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Exploring the design space of e-detailing through Magic Machine workshops to advance technologies for desirable futures

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Master's Thesis

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Abstract

Pharmaceutical detailing is moving to online environments because they are believed to save money, time, and be more convenient. Recently there has also been an increase in e-detailing due to the circumstances around COVID-19 pandemic. In the available literature, the transition to e-detailing is mostly evaluated through efficiency markers, with less focus on broader social implications and the interactions between people involved. To fill this gap and promote development of human-centred e-detailing technologies, this paper explores detailing interactions and related concerns which can guide the development of relevant detailing technologies. The field research and participatory Magic Machine workshops helped reveal and shape concerns which have implications for the future of e-detailing. High-level recommendations were derived to inspire further research and development of lasting, user-centred solutions. Design fiction artifacts were created to convey the research findings as boundary objects between pharmaceutical industry and academia.

Keywords

Pharmaceutical detailing, e-detailing, Magic Machine workshop, design fiction artifact, high-level design recommendation

Sammanfattning

Läkemedelskonsulenter flyttar sin verksamhet alltmer till en digital miljö då det anses spara pengar, tid och ska vara mer bekvämt. Covid-19 pandemin har också bidragit till en ökning av användandet av digitala verktyg för läkemedelskonsulenter. Tillgängliga vetenskapliga artiklar inom ämnet som utvärderar digitaliseringen för läkemedelskonsulenter gör det framför allt genom att mäta hur effektivt det är, och inte så mycket på de sociala följderna samt hur det inverkar på interaktionen mellan de inblandade parterna. För att fylla denna kunskapslucka och för att främja en människocentrerad digitalisering för läkemedelskonsulenter utforskar denna masteruppsats interaktionerna och dess relaterade följder, vilket kan användas som vägledning i utveckling av relevanta teknologier för läkemedelskonsulenter. Fältarbete, och en workshop som använde metoden Magic Machine, hjälpte till att ta fram och klargöra de problem som kan ha en viktig inverkan på framtida digitalt läkemedelskonsulterande. Design rekommendationer togs fram för att inspirera kommande forskning och utveckling av hållbara, användarcentrerade lösningar. Den skapade spekulativa designen visar upp forskningsresultat och på ett sätt som kan vara till användning av läkemedelsindustrin och universiteten.

Nyckelord

Digitala verktyg för läkemedelskonsulenter, läkemedelskonsulenter, Magic Machine workshop, spekulativa design, design rekommendationer

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Stockholm, November 2020
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List of acronyms and abbreviations

COVID-19	Coronavirus disease
RtD	Research through Design
HCP	Health care practitioner
PSR, rep	Pharmaceutical sales representative
VR	Virtual reality

1 Introduction

Pharmaceutical industry spends more money on marketing than research and development activities [1]. The increase in efficiency and effectiveness of marketing methodologies would benefit pharmaceutical companies, physicians, and patients. Pharmaceutical detailing is the oldest and most common pharmaceutical marketing method and an important source of up-to-date information for physicians. Pharmaceutical detailing is a meeting between a pharmaceutical representative (also referred to as "PSR" and "rep") and a physician. During the meeting they discuss aspects of company's products, such as performance and applicability. This paper focuses on e-detailing, a digital version of pharmaceutical detailing where a rep and a physician communicate via digital technology instead of meeting face to face. E-detailing has been gaining attention in the recent years with a notable increase during the COVID-19 pandemic. E-detailing can be useful as a substitution, addition, or a necessity (e.g., to ensure continuity during the COVID-19 pandemic). Primarily, it has been developed to cut costs, save time, and ease accessibility to busy or remote physicians. While it might look like a straightforward choice, it could be deteriorating if not executed properly. This paper focuses on exploration of tensions in e-detailing interaction dynamics. In human-computer interaction design, tension is a focus for analysis and reflection [2]. Tensions help account for e-detailing interaction components which do not conform with best practices, the real-world context and the user's belief system [3]. Interaction between a pharmaceutical sales representative and a physician who are separated by physical distance largely depends on establishing trust, enabling learning, and achieving effective message transmission using digital channels. The existing literature provides information about e-detailing advantages but very little about its disadvantages and struggles. To balance the available resources, this thesis points out e-detailing concerns through highlighting ways to approach them by answering the question

How can we broaden the design space of e-detailing to include lasting and effective human-centred solutions?

Design space exploration is the activity of examining design alternatives before the implementation [4]. Due to vastness of this space and the complexity of human-computer interactions certain alternatives get overlooked. This thesis aims to highlight some of the alternatives which have not been addressed in the current design space. It does so by focusing on lasting, human-centred alternatives. Human-centred refers to the problem-solving approach which emphasizes human perspective in all stages of the process to ensure maximum usability of the final solution. In line with that, the exploration starts with identifying tensions present in e-detailing through ethnographic interview. The analysis of an-depth interview with a pharmaceutical representative explains and reveals tensions, only a part of which are also mentioned by the literature. To further investigate the scale and potential of these tensions, the thesis tackles them with a Research through Design approach (RtD). RtD generates knowledge through the act of making [5]. During Magic Machines Workshops, participants create design propositions in response to identified tension. The creation process and artifacts both inform about human perspectives and desires related to e-detailing. This information is then used in Design Fictions to portray and further analyse how e-detailing can be transformed from its current to a preferred state.

Grounded in exploration involving people and portrayed using design fictions, this paper provokes new ideas which advance development of effective supporting technology for e-detailing Providing insights into e-detailing tensions which are potentially deteriorating enables development of designs which serve e-detailing users and ultimately benefit healthcare. It suggests taking preventative rather than curative measures in a transition to e-detailing. It adds to the domain by exposing certain e-detailing concerns and suggests ways of tackling and highlighting them to further advance such exploration and ideation. It also serves as a bridge between academia and industry, by showing how certain methodologies can be useful in both contexts to identify problems and approach

them responsibly. In line with that, the paper offers high-level recommendations which stem from the conducted research through design process.

1.1 Thesis structure

Presentation of relevant literature and background information on pharmaceutical detailing, e-detailing, and reasons for increase in e-detailing is in chapter 2. Theoretical frameworks which guided the exploration are examined in chapter 3. Methodology is discussed in chapter 4. Interview findings are summarized in chapter 5 and brainstorming procedure with respective findings explained in chapter 6. Online Magic Machine workshops process is examined in chapter 7, which also reveals considerations for execution of online and Magic Machine workshops. The workshops results related to e-detailing are presented in chapter 8. Design fiction proposals are presented in chapter 9. The proposals' attempt to open the e-detailing design space is demonstrated and discussed in chapter 10, which also provides recommendations derived from exploring e-detailing design space and limitations. Thesis ends with a conclusion which includes the outlook in chapter 11.

2 Background

To introduce the topic, ground it in literature, and ease understanding of the main concepts which appear in the thesis, the background section includes a literature review focusing on analysing scientific publications, surveys, case studies, and articles about detailing. The review is grouped by thematic concepts: pharmaceutical detailing, differentiation between traditional or in-person detailing and electronic detailing (hereinafter e-detailing), reasons for increased interest in e-detailing, and a conclusion, which summarizes the background section by pointing out gaps in existing literature. A differentiation and concise usage of terms is established to support exploration of different detailing strategies and enable subsequent discussion.

2.1 Pharmaceutical detailing

Pharmaceutical detailing is a "*one-on-one marketing technique used by pharmaceutical companies to educate a physician about a vendor's products*" [2]. The goal of pharmaceutical detailing is to promote pharmaceutical treatments and convince physicians to prescribe and advocate for the company's products. Pharmaceutical detailing is performed by pharmaceutical personnel with financial links to the company they represent. Pharmaceutical detailing differs from academic detailing, in which educators strive to be neutral while presenting a portfolio of medicinal treatments to physicians. Because of its promotional aspect, many question ethical implications of pharmaceutical detailing. However, pharmaceutical detailing presents information supported by clinical trials and clinical data [6]. Its goal is not to deceive potential customers but collaborate with them to explore whether the company's drugs and treatments could benefit patients. If executed effectively, pharmaceutical detailing enables doctors to receive valuable information about new products [6] which "increases their medical competence" [7]. Especially in Europe, pharmaceutical detailing is bound to strict regulations to ensure ethical correctness and benefits. The problem arises when pharmaceutical representatives (un)intentionally provide inaccurate information [8]. Therefore, appropriate rep and physician training [1], along with infrastructure which enables doctors to easily, critically interpret received information is a desired approach to solving this problem [9]. In search of providing a desired service, pharmaceutical detailing strategies follow the changing demands and possibilities of medical, pharmaceutical, and technology domains. Two main pharmaceutical detailing strategies are traditional detailing and electronic detailing (e-detailing).

2.1.1 *Traditional or in-person detailing*

Traditional or in-person detailing, emphasis being on in-person, denotes that the process of detailing happens in a setting where both a physician and rep are physically present at the same time and place [7]. Because this type of detailing is the oldest and most widespread, it is also called traditional detailing. In literature, a term "face-to-face" is also used to refer to this type of detailing, however, it is not always clear if it encompasses detailing where physician and rep are at different locations and see each other through a video call. To avoid this dubiety, traditional detailing and in-person detailing are used hereinafter to distinguish detailing where people are physically present at the same place at the same time from the types of detailing where they are present virtually or not at all. Other equivalents to in-person detailing encountered in the literature are drug detailing [10] [6], pharmaceutical selling [11], and personal selling [12]. Traditional detailing used to be the most important source of information about new products and medical education for doctors. This is presumably the reason it became so widespread and remained important despite many negative attitudes it received [7]. However, with the rise of new technologies and infrastructure, the method that was once considered inexpensive, convenient, and effective, is not as viable and applicable as it used to be.

2.1.2 *Electronic detailing (e-detailing)*

There are various definitions of e-detailing [13], [14], [15, 16] which are united in acknowledging that it involves the use of digital technology to support message dissemination. However, the boundaries of which marketing efforts fall under e-detailing category are not clear. This body of work considers e-detailing as being any type of detailing which employs digital technology as a communication channel between a physician and a rep provided that they are not physically present in the same place at the same time. The prevailing ways of conducting e-detailing are self e-detailing, and video e-detailing.

Self e-detailing [14] is a type of detailing where product information is accessed and explored by physicians on their own. The content is usually in a form of a presentation and can be accessed online through pharmaceutical companies' websites or third-party vendor companies. It includes animations, audio content, links, online tests and surveys, and incentive driven exercises that reinforce important messages. The interaction can be navigated at the desired pace but is typically designed to last between 5 and 15 minutes. It is common for the interactive session to end with "a call for action" which invites the user to participate in an activity or order samples. One of the most acclaimed benefits of self e-detailing is the possibility to execute it anytime and anyplace, provided one has the necessary infrastructure. E-detailing empowers physicians to control the degree and timing of interactions and help them obtain more relevant information at their convenience [16]. From pharmaceutical industry's perspective, self e-detailing is currently the most money-efficient way to communicate with physicians. Average self e-detailing session is claimed to be longer than the in-person detailing session [14] making it significantly cheaper, especially if measured per minute of detailing. It is important to note that this is not necessarily the same for effectiveness. Equivalents for self e-detailing encountered in the literature are virtual e-detailing [15, 17, 18] and interactive e-detailing [15].

Video e-detailing is closer to traditional detailing and was initially considered as its alternative for remote geographic areas, or physicians in practices which do not allow reps on their premises. Video e-detailing [14, 15] defines detailing via a live video stream. This way, the physician can see and hear the rep, which resembles the in-person detailing. It typically happens on a personal computer or other device with the capability of browsing online content and receiving a video stream. Video e-detailing can make use of self e-detailing content which is then co-browsed with the rep. Alternatively, screen sharing can be used to show or guide a physician through the interactive content which is complemented by rep's real-time remarks and comments. The content of such presentations is usually adapted prior to the session and is based on physicians' interests. These can be extracted from company's customer relationship management data and can help shape the session and follow-up activities. An equivalent to video e-detailing encountered in the literature is live e-detailing [14, 15, 17].

2.2 Reasons for increased interest in e-detailing

E-detailing emerged out of a quest for a more effective and efficient way of detailing. Falling efficiency and effectiveness of reps, which reflects in decreasing returns on investment, increased competition for physician's time, and the spread of technological advancements [19] are the main drivers behind the shift to e-detailing, which has many identified benefits.

Convenience, availability, and accessibility are most acclaimed advantages of e-detailing. The possibility of conducting an e-detail anytime and anyplace, with almost no specialized infrastructure is convenient. It empowers physicians by giving them more freedom and control over accessing the content at the time of their convenience. It gives them the possibility to choose times which do not interrupt their workflow or conflict with their work schedule. Suitable times tend to be after working hours, at home. According to Gleason [20], 72% of detailing happens outside official working hours.

Similarly, 86% of doctors in EU conduct online research in the evenings and 71% during weekends [21]. Moreover, e-detailing is not bound by physical limitations and allows a wider reach. It can reach physicians who were previously left out because of practicing in remote areas, or practices which do not allow rep visits. Lower cost with greater reach and interaction frequency and duration helps extend the reach to those who are normally not targeted due to resource constraints. Furthermore, territories do not need to be organized geographically anymore. Instead, segmenting can be determined based on physicians' characteristics and preferences. This fits with e-detailing because it enables more timely feedback from customers which lets companies raise effectiveness by tailoring content to fit individual preferences and needs. E-detailing sessions are also more engaging than traditional detailing [18] and have stronger impact on prescribing behaviour [15]. Their content is more consistent, qualitative, and quantitative [16]. The sessions are more information-driven and longer [22] which forces pharmaceutical companies to constantly provide new material for discussions. Many physicians classify traditional detailing biased, but do not state the same for e-detailing. They associate in-person detailing with selling while e-detailing does not invoke the same connection and is so far perceived as less biased and more credible. Reported reasons for the adoption of e-detailing are convenience, quality of information, and incentives. Incentives to participate in e-detailing range from honoraria, product samples, practice tools, to patient education resources [23]. Since its beginnings, incentives constituted a big part of pharmaceutical detailing. Pursued by pharmaceutical sales representatives (PSRs), welcomed by physicians, and regulated by governments, they have been a subject of many debates due to ethical considerations of their influence on physicians' prescription behaviour. Introduction of e-detailing is largely efficiency-based and its acceptance among physicians not eagerly welcomed by physicians. Many believe incentivizing participation in e-detailing could be the way forward. Research is uniform in suggesting that incentives are attractive and effective in inviting physicians to participate in e-detailing [7, 24, 25]. Nevertheless, some detailers [26] believe that increasing information relevance and educational value could convince physicians to engage in e-detailing despite its shortcomings. Other are sceptical that this will be a "sufficient motivator for a medical doctor to use e-detailing" [7]. For example, Sanofi Aventis in Poland gave out handheld internet-connected devices that were at the same time used as advertising media and to gather feedback. The goal was to build relationships with the doctors. Results showed that these doctors indeed prescribed more diabetes products by Sanofi Aventis [23]. Physicians characteristics have been shown to influence attitudes towards e-detailing [15]. Firstly, physicians that are more open to e-detailing practices are typically aged 45 years or less [15]. Secondly, physicians prone to e-detailing are more likely to be found in rural areas and small-sized practices [15]. Lastly, medical specialty influences the likelihood of e-detailing adoption. Even though there is little consensus regarding which these medical specialties are, family and general practitioners are on the frontier in most studies. Since e-detailing is a broad term, most literature divides e-detailing into two different types: self e-detailing, and video e-detailing.

There is less awareness about disadvantages of e-detailing. The literature [14] notes that inclusion of video streaming might reduce effectiveness of detailing due to latency and connectivity issues. Similarly, lower retention rates are suspected compared to when video is not used. In addition to technical failures, reported disadvantages and worries expressed by doctors are ease of use [18], decreased social interactions with reps [16], and quality of information [16].

2.3 Conclusion of literature review

The literature review summarized the reasons behind increased interest in and use of e-detailing. Various research firms, such as Forrester Research, Manhattan Research, Jupiter Research, Datamonitor, as well as e-detailing vendors, investigate e-detailing practices and trends. Some of them are biased, have different methodologies, definitions of e-detailing terms, and varying sample sizes. There are a lot of variations among their findings. Many of these findings are contradicting. For a more consistent and reliable body of work, more independent, sizeable, and concurrent

investigations into e-detailing trends are needed. There is also an imbalance between investigated advantages and disadvantages of e-detailing in favour of the former. This makes adoption of e-detailing appealing, especially from the perspective of cutting down the costs through decreased travel need and time savings. However, social implications of this change are understated in available literature. This paper aims to contribute to e-detailing literature by exploring unobvious implications of e-detailing use. It takes a user-centred approach to the advantages and disadvantages of e-detailing through exploring e-detailing experience and human desires. This way it opens a discussion about less obvious concerns related to e-detailing. The human-centricity is necessary to mitigate unfavourable implications of the switch to e-detailing, especially when it is justified through economic factors: to improve efficiency and allow continuity during the COVID-19 pandemic.

3 Theoretical Frameworks

To ground the exploration of e-detailing practices, this section explains two theories which relate important concepts in e-detailing: learning and communication. Learning plays a major role in detailing which is essentially about educating and informing physicians. It is addressed first, through Adult Learning Theory (ALT). Communication, which is arguably the basis of detailing, is discussed second, through Bernewitz's Communication dimensions theory.

3.1 Adult learning theory

Slotnick and Kristjanson [27] explore how Adult Learning Theory applies to detailing. The idea stems from the notion that physicians prefer learning to promotional activities. By learning to solve patient-care problems, physicians reinforce the basic human needs [28] of security, self-esteem and relations. Their study [27] surveyed physicians on learning practices in the past three months. It assessed how healthcare practitioners (HCPs) perceived unsolicited and solicited advice and the credibility of each. They found [27] that credibility is twofold. Data must address an existing problem or pass a validity check by physicians. Before judging the credibility of information, physicians tend to double check it. The perceived credibility of acquired information is increased if it is supported by multiple studies which are not executed by the pharmaceutical company itself, if it appears in an acclaimed or familiar journal, or if it is sufficiently verifiable in any other way [27]. A separate research [29] arrived at the same results using a different methodology, thus increasing convergent validity of these results. It surveyed physicians on preferred detailing processes. The results showed that solicited information, unbiased information, and the means to verify it through links to primary or impartial data supporting rep's claims, are crucial for a positive detailing experience. Slotnick and Kristjanson [27] have also found that negative attitudes towards detailing are often related to rep's detailing style. Rep's style that does not support learning is considered offensive. Doctors favour constructive dialogues to being passive listeners of uniform presentations. Following ALT principles can help adapt rep's detailing style to match physicians' preferences and change their perception of detailing.

The three principles of ALT crucial for detailing are practicality, participation, and multiple demands. Practicality originates from a presumption that physicians are more interested in solutions to existing problems. Less engaging are solutions to hypothetical problems and potential threats. The study [27] shows that unsolicited information was not considered credible unless it coincidentally addresses the issue which is of interest to the doctor. Participation identifies the desire of physicians to be actively involved in their own learning process. The survey [27] shows that solicited pharmaceutical information is considered more credible than unsolicited. Physicians who asked more questions found the information more credible. Surveyed physicians, however, were generally not inclined to ask questions [27]. This is partly a result of cultural norms. Doctors consider attending detailing sessions an obligation. Hence, many do not want to spend more time in it than necessary. However, those who are willing to devote more effort into detailing sessions by asking questions, are more likely to form a positive attitude towards detailing visits. Multiple demands principle [27] stresses increased demands on physician's time. Time spent on learning should therefore be appropriated to avoid clashes with other obligations, such as patient appointments. It should also be used efficiently. One way of achieving this is to make sure the acquired knowledge can be applicable to multiple scenarios instead of an instance.

Even though the study [27] is limited in size and sample variability, and replication is imperative to gain true representativeness, it is important for the research because it proves the value of physician's reflections and evaluations when designing detailing solutions. Furthermore, following ALT principles in the design process addresses credibility issues and increases effective rep to physician message transfer.

3.2 Communication dimensions theory

Torsten W. Bernewitz portrays [22] how various types of detailing can be differentiated based on two communication dimensions. The two dimensions are personal interaction, and control of information flow. Bernewitz uses this model to investigate what type of detailing suits a company based on these two dimensions. Personal interaction determines the desired or required rep involvement in the process. Control of information flow explains who should initiate and control the interaction. Hence, whether the promoting company wants to be the one who pushes specific message or should the customer be the one requesting information. Figure 3-1shows in-person detailing, self e-detailing, and video e-detailing placed on Bernewitz's [22] communication dimensions spectrum. In-person detailing is in the bottom left corner of the spectrum because reps "push" certain messages to HCPs they visit in their offices, making reps in control of the flow. Self e-detailing lies in the upper right corner, as HCPs browse interactive content on their own. A physician can control which content to explore as well as the speed of processing it. There is no personal interaction from the rep. Video e-detailing is placed just below the middle, having relatively high personal interaction due to video stream, and medium control of information because of co-browsing. It is evident in Figure 3-1 that the three detailing types occupy different parts of the communication spectrum and can thus be complementing rather than competing approaches. In line with this, a lack of integration between the three methods of detailing has been pointed out as a potential needed improvement [19].

Bernewitz [22] notes that the effectiveness of a session increases with personal interaction. In-person interactions allow analysis of physician's reactions through body language which helps reps respond by adapting the approach of their presentation to ensure a comfortable atmosphere. At the same time, efficiency decreases with increasing personal interaction. A rep can conduct fewer sessions in person than through video calls, telephone calls or sharing of interactive content. Bernewitz [22] is not alone to suggest that marketing efforts of pharmaceuticals must be approached holistically in order to be most effective and efficient long-term [24]. A holistic approach includes a mixture of various strategies. As the following quote suggests, combing virtual with live interactions is crucial for delivering a good user experience: *"online stores soon discovered that without 'human touch' in the form of telephone support, shopping carts remained largely empty"* [10]. Bernewitz's theory is important for this research: it shows that dichotomy of in-person and e- detailing strategies needs to be bridged for effective and efficient e-detailing.

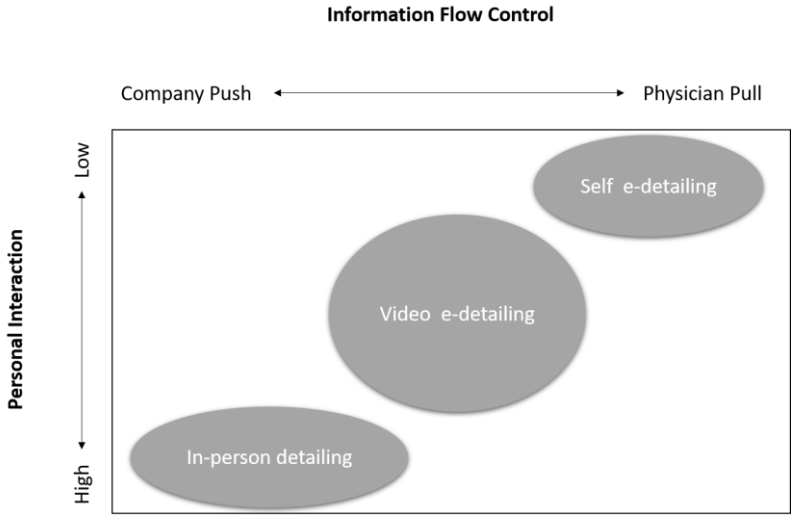


Figure 3-1: Communication dimensions spectrum (The Figure is adapted based on Exhibit 2 in [19], property of ZS Associates)

4 Methodology

The research described in this paper was exploratory and qualitative. The exploration was used to stimulate discussion about social implications of e-detailing and propose ways of developing e-detailing technology that fits into a future we want. It was focused on tensions, concerns, and desires related to e-detailing and approached with a people-centred perspective and methods which help encourage creativity and overcome everyday bias. The thesis followed a research through design process, which has become a popular and accepted form of research in the recent decades. As Interaction Design Foundation explains, research through design employs design activities because they have "a formative role in the generation of knowledge" [30]. Artifacts used and produced in this type of research serve as exemplars, which provide a "conduit for research findings to easily transfer to the HCI research and practice communities" [5].

Methodology, which was used to explore the design space, articulate the problem, and deliver conceptual design proposals which communicate possible design futures, provoke discussion, and extend the e-detailing design space encompassed a) online ethnographic interview, b) brainstorming, c) Magic Machine workshops, and d) design fiction. Table 4-1 outlines the goals and participants of each method, as well as shows how the methods relate to each other through inputs and outputs. The rest of this chapter elaborates on individual methods and why they were chosen in this research.

Table 4-1: Methods used to collect and process data

Method	Goal	Participants	Inputs	Outputs
Online ethnographic interview	To get a first-person perspective of (e-)detailing experience and answer questions which were not sufficiently addressed in the literature review	Pharmaceutical company representative	Literature review findings	E-detailing concerns
Brainstorming (4 rounds)	To reveal unobvious characteristics of e-detailing tensions and investigate the solution domain	3 participants (including the author of this thesis who was simultaneously facilitating the session)	E-detailing concerns	New concepts in e-detailing design space
Magic Machine workshops (2 workshops)	To ensure human-centricity and elicit desires related to e-detailing through participants' design propositions	8 participants (4 in the first and 4 in the second workshop)	E-detailing concerns	Desires conveyed through participant-made design propositions
Design fiction	To combine findings from preceding methods into self-explanatory artifacts which convey research outcomes through tangible artifacts and act as boundary objects between academia and the industry	/	Outputs of all preceding methods	Design fiction artifacts

4.1 Online ethnographic interview

To get a first-person perspective on detailing practices and experiences with in-person and remote detailing approaches, an online ethnographic interview was conducted. The interview was conducted with a representative of a pharmaceutical company specialising in neurology. During the interview, questions about different types of detailing strategies, experiences, preferences, benefits, and struggles were asked to get first-person perspectives on detailing practices. During the interview, the interviewee was able to elaborate on personally relevant topics. This helped direct the conversation towards aspects which were not part of the initial script, because they are less pronounced in the literature. The interview was carried out during the first few months of pandemic in Europe. Opinions and strategies presented in this section reflect this. An interview with the same person in the later stages of the pandemic would likely have resulted in different findings.

Interview was chosen as a user research technique because it facilitates acquiring in-depth information about the participant's experience with (e-)detailing. It allows gathering information about their "attitudes, beliefs, feelings, and emotional reactions" [31]. It was also convenient for the participant because it did not require any preparation from their side. Ethnographic interview was selected because it allows asking open-ended questions. Allowing participants to answer in their own words was a necessary requirement because a set of likely answers was not deductible from the available literature. Deviations from the initial trajectory were welcomed, because it was desired that the participant could point out aspects that were not anticipated by the researcher. Finally, the ethnographic interview was conducted online because it was the only feasible way of conducting interviews in the beginning of the COVID-19 pandemic when social distancing restrictions were advised, to minimize infections. Even though the online environment created a different dynamic than in-person interviewing would, it did not noticeably interfere with the goal of the interview. The interviewee and the interviewer were used to online interactions to the extent that the necessary information could be communicated. Additionally, the online setting of the interview matched some aspects of e-detailing setting, which reminded, emphasised, and made exemplification of some discussed points easier.

4.2 Brainstorming

A brainstorming session was conducted to explore tensions in e-detailing design space. The brainstorm was carried out with two other participants. Incorporating views other than that of the researcher creates more chance for a successful, applicable outcome [32]. Participants were recruited through the researcher's network and were not connected to any medical or pharmaceutical domains and were briefed on the context of detailing. Four brainstorming techniques were used to structure the brainstorming session: rapid ideation, plus 10 method, 6-3-5 brainwriting, and reverse brainstorming. The selection was made based on best practices from the author's previous experience with brainstorming. Additional criteria for selection of techniques were ensuring diversity of techniques, engagement of participants, and release of creativity. More detailed descriptions of the selected techniques are in

Table 4-2, listed in the order used to tackle each of the three issues. All techniques were complemented by two additional rules: the crazier the better and no criticism. Each issue was investigated in four rounds. First, rapid ideation was used to produce many ideas. Ideas were then grouped by themes, which were further developed in the second round using the 10 plus 10 method. Resulting ideas were grouped again, and the most appealing concepts elaborated on in the third round using 6-3-5 brainwriting technique. The ideas which were not selected as the basis for the third round were tackled with reverse brainstorming, as the fourth and last round of ideation.

Table 4-2: Descriptions of brainstorming techniques, ordered by rounds

Round	Brainstorming technique	Description
1st	Rapid Ideation	Rapid ideation [33] is a quick, cheap, and easy process designed to generate a big amount of ideas in a short time frame. Usually, around 10 minutes is given to participants to write down or sketch ideas on separate sticky notes. Afterwards, team members give a brief explanation of their ideas. Finally, it is customary that they are grouped by theme, topic, or relevance, and evaluated.
2nd	10 plus 10 method	10 plus 10 [6] is a fast ideation method which combines breadth and depth. It is carried out in two rounds. First, the task is for each participant to produce 10 ideas on a proposed topic. Ideas are shared within the group and one of them is chosen as a starting point for the second round, where each participant produces 10 new ideas based on the chosen starting point.
3rd	6-3-5 Brainwriting	6-3-5 Brainwriting method [9] is a simple yet effective method to quickly come up with many ideas by building on each other's thoughts. Participants start with addressing the problem by writing down their idea on a piece of paper. After appointed time, the paper is passed on to the next participant, who builds on the written idea or proposes a new one. The process is repeated until the sheet is filled, or until the facilitator deems necessary.
4th	Reverse Brainstorming	Reverse Brainstorming [7] combines the generation of many creative ideas with reversal. Reversal asks how you can create the problem instead of how you can solve it. This enables generation of radical and out-of-the box ideas. The process of this exercise is similar to the usual Brainstorming technique [8]. The reverse brainstorming technique helps you consider unlikely scenarios and enables seeing the problem from a different perspective.

4.3 Magic Machine Workshops

The Magic Machine workshop was used as an exploratory tool that involves craft making to stimulate creativity and uncover tensions, challenges, and opportunities of future tech-enabled communication between reps and physicians. Magic Machine workshops were used to ensure human-centricity and elicit desires related to e-detailing through participants' design propositions. The limitations of Magic Machine workshop format allowed participants to break free from bias and assumptions they had about the future, the technologies, and e-detailing.

Magic Machine Workshops, as proposed by Kristina Andersen [34], are an open-ended, intense, workshop-like exploratory experience which engage "non-experts in a conversation about personal technological desires and fears, to generate visions and manifestations of unknown technologies" [34]. Magic Machine Workshops draw from performance theory, game play, and psychology [35] to help participants tap into their subconsciousness and imagine technologies that reflect personal desires. They allow us to answer questions about the future that are too abstract to tackle with a conventional approach. In this research, they were used for exploring the e-detailing design space.

Designing with Magic Machines aims to avoid using participants of these workshops as resources for design and research projects because it would limit their creative freedom [36]. As in other participatory research methods, participants are viewed as co-creators, and "knowing subjects" [37]. Designing with participants rather than about them, allows us to access different types of knowledge through the "reconstruction of their knowledge and ability in a process of understanding and empowerment" [37]. The guidelines and limitations of Magic Machines workshops were put in place as cues to encourage creative thinking, not as restrictions to control participants and elicit desired outcomes. That way participants had the power to make their personal visions explicit and approach aspects of their own interest. This was crucial for exploration of e-detailing because it enabled tackling of underlying problems instead of extending the technology's functionalities to address tasks which potentially create more problems than they solve. It allowed for broadening of the e-detailing design space through proposals for new ways of realizing physician-rep interactions.

Due to COVID-19 restrictions, the workshops had to be conducted remotely. A videoconferencing tool was used because it provides video and audio connection between multiple participants, as well as screen-sharing and messaging functions through which the presentation slides and written information could be shared. Workshop participants were selected from diverse backgrounds, experience, and age. This aimed to ensure the workshop was checked on suitability, comprehensibility, and appropriateness for a diverse non-expert audience. Four individuals participated in each workshop. They were aged between 23 and 63 years. They were from a range of backgrounds including pharmacy, computer science, interaction design, civil engineering, and mathematics. Participants were acquaintances of the researcher and thus recruited through text messages and email. They were sent an invitation explaining the purpose of the workshop and pre-workshop preparations (see Appendix A). The preparations included gathering materials needed for the creation part of the workshop. Guidance and ideas for material selection were included in the invitation. Participants were asked to fill in an online consent form which informed them of the terms and conditions of the workshop. The workshop was audio and video recorded to ease the workshop analysis.

4.4 Design Fiction

Design fiction artifacts are exemplars [5] which encourage discussion [38] and inspire future e-detailing prototypes and products. They were developed based on the Magic Machine workshops' design propositions to create a shared space for conversation [39] between industry and academia [40] through tangible artifacts. Involving individuals in workshops which inspired the design fictions helps raise relevant considerations [41] for e-detailing design space. Similar to a design fiction example "Future IKEA Catalogue" [40], design fiction is used here to convey research outcomes in ways which support collaboration with the industry. Design fiction encourages designs which fit user needs by putting them into perspective, or critique [42]. In line with that, the proposed design fiction artifacts were designed to direct the future of e-detailing designs into useful, usable, and user-focused objects.

5 Interview Findings

To get a first-person perspective on detailing practices and experiences with in-person and remote detailing approaches, an online ethnographic interview was conducted. The interview lasted 1hour 18 minutes and was transcribed into 9867 words. At the time, the interviewee worked in a pharmaceutical company which specializes in neurology. Her experience with pharmaceutical sales strategies come from her previous as well as current job position. In the past, she worked in a bigger company where she was involved in e-detailing. The team she worked with at the time of the interview was much smaller and focused on face-to-face marketing which was only partly combined with promotion through digital channels. The interview was carried out during the first few months of the COVID-19 pandemic in Europe. Opinions and strategies presented in this section reflect this. The same interview during later stages of the pandemic could have resulted in different findings.

5.1 Experience with e-detailing

Because of the lack of digital skills at the side of the recipient of e-detailing, reps must do a lot of preparation in advance of the meeting as well as conduct repeated meetings. There are also a lot of disturbances which negatively impact the session, such as blurriness, Wi-Fi connection issues, and noise. Elderly, and more traditional doctors are reported to be the hardest to work with. They are not very tech savvy. However, because of the necessity, they are more open to it. Alike doctors, the older the rep the less likely it is they will be in favour of e-detailing. Younger generation, on the other hand, see it as a game and a challenge. They noticed it was easier to implement e-detailing for the reps which have not done many in-person detailing sessions prior to switching to online environments.

E-detailing has a potential to enable more sessions per day, when compared to traditional in-person detailing. Traditional detailing usually costs them between 15 and 30 minutes of time per doctor. With e-detailing, they could in theory be 6-fold more productive. She says it would be possible to do two or three details per hour. However, she realizes that in practice this is not executable because of various external factors. One of the external factors is that certain times are more suitable for e-detailing than others. Wednesday and Friday afternoon are more suitable than Monday mornings, for instance. Apart from time efficiency, e-detailing is also favoured for faraway hospitals and practices. A single field employee at the company covers half of the Netherlands, which is approximately 20 000 square kilometres, therefore e-detailing could decrease the need for travel. Currently, they must travel between one to three hours between details. Regardless of time and travelling savings, the company generally prefers to carry out in-person detailing because they rely heavily on relationships which are, as the interviewee explains, more easily established in person. The communication is more *"crisp and clear",* and it is thus easier to get the intended message across. It also *"conveys more message and ensures a lasting agreement".* Online detailing feels more formal. One cannot shake hands, which is a practiced and widely applied strategy to loosen the situation. Body language in general becomes less involved and one cannot use gestures such as opening the palms face up, to make recipients more comfortable. Making jokes is harder as well because body language plays important role in making an impactful joke. A switch to e-detailing requires a lot of change management. The biggest barrier she sees are people. They like to work with what they are familiar with. In expected environments they are more relaxed, and talk and listen better, which are all crucial for effective detailing. While physicians are used to webcasts because they are a practiced way of learning and retaining their practicing license, they are not used to e-detailing. Reps force small talk at the beginning of e-detailing sessions to make the setting more comfortable and relaxed to enhance message retention rate. Overall, it is easier to connect to the person when you are both in the same space. One thing pointed out as more suitable for e-detailing settings are videoclips. During in-person meetings, reps sometimes point out practices with the help of a videoclip. During online sessions, videoclips are more conveniently included than in person where it breaks the conversation

flow. In online environment, the setting is different and both participants are already focused on the screen so a videoclip does not break the interaction flow in the same way.

Some aspects of detailing sessions cannot happen in online environments, and the same is true the other way around. As she points out, it is important to identify goals of a detailing session and achieve these in an appropriate way, which differs depending on the detailing setting. Looking ahead, she sees the potential for e-detailing in bigger cities and with tech savvy hospitals of the western Netherlands.

5.2 E-detailing during COVID-19 pandemic

During the COVID-19 pandemic and ongoing preventative measures, online communication is more practiced because in-person meetings are not advised. Consequently, people are getting more used to it, including reps and physicians. This makes them more opened to e-detailing.

On the other hand, pandemic also brings about changes regarding medical practices. These make certain conversations redundant because processes and treatments are not happening in the same way. For instance, many people are working from home. With less nurses being in hospitals, and urgent matters taking precedence, certain procedures are on hold. Comparisons of new therapies between patients are often irrelevant amidst a pandemic because new treatments cannot be started. Any novelties, such as new methods that could be applied are irrelevant because only urgent processes are taking place. If methods cannot be implemented right away, it is not viable to talk about them with doctors. Talking about subjects that are irrelevant at the time of speaking will not be remembered well enough. Repeating them again later does not give the same effect, because the listener thinks they already heard the information before and pay less attention to it. As the interviewee points out, timing is crucial and talking about irrelevant topics during the pandemic is just *"background noise, and you don't want to be background noise"*. Furthermore, healthcare personnel are extremely busy during a pandemic. In the Netherlands, they do not have enough ICU doctors. Consequently, neurologists and nurses are being trained to perform the necessary tasks. This means their availability for detailing is even more scarce than usual.

The most important takeaway, as she points out, is to be flexible and adapt to the situation. For pharmaceutical company, COVID-19 pandemic means losing one of their crucial channels: in-person meetings. When a pharmaceutical company loses a channel, they must substitute it with a different one. This time, it means substituting in-person detailing with e-detailing.

5.3 Summary of e-detailing concerns

Based on the literature review, and the interview, seven points of concern in detailing were identified. They are listed and explained in Table 5-1. These concerns partly overlap. The underlying issues and their consequences are intertwined. This interconnectedness was addressed next with the brainstorming which naturally separated concerns into smaller problems.

Table 5-1: Points of concern in e-detailing

Concern	Explanation
Lack of digital skills	Even though healthcare is one of the leading sectors when it comes to using technological advancements, there is still a noticeable lack of digital skills among reps and HCPs alike. Especially in areas which are not directly applicable to patient care, such as videoconferencing tools. This phenomenon hinders the development of technology-assisted detailing strategies. With the change in daily life due to restrictions connected with pandemic, present since the beginning of 2020, digital

	literacy is improving due to necessity. This could have significant consequences for detailing.
In-person communication conveys more message	Reps have a hard time establishing quality relationships online. Since the beginning of times, people have been practicing in-person communication which has evolved throughout the years. There are numerous books, guidelines, and strategies on how to effectively communicate with each other in person. Until 1980s, the emergence of ICT, in-person interaction was the main way of creating relationships. Since the emergence of ICT, we have been learning and getting used to online communication, as an addition to in-person interactions. While online communication has become increasingly accessible and acceptable form of communication, its rules, impacts, and skills it requires are very different from traditional communication. Detailing relies heavily on relationships. With years of experience, and supporting literature, reps have the knowledge on how to establish lasting relationships in person but lack the same skills for online interactions. For instance, they know how to read and respond to non-verbal cues in in-person interaction. Missing non-verbal cues in online interactions, on the other hand, makes their job harder and less effective.
Online communication increases miscommunication	Online communication is subject to more potential disruptions than in-person communication. Connection instability, delays, and background noise are a few examples which hinder the information flow. People involved in an online conversation do not share the same space and context, which along with different experience, and personal differences, adds to potential factors for misunderstanding. In addition, non-verbal communication is absent or less visible in online communication. When we speak, information is not only conveyed through our words, but also non-verbal signs [2], [3]. This is another factor which increases miscommunication during online communication.
People like the familiarity (of in-person visits)	The act of accepting reps in their offices is more familiar than meeting them online. Video conferencing tools allows people to see your private space. You are conscious about inappropriate objects that might be your video frame, as well as unexpected interruptions from family members and pets, if you are calling from your home. Similarly, you never know what to expect from the co-speaker's environment. There are always new environments to process and get to know. This makes it harder for participants to get relaxed and focused on the content.
Missing body language	The complexity of human interaction is not captured in online communication. There are assumptions that half of the information during in-person interactions is conveyed through body language [4]. In online environments, some of the body language is missing. We cannot see the nuances in how our co-speaker is seated in relation to us. Whether they are leaning forward, or backwards. All of these give additional meaning to words. When these cues are missing, a large amount of information that we are used to extract from them is gone. Videoconferencing tools enable us to see other speaker's face, which is useful for reading facial expressions. However, depending on the resolution of the camera or the screen, a lot of micro expressions is left out.

Making jokes is harder online	The missing non-verbal cues, connection lags, different space and different context make joking online harder.
Online detailing feels too formal	There is no ability to shake hands or use body language to make recipients more relaxed. There is no physical contact which communicates trust and connection. The usual business meeting rituals, which are the basis for creating he initial bond, such as exchanging business card, cannot be carried out and their equivalents for online communication are not known yet.

6 Brainstorming Insights

To start tackling concerns identified in the previous chapter (see Table 5-1), a brainstorming session was conducted. The goal was to investigate the potential of addressing e-detailing concerns with novel technologies and reveal unobvious characteristics of e-detailing tensions through generating fresh and creative ideas. It helped with generating fresh and creative ideas for solving three chosen e-detailing concerns: making jokes in videocalls, inclusion of body language, and familiarity of an in-person detailing setting in contrast with video calling as a window to co-speaker's home. The three concerns were selected from a set of seven points of concern which were formed based on the literature review and the interview (see Table 5-1). They were chosen because they cover a range of difficulties with e-detailing which have not yet been successfully tackled in the available literature. Reflecting on the process and the resulting outcomes produced two findings which are important to acknowledge also because they were taken as guidelines in the research steps that follow. The first is about the value of embracing playful and silly solutions, and the second about the importance of context-specific solutions.

Table 6-1 includes a selection of generated ideas which was made to show their variety. The ideas are grouped by concepts to indicate that they cover different areas of the design space. Initially, the brainstormed solutions for the points of concern seemed too childish because many included elements of play. This was the case because fundamentals of effective detailing are comfort and clear communication. Icebreakers and similar game-like elements are known to facilitate communication flow and create a bond between participants. This increases their feeling of relatedness [10] and the chance of positive overall experience and effective message transmission. Embracing the playful and silly solutions which border speculative design is valuable for exploring the design space because it helps reveal unobvious characteristics of a situation.

Secondly, sifting through brainstormed solutions disclosed that many are too general. Because e-detailing largely relies on the use of video streaming technologies and supporting programs which are not specifically designed for e-detailing, although suitable to satisfy some of its goals, concerns with their use can be transferred to other use cases they appear in. To capture specificity of target domain and ensure relevance for e-detailing users, addressing identified concerns must be tied to e-detailing as much as possible by continuously referring to the e-detailing context and physician-rep relation. For example, if a solution includes anecdotes and jokes exchanged at the beginning of the interaction as an attempt to break the formality of an online setting, the anecdotes and jokes could be specific to pharmaceutical or medical industry.

The two main insights from brainstorming informed the preparation and execution of Magic Machine workshops which followed.

Table 6-1: A selection of ideas, generated during the brainstorm (varying amount of provided detail is a result of different techniques used in the process)

	Concept	Ideas as written and presented during brainstorming
1.	Video-background designs to elicit humour	• Your mouse becomes alive and scares away the cat which consequently escapes from the room • Somewhere in your background you hang a hypnotic picture which hypnotizes the co-speaker into the mood that you seek • You can make a WHO is there behind you joke • Real life animation of a cat or tiger getting ready to attack you • A staged background where only a careful observer can notice that what they see is not physically possible • Have a slowly changing (hard to notice) piece of furniture behind you
2.	Influence of situatedness on comfort	• Before entering the videocall, you can test what can be seen behind you, and choose to place videocall-framework-made stickers to cover them. The idea comes from the notion that there are some standard items that we wish to hide because we are not comfortable sharing them with a co-speaker • Pharmaceutical company should choose a live animal or mascot which is always present on videocalls
2.1	Influence of situatedness on familiarity	• You should always have a signature item placed so that it is visible to the co-speaker • You should have an option to pick the co-speakers background (not yours), and therefore making the setting more familiar and comfortable to you, because you have the feeling that you are in control
3.	Context-related strategies to aid relaxedness	• Having a set of occasion-specific jokes. For example, time-, quarantine-, work from home- specific jokes you can tell • Have a catalogue of jokes prepared. If they are your regular client, you can just state the number of the joke. If they are a first timer, you can send them the catalogue after • Have a rehearsed or ready-made joke where something or someone enters the room and make an anecdote about it • Pay a comedian to write and test jokes that work especially in e-detailing videocall environment.

4.	Client involvement for empowerment and investment	• Before the start of the session, you are presented with an interactive virtual cardboard where you can click on a specific card - e.g., "Tired of this salesman" or "Feeling sad" or "Tired eyes" or "I would rather go for a coffee" - to get a joke appropriate for the situation clicked
		  ○ If the coffee card is clicked, make a coffee scent
		  ○ Karaoke, exercise, short fun tasks. Can you do that? Did you know ...
		  ○ Maybe the coffee scent can be elicited in another way :)
		  ○ Dream-team card
		  ○ Dream videoconference call
		  ○ .. we asked 100 people ... what they like/hate about video conference calls (or Dream team, Dream video call)
		• Everyone entering a detailing session should prepare 1 joke to tell at the beginning

5.	Using technological constraints to improve the session (emphasizing versus hiding technological constraints)	• Inclusion of some sort of video to lighten the mood or counteract technical failure
		  ○ A funny video which you can watch at the beginning together
		  ○ It lasts max 15-25 seconds
		  ○ at the end you both have to rate it
		  ○ During the video you have to be attentive to a certain detail (you are told about this before the video starts)
		  ○ If you guess the detail, you get a reward
		  ○ The reward is a joke
		  ○ The joke can be framed as: What do ___ and ___ have in common
		  ○ The video could be about how videocalls will look like in 15 years
		• Play videoconference fails
		  ○ Which you can watch when the co-speaker has technical issues which halt the call (e.g., if they freeze)
		  ○ You can choose which fail to watch
		  ○ Before the videocall you have an introductory video, where you are informed of precautions and procedures, as on airplanes.
		  ○ The introductory video is shot using Lego figurines, like of Turkish airlines.
		  ○ Can specific fails be useful?
		  ○ Cut line - let's go home. Noise - Can't hear anything.
		  ○ There could be a special button which can be pressed by the client (salesperson is unaware of it) to imitate a tech failure and end the call

7 Online Magic Machine Workshop Framework

Brainstorming insights informed re-shaping of Magic Machine Workshops framework. Magic Machine workshops were conducted to explore the future of e-detailing through eliciting people's desires. They were used to reflect the playfulness of brainstorming outcomes and stretch the boundaries of what is considered plausible in the context of e-detailing. Due to the circumstances of COVID-19 pandemic, the workshops were conducted online. This required adapting their traditional framework. The following sections elaborate on the procedure of Magic Machine workshops designed and used in this research to accommodate online setting and detailing context. Two workshops took place. After the 1st workshop, elements which were detrimental or inadequately contributed to the workshop's goal were modified for the 2nd workshop.

7.1 First workshop procedure

The workshop consisted of five parts: workshop introduction, material round, prompt activity, creation, and discussion.

7.1.1 *Workshop introduction*

During the workshop introduction, the researcher, context of research, and purpose of the workshop were explained to familiarize participants with what will be happening. This aimed to give them sufficient guidance and reference on what to expect, as well as what is expected of them, so they knew what to focus on.

Pharmaceutical detailing, and the need for e-detailing was explained for non-expert audience. The importance of communication and establishment of a rep-physician bond was stressed. It was emphasized that good communication and personal relationship are crucial for effective detailing and should be retained irrespective of the detailing method and medium. The workshop's agenda was presented as displayed in Figure 7-1.

Figure 7-1: 1st Workshop Agenda

7.1.2 *Material round*

Material round is not present in Magic Machine Workshops as proposed in [34] but was introduced here because the workshop was conducted remotely. The remoteness changes the dynamics of relationships between participants and makes it harder for the researcher to provide materials for each participant. To overcome these two barriers, participants were asked to gather materials themselves prior to the workshop.

During the material round each participant named and explained the reasons for bringing specific materials to the workshop. This task was designed to be easy and quick but helpful for participants and the workshop experience alike. Its purpose was to make participants become more comfortable with each other by having an opportunity to speak about something they are knowledgeable about. Participants were separated between each other and the researcher by physical distance. This precludes small talk, shaking hands, and similar habits that typically happen in an in-person setting. Material round was an opportunity to justify material choice, appreciate invested effort, and establish a comfortable workshopping atmosphere. Speaking about the prepared materials was personal enough for the participants to empathize with each other and relate with the speaker, but impersonal enough to not make participants reveal information about themselves that could make them self-conscious. There were no right and wrong things to bring or to say. Hence, everything they could possibly say in these two minutes regarding the materials was “correct”. This created a feeling of positive reinforcement which made people more confident, because they had achieved a clear, albeit simple, goal. After a participant finished speaking, they were asked to pick the next person to talk about materials. The purpose of this was twofold. First, it is very practical because it limits the confusion of whose turn is next. Second, it encourages relatedness through referring to each other by names. It aims to help participants be present, and aware of each other by reading and saying each other’s names out loud. All these implications contribute to a more pleasant, relaxed, and comfortable workshop setting. Such atmosphere makes participants more daring in sharing their creativity and desires which are crucial for the purpose of this workshop.

7.1.3 *Prompt*

The prompt included a warmup activity and was used to ease participants into the creation part of the workshop. This transition was designed to shift focus from a descriptive and passive participant role into creative and active participation.

The prompt started with a question "What will long-distance communication medium between a doctor and a rep be in 50 years?". Posing a question prompts the audience to start thinking, even if they are not asked to make the answer explicit. The question was followed by a series of slides which presented a historical succession of long-distance communication methods as shown in Figure 7-2. The images were created using Canva [43]. For the workshop, the presence of detailing was imagined having emerged with first long-distance communication method. Long-distance communication methods included in the prompt were smoke signals, pigeon mail, telephone calls, and video streaming. This list is not comprehensive. Four methods were chosen to keep the list short enough to avoid overwhelming the participants while giving them enough information to understand that long-distance communication has been changing in the past and will continue to change in the future. The four long-distance communication methods were chosen for their variance and appeal. Mail delivery by horses, for instance, was excluded. For the purposes of the workshop, it was too similar to pigeon mail because they both involved a transfer of messages by animals, even though they were different and allowed for different speed and size of transfer. The overview of long-distance communication methods was presented to exemplify how long-distance communication evolved and which interaction modes were added with time. Initially, only small amounts of information could be transmitted through smoke signals. Having a dialogue or a turn-taking conversation was almost

impossible. Later, telephones enabled people to have in-person-like conversations by transmitting uninterrupted voice transmissions. Nowadays, video streaming tools have made a step further by adding video on top of audio as well as screen sharing capabilities. This allows us not only to hear and see the other person but also see what the other person is seeing. At the end of the overview, participants were asked to embody their thoughts about the future medium of long-distance interaction between a doctor and a rep by writing the name of this medium as their Zoom [44] name. This provided a clear indication of when everyone completed the task of coming up with a name for future detailing method. The invented name of the future long-distance communication medium served as the basis for the creation part of the workshop where participants produced magic machines that fit the invented names. Each magic machine name was read out loud by the facilitator before proceeding to make them more explicit and draw attention to them. The written names served as a convenient reminder for the creation part of the workshop because they could see the name each time they looked at the screen. Apart from being a constant source of inspiration during the creation part, it was intended to make it seem as if they are already using the magic machine. This hoped to make the magic machine feel more real and ease the next step of the workshop.

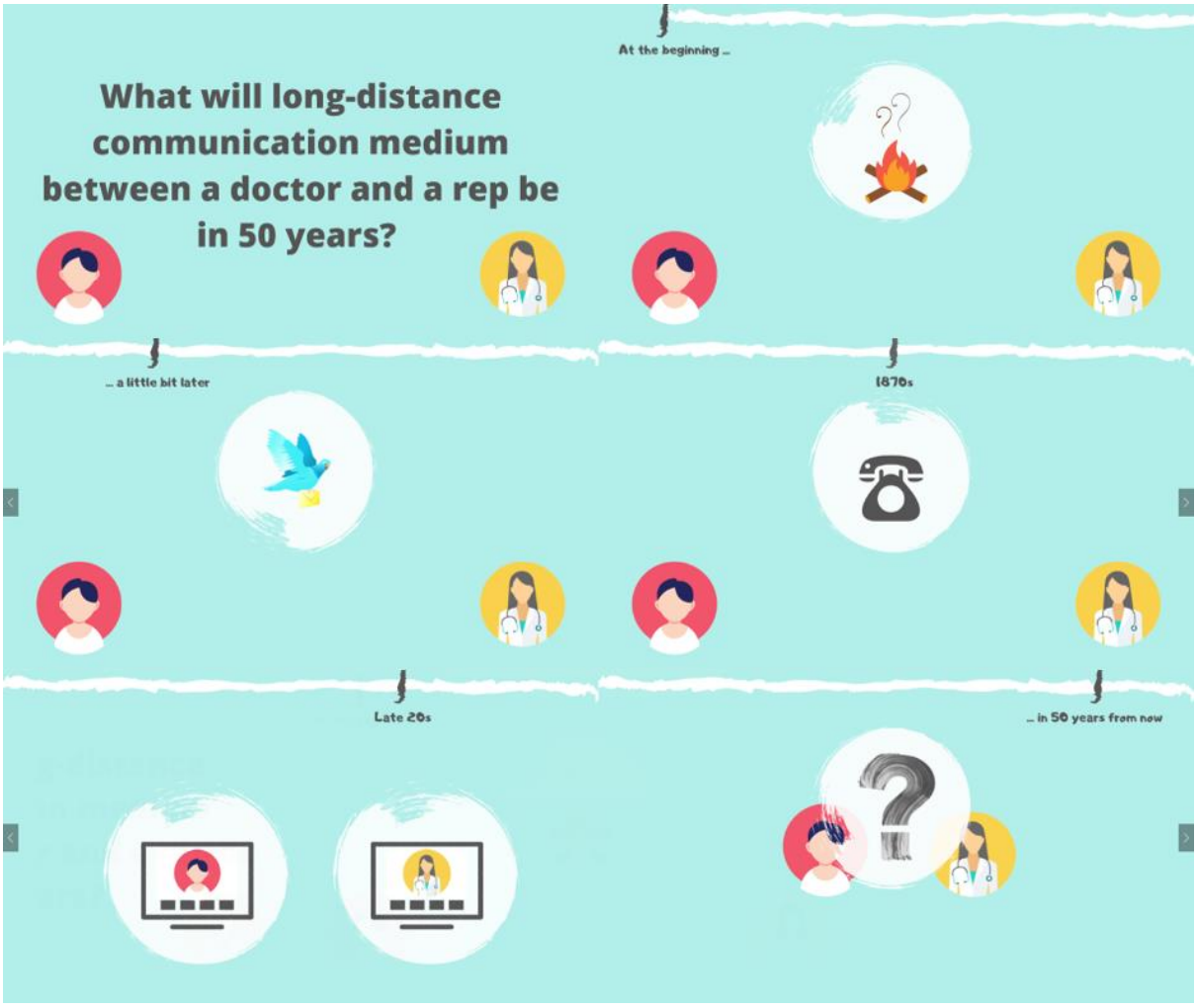
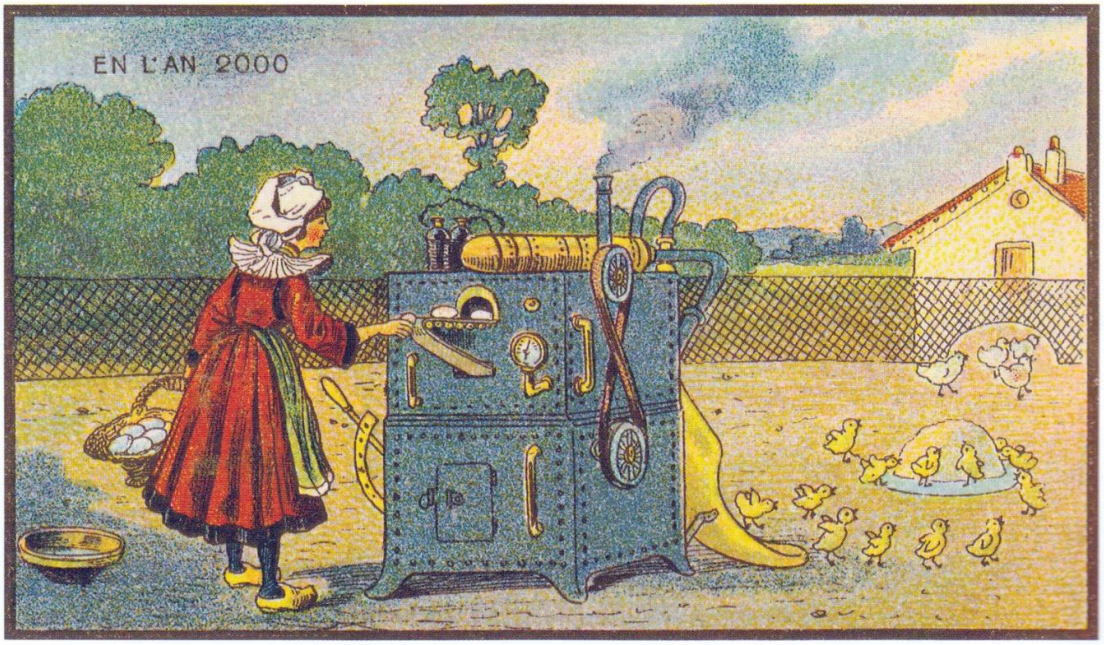


Figure 7-2: 1st Workshop Prompt

7.1.4 *Creation*

The longest, and main part of the workshop was creation. Participants were asked to use the materials they brought with them to create Magic Machines which will enable effective detailing in 50 years,

hence, in the year 2070. Because they were hesitant, the facilitator provided an example of "Magic Machine" from a different domain to avoid biasing participants. The shown example is seen in Figure 7-3. It is from a series of artworks [45] created between 1899 and 1910 by artists speculating what the world would look like in the year 2000. The example painting is titled “Intensive breeding” and illustrates how the author imagined breeding of chickens 90 years into the future. This example was chosen because it showed what kind of "magic" the workshop is aiming for in the "machines" which participants were invited to create. The "machine" on the illustration is not a detailed exemplification of what it is, but of what it does. It transforms an egg into a chicken, in what seems to be almost an instant, judging by the picture's composition. After this exemplification, participants had 20 minutes to create a Magic Machine. They were instructed to take a break if they finished earlier and take pictures of what they have created with their phones or cameras. These pictures were later sent to the facilitator for documentation.



Intensive Breeding

Figure 7-3: France in 2000 year (XXI century). Intensive breeding. France, paper card by Jean-Marc Côté

7.1.5 *Discussion*

After 20 minutes of creation, each participant presented their Magic Machine by explaining how it will be used in the future for communication between a physician and a rep. It was followed by a discussion with questions about the machine and its use from the facilitator and participants to understand and develop the idea further. After the last presentation, the workshop was completed with thanks and goodbyes.

7.2 Second workshop procedure

Based on the findings from the 1st workshop it was determined which elements worked and which needed changing. This section considers changes done after the first workshop to improve its effectiveness. The second workshop design significantly differed from the first in three aspects: the workshop invitation featuring material selection instructions for what should be brought to the workshop, the prompt, and the discussion.

7.2.1 *Changed material selection instructions*

Instructions for material selection were changed in response to the expressed concerns raised during discussion where participants were invited to share their views and experiences connected to the workshop. Upon the evaluation of the first session through unstructured interviews where participants were invited to share their views and experience connected to the workshop, it was apparent that instructions for material selection need to be improved. Even before the workshop, one participant sent a question asking, *"are [there] any materials that you recommend bringing, or just something from each category"*. Two other participants stated that they invested *"quite some time"* to find items from each category. After having participated in the workshop, they realized they misinterpreted the guidelines. They did not dislike having to source the materials, but they expressed the need for better instructions. They believed better instructions would have saved them some time and effort. Half of them did not realize that it was not necessary to bring an item from each category. Finding items for each category consumed a lot of their time. The primary goal of categories was to inspire and give examples of what to bring without demanding a substantial effort on the side of participants. It was not intended that participants bring something from each category. Hence, the instructions were misleading. Instead of making it easier for participants to acquire materials, the instructions made it harder. The goal of material selection instructions was not met and therefore the material selection instructions needed to be clarified. While material selection instructions needed to be changed to improve interpretability, the idea of selecting and explaining the selection during the workshop was proven successful. They were excited to bring materials that could enable them to perform well or *"be the best"*. It was empowering because they felt in control.

Therefore, instructions for what should be brought to the workshop needed to be shorter, clearer, and concise to avoid confusion and overwhelming participants. The instructions for the first workshop listed six categories with accompanying examples (see Appendix A). Participants wanted to be ready, so they tried to bring multiple items from each category. Consequently, the materials they had prepared for creation were more diverse and abundant than usually planned for Magic Machine workshops. Traditionally, Magic Machine workshops include a carefully curated and limited set of materials to inspire out-of-the-box ideas and counteract the normal way of perceiving objects and their function to encourage playfulness. Providing a too elaborate selection of materials risks shifting participants' focus on what to use instead of what to create. More research is needed to determine whether stricter material selection limits inspire more creativity. Ideally, Magic Machine Workshops dictate a limited material selection to encourage creativity through obstruction. Since the Material round was beneficial for the workshop dynamics, it was considered important to find a balance between limiting the material selection and allowing freedom of choosing materials which can be justified during the Material round. Material selection instructions should not eliminate the need for the Material round. Therefore, the new constriction for items required at the workshop included less categories and improved wording. This was changed to clarify that categories are not bounding but inspirational and to avoid redundant categories. Categories which did not add anything new to the set of materials were removed or merged to avoid confusion and overwhelming participants who tried to fit items into categories or vice versa (see Appendix B for the second workshop instructions).

7.2.2 *Changed prompt*

The first workshop's prompt had two parts. A visual stimulus accompanied by the facilitator's explanation, and a short task executed by participants. The visual stimulus took participants on a journey through the history of long-distance communication media. The task invited participants to write the name of imagined future long-distance communication medium as their name on Zoom. The visual stimulus and the naming task were perceived well among participants but failed to meet workshop goals.

The simple, cartoon-like images of visual stimulus fit into the playful tone of the workshop. The participants regarded to it as “fun” and “understandable”. Likewise, the task was clear and easily completed among all participants in a matter of minutes. However, prompts should also introduce the thematic context [34]. The long-distance communication overview was descriptive. The stimulus failed to present the complexity of interaction between a rep and a doctor, the struggles they face when technology cannot support such interactions, and the characteristics of detailing that both involved parties aspire to. It did not immerse participants into the experience of detailing by identifying with reps and doctors. For a more effective prompt, the focus should be put on the detailing process more than the detailing medium which is supporting the process. It should present user experience, struggles, and goals, through scenarios which encourage participants to identify with detailing professionals.

The task resulted in two of the invented names including variations of “teleportation". They were “teleport” and “teleporting channel”. This guided the creation process towards creating teleportation devices. The concept of teleportation is about bringing individuals physically into the same space and contradicts the workshops goal of exploring interaction between two people in separate spaces. Consequently, the importance of a rep and a physician remaining in separate spaces while communicating with each other was stressed in the second workshop.

Additionally, the task prompted participants to imagine a long-distance communication medium used in 2070. Placing the scenario 50 years into the future proved to be too much. The 50-year time difference between current and imagined reality created a gap which was hard to comprehend. The intention of placing the scenario into the future was to avoid giving thought to limitations of current technologies. At the same time, the workshop was about expressing one’s current wants and needs. To remove the constraints of existing technology and keep the workshop relevant to existing desires, the timeframe was shortened for future workshops.

The improved prompt used for the second workshop was a short testimonial of a fictional persona based on the findings from preliminary interview with pharmaceutical representative, and the literature. The new prompt can be seen in Figure 7-4. It included points of concern in e-detailing as identified in Table 5-1. The lack of body language, non-verbal cues, physical contact, shared context, and the overall struggle with interaction dynamics, which is different to the copybook in-person detailing. Participants were invited to choose, write down, and later explain one of these concerns. The reasons for choosing it could be personal, instinctive, or random. It could be because they relate to it, dislike it, are suspicious of it or find it appealing for any other reason. After a few minutes of quiet reading and contemplating, participants were asked to share why they had chosen a specific aspect. Each participant chose a different aspect. Their justifications are explained in Table 7-1.

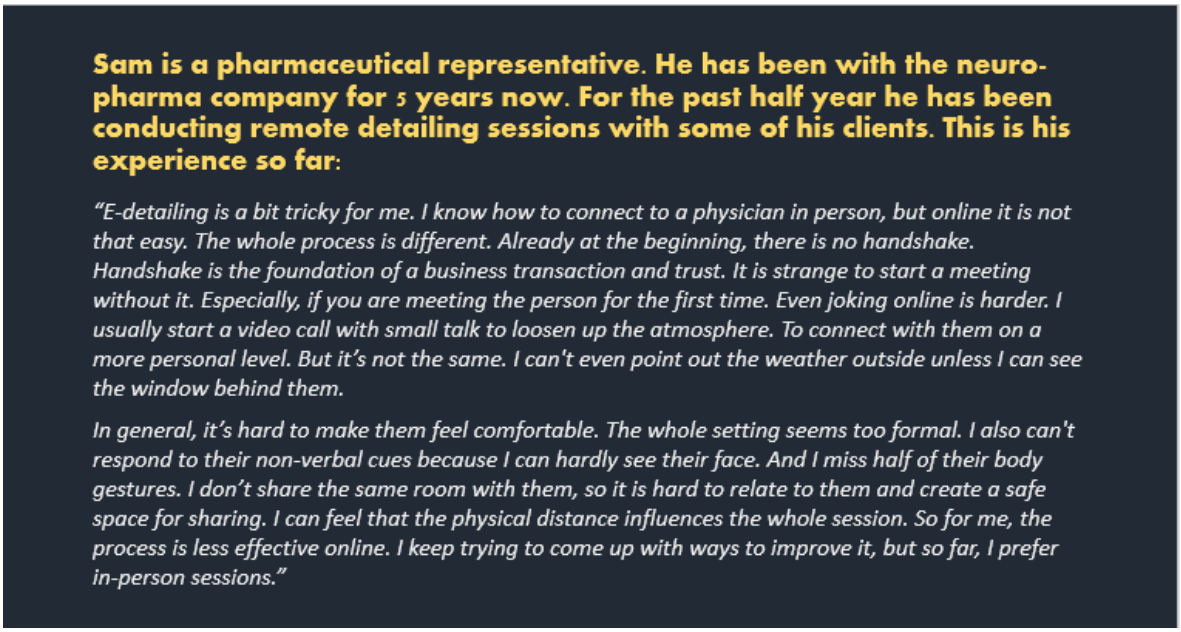


Figure 7-4: 2nd workshop prompt

Table 7-1: Points of interest chosen by participants based on the prompt

Point of interest	Reason
Comfort	Doubts that Sam's statement "In general, it's hard to make [doctors] comfortable" is true. Wonders whether it is his personal opinion or general truth.
Body language	Agrees *"very much"* that it is hard to read the person when you can only see the face and not their body language. Thinks it is important to understand the doctor if you explain treatments and medicines to them.
Handshake	Thinks it is *"very important". "It is the first thing that you do when you see someone new. After that everything is easier, and everybody is more comfortable"*
Small talk	*"It is in the small-talk that you connect on informal level to see in which way you can talk business later on. And When you do that on Zoom you interrupt each other all the time and that disrupts the small talk and that disturbs the business talk later on, I think."*

7.2.3 *Changed discussion*

Reflection of the first workshop's discussion identified the need for two improvements. First, the discussion only related to the presented magic machines and not the overall workshop experience. This goes against the principle of treating participants as equal contributors because their overall

experience is just as important as their end products. Second, the discussion ended too abruptly, and did not round up participant experience.

To address these issues, during the second workshop's discussion, participants were invited to reflect on the workshop experience. The facilitator posed questions to encourage participants to clarify their thoughts and feelings related to the restricted material selection and its influence on the creation process. Additionally, a discussion on how their creations contribute to the research was added as a means to complete their workshop experience.

8 Design concepts from participants

Magic Machine workshops supported participants to contribute to the exploration through imagining a detailing scenario and drawing from personal experience. This section presents and develops ideas that were inspired by participant creations during the online Magic Machine workshops. Each idea starts with the description of the participant-created Magic Machine as presented during the workshop. Learnings and drivers behind the participant-made creation are then examined to gain a deeper understanding of the outcome which indicates new perspectives in the design space exploration.

8.1 VR Simulation

> *"It is really simple because I was struggling a bit to come up with a machine for VR simulation."* (Zoe)

The Magic Machine depicted in Figure 8-1 enables immersing into a VR environment by wearing the VR glasses, in this prototype denoted by a mask, inserting hands into gloves, and connecting to wireless headphones. The gloves allow touching and feeling various materials. This lets the rep directly show the products they are discussing. The scene in Figure 8-1 includes three round-like shapes in the middle which represent three pills. The customer can pick them up and try them out to see what kind of side effects they have and how fast they act. The whole machine is lightweight and portable. As the creator explains, *"Using VR simulation, you are physically apart but it feels like you are teleported into the same space."*

The VR simulation indicates the importance of conveying meaning through physical contact and demonstrating medication activity in terms of effectiveness, safety, and onset of effect. The gloves are introduced to stimulate the sense of touch and simulate sensations felt if the user interacted directly with physical objects. The magic behind trying out the pills virtually and the way of experiencing medication activity was mentioned but not elaborated on. It seems that desire preceded its vision of realization. Neither technology supporting the attribute nor the specifics of how doctors might experience it were given during the presentation. Whether this is a conscious decision, a result of running out of time, or a mid-presentation enlightenment, is not critical for acknowledging that it is pertinent to an improved (e-)detailing experience. Communication through physical contact and comprehension through virtual portrayal of the effects of medicines are two ways of conveying information which are lacking in online detailing experience. VR simulation suggests that e-detailing already lacks certain dimensions, but the means of realizing them are not available yet. It invites the viewer to strive towards the technological leap which will enable it or approximations which will ease the process in the meantime.

Figure 8-1: Participant-created Magic Machine named VR Simulation

8.2 3D transfer

> *"My idea was that when you are having some sort of a videoconferencing call what you are missing is some sort of touch and feel sensation."* (Finn)

The idea for 3D transfer in Figure 8-2 stemmed from experience that videoconferencing calls only enable seeing things, which makes it hard to imagine them in real life. The 3D transfer box would be bigger than the prototype and there would be two of them. One at the doctor's and one at the rep's side. It would be semi-affordable, comparable to today's 3D printers. The box contains two cameras, four position sensors, and a future material, which looks like a type of string. The string could detect when you insert the hand into it and provide feedback. If a transmitter inserts and holds an object they are talking about into the box, the other person could, if they put hands in the box, experience the feedback as if they were given it in person. The cameras are there to show the object as a hologram. The top part of the box is open so one can see the hologram inside. The point is to have physical feedback on the other side when you are having a conversation. *"So, it is kinda teleporting but not really teleporting."*

The 3D transfer machine tries to augment understanding through actualization of touch. The idea behind it is simple. With more ways of exploring and verifying you can achieve a better understanding of reality. By adding haptic feedback to the channel supporting visuals and audio, you can get closer to the truth. During the workshop, a discussion arose around the ability to use this device to not only touch and feel the object, but also the other person's hand. Such ability allows infliction of physical harm. At the same time, it opens the possibility of a handshake, and thus overcomes one of the major shortcomings of e-detailing identified above.

Figure 8-2: Participant-made Magic Machine named 3D transfer

8.3 Holo Meeting

> *"The only way we can achieve that one can see the body language of another person is to see the entire person, not just the face."* (Emma)

Holo Meeting, shown in Figure 8-3 scans one person and projects their hologram in the other person's environment, and vice versa. It creates an illusion of having the other person sitting next to you. It is

expected to be expensive initially, with the prices dropping over time. Its size is comparable to the size of the prototype.

Holo Meeting straightforwardly indicates that there are no partial solutions to body language visibility. You either see the whole body or not. In addition, it implies that 3D is better than 2D because a hologram is chosen instead of a whole-body video stream. If this choice is considered in more detail, it becomes apparent that 2D body stream can hide or be manipulated to (not) show desired movements. A 3D hologram is thus the logical choice for resolving the problem of invisible body language in e-detailing. Coincidentally, it was also the intuitive choice of the participant targeting this issue.

As can be seen from the photograph, Holo Meeting changes the size of the projected object. This is just a prototype, but in the author's explanation it was not specified whether this is in fact the case. Either way, the idea is intriguing. As a doctor, having an unproportionally big hologram figure of a representative in a room with you does not seem particularly comforting. Projecting it into smaller size made more sense. Imagine speaking to a figurine sized representative. It is practical because you can see their body language. Additionally, it is also cute and non-threatening. Because they both only see the other person in figurine size, they both work in a situation which is comfortable. Having the whole person in 3D also aids concentration. When someone is on the screen you cannot see what is going on outside the frame. They might be painting with their leg for all you know. But seeing the other person in 3D automatically signals that they can also see your whole body. This focuses your attention on detailing and discourages you to multitask and give in to distractions. You are constantly aware that you are being observed.

Figure 8-3: Participant-created Magic Machine named Holo Meeting

8.4 Handchine

> *"You could teleport hand cream or just a small amount of it to each other. (...) You put some hand cream on your hand and maybe you can feel the other person like that."* (Julia)

"Handchine" arose from combining hand cream with a machine. It can be seen in Figure 8-4. For the author of Handchine, touch is important. They combined something that can be applied and felt on hands – a hand cream – with a teleportation device. This machine allows you to instantly send a (small amount of) hand cream to the other person. This allows both to apply it and share the sensation of the cream on the hands along with the smells surrounding it.

Sharing of an instantly usable product creates a common experience which couples physical activity with virtual. From Magic Machine workshops, we know that embodied interactions influence our minds. Consequently, the simultaneous action of applying hand cream on your hands can influence the mental connection between a rep and a doctor. In person, a rep and a doctor shake hands to literally connect for a moment. With Handchine, the cream acts as a link which momentarily connects the two users because they are both feeling the same substance.

Figure 8-4: Participant-made Magic Machine named Handchine

8.5 Weather Weather

> *"[O]ne of the most common small talk in the beginning is the weather. So, I made a machine that is called Weather weather."* (Levi)

Weather Weather is a machine created to help with small talk between a doctor and a rep. It is shown in Figure 8-5. When pharmaceutical representatives visit doctors, they can see what the weather is like on the way to the hospital. The hospital can be miles away from their office. It can be winter at the hospital, but it can be summer where the representative starts their journey. Being aware of the local weather helps representative to start small talk about it. Therefore, the machine which creates local weather is useful for the representative. It is located in the rep's space and mirrors the weather at the doctor's location so the rep can refer to it. The machine can show wetness and dryness, as well as seasons, because the plant which is part of it looks different in different seasons. Weather Weather gets data from the weather station nearest to the doctor's location. It provides more than just visual information one gets from a weather forecast. It provides additional, experiential information. If it is winter, you can feel the cold. If it is raining, you can touch the stones to feel how wet they are. You connect better when you are in the same room but if you do not have this option, you can try to get into the same mood differently. The mood is often affected by the weather, so weather provides one way of synchronization. Since you are aiming for creating the same environment on both ends, only one of the co-speakers needs to have Weather Weather to create the same environment. It makes more sense for the reps to have it, because they are the ones trying to accommodate doctors.

Figure 8-5: Participant-created machine named Weather Weather

8.6 Magic coffee and tea machine

> *"I have made a must have gadget. [...] Magic coffee and tea machine. [...] Why not. We all need to feel comfortable."* (Sara)

Cup and comfort go well together, so to enhance the comfort of an e-detailing session, the Magic coffee and tea machine was suggested. You can order coffee, tea, or other beverages of your choice from this machine. Having a cup of warm beverage makes you more comfortable in your remote workplace. The size of this gadget compares to a coffee cup. It needs to be plugged into your computer or other source of energy via USB cable, but includes all the necessary ingredients.

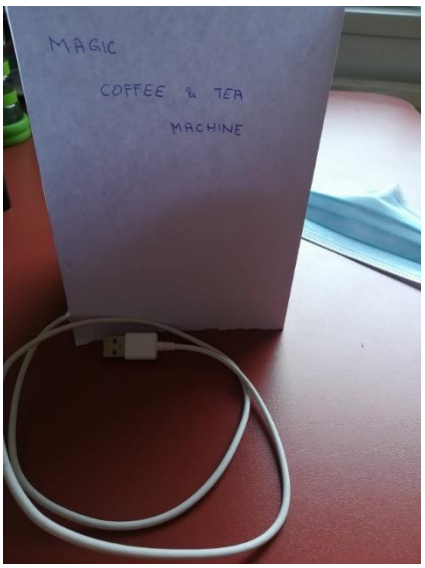


Figure 8-6: Participant-created machine named Magic coffee and tea machine

8.7 Teleport

> *"Not a lot to see because the device is communicating to your mind and read[s] your mind and create[s] what you want."* (Lucas)

Despite the large-sized prototype, Teleport (shown in Figure 8-7) is a small unit held by every household. It is as portable as a mobile phone. The device is simple, with minimal number of parts, because the creator assumes things will be simpler and easier to operate 50 years from now. It has two main functions. Lower part is designated for holographic-like communication. It is more complex than holographic communication because it includes smell and haptics. The upper part is an upgrade of today's 3D printers. It can materialize objects from an invisible substance. According to the Einstein principle, the energy can be transformed into physical matter. This enables the materialization of objects without providing materials for it. The device is always on. It receives energy wirelessly. Information communication is done through a global communication grid, which is available everywhere in 2070. The single most important button is located on the left side of the machine. It controls the transition from digital image to a materialized object. The object cannot materialize without a physical confirmation of the button press. The materialization happens in the user's private space and can therefore invade their security. The button is a safeguard for anyone using this device, prohibiting uncontrolled invasion of security.

Producing objects based on images in our head, the Teleport revolves around simplification of thought and object sharing.

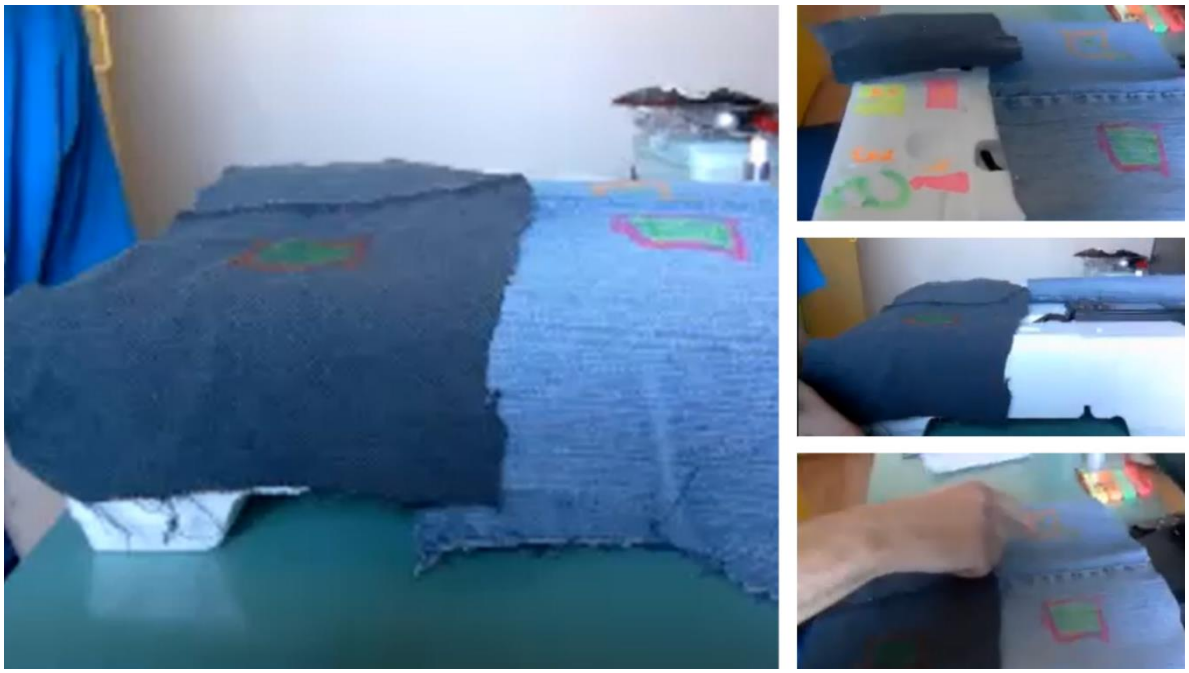


Figure 8-7: Participant-created Magic Machine named Teleport

8.8 Teleporting channel

> *"Mine is simpler and more left to imagination. As a salesperson you go to this capsule, and teleport yourself at the doctor's office." Mila*

Teleporting channel is a bulletproof, safe way of fast travelling. The direction and distance to a desired destination are needed before stepping in a capsule which transports you to your destination. There you appear in an exit capsule which opens and lets you out. The physical workings of travel are left to imagination.

The teleporting channel circumvents (the problems of) e-detailing by reinventing in-person detailing. It suggests a solution for many struggles which surround in-person detailing. It eliminates the need and expense of time-consuming travel, careful scheduling, and related implications. However, the Teleporting channel answers the problem of long-distance travel more accurately than it answers long-distance communication problem, which was at the core of the exploration. It does not mediate communication between a doctor and a rep in separate locations. Instead, it brings them physically to the same location. One of the mentioned reasons for a switch to e-detailing is the COVID-19 pandemic. Those who are forced to start e-detailing due to the COVID-19 pandemic and related social distancing measures are the most eloquent example of why Teleporting channel is not applicable to the circumstance. It not being developed into a design fiction artifact is not an indication of failing. As it was already stressed, the workshops are not used for their outcomes and the participants are not resources, which can be exploited or discarded if useless. It is about widening the design space and any outcome is less significant than the reasons behind it. Despite not being developed into a design fiction artifact, Teleporting channel was a valuable part of the exploration of e-detailing. First, because it emphasized that physical separation is an integral part of e-detailing and should be considered, perhaps even stressed, during utilization of exploration methods. Second, it shows how meaningful preserving in-person interaction features are for this participant. Teleport and Teleporting channel both stress the importance of in-person interactions with objects and people. Teleport focuses on materialization of objects, and Teleporting channel capacitates people to be anywhere anytime to conduct in-person conversations in a manner faster than picking up a phone.

Figure 8-8: Participant-created Magic Machine named Teleporting channel

9 Design fictions

Perspectives revealed through the analysis of participant-made creations inspired the formation of design fiction artifacts. Design fiction was used as a tool [48] for combining findings from literature review, interview, brainstorming, and magic machine workshops into self-explanatory artifacts which convey research outcomes. Design fiction was chosen for its ability to spark discussion about implications of emerging technology [38] through diegetic prototypes [49, 50]. The created artifacts act as harbingers for future e-detailing designs.

The design fiction artifacts were created in the form of exhibit booths for a fictional pharmaceutical trade show of the future which introduces most up-to-date e-detailing equipment to pharmaceutical companies and fellow design agencies. Both pharmaceutical and design professionals, who are typically present at these trade shows, are also the target audience for the created design fiction artifacts. Exhibit booths were chosen as a medium because they support attention-grabbing techniques and effective visual communication. They enable design fiction artifacts to be presented through variously sized banners clearly communicating value proposition and thought-provoking questions to prompt interest and action. They combine the appeal of advertisements which communicate key messages upon first sight with product details which explain individual features upon closer examination. Additionally, exhibit booths naturally place design fiction artifacts into a desired context of use. The pharmaceutical conference of a future is alike the created design fiction artifacts intended to inspire, stimulate discussion, and introduce novel approaches to the emerging trend. Exhibit booths were chosen as a medium because they support attention-grabbing techniques and effective visual communication. They enable design fiction artifacts to be presented through variously sized banners clearly communicating value proposition and thought-provoking questions to prompt interest and action. They combine the appeal of advertisements which communicate key messages upon first sight with product details which explain individual features upon closer examination. Additionally, exhibit booths naturally place design fictions into a desired context of use. The pharmaceutical conference of a future is alike the created designs fictions intended to inspire, stimulate discussion, and introduce novel approaches to the emerging trend.

Three exhibit booths for three different creative healthcare agencies were designed. Each showcases the most recent product or service catering to a distinctive e-detailing aspect. To fulfil requirements of an effective exhibitor booth [51], the designs aimed for: balance between design and function, creative use of display styles, effective and quick storytelling, clear and fast communication, focus on new offerings, focus on key product differentiations, and composition which navigates the viewer to easily find the sought information.

9.1 Small talk transformation with the WeatherWeather

WeatherWeather, presented by the trade show booth in Figure 9-2 and close-ups in Figure 9-1, is about enabling observational small talk. It was imagined as a pebble-sized environment emulator gadget for offices. It would copy physician's weather conditions and recreate them in PSR's office. It would help the rep see what the physician sees and feel what the physicians feels, therefore creating a shared experience which supports observational small talk. The rep could start a discussion about an observed environmental factor without risking that the physician could not relate to the subject; thanks to WeatherWeather, PSR's environmental elements would be the same as physician's environmental elements.

The WeatherWeather booth's design was made using realistic photos to emphasize convincingness of real-like mapping of environmental elements. The plants, cloudy sky, and rainy window were chosen to create a naturalistic atmosphere and bring out positive mood, which is further reinforced by the soothing green and blue colours, which complement the WeatherWeather idea. Green is the colour we relate to nature, and promotes balance and harmony, while blue promotes relaxation and trust. The gadget's irregular shape resembling a pebble further consolidates the nature theme. The surround-booth, which creates a clear separation from the rest of the space, was a deliberate choice to support the feeling of entering a space with a different microclimate.

Figure 9-2: WeatherWeather trade show booth (This image has been designed using resources from Freepik.com and Free-PSD-Templates.com)

Figure 9-1: WeatherWeather trade show booth close-ups (This image has been designed using resources from Freepik.com)

9.2 Comfort boost with The Coffee Magic

The Coffee Magic, presented by the trade show booth in Figure 9-3 and close-ups in Figure 9-4, would be able to provide coffee for physicians and PSRs despite the physical separation. The Coffee Magic would be an e-detailing coffee service which PSRs could subscribe to, provided that they own one of the materialization appliances which are imagined to be owned by the majority at the time. The Coffee Magic would enable instant delivery of any kind and size of coffee to satisfy all tastes. The Coffee Magic subscription would offer voice ordering and instant delivery of coffee to both participants during the e-detailing

session. This way, it would bring comfort, familiarity, and overall positive atmosphere even into remote detailing sessions.

The deep brown is chosen because it is the colour of coffee beans and promotes cosiness. The colour theory claims that it evokes warmth, comfort, and security, all of which are desired in detailing sessions. Retro fonts, illustrations, and a limited selection of shades were chosen for their reminiscence to diners and cafes quintessential for the 50s. In many contemporary depictions they are portrayed as “the ultimate gathering places” [52]. Imitation of their style was used to evoke the link to socializing and casual atmosphere which we associate with coffee house environments.

Figure 9-3: The Coffee Magic trade show booth (This image has been designed using resources from Freepik.com and Free-PSD-Templates.com)

Figure 9-5: The Coffee Magic trade show booth close-ups - Part I (This image has been designed using resources from Freepik.com)

Figure 9-4: The Coffee Magic trade show booth close-ups – part II (This image has been designed using resources from Freepik.com)

9.3 Improved learning with the VR Simulator

VR Simulator, presented by the trade show booth in Figure 9-6 and close-ups in Figure 9-7, is imagined to be a device similar to contemporary VR headsets [53]. VR Simulator would allow physicians and PSRs to meet in a common personalized virtual environment. They could see and hear each other as well as interact with product-related data. VR Simulator would enable physicians to interact with multi-dimensional data structures showing treatments and trends data. It would allow manipulation of data variables to show desired information, treatments' course, and side effects.

Explicit data representations combined with active physician involvement would improve the quality of learning and perception of detailing session.

The large image of a woman using a VR headset was chosen to give an instant association to technical novelty. The industrial impression, created through grid patterns and terminal-style font, further reinforces the technological theme. Purple was used because it occurs least frequently in nature and is therefore typically associated with artificial objects. This makes it suitable for being a signature colour of the VR Simulator display which promotes artificially created digital data representations. The background which shades between purple and blue, complemented with neon pink highlights, was used to give the booth a futuristic feel.

Figure 9-6: VR Simulator trade show booth (This image has been designed using resources from Freepik.com)

Figure 9-7: VR simulator trade show booth close-ups (This image has been designed using resources from Freepik.com)

10 Discussion

In an ever-more digital world, offering services online is becoming increasingly crucial for the growth of any industry. This is even more pronounced during a pandemic, when digital solutions become a necessity to function in the world where physical contact is avoided to limit the spread of the disease. Pharmaceutical detailing is one of the areas where digital solutions are becoming increasingly prevalent, and a switch from in-person to e-detailing is gaining traction. It is therefore a convenient time to offer propositions which point out the importance of future research and implications of e-detailing, and to inspire developers of e-detailing technology to consider implications, control their effects, and develop designs that fit into desired futures. First, considerations related to the design of Online Magic Machine workshops is discussed. Follows a reflection on design fictions and then high-level recommendations to further e-detailing research and design.

10.1 Considerations for Online Magic Machine Workshops

Adapting the Magic Machine workshops framework to fit an online setting, reflections on iterating designs and corresponding implications generated outcomes for e-detailing domain, but also insights and considerations which are relevant for online implementation of Magic Machine workshops. This section discusses these concepts and contemplations pertinent to Magic Machine workshops and online workshops.

10.1.1 *Achieving appropriate selection of workshop materials*

During Magic Machine workshops, participants usually get a carefully curated set of materials for creation. A well-selected selection of materials supports the workshop's attempt of estrangement, which enables "reflection of the intimate and tacit" [46]. Conducting the workshop remotely, and deciding against delivering materials to participants' doorstep, made the ideal assortment of materials difficult to achieve. Providing detailed requirements guarantees optimal selection but is tiresome for participants to follow. Loose requirements risk suboptimal material selection but decrease monetary, mental, and physical strain on participants.

Items that participants were required to bring to the workshop were not raw materials. With the form and function, each item suggests its own design direction by offering affordances and reminders of where and how we treat it in our everyday. Participant who brought a *bullet* added a *bulletproof* functionality to their machine. Participant who brought a *hand cream* created "*The Handchine",* a machine connecting people through applying *hand cream* on their hands. The participant who brought *a cup* designed a machine which enables a doctor and a rep to share a *cup of coffee or tea* to increase comfort of a detailing session. Some existing Magic Machine workshop frameworks [47] suggest a selection of white, natural, and otherwise plain materials. This hopes to avoid indication of ready-made shapes, forms, known uses, or affordances. It is an attempt to defamiliarize them with preconceptions of what materials represent and are used for. It encourages combining these materials in novel and unexpected ways. In both workshops, participants brought ready-made objects. Especially in the second workshop, these objects were such that they could not be repurposed. The instructions guided participants through shaping their material collection without the need to go shopping. Most people do not have specialized raw materials at home, but they likely have junk items which can be deconstructed, and their parts used as materials. Participants were instructed to bring items which they "use daily", "are associated with socializing", or "related to medical or pharmaceutical industry". Workshop materials brought by participants ranged from masks, gloves, newspaper, notebook, old clothes, wires, knife, glitter, coffee, wine, boxes, kinesiology tape, and duct tape to office supplies such as paper, pens, and scissors. Some of them are shown in Figure 10-1. Most participants chose items which they had laying around in the vicinity, items which they encounter in

their daily life, items they know how to use in multiple ways, and items from the suggestion list enclosed in the workshop invitation. This was evident from their statements during the material round, such as *"I also have some paper lying around"* and *"most of it was just hanging on the table, so I just left them there."* One participant chose kinesiology tape, because *"it is actually a really nice material just to have on hand. It is oddly stretchy and comfortable."* It shows that the participant was thinking beyond what the item represents. They considered how that item could accommodate various uses. Similarly, another participant stated that instead of bringing coffee, which was on the suggestion list, they brought coffee filters because *"I thought it would be impractical to bring coffee grounds, so I just have a filter."* This suggests they were trying to find practical materials. They did not know what they will have to create out of the brought materials, so they tried to choose items which they deemed most applicable to various crafting scenarios. But not all items were selected for their applicability to multiple scenarios. Some were selected simply because they were on the list, such as a *"disinfection spray (...) because I had it and it was on the list". Likewise, one participant brought a device which looked like a phone although it was "not exactly the phone but I will use it as a phone."* This suggests that they tried to make sure they had at least a few items from the provided list. Regardless, they also brought some items which were neither on the list nor had an imagined applicability, *"I don't know what to use them for (...) glittery things."* They also brought some items that are traditionally associated with crafting, such as pens and scissors. They referred to them as *"basic stuff"*. When these items were named, they were preceded by *"oh and,"* and *"and of course"* which suggests they were viewed as supplementary crafting tools rather than main materials. What was not anticipated is that participants did not notice or understand that these finished products should allow repurposing. The instructions stated that they should be such that they can be “wasted”. A term used to indicate that although the items are finished products, made for specific use, they can be manipulated, broken down, and repurposed. Ceramic mugs can be broken, face masks can be cut or torn apart, plastic gloves tied into knots and used to attach objects together. Participants bringing personal ceramic mugs, a reusable glass water bottle, and a diary, which were too valuable to be wasted, was more noticeable in the second workshop. These personal items could still be used in the final deliverable, but in a way that left them unharmed and usable when the machine was disassembled after the workshop. Because of the lack of evidence, it can only be speculated whether this was due to the changed instructions or different participants.

Instructing participants to source materials from their environment created a possibility to complement their selection mid workshop. Fetching additional materials during the creation had two contradictory outcomes. It allowed participants to acquire the missing pieces for their creations, but it weakened the artistic obstruction of limited and challenging materials. Participants started creating with materials they brought to the workshop. When their machine started emerging, they left it on the table and went to pick up a specific material they considered necessary to complete their vision. The question remains how the ability to go and get the missing thing influenced the outcome. Its occurrence happened towards the end of the creation process when participant-made invention was already “a thing”. Presumably, this makes it less harmful to the artistic obstruction and overall outcome.

Another observed aspect of material selection was their influence on reinforcing the thematic context. It was a lucky coincidence that readily available materials in times of COVID-19 include items which are associated with medical and pharmaceutical industries, such as masks, disinfectants, and gloves. Under usual circumstances these items are not available in abundance in people's homes. However, during the pandemic, all participants had them lying around and brought them to the workshop. The majority also used them in the prototypes. These pharma and medical materials served as a constant reminder that they were designing for a specific use case scenario. Long-distance communication can easily be applied to other areas, but because the goal of this workshop and this thesis was to explore the detailing domain, it was valuable that the selected materials served as a reminder of the target domain.

Finding appropriate materials for Magic Machine workshops is challenging. A constant struggle between finding forms which accommodate the right balance of obstruction and prospect emerges. Finding a collection of such materials which can be used in a remote setting is even trickier. The "prefect" materials can be hard to get and complicated to deliver to participants. This paper presents one approach to tackling the materials problem. While expressing valuable insights through recycling non-precious personal items did not emphasize defamiliarization process, it was a realizable and promising alternative. Sourcing easily accessible items is a solution which encourages novel and unexpected results through combining diverse sets of items from different thematic contexts. These items offer obscure uses which are overcome by workshop's framework design. It immerses participants into the workshop experience and allow the impossible to become possible.

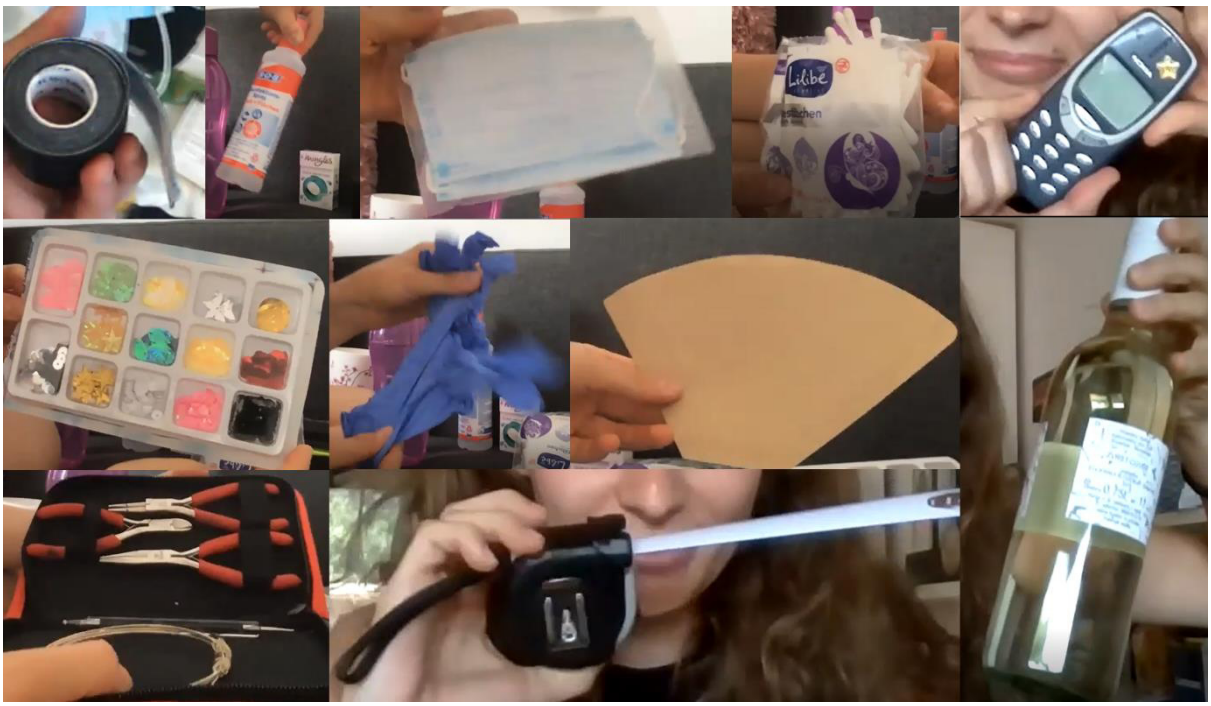


Figure 10-1: Examples of materials participants brought to the workshop including (from the top left) duct tape, disinfection spray, masks, cotton nibs, old mobile phone, glitter, gloves, coffee filter, wine, wire, and wire cutters, measuring tape

10.1.2 *Material round for achieving a good workshopping atmosphere*

The Material round, with accompanying justifications of selecting specific materials, was a good way to connect the group and make them more comfortable speaking in front of each other. The Material round served as a replacement for personal introductions which are common for these settings. During in-person settings people usually introduce themselves by stating their name. However, using a videoconferencing tool such as Zoom, one already has the name spelled out next to their video frame. This eliminates the need for name introductions. More so because one is not able to shake hands, which is a common act accompanied by stating one's name. Naming the next person to present material selection was used as an opportunity to verbalize and enhance relatedness between participants to induce a friendly environment. It is difficult to provide hard evidence of the friendly and comfortable atmosphere which arose, although not solely, from the material round. It is a feeling that can manifest in various ways but was based on nods, smiles, and less-describable facial expressions of the participants which indicated alertness, wonder, amusement, and joy.

10.1.3 *Defining the future participants are designing for*

The first workshop invited participants to imagine the technology of 2070. Imagining a 50-year distant future seemed to be a too complicated of a task. The long timeframe offered too many scenarios and possible variations of the future. A specific year, which is aimed to make the process of imagining easier and focused, instead pressures the participant to think about the world in exactly 50 years. It leaves the participant guessing on what the world is like in 50 years. Not a year less or more. Only when they can imagine the future, can they design for it. Requiring designing for a specific year turned out to be harder on participants than defining the term as broadly as "the future".

Usually, specificity is desired, but this does not apply for the two executed workshops. Broad definition that allows personal interpretation works better because participants are empowered to select the future they want to design for. Allowing them to design for "the future" instead of "the year 2070" is more freeing because trying to imagine a specific year in the future shifts the focus from the goal to what fits under the defined period. This is even more accentuated when the timeframe is set too far into the future because it can be overwhelming to imagine uncertainties for the period until 2070. Mellowing the boundaries of a time period participants are supposed to design for was identified as a better strategy, allowing more creative freedom.

10.1.4 *The effect of naming magic machines*

Each participant was asked to say the name of their magic machine at the beginning of the presentation round. According to the magic machine workshop design, this task is not mentioned before, and often surprises participants [36]. Consequently, one could expect that naming the machines would prompt more discomfort and force participants to be creative on the spot. Contrary, the participants of the workshops carried out in the scope of this thesis did not show hesitation or confusion when naming their machines. All but one participant of the second workshop wrote the names on their creations during or after the process of creation and before the presentation round. Therefore, the requirement for naming the machine did not have a surprising effect. They would have probably mentioned the name of their machine themselves without being asked. Even the participant who did not write it on their machine and was the first person to present, stated the name with confidence and certainty which suggested it was not invented that moment but decided on beforehand.

The specificity of the first workshop's prompt included naming the to-be-created-machine during the prompt task, therefore the element of surprise was not applicable. Coming up with a name of a magic machine during the prompt was an alluring task, which relieved participants of the performance pressure because it was easy and straightforward. It provided direction which they could follow throughout the creation process. Simultaneously, it constrained them from changing their idea in the middle of creation process. One of the participants noted that she "*was struggling a bit to come up with a machine for VR simulation.*" Finally, the participant overcame the struggle and created a respective magic machine fitting the name. None of the participants changed the name during or after the process of creation, even though it was not prohibited. This suggests that the machines were designed to fit the names and did not emerge to be something completely different. It is not clear whether this constraint is (un)desirable from the workshop design perspective. Therefore, it is useful to consider how it fits into a specific workshop goal. Some designs might benefit from allowing participants to change the name throughout the process and others could benefit from sticking with the same name to provide creative obstruction. At the end, both provide valuable yet differing strategies and outcomes.

The surprise effect of saying the name at the beginning of the presentation, which announces the switch from implicit, internal contemplations into explicit justifications of machine's design, was not recognized as transformative in neither session. While the naming did not happen unexpectedly at

the onset of participants' presentation, it was a fitting introduction to an individual presentation and an integral part of the process. The name stresses the focus behind each machine. It is revealing for makers to acknowledge and for listeners to understand. Even when it does not happen unexpectedly at the onset of participant's presentation, its function is crucial.

10.1.5 *Crafting versus assembling*

Magic Machine workshops rely on embodiment and encourage the emergence of ideas through material exploration. Creation, as the longest and most central part of these workshops is used to support this direction. In both online workshops, some participants assembled rather than built or created their machines. Offering verbal or visual directions to inspire participants to employ more daring, experimental and investigative techniques could be employed in future workshops to see the effect of enhanced crafting.

10.1.6 *The importance of asking the right questions during the presentations of magic machines*

At the end of the creation, each participant is invited to state the name of their newly created Magic Machine and what it does. These presentations are carried out without planning and participants rehearse for the first time while presenting. In the spur-of-the-moment, they might forget to mention some aspects. These can be elaborated on during the discussion following the presentation, which invites all participants and the facilitator to engage in a conversation around each machine.

As a facilitator, it is hard to instantly come up with relevant questions. At that moment you think you asked all the relevant questions. After analysing the workshops and the machines, however, additional questions come up. Having analysed eight machines from the two workshops, it is evident that a few additional guidelines for presentations or questions afterwards could disclose the key missing explanations. The questions that were useful for the specific presentations were: How does (the specific feature) impact a detailing session? Which aspect of detailing process does (the specific feature) change? Why might a physician or pharmaceutical representative want to use this in their detailing session?

10.1.7 *The importance of reflective discussion*

Before concluding the second workshop, participants were invited to reflect on their workshop experience. The facilitator posed questions to encourage them to clarify their thoughts and feelings related to the restricted material selection and their influence on the creation process. The questions elicited personal interpretations of their design choices.

Two main approaches were expressed during the discussion of idea formation: finding inspiration in observing a material's affordances, and coupling or making connections between concepts across different domains. Quotes from Emma and Levi exemplify the development of ideas by drawing from the materials. Each contemplated an object which appealed to them until ideas of its use started to emerge. Emma and Levi were inspired by the shape of these objects and contexts they usually appear in.

> *"I saw this toilet paper roll and this kind of a tube reminded me that I can maybe project something from somewhere and that is how I came up with the idea."* (Emma)

> *"The idea started with the stones."* (Levi)

Julia and Sara had a different approach. Their quotes describe a thought trajectory which led them to their ideas. Connections between objects and concepts were used and elaborated on to form ideas.

"For me it was not that hard because handshake, hand, hand crème. It is not that hard to find the perfect combination of [all]." (Julia)

"Cup and comfort go together. That is why the connection was made." (Sara)

Participant testimonials directly reflect how materials influenced their design process. Their reflections offer valuable insights into implicit part of the creation process.

10.1.8 *Influence of participant diversity*

Participants' diversity was reflected in their approach to tasks. Alex, who had the deepest technical knowledge, designed, and explained their Magic Machine with more technical detail than the rest. Detailed understanding of technology and current trends helped the participant imagine technological possibilities in 2070. During the explication of using the created Magic Machine for communication between a rep and a doctor, Alex explained what parts were necessary to make it work. He used his technical expertise to explain it in a way that made it realistic to the extent that surpassed the "magic" of Magic Machines. Although the creation was surprising and novel, Alex explained it with such certainty and detail that indicated he did not perceive it as "imagining the impossible". It is desired that such participants could be driven to dig deeper, into imagining the impossible for them.

10.1.9 *Documentation of online workshops*

A key part of these workshops is the documentation process. It is not solely about easing the analysis for researchers. The process of documentation and its deliverables highlight workshop features which cannot be captured otherwise. Pictures of participants as makers with their temporarily finished creations illustrate that we are part of machines - that they are not a standalone thing but provide value through our interactions.

In an online workshop, photographing participants with their creations is not practical. Some of their creations cannot not be lifted because they are supported by surrounding surfaces. They are hard to show from different angles though video-conferencing interface. Therefore, participants themselves must photograph the machines after self-identified completion. This gives the participants the power to encapsulate the machine's purpose. It emphasizes their role as creators who have complete control over the machine's form and function. It enables them to stage the photograph in a way that best expresses the machine's essential features. The act is not able to capture machines in the context of use. Even so, it provides a way of capturing insights without disrupting the workshop experience. It stresses participants' role as creators instead of observed users.

10.2 Design fictions analysis

This section discusses designs as inputs and outputs useful for e-detailing designers, researchers, and detailers: as reflections of current needs and indications of future desires. It gives the basis and encouragement to act proactively towards the futures people want to live in.

10.2.1 *The Coffee Magic*

With e-detailing gaining its value as a detailing communication medium, the issue of incentivized detailing practices resurfaced again. The paper explored what could be the weighing factor that could convince physicians to participate in e-detailing despite the shortcomings it has compared to in-person detailing. It was derived that an especially valued factor which e-detailing has not yet been able to provide is the warmth of in-person relationships. The Coffee Magic (described in 9.2) prompts

considering non-monetary incentives as an aspect which might be beneficial for all stakeholders and thus a desired e-detailing feature. The Coffee Magic is an example of e-detailing solution which resembles an e-incentive, but its role is more than being an inducement. Indeed, any kind of incentive, even if it is in the form of an experience, can influence physicians and bias their perception of the detailer's personality and their products. Alternatively, they can also help create a supporting environment for learning. They can positively impact the overall atmosphere and physician attitude towards the session. Positive feelings are believed to facilitate learning [54], a core e-detailing goal. The importance of learning facilitation was also discussed in chapter 3.1. A cup of coffee is associated with pleasure, good smell, positive mood, energy, warmth and therefore its role as an atmosphere booster is straightforward. This does not indicate that having a cup of coffee in the physician's hand is the solution for absorbing maximum knowledge from the detail. Nonetheless, it does acknowledge that the environment's impact on learning [54] could result in a better e-detailing solution. E-incentive in the form of coffee or other goods is not necessarily the best and certainly not the only way towards comfort and a better learning environment. Nevertheless, it highlights the effect of in-person detailing element which can easily be neglected during the switch to online environments, decreasing the effectiveness of e-detailing. The Coffee Magic, as a non-monetary e-incentive, points out the wide scope of its effect on a detailing session which goes beyond convincing physicians to participate in e-detailing. With The Coffee Magic, the paper encourages consideration of incentives and implications of eliminating this long-standing detailing custom in the switch to e-detailing. Furthermore, it relativizes the role of motivation and incentives.

10.2.2 *WeatherWeather*

People daily engage in small talk to avoid awkward silences, get to know someone, seem friendlier, or bond with acquaintances. Sensitive topics are avoided to decrease the risk of making co-speaker uncomfortable and thwart the primary goal. This was also noted by Levi, the workshop participant tackling the issue of small talk in e-detailing: *"one of the most common small talk [topics] in the beginning is the weather."* With e-detailing, a rep can have different weather than the physician because they are in different locations, so *"it is important to be aware of the weather if they want to start the small talk about it."* The fictional artifact WeatherWeather would enable small talk about the most discussed topic even for physicians and reps who are kilometres away from each other. WeatherWeather (described in 9.1) tackles the concern that *"online detailing feels too formal"* as well as the difference of contexts, which is one of the reasons that making jokes online is harder (see Table 5-1). Small talk, which connects participants on an informal level, establishes a basis for any kind of transaction that follows (e.g., sales, learning, trust). WeatherWeather opens a design space around a shared experience based on situatedness. It hopes to inspire and direct future e-detailing solutions by showing the wideness and variety of elements influencing e-detailing experience by incorporating more senses than vision. By choosing weather, the traditional go-to topic for small talk, this design also emphasizes the non-personal approach. With today's technology we have an opportunity to find out a person's interests easier than ever before. The trend is for products and services to be increasingly personalized. Detailing has the opportunity to follow this trend but remain conscious of the appropriate boundaries. Physician profile segmentations and monitoring their preferences are the first attempts of doing so and WeatherWeather-like solutions could be the next.

10.2.3 *VR Simulator*

4D films [55] immerse viewers into the experience through physical effects. Scents, chair movements, temperature changes, and water sprays are some of the effects used to stimulate different senses. VR Simulator (described in 9.3) suggests that enhancing virtual reality with similar sensory stimulations would result in better retention of detailing content because intense experiences help our memory encode information more efficiently [56], [57]. VR Simulation would present data in

multi-dimensional tables and graphs where physicians could interact with virtual structures through hand manipulations. The kinaesthetic involvement benefits learning process more than solely hearing the same information [58]. Similarly, active involvement reinforces processing of information. Adult Learning Theory's participation principle discussed in chapter 3.1 clearly explains that active involvement does not only improve the learning, but also influences the overall rating of the experience. Using virtual worlds beyond solely mimicking in-person detailing settings, to extend them to allow for information representations that overcome physical boundaries, could therefore facilitate learning in e-detailing. Moreover, as the ALT suggests, the improved educational value could make physicians become fonder of e-detailing experience. Even if that is not the case, it supports the primary detailing goal and benefits healthcare by equipping physicians to make more informed decisions.

10.3 High-level Recommendations

Three high-level recommendations are discussed next. They derive from assessment of design fictions and methods used to produce them. Recommendations are intended for anyone who wants to add to the exploration of e-detailing, its implications, or aims to design relevant e-detailing solutions.

10.3.1 *Recommendation 1: Keep an open mind - explore unknown unknowns and known* unknowns

In e-detailing, there are things we know that we know (e.g., their susceptibility to technical failures) and things we know that we do not know (e.g., all the ways online interactions influence trust). But the *unknown knowns* and *unknown unknowns* receive much less attention. And there are many *unknown knowns* in e-detailing interactions: all the instinctual habits that automatically bias our online dynamics. There are also many dimensions influencing effectiveness of e-detailing sessions which are not only unknown to us, but which we are unaware of. This paper's exploration helped surface and approach some of these e-detailing *unknown knowns* (e.g., their formal feel and hampered joking environment) and *unknown unknowns* (e.g., that e-incentives such as The Coffee Magic can help with learning). However, the size of both types of this knowledge extends beyond what is presented in this paper, so it recommends further efforts into surfacing the unknowns to help prepare e-detailers for the surprises ahead.

10.3.2 *Recommendation 2: Opt for targeted e-detailing designs*

The best e-detailing technology largely depends on the company objectives, their detailing style, and their customers. Design fiction artifacts (see chapter 9) present three separate designs by three fictional companies, each with their signature style appealing to a specific audience. They indicate three dissimilar ways of addressing e-detailing concerns. There is a variety of aspects in e-detailing which need improving, and each of the resulting designs only addresses a part of them. This indicates that a one-size-fits-all solution is not the only nor the most suitable way forward. Pharmaceutical companies and their strategies differentiate, as was pointed out in Communication dimensions theory (see section 3.2). This means they could benefit from different solutions based on where they are and want to be in the communication dimensions spectrum illustrated in Figure 3-1. Rather than trying to solve all problems at once and risk not satisfying any, the paper considers targeting them separately. It argues that the complexity of detailing process makes the impact of solving one problem with rigor more beneficial than addressing all of them, but inadequately. This was also exemplified by The Coffee Magic, where improving comfort did not only improve attitude, feeling, and relaxedness, but perhaps even more importantly, resulted in improved learning. This reflection suggests that thought-out targeted designs are more impactful than superficial solutions to loosely defined problems.

10.3.3 *Recommendation 3: A shift to e-detailing should not be a one-to-one mapping*

This recommendation tries to warn that simply transferring in-person detailing elements to online environments is not enough to ensure a successful transition. The affordances and possibilities of the two channels are too dissimilar to both yield benefits from the same detailing elements. Consequently, e-detailing should be viewed with a fresh mindset, to discover the largest number of benefits that digital solutions can offer. First, it is important to investigate the implications of unobvious connections between e-detailing elements. The Coffee Magic and VR Simulator improve learning, even though that was not the primary goal of either. Improving the learning experience could be done through targeting information, as VR Simulator does. VR Simulator eases understanding through reinventing data representations and improves retention through bodily involvement. The Coffee Magic targets the concept of comfort, seemingly unrelated to learning, and yet directly influences it because comfort heightens our ability to acquire and retain new knowledge. This comparison exemplifies that there are unexpected ways to achieving the same outcome. Keeping an open mind and utilizing varied methodologies when approaching the problem, can help us reveal these connections. Precisely because of the unobvious connections between e-detailing elements, viewing them as separate units imperils a successful e-detailing solution. In the example of incentives, viewing the aspect too narrowly could result in neglecting the whole concept without realizing that it can significantly improve learning experience. Seemingly unimportant, neglectable elements, such as having a cup of coffee at the beginning, have the power to positively impact e-detailing with minimal changes to the session and might be the most efficient and effective in the long term. In a complex system, such as e-detailing, where time, money, learning, lives, trust, and other crucial values are merged into one interconnected system, even the smallest alteration can have a significant effect.

10.4 Limitations

This work does not identify all e-detailing concerns. Furthermore, it does not tackle all identified concerns with the same rigor, because it would be out of the scope of this paper which was to show the variety of approaches, indicate new design space areas and variability that each of them offers. Such approach was necessary to create the basis for more grounded and applicable e-detailing designs. The changed circumstances amidst the process of conducting this research, arising from the COVID-19 pandemic, resulted in extra strain on the healthcare sector, inability to conduct field observations and have more contact with end-users. As a result, the recommendations and design proposals are not grounded in traditional participatory design (which involves the participation of end users) but an approximation of participatory design. It employed participants (including healthcare, pharmaceutical, design professionals) who provided end-user value through user personifications which were created from literature review and the interview. This different approach to participatory design was possible and beneficial because all participants had experienced various forms of online interactions, and even though those were sometimes from different domains, participants could provide valuable contributions because concepts are often transferrable between domains. Cross-domain integration has proven beneficial especially in complex systems, which e-detailing is.

11 Conclusion

There is a gap in the examination of e-detailing disadvantages which could hinder the development of user-centred, long-lasting, and socially responsible e-detailing technologies. This paper's human-centred exploration indicates under-investigated points of concern (see Table 5-1) in e-detailing. These concerns were deemed critical to consider for the emergence of effective e-detailing solutions. Conceptual designs presented as design fictions portray possible future e-detailing technologies which are free from typical constraints. They are presented as trade show banners which grab attention and invite the audience to talk about portrayed designs of e-detailing exemplars. They indicate and warn of possibilities which both hinder and advance usable e-detailing designs. Their conceptual level allows for portrayal of imaginative designs. This gives them the power to inspire others to work out the details or critically evaluate their future existence. Choosing to work towards or against them fulfils their goal because it encourages contemplation.

This work aimed towards inspiring designers and industry practitioners to be conscious of the lack of body language, non-verbal cues, physical contact, shared context, and the overall discrepancy in online versus in-person interaction dynamics while developing or using e-detailing technology. The presented designs also prime the audience for future e-detailing technology so that they can be more receptive and proactive in its arrival.

The reflections on the online Magic Machine workshops framework highlight the main considerations that influenced the process and its outcomes. The necessity to execute the workshops online introduced new aspects to how this method can be practiced.

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Appendix A: 1st workshop participant recruitment ad

Invitation - pilot study participants

Dear colleague,

I am writing to **invite you to take part in a pilot workshop (remote) which I am conducting as a part of my master thesis project**. The objective of this pilot workshop is to shed light on the format of the workshop and improve research process prior to the main study.

The workshop is a Magic Machines workshop. It is an exploratory workshop which involves craft making to stimulate creativity and uncover challenges and opportunities for future tech-enabled communication between pharmaceutical representatives and doctors.

You do not have to have any prior knowledge about the topic or method to join the workshop. Everything will be explained during the workshop. The workshop will take approximately 1 hour and you will be asked to bring a few items, which you can easily acquire, along to the workshop.

These items will be used to construct a simple prototype, and might not be usable afterwards, so keep that in mind when selecting them and make sure to bring only items which can be wasted. Some ideas for the items which you should bring to the workshop are:

- Items that are a part of most households
  - **Examples**: toilet paper, old clothes, fruit, food, newspapers and magazines, sponges, masks, gloves, duck tape, paper or plastic cups and plates, straws, flowers

Invitation - pilot study participants 1

- Items that are associated with bonding and connection
  - **Examples**: mugs, glasses, food, coffee, teabags, loose tea, keys, strings, old books&magazines
- Items that are connected to medical and pharmaceutical professions
  - **Examples**: pens, papers, pills, disinfectants, gloves, masks
- Items that are associated with distancing
  - **Examples**: books, mobile phone, headphones, blanket
- Items that are interesting to touch
  - **Examples**: soft cotton, rocks, rugged carton, sand, salt, dough
- Any other items (which have not been mentioned above) you can find in and around your home and can be wasted

> The workshop will be carried out remotely (through Zoom) on Monday 13 July at 17:00. If possible, bring at least 5 different groups of items to the workshop, along with some scissors for easier manipulation of materials. **Please let me know if you are willing to participate in this workshop, so I can send you a Zoom invite.**

Many thanks for your consideration and I look forward to working with you.

Best regards,

Iza Grasselli
Human-Computer Interaction Design master student

Appendix B: 2nd workshop participant recruitment ad

Invitation - study participants

I would like to **invite you to take part in a remote Magic Machines Workshop** which I am conducting as a part of my master thesis project.

It is a fun, exploratory workshop which involves craft making to stimulate creativity and uncover challenges and opportunities of future tech-enabled communication between pharmaceutical representatives and doctors.

You can join the workshop if you are (or were):

- a doctor OR
- a pharmaceutical representative OR
- know what is pharmaceutical detailing.

The workshop will last between 1h and 1h 30mins. The procedure of the workshop will be explained during the workshop. No prior knowledge or skill is required but you are asked to bring a few things along to the workshop.

Things you should bring to the workshop are as follows:

- something that is interesting to touch (e.g. cotton, clay, wool, ...),
- something that is associated with medical and pharmaceutical industry (e.g. gloves, pills, containers, ...), and
- something that you use daily (e.g. plastic cups, coffee filters, toilet paper, ...)

You should bring more things of the same type. For example, if you decide to bring cotton, gloves and toilet paper, you can bring as much cotton, gloves and rolls of toilet paper as you like to make sure you have enough materials for the creation part of the workshop. Note that the provided examples are just there to give you a better understanding of what it is you can bring. And while you can bring the named examples, I encourage you to look around your home and find alternatives which fit the criteria for things you should bring to the workshop listed above.

> The workshop will be carried out via Zoom. You can choose to attend on **Friday 31st July at 17h** or **Monday 3rd August at 17h** (Central European Summer Time / UTC +2).
> Do not forget to bring the things specified above, along with some utensils (scissors, pens, glue, tape) for easier crafting.
> **Please let me know if you are willing to participate in this workshop by filling in the consent form. Afterwards, you will receive a Zoom invitation which you can use to join the workshop. Each participant will receive a 10$ worth Amazon voucher at the end of the workshop.**

Many thanks for your consideration and I look forward to collaborating with you.

Invitation - study participants 1

Best regards,

Iza Grasselli
Human-Computer Interaction Design master student

The project is conducted in collaboration with KTH Royal Institute of Technology and University of Twente