

The Impact of Flexible Working on the Future of Time

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ABSTRACT

Our relationship with time has changed in the last few centuries. We identified some current trends that can have a significant impact on our relationship with time. These trends are the automation of production lines, the general trend of increased awareness and care of mental health, the rights of workers to ‘unplug’ from their work and the trend of flexible working. These trends may lead to a future where the exact form of time is not important anymore, meaning you do not have to know the exact time down to the minute. We performed multiple studies to explore this future: An autoethnographic study, a workshop and a diary study. This gave insights into what time is used for, what tools can be used for planning or keeping track of time and what the experience of daily life in this future could be like. This provides designers with a new scenario to design for and build on.

Author Keywords

Exact time; Future speculation; Flexible working; Futures wheel; Magic machine workshop

INTRODUCTION

Time is a constant in our world, when looking at it from the perspective of physics. However, we humans do not necessarily experience time as a constant. Our relationship with time has changed in the last few centuries, as we need to connect with people that are on the other side of the globe [25]. At the moment, we read the time in an exact form, where you can know the exact time down to the minute or even the second.

We identified some current trends that can have a significant impact on our relationship with time. These trends are the automation of production lines, the general trend of increased awareness and care of mental health, the rights of workers to ‘unplug’ from their work and the trend of virtual working. Using the future wheels method one can find possible futures and effects of these trends [27]. When looking at the trend of automation, some effects are that workers have to do less repetitive and or dangerous tasks. Which then could lead to a safer work environment and a switch to more technical tasks. This development could mean that unemployment levels would rise, but also the satisfaction and mental health of workers would increase. For the trend of increased awareness and care of mental health, the effect would be to have fewer

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work hours and more flexibility within those hours as well as more attention to meditation, mindfulness and nature and working environment of people. This development also leads to less focus on efficiency [21, 18, 31, 29, 26, 11]. Looking at the rights of workers to ‘unplug’ from their work and the trends in policies around it [12]. The effects could be more flexibility within working hours and less distractions when working. This development would lead to a difference in planning working hours. Lastly, for the trend of virtual working, the effects could be having more time for other activities such as family as one does not need to spend as much time travelling to work anymore when engaging with a virtual environment. This development would lead to better mental health as well as a different time perception [15, 13, 17, 9].

When combining these trends, it becomes clear the flexibility is very important, see figure 1. When looking at flexible working, it becomes clear that the exact working hours are not crucial anymore as people can decide themselves when they are going to work. Perhaps, this could be extended into a future where the exact form of time in general might not be important anymore. Instead of deciding at what time you start working and for how long exactly, you will decide to start working in the morning and keep going until the late afternoon, with a lunch break somewhere in between. Perhaps, people will not care about working eight hours in a day, but instead care about working enough.

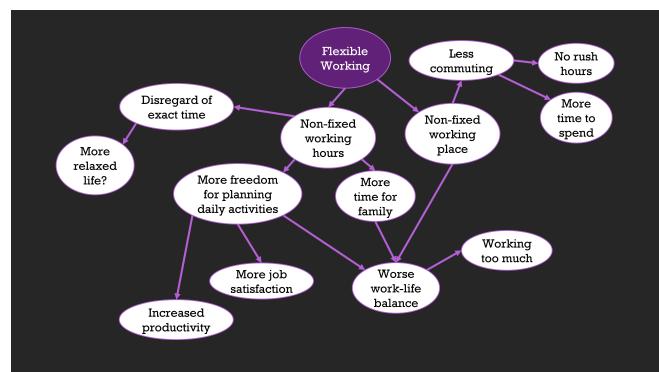


Figure 1: Futures Wheel: Trend of Flexible Working

Within this research paper, this future will be explored as well as how the disregarding of the exact time would impact people’s experience of their daily life. Setting the scene for future designers to design for. By looking at how people do experience an abstract visualization of time in their daily life and how does this change how people plan their daily life. As

well as the possible problems, benefits, frictions or flows that could appear in this future.

Related Literature

Experience and use of time

When it comes to living without the use of time on the clock, which we will refer to later as living without ‘exact time’, we first have to investigate how people experience and use exact time right now. Rapp et al. argue that the use of exact time is to socially synchronize your own life with that of other people, for example to know when to meet [25]. Hjorthol discusses the mobile phone as a tool used in families a lot for communication about short term planning [16]. Calendars, which can be either physical or digital, are also a tool used by people to plan their days using exact time [28, 6, 8, 23]. Innovative concepts in this field concern for example the smart wall calendar by Voit et al., which helps you to plan your day with local activities [32]. Another example is a calendar with speech input by Lyons et al. or an AI based calendar assistant by Gervasio et al. which learns about preferences in scheduling [20, 14]. Another approach concerns the application of group scheduling [22, 24]. An example is the family clock by Pschetz et al. where family members can ‘negotiate’ concerning the planning of the day by moving the hand of the clock [24]. Looking more towards the experience of time, Ban et al. present an interesting finding by letting people work while making a clock tick faster [5]. This led to a better work productivity because of a faster perceived time [5]. Claessens et al. discuss how perceived control of time is also influenced by planning [10]. An example of a recent design that is based on a shift in experience of time is Circa Solar by Hunt, that uses loose approximations of the regular smartphone clocks and calendars by showing natural rhythms of the sun and moon [30]. The design aims to reconnect the user with nature and in that way allow for better physical and mental health [30].

Mental wellbeing and planning

Furthermore, various papers discuss the relationships between the planning of everyday life and mental wellbeing. When it comes to working life, more control over scheduling working hours leads to better mental wellbeing [21, 18]. Job satisfaction as a whole corresponds with greater wellbeing [21]. Another current trend of importance concerns the increase of mental health issues, in particular among young people, which does not receive the holistic support it needs [31, 29, 26, 11]. The European Union is now considering a policy where workers get rights to not get disturbed with work related issues, like emails, outside working hours to limit burnouts as a response to this problem [12]. An emerging design trend in the field of mental wellbeing is Calm Technology, which is a method to create products that become part of the lives of people in an unobtrusive way [3].

Managing time efficiently

Besides, we see a trend where time is seen as a limited resource which argues we should live as efficiently as possible. An example is given by Koeleman et al, who discuss a way to optimise appointment scheduling [19]. Abramov et al. argue that making a planning as efficiently as possible is important in modern day society [1]. Wajcman also recognises this

trend and discusses how calendars are a tool focused on this purpose of spending time as efficiently as possible and how this can lead to feeling of failure and frustration because one can never live up to these types of specific plannings exactly [33]. Agre supports this by implying everyday life itself cannot be managed in an efficient way [2]. Combined with the need for better mental wellbeing support, we argue the planning of our lives needs a more ‘loose’ approach. We defined ‘loose time’ as a non-accurate approximation of about 20 minutes around the ‘exact time’.

Flexible working

Flexible working, where people work both at the office and at home, has been an increasing trend due to the Covid-19 pandemic [15, 13, 17, 9]. The findings of studies researching people working in these conditions are relevant for investigating what effects working without ‘exact time’ have on people’s lives. An important finding is that working from home can result in better motivation and productivity [15, 13, 17]. It could also have a good influence on work-life balance where people spend more time with for example family [13, 17]. Cho et al. discuss how people create their own boundaries for their work and personal life, for example by working on a different spot in the home or with a different device [9]. They also find that people working from home give mental health priority to work that has to be done [9]. However, there are also drawbacks when it comes to flexible working, like more stressful and longer working hours and work uncertainties [17, 7].

METHODS

Autoethnographic observation / experiment

We started with an autoethnographic study, where we tried to minimize the amount of times we looked at the clock and write down why and when we do look at it. Each of us performed this a bit differently and over differing periods of time ranging from 2 separate days to 6 consecutive days. During and after the experiment, we shared our findings with each other, using the information to determine the next steps of our research.

One of the researchers got rid of as many clocks as possible by covering or hiding them from their electronic devices and stopping or avoiding clocks in their house and environment. They still had the possibility to look at the time when they did need it, writing down when and why this was the case. This experiment went a bit further, as it resulted in moments where they had no idea what time it was, leading to different experiences and thoughts, which were documented.

Workshop

Based on a paper by Andersen and Wakkary about Magic Machine Workshops [4], we decided to organize one for our research. In this workshop, participants were given a future scenario, in our case life with a loose experience of time. First, we asked some questions in order to start a small discussion about this topic, mainly to get the participants into a certain mindset to make it easier to imagine this future. After this, they were asked to make a ‘magic machine’ using quirky materials like paper cups, wooden cutlery, straws or egg cartons.

This magic machine should be a tool that will help them synchronize with other people in their lives if this future would become reality. We selected the materials so they will lead to more creative concepts, instead of regular circles which could resemble clocks and standard boxes. The full list of materials and tools used can be seen in Appendix A.



Figure 2: Layout of room during workshop

After creating their magic machines, we asked the participants to present their machine to the rest of the group and tried to spark a short conversation about it by making some comments. After all the presentations, we took pictures of the machines produced by the participants while giving them the ability to "direct" the pictures we take. During the whole session, we wrote down our observations and took pictures. The findings along with the produced magic machines were used to inspire our design used as a research artifact in the following study. The detailed workshop set-up can be found in Appendix B.

Diary study

During the diary study one research artifact was given to a family of three to actively use during their daily lives for a period of three days. The research artifact used is the Planner, as described in the following section. One of the participants was asked to document the planning at the start and the end of the day by taking a picture of it. Furthermore, they were given a booklet with instructions and an assignment for every day. The main participant was asked to write any of their thoughts and feelings down during the day. In the evening, they reflected on the usage of the device that day and log what they used the artifact for, their feelings regarding the experience they had with the artifact and, finally, what successes and what failures they encountered while using the artifact. The full booklet created for the diary study can be seen in Appendix C.

DESIGN

Using the insights from the autoethnographic study and magic machine workshop, along with the knowledge gained from the related works, we created two designs which both show the time in an abstract way. Both would be used in a different context.

The designs were first explored using an exploratory sketching technique, sketching and adapting the ideas as they came up. These sketches, visible in Figure 3 were later discussed among the researchers, to determine which designs to create and to further adapt them to fit the research. Principles of unobtrusiveness based on the Calm Technology methodology were integrated in both designs to build on the need for more attention for mental wellbeing in the envisioned future [3].

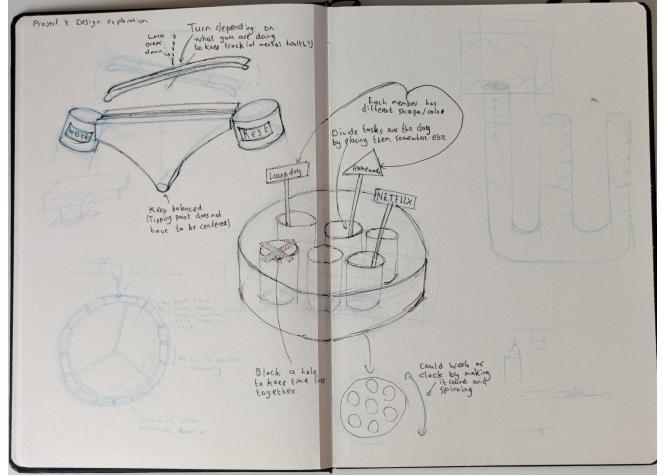


Figure 3: Exploratory sketch of the designs

Planner

Three out of five workshop participants created a device that could be used to plan their day ahead (see Figure 4). Two of these devices can be used by multiple people to also keep track of what the other household members are doing (see Figure 4a) or plan something together (see Figure 4b). The functions of these magic machines are further discussed in the Results section.

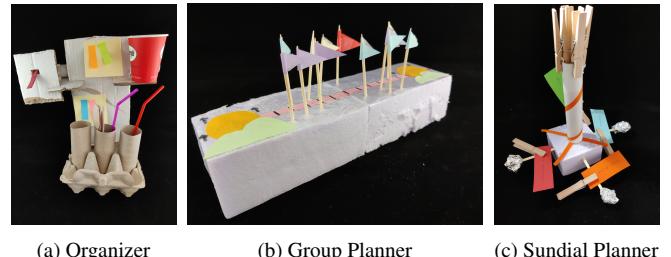


Figure 4: Planning Machines

These aspects were combined into one design concept, which can be used to determine the approximate time of day and to allow multiple users to plan their day. Because all users are using the same device, they can see and adapt to the planning of other users, thus making it possible to plan something together.

The device, which can be seen in Figure 5, consists of a round disk with 6 holes which does one rotation every 24 hours, like earth. This way, the colors correspond to a certain time of day, where the dark purple represents night and the bright



Figure 5: Planner Design

yellow represents the middle of the day, similar to the amount of sunlight during day and night.

Users can write something they want to do that day on a 'flag', which is then placed in one of the holes. This way, the user can approximately plan their day and because of the rotation they can see when a planned event is approaching. Every user has a different colour, making it possible to see someone else's planning and keeping time free to do something together. The four different shapes of the flags, namely circles, triangles, squares and pentagons, can be used to indicate categories of events, like appointments or events during spare time, and are open to personal application by the user.

Balancer

During the workshop, two participants used physics in their machine, both at first starting with balancing weight. Even though one of them did not continue with the balance and decided to make a sort of pendulum (see Figure 6a), we were still intrigued by the idea of using balance. The other participant did continue with the balancing idea, specifically using water as a weight on one side (see Figure 6b). Again, these machines are discussed in more detail in the Results section of this paper.



(a) Pendulum

(b) Water Timer

Figure 6: Balance Machines

The second design concept is a device, which balances two activities. It can be seen in Figure 7. It is a beam with two containers on either side, representing the two activities. Balancing the activities is done by letting water, from the reservoir, drip into one of the containers when doing that activity. An

example could be to balance rest and work. However, these two activities might not require the same amount of time. For this, the base of the balancer can be moved to a second position, which changes the ratio between the activities. The user would use this device during the day to visualize how much time they spent doing an activity and give them the ability to balance their day and reflect on how balanced it was.

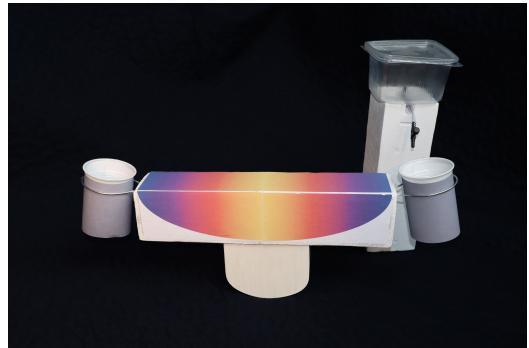


Figure 7: Balancer With Equal Ratio

RESULTS

Autoethnographic observation/ experiment

For the study, we wrote down the time at which we looked at the clock and for which reason. These different reasons were categorized. When looking at the categories as can be seen in Table 1, there are three themes within them: Accidental, travel and purposeful. Within the purposeful category, sub-categories formed for each of us. This category is mostly used to purposely look at the time to see how much time is left until a certain event. Interestingly these general categories have different distributions across us, as the highest used category for two of us was *purposeful* (with 62 percent and 42 percent, see Table 1) the other's highest category was *accidental* (with 56 percent, see Table 1). What is however unilateral is the fact that during the experiment the number of times we looked at the clock went down. Also, we looked at the clock less frequently during the weekend, where the average went from 7 to 9 times during a workday to 2 to 4 times per day in the weekend.

Category	Researcher 1	Researcher 2	Researcher 3
Accidental	56%	35%	10%
Purposeful	36%	42%	62%
<i>Sub-categories</i>	<i>Purpose</i> <i>Until when</i> <i>Planning</i>	<i>Sleep</i> <i>Personal</i> <i>Check</i> <i>Meeting</i>	<i>Purpose</i> <i>Until when</i> <i>Planning</i>
Travel	8%	23%	28%

Table 1: Developed Categories and Their Percentage

During this experiment, we noticed that the starting time of an event was more important to them than the ending time, as we often determined how much time was left until the next event starts. We did not look at the clock to see when it would end. One of us, who avoided the clock as much as possible, found

new ways of determining the time, as they for example used the line in their digital agenda to see how much time was left until their meetings.

Workshop

A total of five machines were made during the workshop: A group planner, a sundial planner, an organizer, a pendulum timer and a water timer. They can all be seen in Figure 8. In this section, we will go over each of them.

Group Planner (Figure 8a)

The group planner is a planner goes from sunrise to sunset. The planner is to be used by a group of people, for example a household. Everyone has a couple of flags in their own color. With these flags they can plan individual events. These placed flags can then be used to find a spot in the day where everyone is available, in order to plan something together.

Sundial Planner (Figure 8b)

The sundial planner is a sundial where the shadow of the pillar shows the user the time of day. In the different sections of the day the user can plan event and tasks using cards. When the shadow approaches the card, the user can see it is almost time to start on this event or task.

Organizer (Figure 8c)

The organizer is a station which contains multiple tools. There is a rope which the user can pull to keep track of how long they have worked on a task or activity. There is also a mini planner in which items can be put to see if for example a person has already had lunch or not, meaning the station can be used by multiple people. Lastly, there is a space the write to-do-lists.

Pendulum Timer (Figure 8d)

The pendulum timer makes use of a pendulum to represent the duration of time. By swinging the pendulum differently, so with less force or in a different pattern, different durations of time can be achieved. When the pendulum stops swinging, the timer has elapsed.

Water Timer (Figure 8e)

The water timer makes use of weights in the form of balls. These can be added in the quiver to set an approximate time. Water slowly drips in the cup on the other side, until it eventually counters the weights. At that point, it will tip over to indicate that the timer has elapsed.

Three trends can be identified: Group use, planners and timers. There are two machines, the group planner and organizer, which can be used by a group to plan and synchronize with each other. Both of the group machines are also planners, however the sundial planner which is used individually is also a planner. Lastly two machines, the pendulum and water timer, are timers. Interestingly participants did not make use of digital technology and instead made tangible devices.

Diary study

During the diary study the participant made use of a booklet to note down their experience, the full version of this can be found in Appendix C.

The participant was quite frustrated and doubtful at the start of the study, as they were confronted with the fact that they are quite depended on the exact time. Some frustration also came from the fact that they felt that they were not doing things at 'the right time' like they had planned. They were also unsure about which activities to plan with the device and which ones not to. Did they need to plan smaller activities such as cleaning and preparing food? However, on the third and final day of the study, they figured out a system that works better for them. As one problem they were having was how to deal with spontaneous ideas, for which they use their system to fix the problem. They did this by only planning the spontaneous activities if they were to happen later on in the day. Otherwise the activities would just happen naturally.

During the study it became clear that there are spontaneous activities and activities you do without thinking, that are difficult to plan. Furthermore, there are activities that need to be done at an exact time, at least for the participant. This means that planning in a loose way, like is the case with our design, does not work very well to them. An activity is either planned exactly or not planned at all. An interesting comment that the participant made was that they expect the planner works better and more effectively for people who work flexible or independently and thus do not have any work-related exact planning.

DISCUSSION

Interpretation Results

The main findings of this research are about the impact of the disregarding of the exact time. People generally think this would be an improvement as it would mainly lead to a decrease in stress due to time pressure. However, it is also clear that a drastic change in society would be needed to make the disregarding of the exact time even possible. Because of how the current society is build up and because of the way we live, most people believe this will not become reality. If the exact time would be disregarded however, there would be a lot of problems to overcome. Some straightforward time-related things in life we currently do not think about anymore, would become a problem. Some examples are working in shifts, determining when to go to bed, going to a large event with a lot of people, knowing the opening times of stores and many more things. All of these simple things would become a problem or a friction that need a solution, allowing for a lot of opportunities for industrial design.

When those problems and frictions would be solved, this would likely be a pleasant future to live in. Less stress and pressure, more freedom. People could feel more relaxed and their mental health would improve, which could have a positive impact on their productivity at work. However, we do not expect that the exact time will ever be fully disregarded, it will most likely still be used for short and long term planning, mostly to make sure people can still synchronize with each other. However, in most cases those exactly planned events will still be seen in an abstract visualization.

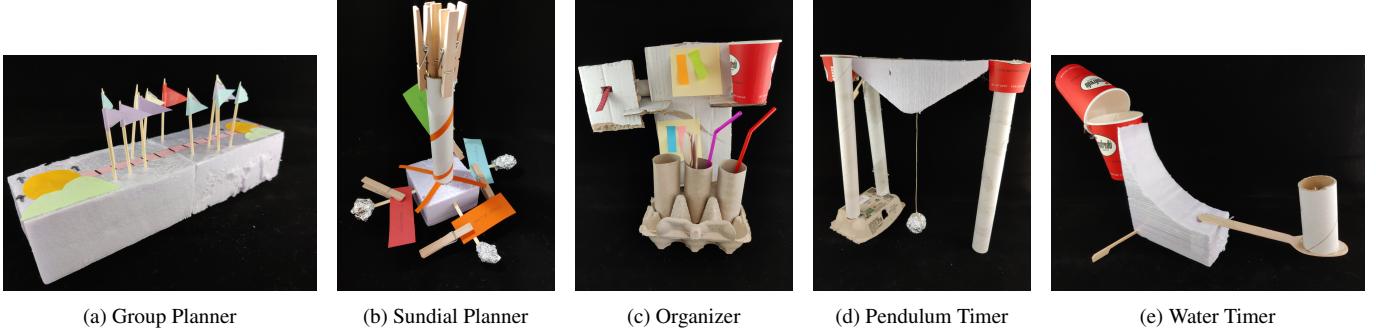


Figure 8: Magic Machines

Possible Limitations

Let us start with the elephant in the room. We are researching something that *could be* reality in the future (the year 2035). It is about an entire different way of living with time, which is near impossible in the current society. One could ask if it is even possible to research a way of living while the vast majority of the current (western) population does not and cannot live this way. And if so, it is unclear if the results would even be accurate. However, the goal of this research was not to predict the future. It is merely meant to introduce this possible future, which can be used by designers to create an innovative design for. Barely scratching the surface of what could be explored, we do believe the goal of this research was achieved, just like our goal to learn from it.

An autoethnographic study can be a very powerful and useful method for designers to use, not just when researching but also when designing. It helped us get into a certain mindset which made it easier to grasp and communicate about this future with each other, while at the same time providing us with a backbone to further define the direction of our research. However, all three participants performed this study in a different way and for a different duration, ranging from just writing down when looking at the clock for just one day, to attempting to avoid looking at clocks all together during six consecutive days. It did lead us to some useful insights, but it might have been better if all three of us performed the study in the same way. Even more so, we should have explored whether there are certain frameworks for performing these type of studies to make them more robust.

During the workshop, none of the participants made anything digital or technological at all. All magic machines were very tangible and hands-on, which could be simply because of the improved experience provided by tangibility. However, it is also very much possible that this is the case because none of the materials provided allowed for any digital interaction. We do not think this is a big limitation of the research, however we do believe that the digital environment could be explored a lot more. We are talking about life in 2035 after all, as much as we are hoping for tangible devices to remain among us, it is a realistic scenario that devices in the future will become increasingly digital.

For the diary study, we gave the prototype to one household of three people to use, but asked for only one of them to fill in

the booklet. This means we have no way of knowing whether the thoughts of the other members of the household made it back to us or not. They might have discussed it while filling in the booklet together, or one person just filled it in based on their own insights. It would probably be better to give all members a booklet to fill in, which could lead to more insights but would certainly lead to better knowledge about its source.

Future Work

A main direction for future design and research would be exploring loose time in the digital domain. Digital products are becoming more and more common, with digital versions being produced of pretty much everything. It would only make sense if people would interact even more or almost exclusively with digital systems in the future. Some questions that would arise are: How would a digital approximation of time look and work? How would people interact with it? How can it be connected to other (digital or tangible) systems? Would a combination between digital and tangible result in a better experience for the user in this context? What would be the most likely in a future like this?

As already mentioned, if this future would become reality, a lot of straightforward time-related things would become a problem. These would require solutions before society were to disregard the exact time. What would be a solution for one or more of these problems? This could be an interesting opportunity for the field of industrial design and future design research.

Another relevant research direction would be whether some cultures already exist where the exact time has been disregarded, either fully or partially. How do they deal with problems that we would face in this possible future? Did they disregard the exact time on purpose or did they never even start using exact time?

CONCLUSION

Our research, consisting of three separate studies, allowed us to explore and speculate about a future where exact time on the clock is disregarded. We investigated various trends that lead to flexible working, which show how exact time could become less important. Furthermore, we found in the autoethnographic study that time could be used to plan the day and see how much time is left before an event starts. Our magic machine workshop showed examples of devices which

could be used to navigate the day with the absence of exact time and inspired us to create designs for this future. Our diary study, for which we designed the planner as research object, implies that spontaneous activities are hard to plan and it becomes easier over time to use this device. The results also build on the previous trend analysis, by indicating an opportunity for people with flexible jobs as a possible target group for the device. The future we explored in this paper can be used as a basis for other designers to explore.

REFERENCES

- [1] Abramov, Ivan, Poznakhirko, Tatiana, and Sergeev, Alexandr. 2016. The analysis of the functionality of modern systems, methods and scheduling tools. *MATEC Web Conf.* 86 (2016), 04063. DOI: <http://dx.doi.org/10.1051/matecconf/20168604063>
- [2] Philip E. Agre. 1988. *The Dynamic Structure of Everyday Life*. Technical Report. MASSACHUSETTS INST OF TECH CAMBRIDGE ARTIFICIAL INTELLIGENCE LAB. <https://apps.dtic.mil/sti/citations/ADA205677> Section: Technical Reports.
- [3] Amber Case. 2015. *Calm Technology: Principles and Patterns for Non-Intrusive Design*. O'Reilly Media, Inc. <https://www.oreilly.com/library/view/calm-technology/9781491925874> ISBN: 9781491925881.
- [4] Kristina Andersen and Ron Wakkary. 2019. The Magic Machine Workshops: Making Personal Design Knowledge. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19)*. Association for Computing Machinery, New York, NY, USA, 1–13. DOI: <http://dx.doi.org/10.1145/3290605.3300342>
- [5] Yuki Ban, Sho Sakurai, Takuji Narumi, Tomohiro Tanikawa, and Michitaka Hirose. 2015. Improving Work Productivity by Controlling the Time Rate Displayed by the Virtual Clock. In *Proceedings of the 6th Augmented Human International Conference (AH '15)*. Association for Computing Machinery, New York, NY, USA, 25–32. DOI: <http://dx.doi.org/10.1145/2735711.2735791>
- [6] David Beard, Murugappan Palaniappan, Alan Humm, David Banks, Anil Nair, and Yen-Ping Shan. 1990. A Visual Calendar for Scheduling Group Meetings. In *Proceedings of the 1990 ACM Conference on Computer-Supported Cooperative Work (CSCW '90)*. Association for Computing Machinery, New York, NY, USA, 279–290. DOI: <http://dx.doi.org/10.1145/99332.99361>
- [7] Ettore Bolisani, Enrico Scarso, Christine Ipsen, Kathrin Kirchner, and John Paulin Hansen. 2020. Working from home during COVID-19 pandemic: lessons learned and issues. *Management & Marketing. Challenges for the Knowledge Society* 15, s1 (Oct. 2020), 458–476. DOI: <http://dx.doi.org/10.2478/mmcks-2020-0027>
- [8] A.J. Bernheim Brush and Tammara Combs Turner. 2005. A Survey of Personal and Household Scheduling. In *Proceedings of the 2005 International ACM SIGGROUP Conference on Supporting Group Work (GROUP '05)*. Association for Computing Machinery, New York, NY, USA, 330–331. DOI: <http://dx.doi.org/10.1145/1099203.1099263>
- [9] Janghee Cho, Samuel Beck, and Stephen Voda. 2022. Topophilia, Placemaking, and Boundary Work: Exploring the Psycho-Social Impact of the COVID-19 Work-From-Home Experience. *Proc. ACM Hum.-Comput. Interact.* 6, GROUP, Article 24 (jan 2022), 33 pages. DOI: <http://dx.doi.org/10.1145/3492843>
- [10] Brigitte J. C. Claessens, Wendelien Van Eerde, Christel G. Rutte, and Robert A. Roe. 2004. Planning behavior and perceived control of time at work. *Journal of Organizational Behavior* 25, 8 (2004), 937–950. DOI: <http://dx.doi.org/https://doi.org/10.1002/job.292>
- [11] Helen Coughlan, Mary Cannon, David Shiers, Paddy Power, Claire Barry, Tony Bates, Max Birchwood, Sarah Buckley, Derek Chambers, Simon Davidson, Marie Duffy, Blánaid Gavin, Ciaran Healy, Colm Healy, Helen Keeley, Michael Maher, Chris Tanti, and Patrick McGorry. 2022. Towards a new paradigm of care: the International Declaration on Youth Mental Health. (1 2022). https://repository.rcsi.com/articles/journal_contribution/Towards_a_new_paradigm_of_care_the_International_Declaration_on_Youth_Mental_Health_/10795709
- [12] EurWORK. 2021. Right to disconnect. (Dec. 2021). <https://www.eurofound.europa.eu/observatories/eurwork/industrial-relations-dictionary/right-to-disconnect>
- [13] Denae Ford, Margaret-Anne Storey, Thomas Zimmermann, Christian Bird, Sonia Jaffe, Chandra Maddila, Jenna L. Butler, Brian Houck, and Nachiappan Nagappan. 2021. A Tale of Two Cities: Software Developers Working from Home during the COVID-19 Pandemic. *ACM Trans. Softw. Eng. Methodol.* 31, 2, Article 27 (dec 2021), 37 pages. DOI: <http://dx.doi.org/10.1145/3487567>
- [14] Melinda T. Gervasio, Michael D. Moffitt, Martha E. Pollack, Joseph M. Taylor, and Tomas E. Uribe. 2005. Active Preference Learning for Personalized Calendar Scheduling Assistance. In *Proceedings of the 10th International Conference on Intelligent User Interfaces (IUI '05)*. Association for Computing Machinery, New York, NY, USA, 90–97. DOI: <http://dx.doi.org/10.1145/1040830.1040857>
- [15] E. JEFFREY HILL, BRENT C. MILLER, SARA P. WEINER, and JOE COLIHAN. 1998. INFLUENCES OF THE VIRTUAL OFFICE ON ASPECTS OF WORK AND WORK/LIFE BALANCE. *Personnel Psychology* 51, 3 (1998), 667–683. DOI: <http://dx.doi.org/https://doi.org/10.1111/j.1744-6570.1998.tb00256.x>
- [16] Randi J. Hjorthol. 2008. The Mobile Phone as a Tool in Family Life: Impact on Planning of Everyday Activities

- and Car Use. *Transport Reviews* 28, 3 (2008), 303–320. DOI: <http://dx.doi.org/10.1080/01441640701630905>
- [17] Christine Ipsen, Marc van Veldhoven, Kathrin Kirchner, and John Paulin Hansen. 2021. Six Key Advantages and Disadvantages of Working from Home in Europe during COVID-19. *International Journal of Environmental Research and Public Health* 18, 4 (2021). DOI: <http://dx.doi.org/10.3390/ijerph18041826>
- [18] Soo Jung Jang, Rhokeun Park, and Allison Zippay. 2011. The interaction effects of scheduling control and work–life balance programs on job satisfaction and mental health. *International Journal of Social Welfare* 20, 2 (2011), 135–143. DOI: [http://dx.doi.org/10.1111/j.1468-2397.2010.00739.x](http://dx.doi.org/https://doi.org/10.1111/j.1468-2397.2010.00739.x)
- [19] Paulien Koeleman and Ger Koole. 2012. Appointment scheduling using optimisation via simulation. In *Proceedings of the 2012 Winter Simulation Conference (WSC)*. 1–5. DOI: <http://dx.doi.org/10.1109/WSC.2012.6465186>
- [20] Kent Lyons, Christopher Skeels, and Thad Starner. 2005. Providing Support for Mobile Calendaring Conversations: A Wizard of Oz Evaluation of Dual-Purpose Speech. In *Proceedings of the 7th International Conference on Human Computer Interaction with Mobile Devices and Services (MobileHCI '05)*. Association for Computing Machinery, New York, NY, USA, 243–246. DOI: <http://dx.doi.org/10.1145/1085777.1085821>
- [21] Laurenz L. Meier and Paul E. Spector. 2015. *Job Satisfaction*. John Wiley Sons, Ltd, 1–3. DOI: <http://dx.doi.org/https://doi.org/10.1002/9781118785317.weom050093>
- [22] Jane N. Mosier and Susan G. Tammaro. 1997. When Are Group Scheduling Tools Useful? *Computer Supported Cooperative Work (CSCW)* 6, 1 (March 1997), 53–70. DOI: <http://dx.doi.org/10.1023/A:1008684204655>
- [23] Stephen J. Payne. 1993. Understanding Calendar Use. *Human–Computer Interaction* 8, 2 (1993), 83–100. DOI: http://dx.doi.org/10.1207/s15327051hci0802_1
- [24] Larissa Pschetz and Michelle Bastian. 2018. Temporal Design: Rethinking time in design. *Design Studies* 56 (2018), 169–184. DOI: <http://dx.doi.org/https://doi.org/10.1016/j.destud.2017.10.007>
- [25] Amon Rapp, William Odom, Larissa Pschetz, and Daniela Petrelli. 2021. Introduction to the special issue on time and HCI. *Human–Computer Interaction* 37, 1 (2021), 1–14. DOI: <http://dx.doi.org/10.1080/07370024.2021.1955681>
- [26] Kathryn E. Ringland, Jennifer Nicholas, Rachel Kornfield, Emily G. Lattie, David C. Mohr, and Madhu Reddy. 2019. Understanding Mental Ill-Health as Psychosocial Disability: Implications for Assistive Technology. In *The 21st International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS '19)*. Association for Computing Machinery, New York, NY, USA, 156–170. DOI: <http://dx.doi.org/10.1145/3308561.3353785>
- [27] Scott Smith. 2020. Scenario development: combining patterns and themes to tell strategic stories. In *How to Future: Leading and Sense-Making in an Age of Hyperchange*. Kogan Page, Limited, 119–141. <https://b-ok.cc/book/6068610/1227df>
- [28] Thad E. Starner, Cornelis M. Snoeck, Benjamin A. Wong, and R. Martin McGuire. 2004. Use of Mobile Appointment Scheduling Devices. In *CHI '04 Extended Abstracts on Human Factors in Computing Systems (CHI EA '04)*. Association for Computing Machinery, New York, NY, USA, 1501–1504. DOI: <http://dx.doi.org/10.1145/985921.986100>
- [29] Shona Sturgeon. 2006. Promoting mental health as an essential aspect of health promotion. *Health Promotion International* 21, suppl_1 (12 2006), 36–41. DOI: <http://dx.doi.org/10.1093/heapro/dal049>
- [30] Ted Hunt. 2019. circa. (July 2019). <http://www.circa.bio/>
- [31] Mark Tomlinson and Crick Lund. 2012. Why Does Mental Health Not Get the Attention It Deserves? An Application of the Shiffman and Smith Framework. *PLOS Medicine* 9, 2 (02 2012), 1–4. DOI: <http://dx.doi.org/10.1371/journal.pmed.1001178>
- [32] Alexandra Voit, Rufat Rzayev, Dominik Weber, Manuel Müller, and Niels Henze. 2018. Investigation of an Ambient and Pervasive Smart Wall Calendar with Event Suggestions. In *Proceedings of the 7th ACM International Symposium on Pervasive Displays (PerDis '18)*. Association for Computing Machinery, New York, NY, USA, Article 10, 5 pages. DOI: <http://dx.doi.org/10.1145/3205873.3205892>
- [33] Judy Wajcman. 2019. How Silicon Valley sets time. *New Media & Society* 21, 6 (2019), 1272–1289. DOI: <http://dx.doi.org/10.1177/1461444818820073>

APPENDIX

A. WORKSHOP MATERIALS



Figure 9: Materials

Materials

- Paper cups
- Carton in odd shapes
- Colored paper strips
- Wooden cutlery
- Rope
- Plastic straws
- Wooden (ice cream) sticks
- Cocktail sticks
- Wooden clothespins
- Post-its
- Aluminum foil
- Toilet rolls
- Foam in odd shapes
- Hard carton rolls
- Egg cartons

Tools

- Scissors
- Stanley knives
- Adhesive tape
- Painter's tape
- Bottle of glue
- Glue gun
- Pens

B. WORKSHOP SETUP

5-8 participants

Duration: 2 to 2.5 hours

1. Introduction (10 min)

- Planning of day
- Presentation to explain background information (which trends we see, what exactly is our defined scenario of future without time.)

2. Scenario discussion (10-20 min)

- Short explanation of planning scenario workshop. (5 min)
- Discuss with each other (5-15 min):
 - If you would envision yourself in this scenario, how would your life change or stay the same?
 - What problems could be solved and what new problems arise?
 - Have you seen any hidden cues in current society that point to this scenario?

3. Break (if needed) (20 min)

4. Magic machine workshop (1 h and 10 min)

- Short explanation of planning magic machine workshop. (5 min)
- Use available material to (individually) make a 'machine' that addresses prompt. Provide participants with 'quirky' materials that do not lead to them making for example boxes (cardboard boxes) or buttons (bottle-cap) or regular time-displaying devices. (35 min)
- Participants are then asked to present their 'machine' to the rest of the group as a performance or demonstration and the machine is discussed in the group. (30 min)

5. Conclusion (5 min)

- Thank participants for participation and ask for any final comments.

6. Each machine is photographed, participants can direct the pictures that are taken.

C. DIARY STUDY BOOKLET (FILLED IN)

The original booklet and the answers in it are in Dutch. For this report, the assignment and questions were translated to English. The answers are translated too, but they were also anonymised. The tables show the planning created by the participants and whether they were changed during the day.

Day 1

Plan an activity with the other residents.

Time	Flag	Event
Blue (early morning)	Empty	
Red (morning)	Pink	Cycling
Yellow (early afternoon)	Blue	Cycling
Yellow (late afternoon)	Empty	
Red (evening)	Pink	Visit
Blue (night)	Empty	

Changes: No changes

Table 2: Planning day 1

Notes

- I plan very little on my free days as I need to get more rest on these days.
- Activity one (cycling) was done later because of the rain. This is frustrating, because we are used to leaving around 10 - 11 o'clock.
- I immediately realized I am dependent on the exact time, because I need to take my medication on time. Also, I can do certain activities depending on the time I eat. So I would not be able to live without the clock.

How did you approach the exercises?

- The flags have been made in the evening before. I feel like I must stick to this planning for the study.
- Time-wise, activities have not been done at the "right" time, as the visit did not take place and we spontaneously made a walk in the evening.

How did the planning of the activity go? What went well and what did not?

- It is hard to plan activities precisely, as it depends on the weather and how I generally feel at that moment.
- Spontaneous activities, such as walking, are not written on a flag.

Do you think you would approach it differently next time? How would someone else approach it?

- Because I have no work on this day, I do not want to plan ahead. I prefer to see what we feel like doing in the moment.

Day 2

Make a planning in the morning and ask the other residents to do the same.

Time	Flag	Event
Blue (early morning)	Empty	
Yellow	Work	
Red (morning)	Pink	Visit
Blue	Cycling	
Yellow (early afternoon)	Pink	Cycling
Blue	Cycling	
Yellow (late afternoon)	Pink	Visit
Blue	Walk	
Red (evening)	Empty	
Blue (night)	Empty	

Changes: Addition of second yellow section

Table 3: Planning day 2

Notes

- Doubt
- The planning feels very empty, am I forgetting things?
- Do I also have to plan other daily tasks, like preparing dinner, walking the dog, spontaneous activities or cleaning?

How did you approach the exercises?

- In the morning, I put the flags in the planner.
- During the day, I added two more events we were going to do today.

Did the planning change over the course of today?

- Yes, the visit and the walk were added in to the second yellow section (late afternoon).

Did you plan one or more activities together?

- Yes, cycling together. Other activities were with non-residents.

Did you have a clear image of what the other residents were doing during the day?

- Yes, but that was more because it was a free day.
- Also without the planner we would know what our daughter was going to do.

Day 3

Use the planner with the other residents.

Time	Flag	Event
Blue (early morning)	Empty	
	Yellow	Work
Red (morning)	Pink	Shopping
	Pink	Walk the dog
Yellow (early afternoon)	Blue	Work
	Pink	Work
Yellow (late afternoon)	Pink	Walk the dog
	Yellow	Training
Red (evening)	Pink	Cooking
	Blue	Walk the dog
Blue (night)	Empty	Empty

Changes: No changes

Table 4: Planning day 3

Notes

- It is a bit difficult to make a flag for every activity, as many of those activities are just happening "automatically".

How did you approach the exercises?

- In the morning, I checked the flags.
- Every now and then, I checked if they were still in the right section.
- If a new activity was planned, I only added it if it was at least one hour later.

Looking back at the other days, what did you do differently and what not?

- I put more "smaller" activities on the planner, because most activities just do not need to be planned as they are already in our system, without clock or planner.

Do you think you would use this in the future?

- For us, it does not work.
- We are bond to the exact time for different reasons like working hours or meetings.

Do you know other people who would benefit from the planner?

- I think this planner works better and more efficiently for people who work flexible or independently.
- As soon as you work with multiple people, I think you will be dependent on the clock.

Were there different strategies used by the residents to plan with the planner?

- No, I made the planning based on what the other residents told me what they were planning to do on that day.

D: WORK DIVISION

Section	Main Author	Second Author
Abstract	Leonie	
Introduction	Leonie	
Related Works	Yanna	
Methods:		
Autoethnographic Study	Jochem	
Magic Machine Workshop	Jochem	
Diary Study	Leonie	
Design	Jochem	Leonie
Results:		
Autoethnographic Study	Leonie	
Magic Machine Workshop	Leonie	Jochem
Diary Study	Leonie	
Discussion	Jochem	
Conclusion	Yanna	

Table 5: Work Division

Please note that we all worked together on the research, and divided the text to write. Also, in every section we all read each other's text multiple times, constantly making minor changes or additions and giving feedback. This cannot be communicated in this table. We all contributed equally to this research project.