the most relevant requests might come through and less relevant notifications might not. With two blending spheres with their own connected computational things (smart home assistants, work phone etc.) – multiple things with affordances and agency come into play. The complexity within the context increases significantly, exceeding the traditional HCD framework.

Whereas some workers might adhere to a good work ethos in the favour of productivity, others might misuse it. In our user research, the example of 'invisible vacation' has emerged. When a manager asked one of the workers we interviewed how much time a task would take to complete, the worker replied two days, despite knowing one was sufficient. This way the worker gained a free vacation day, while pretending to do some 'self-contained work'. The openness for misuse, could also be seen as a human element, facing tendencies towards technocracy or dystopia. With the notion of User-Centered Design, the design space revolves around the ideal of usefulness. With an increasing complexity, designers might have to acknowledge to know less certainly what is useful. If we design for conditions under which the human decides, self-empowered, we can broaden a prescribed area of use, towards making possible. This openness could further contribute to a shift in mindset, from designing for the 'usefulness' of technology, towards design for 'living with' technology. By breaking out of the connotation of usefulness, other objectives, such as wellbeing or creativity, might receive more attention.

Existing solutions to control availability are embedded into multi-purpose devices, such as the work computer and mobile phone, which overall have a high potential to distract. In order to fulfil the need to set boundaries and create an atmosphere free of distractions at any time and in a spontaneous manner, we added a networked computational thing, which is physically separate, yet connected to the existing communication system. This adds cluttering. It also brings an omnipresent interface. It could be interpreted as an oxymoron, since the sheer presence of the interface itself, worn as a wristband, carries an innate potential to distract. That provokes the thought: In which cases would technology be counterproductive? When would posthuman phenomena, such as networked computational things, turn against HCD objectives? When does creating a shell become a solution, facing omnipresent technology and in which cases is it required to abandon technology altogether?

From HCD perspective, the distinct human as a discrete individual has full agency, while a tool has none, and hence stands by and remains inactive if not needed. Giaccardi & Redström (2020) ask us to include networked computational things with machine agency, which makes them participants. Originally Gibson (1979) has put emphasis on affordance as a relational concept. That might give us a starting point, for how the capabilities of a human-nonhuman hybrid expand, compared to the prevailing separate entities of human and tool. Whereas in HCD the relation of the user goes towards the tool and ends there, in More-Than-Human Design, the human experience through the nonhuman, goes beyond this relation, connecting to a wider network.

Seeing affordance as the original relational concept, we can focus on the relationship between human and nonhuman, but also the horizontal and vertical connections the networked computational thing might engage in. While we have always been working with nonhumans, the membrane surrounding us is affecting our perception. Other than ease of use, as many smart home devices promise, this enables us to have more intimate and pervasive relations with and through this nonhuman.

In the past there have been different notions and metaphors for describing the relationship and outcome when the human and computational things come together as one or become equal. There has been the cyborg (Haraway, 1991), the composite (Vallgårda & Redström, 2007), actor-network theory (Latour, 2005) and object-oriented ontology (Graham, 2015). Whereas all these concepts have contributed to a new understanding, none have excelled at conveying a human connotation. They all sound rather technical. ‘Cocoon’ as a term refers to nature, even the wonders of metamorphosis. It carries the notion of an organic, protective sphere which fits like a second skin, expands and contracts. More than a semantic appropriation, it should give the human an atmosphere where they feel safe and sound, protected from external influences.

CONCLUSION

The ‘Cocoon’ concept contributes to a possible direction of future workplace design. We hope that the more universal idea of a ‘virtual membrane’ might provide some new perspectives when working with issues of blurring boundaries and hybrid human-nonhuman relationships as we move towards More-Than-Human Design practices.

REFERENCES

Clickshare. 2020. *Finding a new balance.* [Online]. [No place]: Barco. [Accessed 8 January 2021]. Available from: https://www.barco.com/en/clickshare

Djajadiningrat, T., Wensveen, S., Frens, J. & Overbeeke, K. 2004. Tangible products: redressing the balance between appearance and action. *Personal and Ubiquitous Computing*, **8** (5) , pp. 294-309.

Forlano, L. 2017. Posthumanism and Design. *She Ji: The Journal of Design, Economics, and Innovation,* **3**(1), pp. 16–29.

Giaccardi, E., & Redström, J. 2020. Technology and More-Than-Human Design. *Design Issues*. **36** (4), pp. 33–44.

Gibson, J. 1979 *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin.

Graham, H. 2015. Object-Oriented Ontology. In Hauskeller, M., Philbeck, T. D. & Carbonell, C. D. eds. *The Palgrave Handbook of Posthumanism in Film and Television.* London: Palgrave Macmillan, pp. 401–402.

Haraway, D. J. 1991. A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century. In: Haraway, D. J. ed. *Simians, Cyborgs and Women: The Reinvention of Natur*e. New York: Routledge, pp. 149-182.

Hodder, A. 2020. New Technology, Work and Employment in the era of COVID-19: reflecting on legacies of research. *New Technology, Work and Employment*, **35** (3), pp. 262–275.

Kobayashi, B. 2014. Tele-Cocooning: Mobile Texting and Social Scope. *Journal of computer-mediated communication,* **19**(3), pp .681–694.

Latour, B. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory*. New York: Oxford University Press.

Redström, J. 2008. Tangled interaction: On the expressiveness of tangible user interfaces. *ACM Transactions on Computer-Human Interaction*, **15** (4), article no: 16 [no pagination].

Sachs, P. 1995. Transforming work: collaboration, learning, and design. *Communications of the ACM*, **38** (9), pp.36–44.

Suchman, L. 1995. Making work visible. *Communications of the ACM*, **38** (9), pp. 56–64.

Strömberg, H., Pettersson, I. & Ju, W. 2020. Enacting metaphors to explore relations and interactions with automated driving systems. *Design Studies*, **67**(March 2020), pp. 77–101.

Vallgårda, A. & Redström, J. 2007. Computational composites. In: *Proceedings of the conference on human factors in computing systems*, 28 April–3 May, San José. [no place]: [no publisher], pp. 513–522.