The Hub: Facilitating Walking Meetings through a Network of Interactive Devices
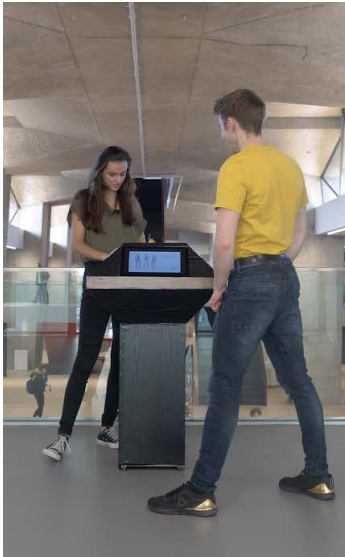

Figure 1: The Hub placed in the office environment

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Abstract

Walking meetings are a promising means to improve healthy behavior at work. By providing a physically active way of working, walking meetings can reduce our sitting time. Several obstacles that limit the social acceptance and wider adoption of walking meeting practice have been highlighted in previous research. Amongst these, the difficulty to take notes or present files is a recurring concern for office workers. To address these barriers, we designed the Hub, a network of stand-up meeting stations that accommodate different work-related tasks during walking meetings. We report on two pilot user tests investigating users' experiences and ideas for improvement, and present future research steps. We discuss the usefulness and relevance of the Hub concept to overcome the obstacles associated with walking meetings.

Author Keywords

Walking meetings; Office environment; Sedentary behavior; Collaborative Work

CSS Concepts

• Human-centered computing ~Human computer interaction (HCI) ~HCI design and evaluation methods

Figure 2**:** Dutch ANWB signpost

Figure 3: Fabrication of the Hub

Introduction

Our increasingly sedentary lives are a major health risk [3]. Physical inactivity is the fourth leading cause of death worldwide and is associated with the development of a wide variety of diseases such as type II diabetes, cardiovascular diseases, colon- and breast cancer [10,11,14,15]. Office work is particularly prone to physically inactive behaviour, with office workers spending the vast majority of their working hours sitting [6]. In the past decade, a myriad of digital tools has been developed to reduce sedentary time at work. A common strategy to reduce sitting time is to encourage people to take more breaks and interrupt their work [9]. Very few tools, however, facilitate physically active ways of working. In the field of Human Computer Interaction (HCI), we can find a few notable exceptions like the work of Tobiasson et al. [16] on physical movement probes and dynamic workstations by Probst et al. [13] and Choi et al. [5].

Walking to increase occupational health is studied from a range of perspectives, with a dearth of research so far on how technology can mediate the practice of walking meetings [1,2,8,9]. Ahtinen et al. [1,2] investigated the use of mobile technology to mediate walking meetings, whereas Damen et al. [8,9] studied a service design for walking meetings. According to Damen et al., walking meetings offer a promising means to integrate physical activity into daily office life. Not only can it reduce sedentary time at work, walking is also beneficial for physical health [4], mental health [4] and work performance [7,12]. Although walking meetings offer a promising solution to reduce and prevent the negative effects of prolonged sitting, there are several barriers that prevent office workers from engaging in this practice. Damen et al. [9] have

identified nine categories of barriers, amongst which the most common are unpredictable weather, cultural acceptance of this form of meeting and its integration into daily routines and the lack of possibilities to take notes or give a presentation [9]. Ahtinen et al. [2] presented 10 implications for design grouped into the following categories: designing for acceptability, non-interrupting guidance, and discreet persuasion and stimulation. Relevant examples include: (i) enabling the walking meeting to "become an accepted way of work" for instance by designing an 'official' tool to support acceptance; (ii) utilizing digital UI features and physical objects to motivate and support and (iii) guide but do not interrupt. Following these implications, we focus on the design and development of a network of interactive devices that accommodates walking meetings.

Design of The Hub

Design Process

The design process of the Hub is based on a research-through-design approach [18]. First, we gained insights into the practice of walking meetings by adopting a first-person perspective. Exploring different forms of meetings (indoor vs. outdoor, 2 vs. 4 team members, ideation vs. informal discussion), we experienced the thresholds of walking meeting, specific to indoor walks. We also explored how digital tools such as phones and tablets and non-digital tools such as notebooks, could facilitate note taking and presenting. We then generated ideas, around four design requirements, based on previous empirical studies identifying several barriers related to the practice of walking meetings in the office environment [2,9]. Our artefact should: (i) facilitate the opportunity to present and/or take notes, (ii) not interrupt the flow of the meeting, (iii) accommodate different types of meetings and facilitate

Figure 4: Pilot testing of the Hub in an indoor office setting

open-ended use, (iv) accommodate indoor as well as outdoor walking meetings.

Design Concept
The Hub (Figure 1) is a stand-up meeting station that accommodates different work-related tasks during walking meetings. Several Hubs are placed in series and form a network of landmarks that guide the meetings. A hub is equipped with one to four integrated touchscreen-controlled laptops with RFID scanners that connect to the employee card to a custom-made web environment. The shape of the Hub is inspired by Dutch ANWB signposts, which are commonly used to point direction in the Netherlands (Figure 2). The basis of the Hub is made of an MDF structure, wrapped with adhesive PVC foil with wood effect. The top is designed as a slanted cubic that can integrate four touchscreens. The height (112cm) was defined to maintain the social and informal aspect of a walking meeting while also being a convenient surface to take manual notes or place items like a coffee cup (Figure 3).

The Hub is controlled by an Arduino and Processing sketch. The Arduino is connected to an RFID, reading the tag id of the user's card. The card's value is sent via USB to a Processing sketch which runs on the computer(s) in the Hub. This will access a customised web environment, where users can view the meeting's agenda and action points, show presentation material, take notes, or browse the web. The screens on the Hub can be used either independently or in a duplicate mode. While features such as speech to text, audio recording or an integrated receipt printer for meeting notes were part of the ideation process, the first version of the Hub act as a minimum viable product

which will allow us to research and optimise the experience of walking meetings with these devices.

Pilot Study
Two pilot tests (Figure 4) were conducted to improve the concept of the Hub, focussing on an indoor scenario. In the first test, a brief explanation of the concept was given to seven target users, who were asked about their first impression about the concept, its perceived usefulness and the scenarios of use they could think of. The second test included a 30-minutes exploratory user test using the Hub with 10 participants divided in groups of 2 to 4, followed by a 20-minutes interview. For this test, participants were asked to conduct a meeting that was already scheduled in their agenda. After a short explanation of the study set-up, the participants conducted their scheduled meeting during an indoor walking meeting while making use of the Hub. The Hub was relocated twice, so that participants had three moments to interact with the device. The results of the pilot tests revealed that the placement of the Hub was important, since they did not want to disturb other people during their meeting. Also, privacy was considered an issue, especially when discussing sensitive information. To further ensure privacy, the slides on the Hub should disappear immediately after leaving. The multiplicity of Hubs served as a timing mechanism for the participants, stimulating wrapping up a subject and continuing to the next point on the agenda. On the aesthetical side, participants also mentioned that the Hub should match the look and feel of the built environment it is part of. Finally, it was deemed important that the Hubs would be inclusive for all types of users.

Step 1: You are inviting a colleague to a walking meeting by adding it as a location to your meeting request. The location of the meeting will show the closest starting point.
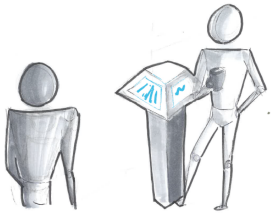
Step 2: You meet-up with your colleague at the starting point of the walking meeting, equipped with a 'Hub'. The Hub is an interactive device with screens to support work related tasks during a walking meeting.
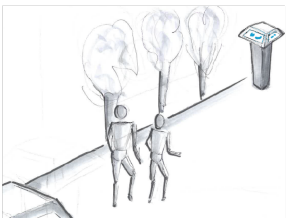
Step 3: You go for a walking meeting by following the network of Hubs. The route is adjusted to your set meeting time.

Figure 5: Scenario of the use of the Hub for an upcoming evaluation study

Future Work

Future work includes several user studies to explore the most relevant use scenarios for the Hub both indoor and outdoor: a) an online survey based on scenarios of use and b) a series of ideation "walkshops" (i.e. walking workshops) and user tests. First, we created four storyboards representing office workers going for a walking meeting using the Hub (Figure 5). Following the method used by [17] the scenarios are incomplete: it is up to our participants to imagine how they will use the hubs depending on the number of people involved in the meeting. This study will inform research on walking meetings by providing insights on the influence of the number of participants on the desirable uses of the Hub. We will also refine the web platform and features on the Hub, exploring creative proposals beyond the pragmatic functionalities offered. Second, we will conduct walkshops and user tests with groups of participants to study the experience of the Hubs in-situ. Our focus will be on the flow of the meeting, the supportive role of the Hubs and the optimization of the location and number of Hubs in a given workplace environment. Technical solutions might later be sought to make users aware of the position and availability of Hubs during their walks, or even to suggest different types of routes depending on the meeting type. In addition, we will also research the ergonomics of the Hub further, with a focus on accessibility.

Discussion and Conclusion

The Hub is developed as a network of interactive devices to accommodate walking meeting practices and overcome common barriers identified in empirical studies. Throughout the design process and pilot studies, we reflected upon our design choices.

As a presenting artefact, the Hub firstly serves the very pragmatic goal of supporting office workers in presenting and taking notes during their meetings. This was repetitively mentioned as an obstacle in previous research [2,9] and the Hub surely seems to offer a credible response to that concern. As an ecosystem of devices clearly visible in the work environment, the Hub constitutes an 'official' sign that walking meetings is an accepted way of work in a specific company [2,9]. More than the Workwalk concept [8] presented as a simple dotted line on a campus, the Hub can support the communication of a modern organizational cultural and the social acceptance of the practice. Yet despite these benefits in mind, both on the practical and the social side, one could argue that the downside of the Hub is to remove a part of the freedom that characterizes walking meetings. The « freedom from computer » is indeed highlighted by Ahtinen et al. [2] who argue that « without the usual office tools (desk and computer) one gets more space for thinking and concentration to the actual topic. One gets freedom from all additional stimuli and multitasking with the computer. ». Based on our practice and previous studies conducted, we tend to agree with this line of argumentation. We attempted to reduce the distraction of digital tools by limiting the number of features on the Hub as well as presenting the Hub as a hop-on / hop-off device for brief interactions only. Collected evidence also shows [2,9] that social acceptance and adoption of walking meetings as a routine work habit is a challenging endeavor. Incremental changes in office workers' routines might prove more effective and reassuring than disruptions in the ways of working. With the Hub, we thus hope to bridge the gap between mainstream corporate culture and innovative work practices.

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