Do *Knob* Disturb: A Tangible Controller for a Distraction-free Work Environment

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ABSTRACT

Disruptive colleagues, procrastinative web-browsing or low-priority e-mail are just a few types of distractions in the modern workplace. They reduce efficiency and increase perceived workload. Previous work shows that digital and social distractions can be reduced by tangible artifacts that signal phases of high concentration to colleagues or block websites. In this paper, we present the *knob* a holistic approach to distraction blocking. It simultaneously serves as a controller for blocking websites, managing smartphones' state, and signaling availability to colleagues. We evaluated the system through an in-situ deployment to understand how the artifact can reduce distractions. We show that the *knob* has the potential to improve users' self-discipline and provide suggestions for future distraction blocking solutions.

CCS CONCEPTS

• **Human-centered computing** → **Natural language interfaces**; **Ubiquitous and mobile computing**; **Graphical user interfaces**.

KEYWORDS

interuptability, distraction, workflow, tangible interaction

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1 INTRODUCTION & BACKGROUND

Staying focused at work can be difficult and exhausting as modern-day workplaces provide an abundance of distractions. Some distractions, such as *Internet procrastination* [6, 13], are chosen deliberately. Thatcher et al. describe *Internet procrastination* as " [...] using the Internet (at work) for non-work (personal interest) purposes in order to avoid doing work-tasks because these are perceived as boring, unpleasant, or too challenging" [13]. Work-related, lower priority digital tasks can also distract from more important tasks. For instance, it is common for information workers to interrupt their current task and check their e-mail inbox 74 times a day on average [10]. One way to cope with deliberate digital distractions is blocking software to regulate the access to known disruptive sites, apps and services. Evaluating a software solution which blocks websites not related to participants' work tasks, Mark et al. showed that "participants assessed their productivity significantly higher and could focus significantly longer" [11] than without the solution.

Figure 1: The *knob* is a tangible artifact for distraction blocking. A traffic light-style illumination indicates availability. Rotating the canopy of the *knob* increases or decreases distraction filtering on the user's computer and smartphone.

Other types of digital distractions are not being experienced deliberately. For instance, information workers instantly respond to 70 percent of the push notifications announcing new messages [10], frequently interrupting their current work for low priority tasks [5]. But not only work-related emails distract from tasks. Private instant messaging is another common source for distraction [1, 3]. One way to cope with such distractions is facilitating instant messenger's state management. Hausen et al. developed the tangible controller *StaTube* which sets the availability status in Skype [8]. Turning the tubular artifact set the Skype status, while traffic-light style LEDs visualized the status of the users' regular contacts. Through an in-situ deployment with six participants, Hausen et al. showed that users were motivated to update their status more frequently using the artifact than without it. The authors observed a fading of novelty as the artifact was used more frequently in the first week of their experiment than in the second one.

In addition to digital systems, colleagues can also be distracting, for instance when having a lower priority request or seeking informal interaction [4, 7]. Kraut and Attewell indicate that especially work-based social interruptions are critical and unfair. The "initiator has a reason in mind for starting the communication and schedules it at a time that is convenient to him or herself. The

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recipient, on the other hand, may be thought of as a more or less willing victim of the initiator's designs." [9].

A way to cope with social interruption is communicating one's availability. Common ways to signal unavailability include closed doors and headphones [20]. Since these mechanisms are not suitable for all workplaces, such as open plan offices, Züger et al. proposed *FlowLight*, a physical artifact to regulate social distractions by colleagues. *FlowLight* estimates a workers' level of concentration based on the interaction with their computer and visualizes it through traffic light-style illumination. Züger et al. showed that the artifact can reduce distractions through co-workers by 46 percent [20]. Modern work environments are not only affected by a single type of distraction. Although tackling one type of distraction can already increase productivity, it only solves one aspect of the general problem. Furthermore, different working situations favor different distractions. Thus, none of the previously proposed systems can serve as a general solution. We propose a holistic approach for blocking interruptions at the workplace and combine approaches by Züger et al. [20], Hausen et al. [8], and Mark et al. [11].

To provide a holistic approach for coping with distraction, we developed the *knob*, a tangible artifact that serves as a physical controller for multiple distraction blocking mechanisms, tackling social and digital distractions at once. In line with previous work [8, 11, 20], we evaluated the system through an in-situ deployment. Using interaction logs, semi-structured interviews, and online questionnaires, we observed four participants for three weeks. Amongst others, we observed that the active choice of a blocking state combined with site blocking can lead to higher self-discipline. To foster future work on distraction blocking, we provide the hardware design and source code to the research and the open-source community[1].

2 THE *KNOB*

The *knob* is a tangible device, which simultaneously serves as a controller for digital distraction blocking and a signifier for the social environment. It is inspired by *FlowLight's* visualization of the user's degree of focus through a traffic light illumination [20]. Similar to *StaTube* [8] users change the level of availability by rotation of the device, as rotation is expected to be intuitive.

2.1 Hardware Design

In line with Züger et al. [20] and Bjelica et al. [3], the *knob* visualizes the interruptability with a traffic light-style color code. Green indicates low concentration and high interruptability, yellow indicates medium focus and allows important interruptions, red light indicates high concentration and no tolerance for interruptions. The visualization was implemented through LEDs mounted inside a translucent 3D-printed housing. The device has been designed to be large enough to noticeably communicate the user's status to colleagues. We use *WS2812B*-controlled RGB LED stripes (5050-type LEDs), as they are easily deploy- and programmable and can also be powered with a 5V USB output. To make the interaction with the system simple, unobtrusive, efficient and most importantly not distracting from actual work, turning the artifact, as proposed by Hausen et al. [8], sets its status, similar to the interaction with a volume knob. While turning, the color fades through the states red, yellow and green to give users feedback on the system state. We use the *KY-040* rotary encoder module for recording rotation movements because of its widespread use and easy accessibility.

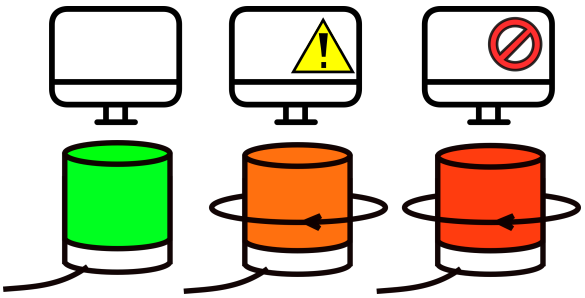

Figure 2: The *knob* offers and visualizes three states. The state is set by rotating the canopy. The green mode does not block websites and sets the phone volume to 10%. The yellow mode blocks all websites in a user-defined blacklist and sets the phone to vibration mode. The red mode blocks website on the user's black- and gray-list and mutes the phone.[2]

2.2 Distraction Blocking

Since the purpose of the *knob* is not only to communicate the users' interruptability to their environment but also to reduce digital distractions, we implemented two digital blocking mechanisms. To avoid procrastination on distracting websites, such as social networks or shopping services, we implemented a site-blocking plugin for *Google Chrome*. It observes requests to websites listed in personalized gray- and blacklists. If a site from the lists is requested, the plugin replaces the site with a motivational message. When the *knob* is set to yellow only blacklisted sites are blocked and if it is set to red, black- and graylisted sites are blocked. As smartphones are a major source of distraction [1], we regulate the ring tone of the phone based on the *knob's* status using the IFTTT framework[3]. A phone is connected to the *knob* by installing the IFTTT Client and logging into a pre-configured account. The ring tone is set to 10% in the green state. The phone is set to vibration mode when the state is yellow. The phone is completely muted in the red state.

3 METHOD

We evaluated the *knob* to explore how it is used and how it supports users when trying to keep focused during work. We followed the study designs of Hausen et al. through a small scale in-situ deployment [8]. Similar to Hausen et al. [8], the study took three weeks per participant. The first week served as a baseline by observing participants' natural behavior. Afterward, we deployed the *knob* for two weeks to learn how the system is used and to capture habituation effects.

3.1 Design and Measures

We conducted two interviews with each participant. In the initial structured interviews, we asked about demographics, workflow, and

[1] https://github.com/FelixRDL/Do-Knob-Disturb-A-tangible-Controller-for-a-Distraction-free-Work-Environment

[2] Computer SVG: Created by user Good Ware on https://flaticon.com

[3] "If this than that", https://ifttt.com/

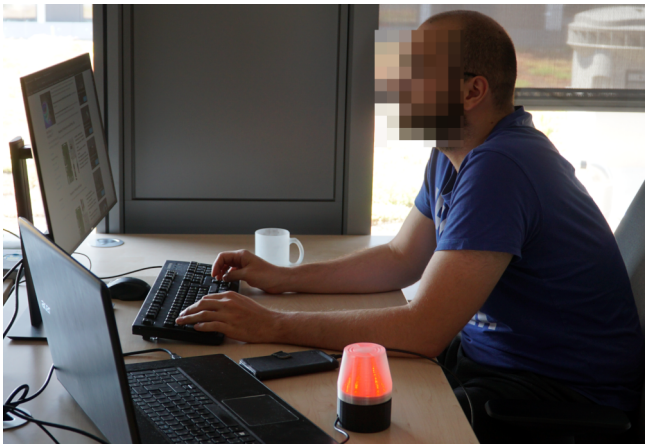

Figure 3: We installed the device at the workplace of four participants. Participants were asked to place and use the device as desired (scene re-enacted).

typical interruptions. We also collected websites which frequently distract the participants from work and asked participants to create a *graylist* and a *blacklist* which were later used to personalize our *Google Chrome* plugin. After the three weeks, we conducted a semi-structured interview. We asked about acceptance, design and usability, effects on distraction, fading of novelty, and suggestions for improvement.

After each week, we used an online questionnaire to get insights about the previous week. We asked about the estimated workload as well as the intensity and quality of interruptions. Participants rated each aspect using a 5-point Likert-item and provided further insights using a text field for further comments. For the second and third week, we also asked about the usage and perceived effectiveness of the artifact. To elicit the frequency of social interruptions through colleagues or fellow students, we asked participants to fill an online questionnaire after each interruption. The questionnaire asked about the sources of interruption, the prior degree of concentration and a free text field to describe the situation. All questions were optional as we aimed for higher-quantity reporting than detailed descriptions of the interruption.

We recorded browser usage to quantify the effect of the artifact on browsing behavior and the general effectiveness of the site-blocker. We recorded each time participants accessed sites in their gray- and blacklist. To preserve participants' privacy, we obfuscated requests on sites that have not been added to the participant's black- or graylist. To identify active phases of PC usage, we recorded whenever a mouse button or a key on the keyboard was pressed. We grouped the interaction events to "active phases" in which there are no usage pauses (times without mouse or key pressed events) longer than 15 minutes. To gain insights on the usage of the prototype, we recorded all state changes of the *knob*.

3.2 Procedure and Participants

During the first meeting, we explained the purpose of the study and asked participants to provide informed consent. We installed our plugin on the computers participants generally use for work. Throughout the study, participants were asked to report social distractions through the web form. We also recorded browser usage and computer interaction. After one week, we deployed the system and observed the usage of the device over the following two weeks. After the first week, we also recorded the interaction with the artifact and when sites were blocked. After each week, a short online questionnaire was sent to the participants. After the third week, we conducted the semi-structured interviews. At the end of the interview, each participant was handed a personalized, inexpensive gratification and all components of the study setup were removed from the participants' workplace and computer.

Two female and two male participants took part in the study. They were between 21 and 30 years old (M=26). Two of them were full-time students and the other two were full-time university employees. The first participant (P1) was an employee and stated to work 10-11 hours per day. He leaves his office door open most of the time. The second participant (P2) was a student with a part-time job at the university. She estimated to study 3 hours per day and additionally work 2-3 hours per day for a part-time job. She often changes between working areas at home and university. The third participant (P3) was employed and worked 46-48 hours per week. His office door is closed if possible. The fourth participant (P4) was also a student with a part-time job at the university. She estimated the average time for her studies to be 5-6 hours per day and additionally 1,5 hours per day for the part-time job. As P2, she frequently changes between different working environments.

4 RESULTS

After the study, we collected the data from participants' computers and transcribed the interviews. We extracted 187 statements (P1: 48, P2: 38, P3: 60, P4: 35). We grouped them by question and recurring patterns. We extracted 122 statements (P1: 35, P2: 23, P3: 38, P4: 26) from the weekly questionnaires and grouped them by topic.

4.1 General Usage and Acceptance

All participants stated that the artifact itself did not distract them from work. P1, P2, and P3 described the artifact's usage as comprehensible and intuitive. Furthermore, P2 mentioned the traffic light-style color coding to be "self-explanatory". P2, P3, and P4 criticized that the artifact is too big to be conveniently transported. P2 additionally mentioned that the artifact seems too fragile for regular transportation. Therefore, the two students without a fixed workspace, left the artifact at home multiple times.

In the weekly questionnaire, P1, P2, and P3 mentioned that they disconnected the artifact when they transported their PCs during the second and third week. P2 and P4 disconnected the *knob* from their PC during leisure time in week two and three. P3 had to disconnect and reconnect the *knob* during week two and three when a malfunction occurred. P2 disconnected the artifact after she learned that the current artifact status is still recorded after

	green	yellow	red
P1	78%	19%	3%
P2	12%	55%	34%
P3	8%	19%	73%
P4	46%	44%	1%

Table 1: Time spent in the three states.

	Week 1	Week 2	Week 3
P1	0	0	1
P2	1	1	0
P3	8	3	0
P4	0	2	1

Table 2: The number of submitted interruption reports that describe social interruptions.

	Week 1	Week 2	Week 3
P1	4	3	3
P2	4	2	4
P3	5	4	3
P4	2	3	3

Table 3: Answers to "How often did [...][other] people distract you from working?" (1=not at all, 5=daily)

	Week 1	Week 2	Week 3
P1	4	4	3
P2	4	3	3
P3	3	3	5
P4	2	5	4

Table 4: Answers to "How often did you work/learn concentrated this week?" (1=not at all, 5=daily)

disconnecting the *knob* during week three. In the final interview, all participants agreed that they would like to use the *knob* in the future. P4 additionally mentioned that the knob would be helpful when trying to focus on university projects. P1 would continue using the artifact if the phone volume regulation would be improved.

4.2 Status Changes and Blocking States

The number of interactions with the artifact receded during the second and third week for all participants except P1 (see Figure 4). For P4, no status change events have been detected during week three, caused by a malfunction of the logging module. In the final interviews, P2 explains the recess in status changes with a more aware style of use. Also, P3 mentioned having used the artifact more frequently at the beginning of week two, since he was trying out the device at this time.

The device usage differed between participants (see Table 1). From the interviews, we learned that it depends on personal preferences and work environment. P3, who initially described himself to be interrupted regularly by colleagues and students, set his artifact mostly to the *red* state. In the final interview, he mentioned that he did not understand the reason for a yellow state as he regards availability as "binary". P1 mostly kept the state to *green* and eventually *yellow*. In the final interview, he mentioned that he disliked the red state as he wanted people to feel welcome in his office. The results also deviated between the two students. P2, who was working in a shared space or in her shared flat spent noticeable amounts of her time in the *red* and the *yellow* state. P4 split her usage time between the *green* and the *yellow* state, while indicating in the final interview, that she did not see the reason of a yellow mode. This discrepancy may be caused by the logging malfunction during week three, not capturing her behavior during week three.

4.3 Browser Usage

The number of blocked sites receded from week two to week three (see Figure 5). One page was blocked for P1 and two were blocked for P2. For P3 and P4 no pages were blocked during week three. While the number of blocked sites decreased from week two to week three, the number of listed sites that have been accessed also receded (see Table 6).

The subjective perception of interruptions through distracting websites collected in the weekly questionnaires is in line with the log files for P1 and P2. Table 5 shows a slight decrease from week one to week two (P1) and week two to week three (P2). The perceived distraction slightly increases for P3 and P4. P4 mentioned in the final interview that the *knob* helped her gain awareness on how often she interrupts her work for distracting sites. This increased awareness might be responsible for higher scores in the questionnaire. Yet, all participants indicated the *knob* as a blocking strategy against digital distractions during week two and three.

All participants indicated to have attempted evading the page blocker functionality. In the final interviews, P2, P3, and P4 indicated evading site blocking by surfing on their smartphone (P2, P4), switching browsers (P3) or using the private mode of the browser (P2). P4 mentioned that she frequently switched back to green mode if she wanted to access blocked pages. P1, P2, and P3 recalled events where distraction blocking in red mode was too aggressive and blocked sites that were needed for their work.

4.4 Phone Usage

The final interviews showed that controlling the phone's volume was not seen as a useful or effective feature. P2, P3, and P4 did not notice any particular effect of the artifact on their phone usage. P1 mentioned that he unlocked his phone more frequently than before to manually set the volume to mute when in the green state. Setting

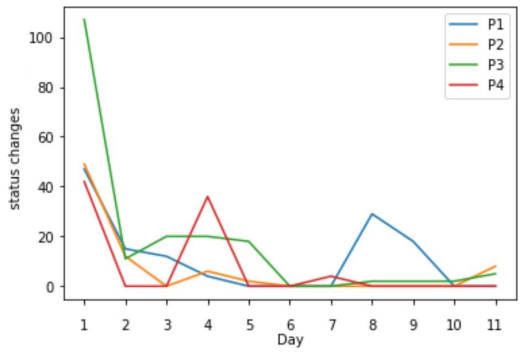

Figure 4: Number of status changes on the artifact

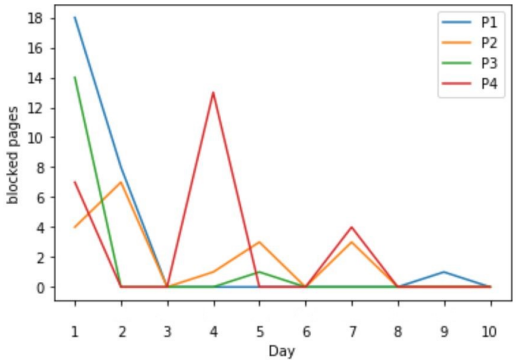

Figure 5: Number of blocked sites per week

the ring volume higher than *vibrate* has been unusual behavior for him, as well as for P2 and P3. P1 mentioned that browsing on the phone was more distracting than browsing on the PC. He also mentioned mobile browsing to be more distracting than reacting to the phone ringing or vibrating. P1, P2, and P4 agreed that blocking certain apps could reduce distractions by the phone. P1 mentioned that locking the phone while in the red or yellow state would be a useful functionality. P2 mentioned that the status LED of their phone should also be switched off when in yellow or red mode, or their phone should be set to flight mode.

4.5 Social Distractions

Table 2 summarizes the interruption self reports. There is a noticeable tendency for P3 that the artifact could decrease social interruptions. Social interruptions also decreased slightly for P2 and P4 from week two to week three. The self-assessment of social distractions (see Table 3) revealed a slight decrease of social interruptions for P1 and P3 in week two, the first week of deployment. The value remains constant for week two for P1 and decreases for P3. This indicates that the signal effect of the *knob* can be established over time and is increasingly respected by the surrounding. The effect on the two students P2 and P4 was limited. While temporarily decreasing for P2 in week two, the frequency increased for P4 in week two and three. All participant named colleagues as socially disruptive. In week two, P1 mentioned that the artifact "ironically" had the effect of causing social disruptions as interested passersby would come in and ask about the artifact. He also emphasized this observation in week three. P3 mentioned colleagues deliberately ignoring the status after having asked about its meaning. P2 described some disruptions as unavoidable in week one and three because of their work in a shared workspace.

In the final interview, P3 reported that the artifact's color was generally accepted by roughly half of his colleagues. He recalled multiple situations, where passersby or colleagues desisted from interrupting. P1, P2, and P4, however, stated that the artifact's state was ignored multiple times. Still, P1 and P3 were not sure how often the artifact prevented interruptions as this was hard to notice for them. Furthermore, P3 mentioned that placing the artifact on a more prominent position of their desk led to higher acceptance from their colleagues ("I have re-positioned it after three, four days, to a place where I can reach it, but people coming in through the door still notice it ... people did register this more easily", P3) The two office workers, P1 and P3, reported that the artifact has had a counterproductive influence in week two. Passersby interrupted their work to ask questions about the artifact ("'what is green? what is red?'", P1; "i have explained it to two or three colleagues, who have asked about it", P3). P1 also mentioned, that people "got used to it" after one week of deployment and asked less about its.

	Week 1	Week 2	Week 3
P1	3	2	2
P2	4	4	3
P3	1	2	2
P4	1	2	2

Table 5: Answers to "How often did those [distracting] websites interrupt you while working?" (1=not at all, 5=daily)

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P2 and P3 described in the final interviews that they also encountered situations of social co-distraction. Working in a shared space or office led to the participants being interrupted by people seeking an appointment with another person in the room. Both participants indicated that they could not imagine the artifact having a noticeable effect on such interruptions. P1 also mentioned that social distractions on some occasions may be desirable as he appreciated casually having a chat with students or colleagues. P1 and P2 (whose artifact states had been barely respected by others) assumed, that widespread use of the artifact or common knowledge of the signal could prevent more social interruption.

4.6 Workflow and Self Discipline

Table 4 shows participants' self-assessment of their capability to focus on work, acquired in the weekly questionnaires. For P4, a noticeable increase can be noticed between week one and week two. She also described week two as "more productive than the week before" and the artifact as "enforcing to work productively". P3 also experienced a noticeable increase regarding his capability to focus on work between weeks two and three, describing week three as "extraordinarily undisturbed and productive". He also mentions that "it may not have exclusively been an effect of the *knob*, but it surely has contributed to it". In the final interview, P1 stated that the *knob* could not support him in keeping focused at work.

In the weekly questionnaires, participants stated that the artifact helped them stay more disciplined at work by reminding to stay focused or actively deciding to stay productive. P2 mentioned "scolding" through the device has been an effective way of keeping her focused (week three). P4 gained awareness of the extent of her daily leisure browsing by noticing how often she would interact with the artifact just to unlock blocked pages (week two). She moved on to "allow [herself] distraction brakes more consciously" (week three). Also, P1 mentioned that the "awareness for it [distracting behavior] is raised" by being reminded to stay focused. The final interviews support this observation. P1, P3, and P4 described the blocking notice of the site blocker plugin to have prompted them to stay focused and resume working. P4 also mentioned the site blocker as the artifact's most effective functionality. P2 and P3 remembered the active decision to be focused as helpful. P4 reported that she gained awareness towards the extent of her leisure browsing, confirming her statements from the questionnaire. P3 indicated that the bare usage of the artifact had a positive, conditioning effect on her ("As soon as the artifact was connected, you should work").

5 DISCUSSION

Covering a small sample size and having more of an exploratory character, our field study could still show that a controller for multiple distraction blocking mechanisms was accepted by the participants and could reduce interruptions during work. Participants indicated they would like to continue using it. Also, three out of four participants confirmed that the artifact is intuitive, comprehensible, and does not distract from actual work. The most critical factor was the artifact's large form factor, as it made it hard to transport. This especially impacted the two students, as they had to change their workspace frequently. Similar to Hausen et al. [8], we noticed a decrease in interactions from week two to week three.

	Week 1		*Week 2*			*Week 3*		
	Unlisted	**Listed Opened**	**Unlisted**	**Listed Opened**	**Listed Blocked**	**Unlisted**	**Listed Opened**	**Listed Blocked**
P1	802	11	827	11	26	815	8	1
P2	280	74	460	47	18	174	11	2
P3	130	11	160	4	15	297	4	0
P4	597	103	759	207	24	1335	169	0

Table 6: Page requests for unlisted, listed and blocked pages.

The first week with the artifact has been considered more of a try-out phase (P3), while artifact usage in the second week was more aware and effective (P2). Also, the longer-term deployment could mitigate counter-productive effects on social interruptions for the two office workers. Over the course of the study, their colleagues became familiar with the artifact and stopped asking about it.

All participants indicated that the site blocker motivated them to resume work and prevented procrastination. P4 described, that it raised her awareness for procrastinative browsing by requiring to actively unlock blocked pages. P2 and P3 also described that the artifact has been a reminder of their active decision of staying focused. This indicates that manual regulation, in contrast to automatic regulation proposed by Züeger et al. [20], can increase awareness for procrastinative behavior as the decision to focus is actively made. Participants did not consider changing the phone's volume helpful and P1 even experienced a counter-productive effect. We conclude that this feature is not an effective way to reduce interruptions. As stated by the participants, blocking the phone or installed apps, as well as a phone-based site blocker, might more effectively reduce interruptions.

Participant established their own style of using the artifact. For instance, the two students, who were using their computer also in their leisure time, unplugged the device after finishing their work. The office workers mostly left the device plugged in since they barely used their work computer for private purposes. Also, the individual preference of artifact states strongly differed between the participants. P1, who intends to communicate openness to colleagues and students mostly left the device in green mode and switched to yellow when attempting to focus. P3, who described social distractions as a regular problem in his office, mostly kept the device in the red state. While he described the illumination as very effective, P2 and P4 described the site blocking feature as the most useful functionality. We conclude, that the artifact itself, as well as the combined blocking mechanisms, were able to adapt to multiple work and distraction scenarios.

Only P3 described the artifact as having a noticeable effect on social distractions. All participants mentioned that the artifact was deliberately or accidentally ignored. Also, we found a counter-productive effect for P1 and P3, as colleagues were curious and asked about the device. Since our concept lends design and functionality aspects from *FlowLight* [20], which could reduce social distractions, this difference is worth investigating. The nature and frequency of distractions may differ between university environments and the open office space chosen by Züger et al. [20]. Outside universities, the social environment might be more stable and the effect of the signal can be established through extended usage. In a university setting, the social environment frequently changes as there are students who are not present regularly and thus may not adapt to the system easily. Also, Züger et al. did not assess interruption statistics during the first week of deployment to mitigate Hawthorne and novelty effects. Thus, they may not have captured the rise in social distractions caused by the artifact itself [20]. Another reason for the limited effect on social distractions, which is supported by participants' statements, is that the *knob* might require *collective adoption* to be fully effective. This is supported by Hausen et al. who were also limited by a small sample size [8].

6 CONCLUSION AND FUTURE WORK

We presented the design and evaluation of the *knob*, a device that combines blocking mechanisms for social and digital distractions through a tangible controller. Through an in-situ deployment, we explored users' acceptance of the artifact and its effect on social and digital distractions. The *knob* was well received and participants successfully integrated it into their workflows and workspace. We found individual behavior which highlights the importance that distraction blocking solutions must be highly adaptable. The artifact was used for self-disciplining, by reminding of the decision to stay focused. It increased awareness for procrastination and helped to focus on tasks. Manual selection of the state enabled to actively deciding to stay focused. In contrast, muting the phone was not helpful or even had counter-productive effects. It would be more helpful to completely block the phone or individual applications as browsing causes more distractions than reacting on incoming push notifications or calls. In line with Hausen et al. [8] we also found that collective adaption of an interruption management solution might be necessary to reduce social distractions.

As the results showed that controlling the phone's volume was not sufficient, the *knob* could contribute to smart notification management [2, 16]. Notifications are a major source for distraction [12, 14, 14] and the *knob's* state could trigger delaying the delivery of notifications [17] or used to only deliver notifications that are urgent and important [18]. The sites blocked by the *knob* can be adapted to the user. Future work should explore further possibilities for personalization. Users could, for example, configure how notifications should be displayed [19], which colors are used, how bright the light shines, and which blocking mechanism are used in each state.

As the effectiveness and usage varied between participants, future work should investigate which context benefits most from which kind of distraction blocking mechanism. This is not necessarily limited to the workplace. Other contexts, for example when the user is at home, could also benefit from blocking distractions [15]. We are mainly interested in investigating self-disciplining caused by the combination of active decision towards concentration, detection of the intent of procrastination and reminder of the intent of staying focused. As we provide the *knob's* hardware design and the software to the community, we hope that our work enables larger-scale and long-term deployment of distraction blocking solutions.

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